

SONY®

HD DIGITAL VIDEORECORDER

HDD-1000



Digital *HDVS*

MAINTENANCE MANUAL

Volume 1 1st Edition (Revised 5)

Serial No. 10001 and Higher

SAFETY CHECK-OUT

(Only for USA)

After correcting the original service problem, perform the following safety checks before releasing the set to the customer:

Check the metal trim, "metallized" knobs, screws, and all other exposed metal parts for AC leakage. Check leakage as described below.

LEAKAGE TEST

The AC leakage from any exposed metal part to earth ground and from all exposed metal parts to any exposed metal part having a return to chassis, must not exceed 3.5 mA. Leakage current can be measured by any one of three methods.

1. A commercial leakage tester, such as the Simpson 229 or RCA WT-540A. Follow the manufacturers' instructions to use these instruments.
2. A battery-operated AC milliammeter. The Data Precision 245 digital multimeter is suitable for this job.
3. Measuring the voltage drop across a resistor by means of a VOM or battery-operated AC voltmeter. The "limit" indication is 5.25V, so analog meters must have an accurate low-voltage scale. The Simpson 250 and Sanwa SH-63Trd are examples of a passive VOM that is suitable. Nearly all battery operated digital multimeters that have a 20V AC range are suitable. (See Fig. A)

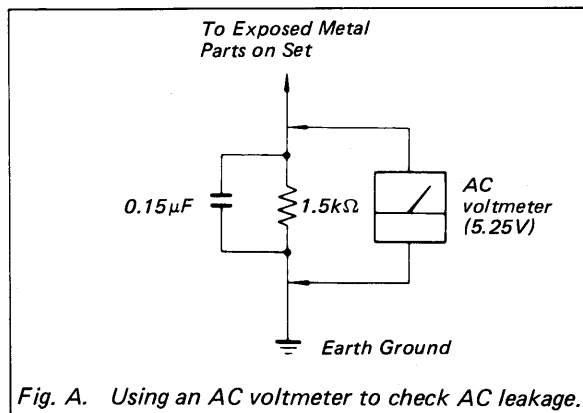


Fig. A. Using an AC voltmeter to check AC leakage.

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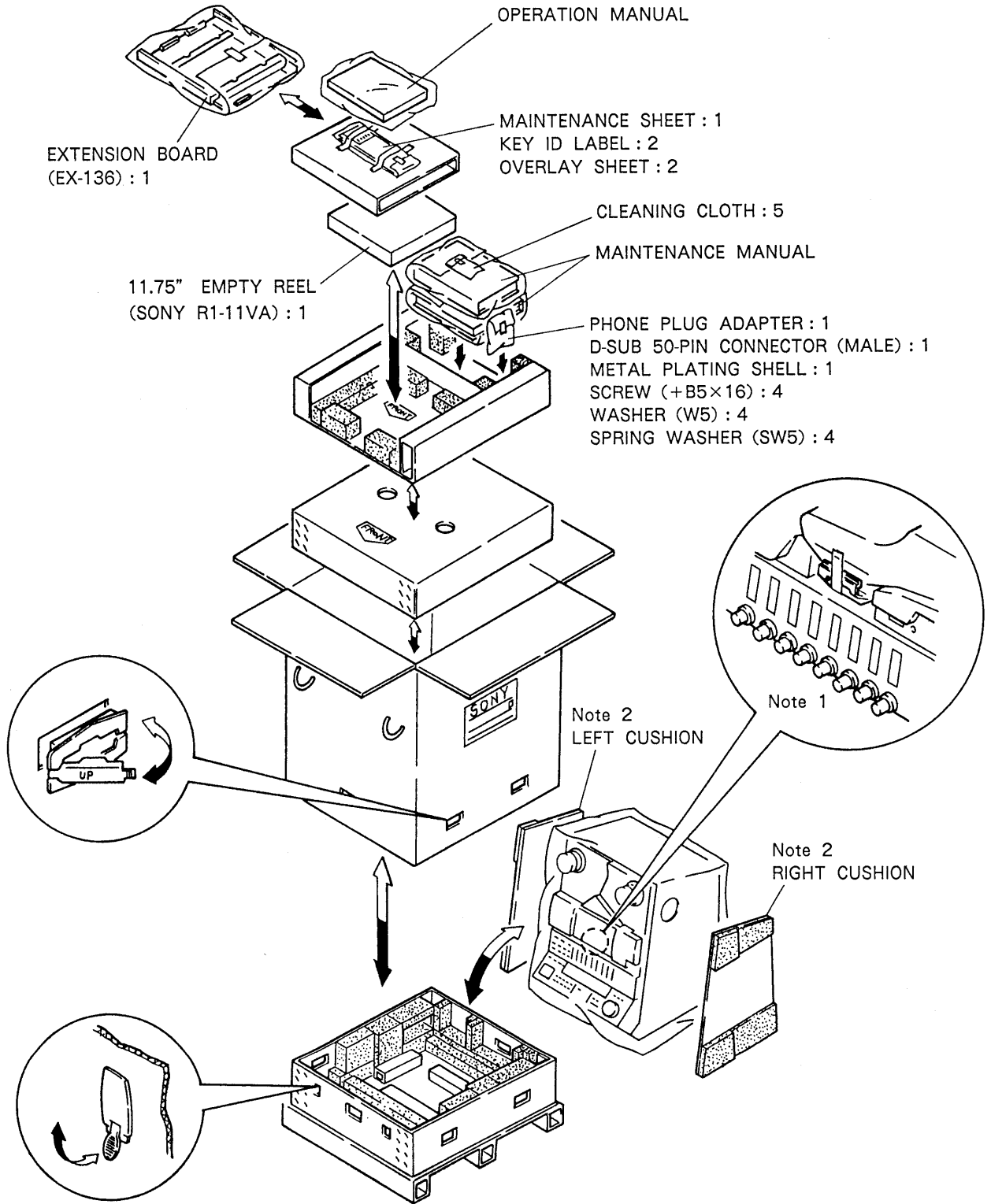
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SECTION 1 INSTALLATION

1-1. UNPACKING AND REPACKING



Note 1
When the unit is shipped from the manufacturing plant, the audio shield cover is secured in position with tape in order to prevent it from being dislodged during transit. Peel away this tape before use.

Note 2
The unit can be packed with the BKH-3001 side panel kit mounted provided that the left and right cushions are dispensed with.

1-2. ACCESSORIES

1-2-1. Accessories Supplied

11.75" Empty Reel (Sony R1-11VA) : 1

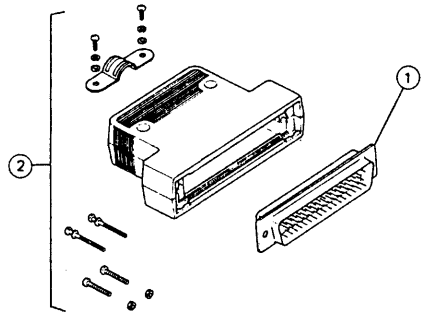
This is used as the take-up tape reel for automatic tape threading.

D-Sub 50-pin Connector (male)

A plug for [REMOTE-3] connector and consists of the following parts.

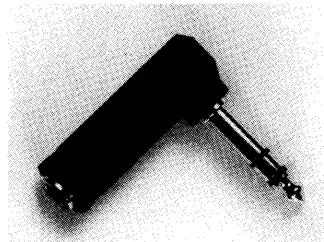
Used for connecting a parallel type remote controller to the VTR.

- ① D-sub 50-pin Connector (Male) : 1
- ② Metal Plating Shell : 1



Phone Plug Adapter : 1

If headset is connected through this adapter, the plug will project less.



Screw (+B5×16) : 4

Washer (W5) : 4

Spring Washer (SW5) : 4

These parts are used to mount the VTR in a rack.

Maintenance Sheet : 1

This is used for entering details of the upper drum replacements and maintenance conducted in the past. It is adhered to the inside of the bottom lid, and one sheet is supplied for mounting the VTR in a rack.

When the VTR is mounted in a rack, attach the sheet as required where it can easily be seen.

Operation Manual : 1

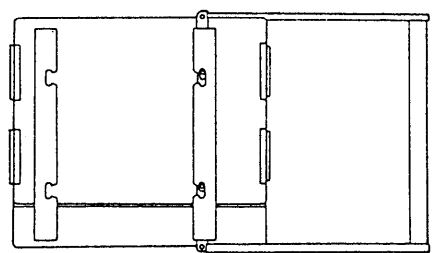
English version is provided with the USA/Canadian model. English version, French version and German version are provided with the European model.

Maintenance Manual

Vol-1 and Vol-2 are provided with the unit.

Extension Board (EX-136) : 1

This is used for inspecting and repairing the plug-in circuit board in the card rack.



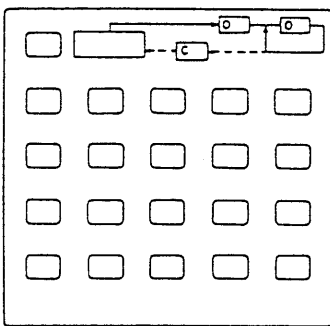
Overlay Sheet : 2

Key ID Label : 2

Overlay sheets are used when the user changes the assignment of the preset menu. The key ID labels are the ID labels for the menu bonded to overlay sheets.

Use the above overlay sheets by placing them over the 21 keys on the control panel.

Overlay sheet



Key ID label

KEY ID LABEL (HD)			
501	REM	513	CUE
502	MDN	551	TC SRC
503	VFM	552	TCR
504	FREEZE	553	TCR
505	EDIT	554	TC/UB
506	BYB	555	TC REG
507	REACT	556	UB REG
508	PABA	557	V TIC
509	EOT	558	CHAR
512	REP	570	DA

Cleaning Cloth : 5

This is used for cleaning the tape running system drums and heads.

The cleaning cloth can be reused by washing.

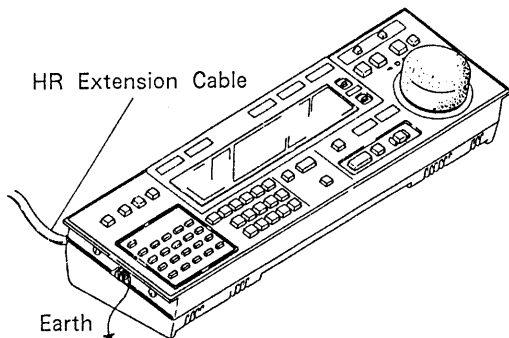
See Section 5-2 as regards the cleaning procedures.

1-2-2. Optional Accessory

HR Extension Cable Sony Part No. 1-559-524-11

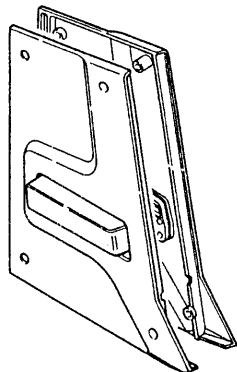
This is an extension cable (10 m in length) to control remotely the HDD-1000 VTR using the VTR's function control panel. This cable is supplied in the same way as ordinary repair parts.

Connect a wire from the chassis of the control panel to the earth as shown below. The earth ground will prevent the static noise from causing malfunction.



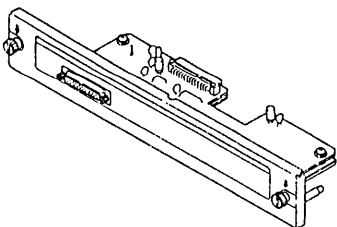
BKH-3001 Side Panel Kit

This side panel kit equipped with grips is used when the HDD-1000 is to be employed as a discrete unit.



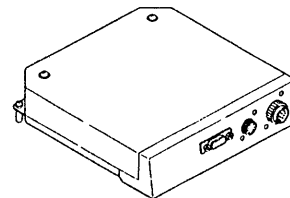
BKH-3002 RS-232C Interface Kit

The VTR can easily be connected to a computer by mounting the BKH-3002 in place of the serial remote interface board (SE-49 ASSY).



BKH-2016 CCJ Converter

Using the CVK-1 cable (40 cm in length) supplied with the BKH-2016, the VTR can be connected with VTRs or editing control units with a CCJ (10-pin) remote connector.



1-3. POWER REQUIREMENTS

1-3-1. Capacity of AC Power Source

Power Line Voltage (switchable)

AC 100 to 120 V \pm 10 % (for UC)

AC 220 to 240 V \pm 10 % (for EK)

Power Line Frequency 50/60 Hz

Power Consumption 600 W max.

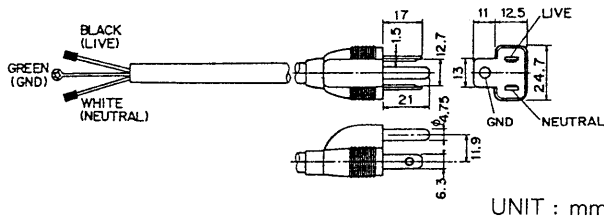
The supply voltage setting can be changed using the voltage selector switch in the unit. The above power is consumed during normal operation. When the unit is first switched on, however, a maximum surge current of about 3 to 4 times as much the above power will flow. Unless the AC supply has sufficient capacity to handle this current the breaker on the AC supply side will operate, and also the input voltage detector inside the HDD-1000 will operate, causing the VTR to go into the STOP mode.

1-3-2. Power Cord

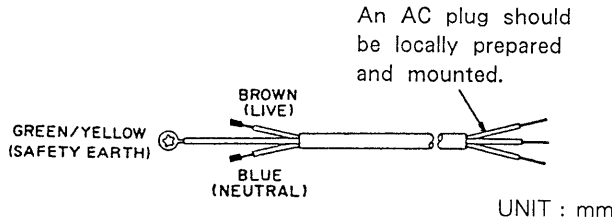
Length : Approx. 1.8 m

Plug configuration

For UC



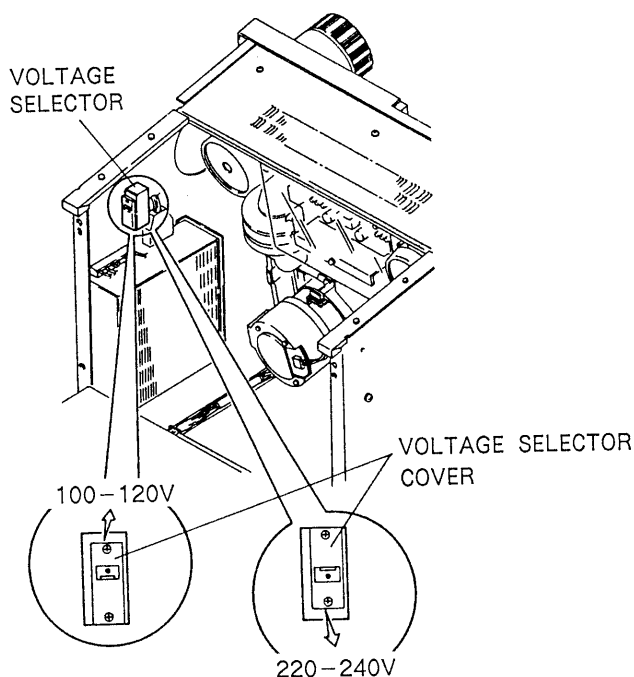
For EK



1-3-3. Voltage Selector Setting

To change the AC voltage setting, open the rear panel (see section 2-2), remove the voltage selector cover shown in the figure, select the voltage value, and then install the cover so that the selected voltage value may be seen.

<REAR VIEW>



1-3-4. Ventilation and Heat Sink

The three fans are for cooling the HDD-1000. If either the intake or exhaust should become clogged or the fans stop, damage may result to the power unit etc. The heat sinks provided on each board are rated on the assumption that cooling will be provided by the fans. Consequently, the unit should not be operated too long without fan cooling (such as when the unit is opened for checks etc.).

1-4. INSTALLATION CONDITIONS

Operating temperature : +10 °C to +35 °C

Storage temperature : -20 °C to +60 °C

Humidity : 10 % to 85 %
(no condensation)

Notes for Installation

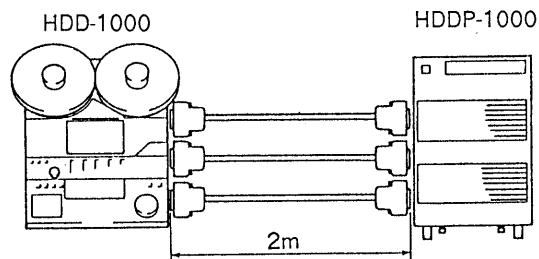
1. The combined weight of the HDD-1000 (approx. 70 kg) and HDDP-1000 (approx. 100 kg) is approximately 170 kg. When the BKH-3001 side panel kit has been attached, the HDD-1000 weighs about 75 kg.
2. Install the unit on a flat and stable base.
3. Make sure that the exhaust fan does not become blocked in order to prevent internal overheating.
4. Do not install the unit in the following locations:
 - Near the blower on the air conditioner.
 - Exposed to be directly open air (for example, near the door or the window etc.)
 - Exposed to direct sunlight or strong lights
 - In a dusty location
 - Exposed to excessive vibrations
 - Exposed to strong electromagnetic fields
 - Exposed to high levels of electrical noise
 - Exposed to static electricity

1-5. HDD-1000 AND HDDP-1000 INSTALLATION

The HDD-1000 and HDDP-1000 should be placed no more than 2 meters apart and connected using VTR-processor connecting cables (three included with HDDP-1000).

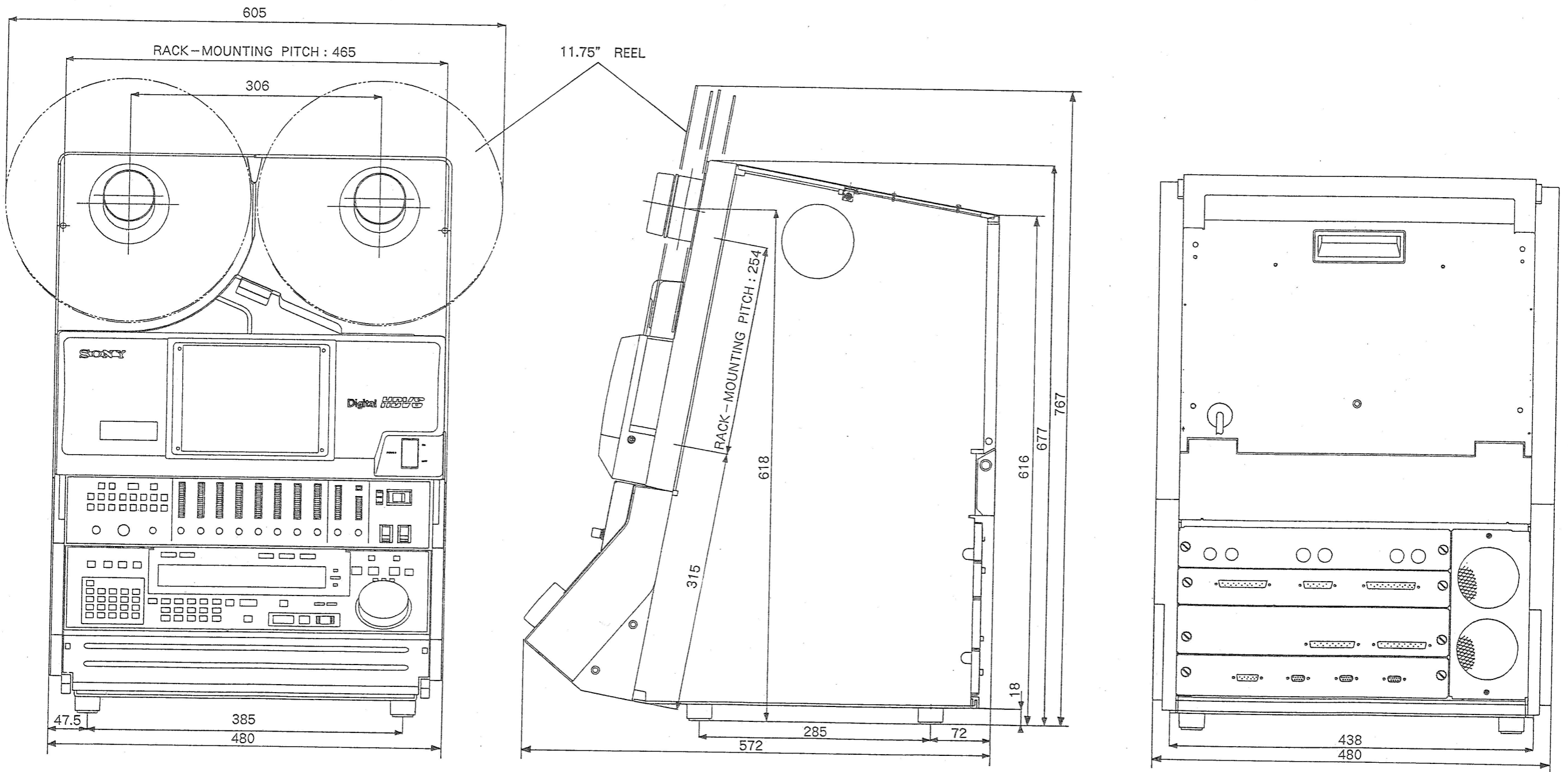
Proper performance cannot be guaranteed if the HDD-1000 and HDDP-1000 are placed further apart than 2 meters. Use of the supplied VTR-processor connecting cables is therefore strongly recommended. When using the units by putting the HDD-1000 on the HDDP-1000, be careful not to be fallen in the earthquake or the movement of the unit.

VTR-processor connecting cable : 2 m

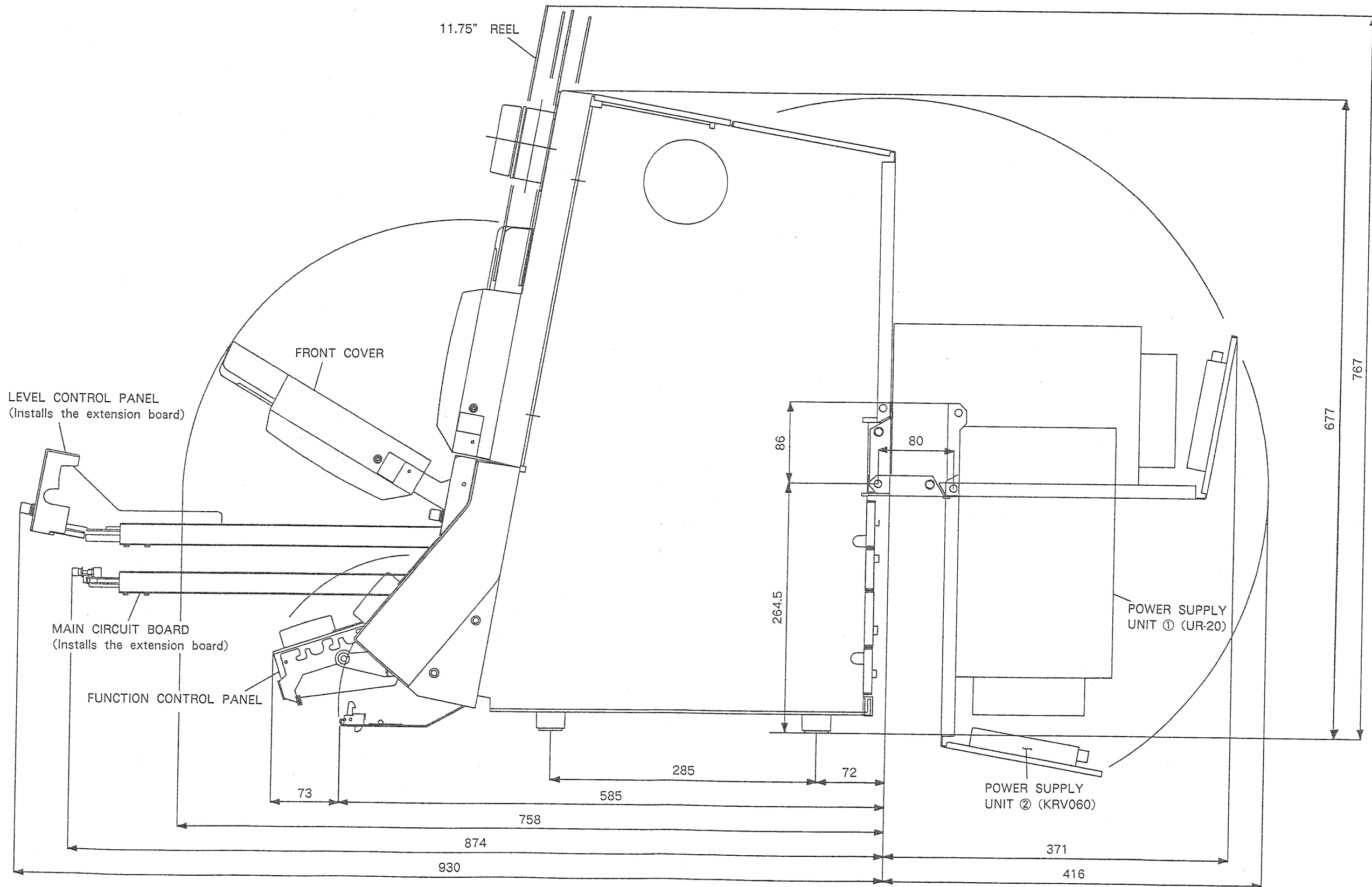


1-6. INSTALLATION SPACE

External Dimensions

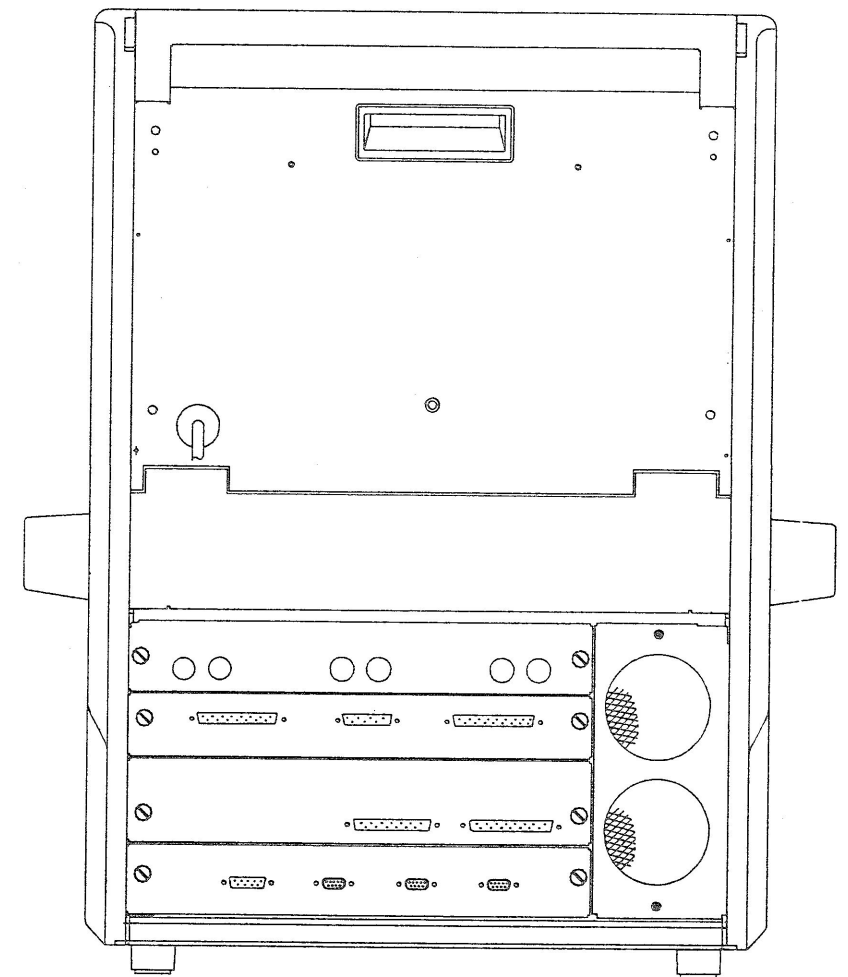
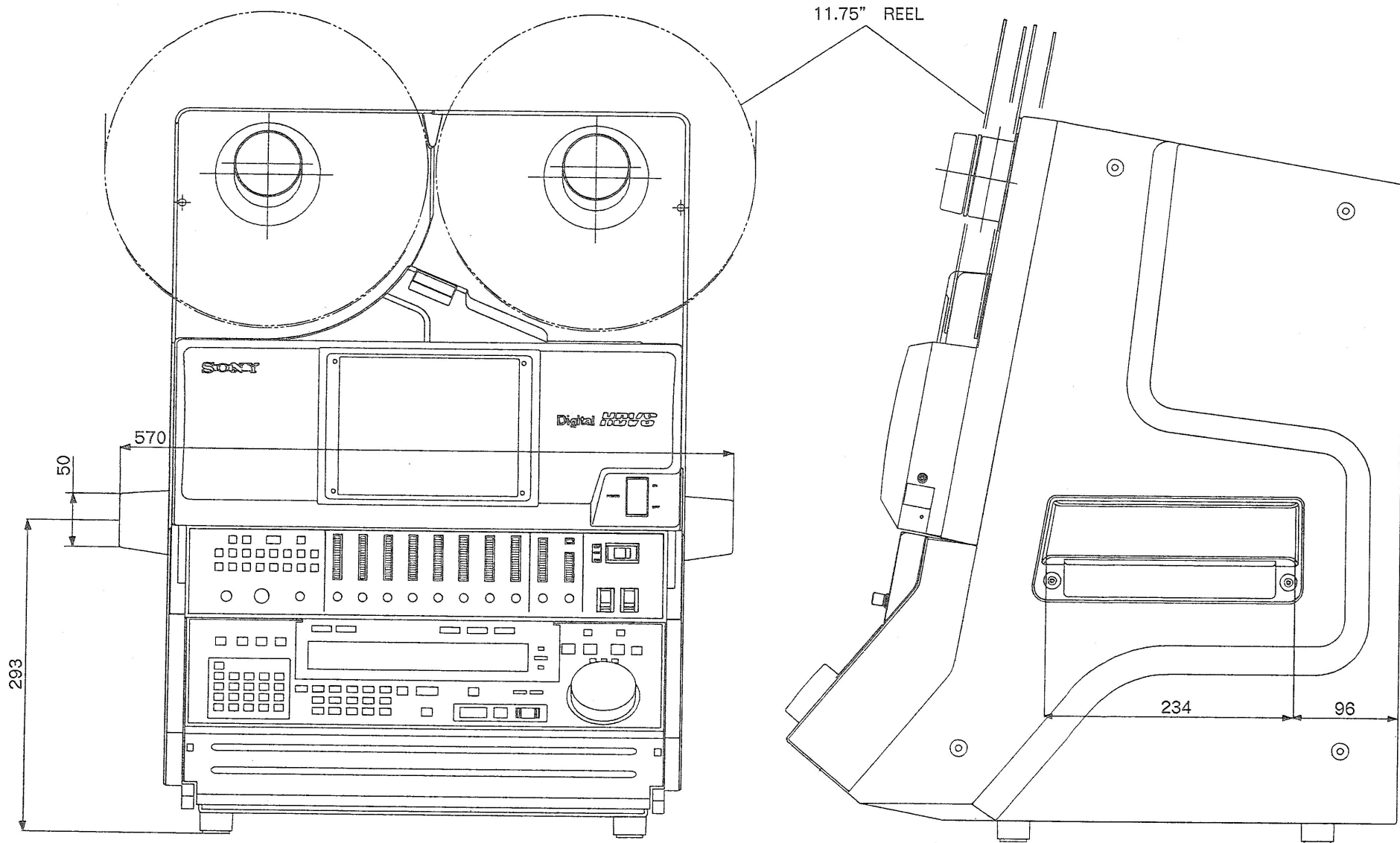


UNIT : mm



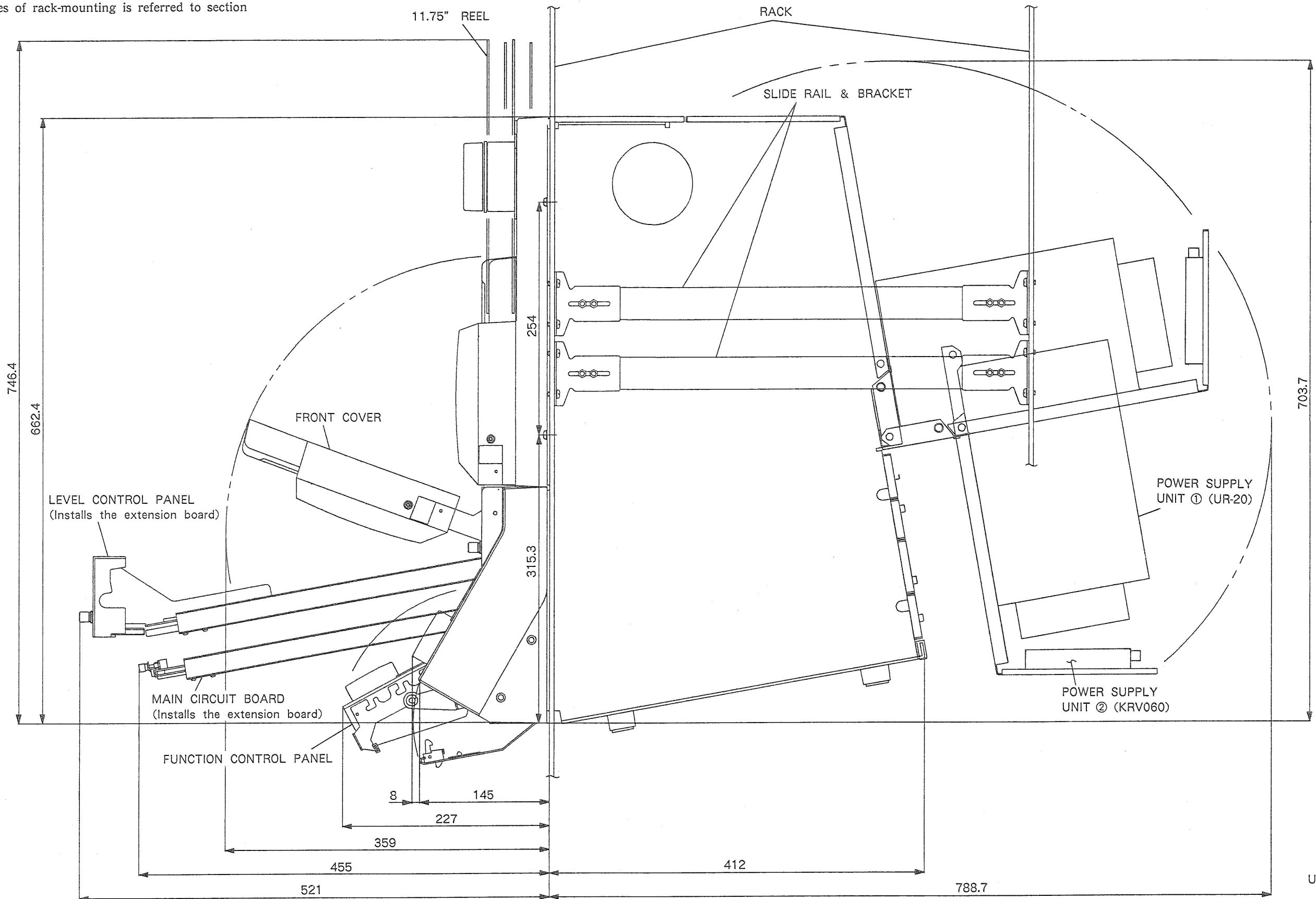
UNIT : mm

External Dimensions : when mounting BKH-3001



UNIT : mm

External Dimensions / Working Space : when rack-mounting
 The procedures of rack-mounting is referred to section 1-6.



1-7. RACK MOUNTING

Prepare the following parts for rack-mounting.

Slide Rail : 2 pairs

One pair consists of two inner members and two outer members.

Manufactured by Accuride*
 Model 201 (20" in length) *
 or Model 203 (20" in length) *

Bracket : 8

Manufactured by Accuride #5355-2

*Accuride slide rail Model 305 (20") and Bracket 5356 can be used also.

Inner Member Fixing Screw : 12

+B4×8 (Sony part No. 7-682-561-04)

VTR Fixing Screws and Washers

Screw +B5×16 : 4

Washer W5 : 4

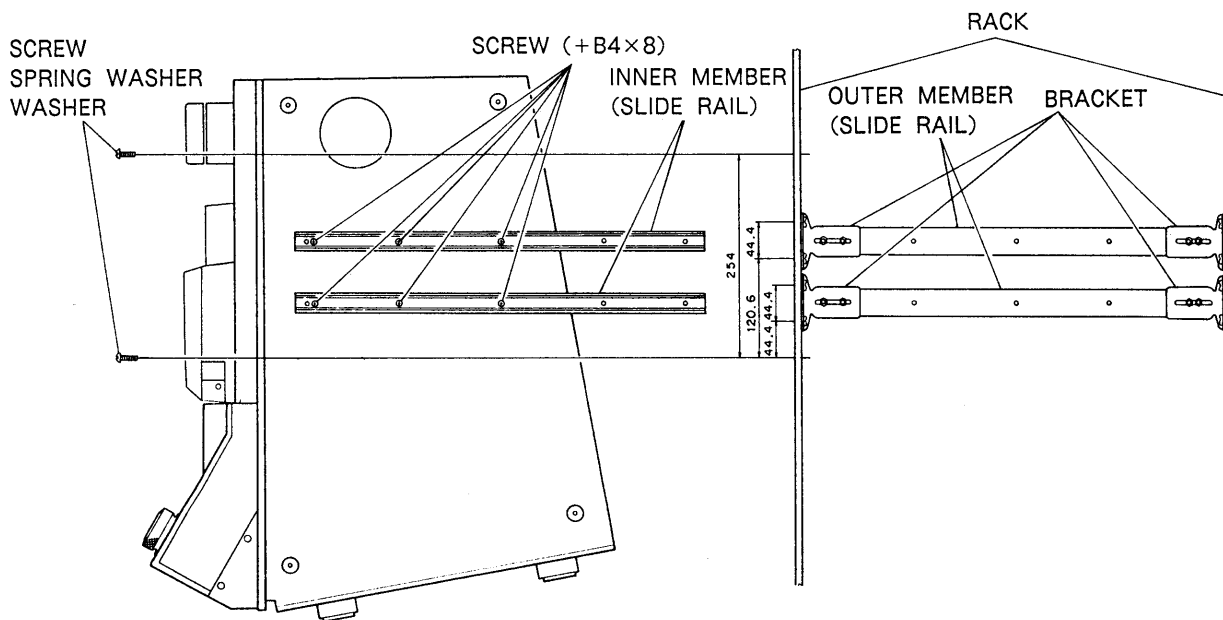
Spring washer SW5 : 4

These are supplied to the VTR. However, if they do not fit the rack to be used, prepare appropriate parts. The diameter of the head of screws and washers must be less than 11.5 mm.

Other Screws and Nuts

Be sure to use the parts recommended by the slide rail manufacturer.

Fit the slide rails and mount the VTR in the rack.
 See section 1-6 for the external dimension and the working space at rack-mounting.



UNIT : mm

1-8. INPUT/OUTPUT INTERFACE

1-8-1. Matching Connectors and Cables

HDD-1000 Connectors		Matching Connectors Cables	
Used for	Name	Name	Sony Part No.
LINE INPUT CUE, TIMECODE	XLR, 3P, Female	XLR, 3P, Male	1-508-084-00 (Note1)
LINE OUTPUT CUE, TIMECODE	XLR, 3P, Male	XLR, 3P, Female	1-508-083-00 (Note2)
MONITOR OUTPUT L, R	XLR, 3P, Male	XLR, 3P, Female	1-508-083-00 (Note2)
HEADPHONES	φ 6 Phone Jack	φ 6 Phone Plug	
SERIAL REMOTE REMOTE-1	D-Sub, 15P, Female	CVK-1 Cable ASSY	1-556-409-00 (Note3)
REMOTE-2A IN	D-Sub, 9P, Female	} D-Sub, 9P, Male RCC-5G Cable RCC-10G Cable RCC-30G Cable	} Optional Accessory (Note4)
REMOTE-2A OUT	D-Sub, 9P, Female		
REMOTE-2B IN/OUT	D-Sub, 9P, Female		
REMOTE AUX	D-Sub, 9P, Female	} D-Sub, 50P, Male	} 1-508-516-11 (Note5)
REMOTE-3	D-Sub, 50P, Female		
TO PROCESSOR CN-1	D-Sub, 50P, Male	} VTR-Processor Connecting Cable (Note 7)	} 1-574-997-11 (Note6)
CN-2/3	D-Sub, 50P, Female		

(Note 1) XLR 3-pin Male connector
Equivalent to CANNON XLR-3-12C.

(Note 2) XLR 3-pin Female connector
Equivalent to CANNON XLR-3-11C.

(Note 3) CVK-1 Cable ASS'Y
Used for connecting to the CCJ converter BKH-2016. The length is 40 cm. Supplied one cable with the BKH-2016.

(Note 4) RCC-5G/10G/30G Cable
Used for connecting the two HDD-1000, BVE-900 or BVE-9000 etc. The length of the cables are as follows.
RCC-5G = 5 m
RCC-10G = 10 m
RCC-30G = 30 m

(Note 5) D-sub 50-pin Male Connector
One connector is supplied with the HDD-1000. See section 1-2.

(Note 6) VTR-Processor Connecting Cable
Used for connecting the HDD-1000 to the processor HDDP-1000. The length is 2 m. Supplied three cables with the HDDP-1000. See the HDDP-1000 maintenance manual, section 1-2.

(Note 7) VTR-Processor Connecting Cable
VCD-5005D (5 m) 96-6182-00
VCD-5010D (10 m) 96-6181-00
VCD-5020D (20 m) 96-6180-00

1-8-2. Input/Output Signal of the Connectors

① LINE

LINE INPUT

CUE ; - 16 dBm to + 16 dBm, reference level
 + 4 dBm, 600 Ω/high impedance (more than 10 k Ω) selectable, balanced
 TIME CODE ; SMPTE time code, 600 Ω, balanced

LINE OUTPUT

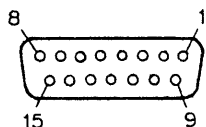
CUE ; + 4 dBm nominal, 600 Ω, balanced
 TIME CODE ; SMPTE time code 2.4 V p-p,
 600 Ω balanced

MONITOR OUTPUT (L, R) ;

+ 4 dBm, 600 Ω, balanced, variable level, L/R channel and analog audio signal selectable

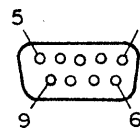
HEADPHONES ; 8 Ω, unbalanced, variable level

② REMOTE-1 Connector



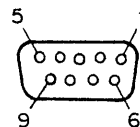
Pin No.	Signal	Remarks
1	TIMER PULSE	CMOS level
2	CCJ IN (-)	Serial control signal
10	CCJ IN (+)	RS422A level
3	CCJ OUT (-)	Serial control signal
11	CCJ OUT (+)	RS422A level
4	TAPE DIR	Tape direction, CMOS level
5	- 12 V	- 12 V OUT, DC
12	+ 12 V	+ 12 V OUT, DC
6	+ 5 V	+ 5 V OUT, DC
7	CTL OUT	CTL signal
8	REMOTE OUT	REMOTE/LOCAL select Open collector out
9	GND	
13	FRAME GROUND	
14	GND	
15	GND	

③ REMOTE 2A IN Connector



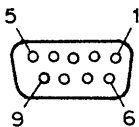
Pin No.	Signal	Remarks
1	FRAME GROUND	
2	REM 2A IN (-)	Serial control signal
7	REM 2A IN (+)	(Sony 9 pin REMOTE IF)
3	REM 2A OUT (+)	Serial control signal
8	REM 2A OUT (-)	(Sony 9 pin REMOTE IF)
4	GND	
5	PRIORITY 2A IN	REMOTE-2 priority control, TTL level
6	GND	
9	FRAME GND	

④ REMOTE 2A OUT Connector



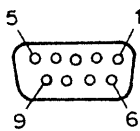
Pin No.	Signal	Remarks
1	FRAME GROUND	
2	REM 2A IN (-)	Serial control signal
7	REM 2A IN (+)	(Sony 9 pin REMOTE IF)
3	REM 2A OUT (+)	Serial control signal
8	REM 2A OUT (-)	(Sony 9 pin REMOTE IF)
4	GND	
5	PRIORITY 2A OUT	REMOTE-2 priority control, TTL level
6	GND	
9	FRAME GROUND	

⑤ REMOTE-2B IN/OUT Connector



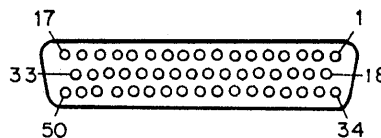
Pin No.	Signal	Remarks
1	FRAME GROUND	
2	REM 2B IN (-)	Serial control signal (Sony 9 pin REMOTE IF)
7	REM 2B IN (+)	
3	REM 2B OUT (+)	Serial control signal (Sony 9 pin REMOTE IF)
8	REM 2B OUT (-)	
4	GND	
5	PRIORITY 2B IN/OUT	REMOTE-2 priority control TTL level
6	GND	
9	FRAME GROUND	

⑥ AUX Connector



Pin No.	Signal	Remarks
1	F GND	
2	MONI SEL IN (-)	Monitor select RS422A level
7	MONI SEL IN (+)	
3	OUT (+)	Monitor select RS422A level
8	OUT (-)	
4	GND	
5	SPARE	
6	GND	
9	F GND	

⑦ REMOTE-3 Connector



The signals are different by setting Menu I20, REM3 AUDIO REC.

See the table as shown the next page.

Note

*1: Depending on the setting of Menu S70, DA REPLACE, the following channels are selected.

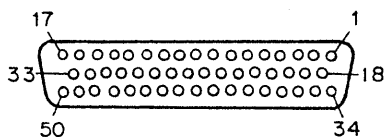
S70	Pin No.	
	37, 39	38, 40
DISABLE	A1	A2
DA1/DA2	A1	A2
DA3/DA4	A3	A4
DA5/DA6	A5	A6
DA7/DA8	A7	A8

*2: Turn off the switches SW1-1, SW1-2 and SW1-3 on the IF-207 board.

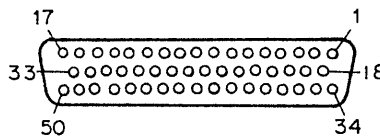
(⑦ REMOTE-3 Connector)

Pin No.	Menu I20, REM3 AUDIO REC					
	DISABLE		ENABLE			
	Signal	Remarks	Signal	Remarks		
1	FF IN	COMMAND INPUT CMOS level	FF IN	COMMAND INPUT CMOS level		
19	STBY ON IN		STBY ON IN			
20	REW IN		REW IN			
21	ENTRY IN		ENTRY IN			
34	PLAY IN		PLAY IN			
35	STOP IN		STOP IN			
36	REC IN		REC IN			
18	PREROLL IN		PREROLL IN			
22	STBY OFF IN		CUE REC IN			
2	REC SW OUT		COMMAND RETURN Open collector out		REC SW OUT	COMMAND RETURN Open collector out
3	PLAY SW OUT	PLAY SW OUT				
4	STOP SW OUT	STOP SW OUT				
5	ENTRY SW OUT	ENTRY SW OUT				
37	REV LAMP OUT	SHUTTLE, JOG VARIABLE Open collector out	A1/A3/A5/A7 REC IN *1 *2	COMMAND INPUT		
40	FWD LAMP OUT		A2/A4/A6/A8 REC IN *1 *2			
46	STBY ON OUT	STATUS OUT Open collector out	STBY ON OUT	STATUS OUT Open collector out		
47	PLAY OUT		PLAY OUT			
43	STOP OUT		STOP OUT			
24	REC OUT		REC OUT			
50	PREROLL OUT		PREROLL OUT			
48	REMOTE OUT		REMOTE OUT			
49	ALARM OUT		ALARM OUT			
39	A1 PRESET OUT		STATUS OUT Open collector out		A1/A3/A5/A7 REC SW OUT *1	COMMAND RETURN Open collector out
38	A2 PRESET OUT				A2/A4/A6/A8 REC SW OUT *1	
42	A3 PRESET OUT				TC REC SW	
41	A4 PRESET OUT	CUE REC SW OUT				
44	VIDEO PRESET OUT	SHUTTLE, JOG, VARIABLE Open collector out	REV LAMP OUT	SHUTTLE, JOG, VARIABLE Open collector out		
26	ASSEMBLE PRESET OUT		FWD LAMP OUT			
45	INSERT PRESET OUT					
27	EDIT OUT		EDIT OUT	STATUS OUT Open collector out		
23	————		TC REC IN *2	COMMAND INPUT, CMOS level		
25	————		————			
6	REF ERROR OUT	WARNING OUT Open collector out	REF ERROR OUT	WARNING OUT Open collector out		
7	————		————			
8	DRUM LOCK OUT	WARNING OUT	DRUM LOCK OUT	WARNING OUT		
9	CAP LOCK OUT	Open collector out	CAP LOCK OUT	Open collector out		
12	DVT (VITC DATA)	TC/timer interface (outputs from SY-103 board) CMOS level	DVT (VITC DATA)	TC/timer interface (outputs from SY-103 board) CMOS level		
13	DRD (READ DATA)		DRD (READ DATA)			
14	TC CK		TC CK			
15	TC DATA 1		TC DATA 1			
32	TC DATA 2		TC DATA 2			
16	TC DATA 4		TC DATA 4			
17	TC DATA 8		TC DATA 8			
28	DTM		DTM			
29	DGN		DGN			
30	MP		MP			
31	K4		K4			
33	GND	GND				
10	SP-2	Spare	SP-2	Spare		
11	SP-1		SP-1			

⑧ TO PROCESSOR Connector (CN-1: AUDIO IN/OUT)



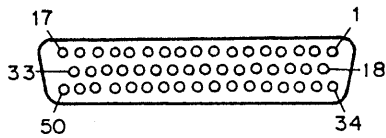
⑨ TO PROCESSOR Connector (CN-2: VIDEO IN/OUT)



Pin No.	Signal	Remarks
1	N.C	
34	N.C	
2	MONI R1 (X)	Analog audio monitor (R) in - 2 dBs
18	MONI R1 (G)	
35	MONI R1 (Y)	
3	MONI L1 (X)	Analog audio monitor (L) in - 2 dBs
19	MONI L1 (G)	
36	MONI L1 (Y)	
4	TR8 DATA (+)	Audio CH-8 PB data out RS422A level
37	TR8 DATA (-)	
5	TR7 DATA (+)	Audio CH-7 PB data out RS422A level
38	TR7 DATA (-)	
6	TR6 DATA (+)	Audio CH-6 PB data out RS422A level
39	TR6 DATA (-)	
7	TR5 DATA (+)	Audio CH-5 PB data out RS422A level
40	TR5 DATA (-)	
8	TR4 DATA (+)	Audio CH-4 PB data out RS422A level
41	TR4 DATA (-)	
9	TR3 DATA (+)	Audio CH-3 PB data out RS422A level
42	TR3 DATA (-)	
10	TR2 DATA (+)	Audio CH-2 PB data out RS422A level
43	TR2 DATA (-)	
11	TR1 DATA (+)	Audio CH-1 PB data out RS422A level
44	TR1 DATA (-)	
12	REC EN LCK (+)	Clock for REC amplifier in RS422A level
45	REC EN LCK (-)	
13	REC EN (+)	CH-1 to CH-8 audio REC EN signal in RS422A level
46	REC EN (-)	
14	LCK (+)	Clock to latch audio REC data in RS422A level
47	LCK (-)	
15	BCK (+)	Clock to shift audio REC data in RS422A level
48	BCK (-)	
16	DATA 2 (+)	Audio CH-5 to CH-8 REC data in RS422A level
49	DATA 2 (-)	
17	DATA 1 (+)	Audio CH-1 to CH-4 REC data in RS422A level
50	DATA 1 (-)	
20	F GND	
21	F GND	
22	F GND	
23	F GND	
24	F GND	
25	F GND	
26	F GND	
27	F GND	
28	F GND	
29	F GND	
30	F GND	
31	F GND	
32	F GND	
33	F GND	

Pin No.	Signal	Remarks
1	CPU V (+)	Communication timing reference out RS422A level
34	CPU V (-)	
2	MIX IN (X)	Digital audio mix signal for CUE channel REC - 2 dBs
18	MIX IN (G)	
35	MIX IN (Y)	
3	WFM OUT (X)	CTL/RF envelope signal (Refer to Menu S03) 0.3 V p-p to 0.8 V p-p
19	WFM OUT (G)	
36	WFM OUT (Y)	
12	R CK (+)	Clock for REC video data in ECL level
45	R CK (-)	
4	R DATA-1 (+)	Video CH-1 REC data in ECL level
37	R DATA-1 (-)	
5	R DATA-2 (+)	Video CH-2 REC data in ECL level
38	R DATA-2 (-)	
6	R DATA-3 (+)	Video CH-3 REC data in ECL level
39	R DATA-3 (-)	
7	R DATA-4 (+)	Video CH-4 REC data in ECL level
40	R DATA-4 (-)	
8	R DATA-5 (+)	Video CH-5 REC data in ECL level
41	R DATA-5 (-)	
9	R DATA-6 (+)	Video CH-6 REC data in ECL level
42	R DATA-6 (-)	
10	R DATA-7 (+)	Video CH-7 REC data in ECL level
43	R DATA-7 (-)	
11	R DATA-8 (+)	Video CH-8 REC data in ECL level
44	R DATA-8 (-)	
13	CHARA GATE (+)	Blanking signal for character insertion RS422A level
46	CHARA GATE (-)	
14	CHARA SIG (+)	Character data out RS422A level
47	CHARA SIG (-)	
15	REF SYNC IN (+)	Servo reference signal in RS422A level
48	REF SYNC IN (-)	
16	RS-422 IN (+)	Proc.-to-VTR communication data RS422A level
49	RS-422 IN (-)	
17	RS-422 OUT (+)	Proc.-to-VTR communication data RS422A level
50	RS-422 OUT (-)	
20	GND	
21	GND	
22	GND	
23	GND	
24	GND	
25	GND	
26	GND	
27	GND	
28	GND	
29	GND	
30	GND	
31	GND	
32	GND	
33	GND	

⑩ TO PROCESSOR Connector (CN-3 : VIDEO OUT)



Pin No.	Signal	Remarks
1	N.C	
34	N.C	
2	RTN DATA-1 (+)	Video CH-1 PB data out
35	RTN DATA-1 (-)	ECL level
4	RTN DATA-2 (+)	Video CH-2 PB data out
37	RTN DATA-2 (-)	ECL level
6	RTN DATA-3 (+)	Video CH-3 PB data out
39	RTN DATA-3 (-)	ECL level
8	RTN DATA-4 (+)	Video CH-4 PB data out
41	RTN DATA-4 (-)	ECL level
10	RTN DATA-5 (+)	Video CH-5 PB data out
43	RTN DATA-5 (-)	ECL level
12	RTN DATA-6 (+)	Video CH-6 PB data out
45	RTN DATA-6 (-)	ECL level
14	RTN DATA-7 (+)	Video CH-7 PB data out
47	RTN DATA-7 (-)	ECL level
16	RTN DATA-8 (+)	Video CH-8 PB data out
49	RTN DATA-8 (-)	ECL level
3	RTN CK-1 (+)	Clock CH-1 PB data out
36	RTN CK-1 (-)	ECL level
5	RTN CK-2 (+)	Clock CH-2 PB data out
38	RTN CK-2 (-)	ECL level
7	RTN CK-3 (+)	Clock CH-3 PB data out
40	RTN CK-3 (-)	ECL level
9	RTN CK-4 (+)	Clock CH-4 PB data out
42	RTN CK-4 (-)	ECL level
11	RTN CK-5 (+)	Clock CH-5 PB data out
44	RTN CK-5 (-)	ECL level
13	RTN CK-6 (+)	Clock CH-6 PB data out
46	RTN CK-6 (-)	ECL level
15	RTN CK-7 (+)	Clock CH-7 PB data out
48	RTN CK-7 (-)	ECL level
17	RTN CK-8 (+)	Clock CH-8 PB data out
50	RTN CK-8 (-)	ECL level
18	GND	
19	GND	
20	GND	
21	GND	
22	GND	
23	GND	
24	GND	
25	GND	
26	GND	
27	GND	
28	GND	
29	GND	
30	GND	
31	GND	
32	GND	
33	GND	

1-9. SWITCH/MENU SETTING

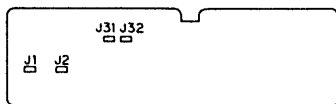
1-9-1. Initial Setting Menu

Initial settings are set by the menu operation. The contents of setting menu can be saved and restored by a NOVRAM (nonvolatile RAM) according to the individual need. For details, refer to the operation manual.

1-9-2. Changing the Input Impedance of Audio

LO-06 Board

Component Side



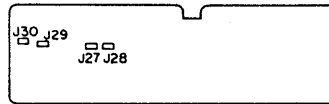
J1 : CUE line input impedance select jumper
J2 : TC (Time Code) line input impedance select jumper
 The input impedance is set to 600 Ω, when shipped. However, the LO-06 board changed as shown below makes high impedance (more than 10 k Ω) possible. The sockets for inserting onto J1 and J2 are able to insert onto the spaces of J31 and J32 in order not to be lost.

	600 Ω (when shipped)	High impedance
J1	SHORT	OPEN
J2	SHORT	OPEN

1-9-3. Selecting CUE Channel Line/Mic Input

LO-06 Board

Component Side



J29, J30 : CUE channel line/mic input select jumper
 The line and mic levels are able to input to the CUE channel. The LO-06 board changed as shown below makes mic input possible.

	LINE input (when shipped)	MIC input
J29	OPEN	SHORT
J30	OPEN	SHORT

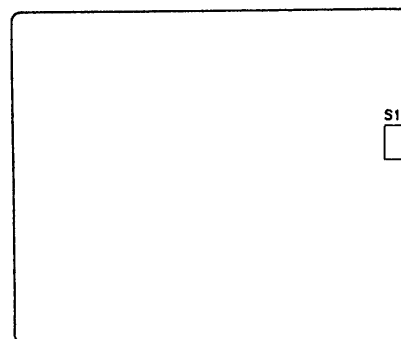
When shipped, the sockets for the CUE channel line /mic input select jumper (J29 and J30) are inserted onto the spaces of J27 and J28. Be same the setting of J29 and J30. Be sure to set the CUE line input impedance select jumper (J1) to be open circuited, when setting to the mic input.

1-9-4. Switches, Jumpers and Indicators on Boards

AU-109 Board

(AUDIO PB EQ, CUE MOD/DEMOD & CPU)

Component Side

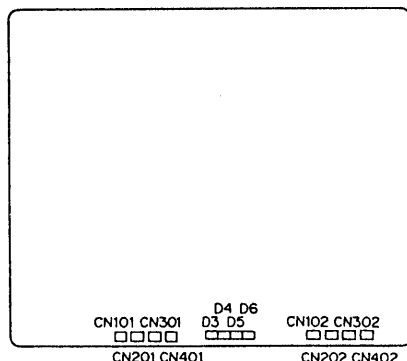


S1 : Normally set to OFF.

DRC-1 Board

(VIDEO PB EQUALIZER & PB CLOCK PLL)

Component Side



D3 to D6 : RF ALARM indicator (red)
Light when no signal is reproduced by the corresponding video head during playback. A clogged head may be the cause.
The indicators and each channels are as follows.

	Slot No.2	Slot No.3
D3	CH-1	CH-5
D4	CH-2	CH-6
D5	CH-3	CH-7
D6	CH-4	CH-8

EX ; When indicator D3 on the DRC-1 board (slot number 2) lights on, no signal on the CH-1 video head is played back.

CN101, CN201, CN301, CN401 :

RF MONITOR connector

CN102, CN202, CN302, CN402 :

CLOCK OUT connector

The connectors and each channels are as follows.

Connector		DRC-1 board	
RF MONITOR	CLOCK OUT	Slot No.2	Slot No.3
CN101	CN102	CH-1	CH-5
CN201	CN202	CH-2	CH-6
CN301	CN302	CH-3	CH-7
CN401	CN402	CH-4	CH-8

The RF MONITOR connectors output the equalized RF signals from the respective video heads. The CLOCK OUT connectors output the clock pulses which are regenerated from the RF signals.

You can observe the RF signal as the eye pattern by connecting an oscilloscope to the RF connector and by triggering the oscilloscope from the CLOCK connector.

The BNC-UM cable (Sony Part No. J-6264-360-A) is recommended to connect to the oscilloscope.

IF-207 Board

(PROCESSOR INTERFACE : AUDIO & SYSTEM)

Component Side



- SW1-1** : REMOTE-3 connector (23 pin) IN/OUT switch
- SW1-2** : REMOTE-3 connector (40 pin) IN/OUT switch
- SW1-3** : REMOTE-3 connector (37 pin) IN/OUT switch
- SW1-4** : REMOTE-3 connector (22 pin) IN/OUT switch

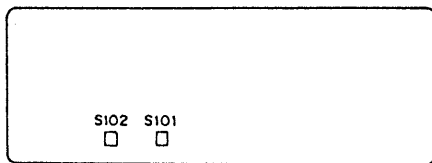
By setting of Menu I20. REM3 AUDIO REC, the signals (and directions) which are input or output from the REMOTE-3 connector can be changed. Turn the above switches ON or OFF as shown below by corresponding to the setting of the menu, that is, the direction of input or output. When shipped, these switches and Menu I20 are set to the side of DISABLE.

See the operation manual for the menu setting.

Switch	Menu I20. REM3 AUDIO REC			
	DISABLE (when shipped)		ENABLE	
	Signal	Setting	Signal	Setting
SW1-1	not used	ON	TC REC IN	OFF
SW1-2	FWD LAMP OUT	ON	A2/A4/A6/A8 REC IN	OFF
SW1-3	REV LAMP OUT	ON	A1/A3/A5/A7 REC IN	OFF
SW1-4	STBY OFF IN	OFF	CUE REC IN	OFF

KC-14 Board (KEY CONTROL)

Component Side



S101 : RESET switch

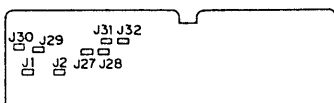
This is the reset switch for the function control panel. By pressing this switch, the function control panel will go into the same status as if the power had been turned OFF and then ON again.

S102 : TEST switch

By pressing this switch, the VTR will go into the PANEL menu of the test menu. See section 3-3 "Maintenance Menu".

LO-06 Board (CUE/TC I/O & AUDIO MONITOR OUTPUT AMPLIFIER)

Component Side



J1 : CUE line input impedance select jumper (When shipped, short circuited.)

J2 : TC (Time Code) line input impedance select jumper (When shipped, short circuited.)

These are for selecting the input impedance. See section 1-9-2.

J27, J28, J31, J32 : Jumper pins for parking
The sockets for inserting onto the CUE line input impedance select jumper (J1), the TC (Time Code) line input impedance select jumper (J2) and the CUE channel line/mic input select jumper (J29 and J30) are able to be inserted onto the above jumper pins in order not to be lost.

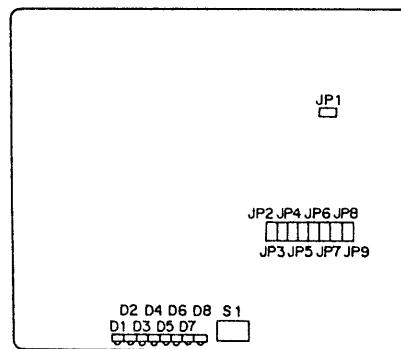
However, when shipped, the sockets for the CUE channel line/mic input gain select jumper (J29 and J30) are inserted onto the J27 and J28.

J29, J30 : CUE channel line/mic input select jumper (When shipped, both of them are open circuited.)

See section 1-9-3.

PRD-1 Board (VIDEO REC EQUALIZER)

Component Side



- D1** : CH-1 REC OFF ALARM indicator (red)
- D2** : CH-2 REC OFF ALARM indicator (red)
- D3** : CH-3 REC OFF ALARM indicator (red)
- D4** : CH-4 REC OFF ALARM indicator (red)
- D5** : CH-5 REC OFF ALARM indicator (red)
- D6** : CH-6 REC OFF ALARM indicator (red)
- D7** : CH-7 REC OFF ALARM indicator (red)
- D8** : CH-8 REC OFF ALARM indicator (red)

The above indicators lights on when the following switches are set to ON.

Switch	Indicator
CH-1 REC OFF TEST switch (S1-1/PRD-1)	D1
CH-2 REC OFF TEST switch (S1-2/PRD-1)	D2
CH-3 REC OFF TEST switch (S1-3/PRD-1)	D3
CH-4 REC OFF TEST switch (S1-4/PRD-1)	D4
CH-5 REC OFF TEST switch (S1-5/PRD-1)	D5
CH-6 REC OFF TEST switch (S1-6/PRD-1)	D6
CH-7 REC OFF TEST switch (S1-7/PRD-1)	D7
CH-8 REC OFF TEST switch (S1-8/PRD-1)	D8

JP1 to JP9 :

These jumpers are normally set as follows. If changing the setting, the VTR may not normally record and play back.

JP1	JP2	JP3	JP4	JP5	JP6	JP7	JP8	JP9
SHORT	OPEN	SHORT	OPEN	OPEN	OPEN	SHORT	OPEN	OPEN

Note : JP2 to JP9 are installed on the PRD-1 board with suffix-11.

- S1-1** : CH-1 REC OFF TEST switch
- S1-2** : CH-2 REC OFF TEST switch
- S1-3** : CH-3 REC OFF TEST switch
- S1-4** : CH-4 REC OFF TEST switch
- S1-5** : CH-5 REC OFF TEST switch
- S1-6** : CH-6 REC OFF TEST switch
- S1-7** : CH-7 REC OFF TEST switch
- S1-8** : CH-8 REC OFF TEST switch

Used to inspect the recording condition of each video head.

These are enable to set when Menu T5. PRD REC TEST is set to ON.

See section 3-2 for the procedures of the test menu. When one of these switches is set to OFF and others of those are set to ON, the channel which corresponding to the switch which is set to OFF can be recorded.

ON : Erase operation can be done without recording onto the video track which is corresponding to the switch.

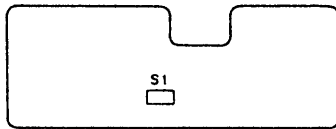
You can check that the erase operation is normal.

OFF : Normally recording.

When shipped, all of them are set to OFF.

SE-49 Board (REMOTE-1, 2 INTERFACE)

Component Side



S1 : REMOTE-2A, 2B signal terminating ON/OFF switches

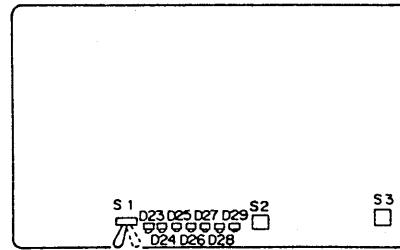
By turning the switches on, the following signals will be terminated in 100 Ω.

- S1-1 : REMOTE-2A IN signal (REMOTE-2A connector)
- S1-2 : REMOTE-2A OUT signal (REMOTE-2A connector)
- S1-3 : REMOTE-2B IN signal (REMOTE-2B connector)
- S1-4 : REMOTE-2B OUT signal (REMOTE-2B connector)

When shipped, all of them are set to OFF.

SV-90 Board (SERVO/LOGIC CONTROL)

Component Side



D23 : SV-SY indicator (red)
Lights if the interface error between the SV-90 and the SY-103 boards occurs.

D24 : TTP indicator (red)
Lights if a tape transport error occurs.

D25 : SUB indicator (red)
Lights if the sub-CPU (ICB15) error occurs.

D26 : MODE indicator (green)
Lights when the tape transport system is ready.

D27 : DR indicator (green)
Lights and remains lit when the drum servo is locked.

D28 : CAP indicator (green)
Lights and remains lit when the capstan servo is locked.

D29 : READY indicator (green)
Lights when the CPU (ICK19) is normally operating.

S1 : TAPE RUN switch (NORMAL/STOP)
Normally, leave this switch in the "NORMAL" position. If it is put in the "STOP" position, the drive amplifiers of the following motors and solenoids will go off, causing the motors to stop and the solenoids to be deenergized. Use this switch to check the operation of the circuits.

- Capstan Motor
- Drum Motor
- Reel Motors (S and T)
- Threading Motor
- Blowers (S and T)
- Pinch Roller Solenoid
- Reel Brake Solenoids (S and T)

S2: NVRM (NOVRAM WRITE) switch

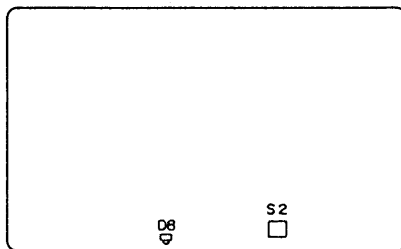
Turn this switch on when writing adjustment data for the drum, capstan and reel servo, etc., in the NOVRAM. See section 3-3 "Maintenance Menu".

S3: RESET switch

This is the system reset switch. By turning this switch on, the VTR will go into the same status as if the power had been turned off and then on again.

SY-103 Board (CPU & TC READER/GENERATOR)

Component Side

**D8**: READY indicator (green)

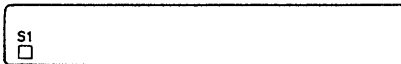
Lights when the CPU (ICH14) operates normally.

S2: TEST switch

By pressing the key on the 21-key section while pressing this switch, the TTP ADJ menu of the test menu will appear. See section 3-3 "Maintenance Menu".

VR-74 Board (AUDIO LEVEL CONTROL)

Component Side

**S1**: CPU RESET switch

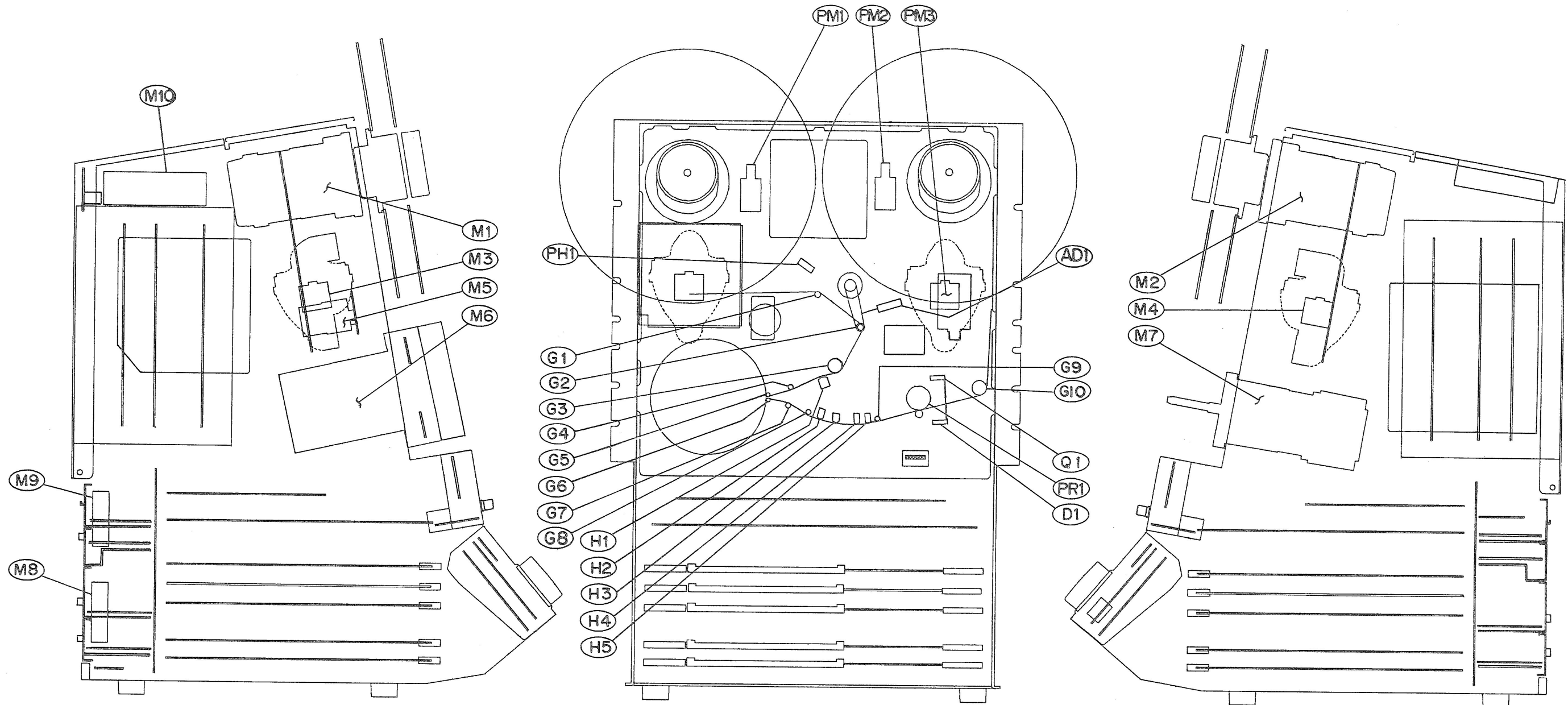
Resets the CPU (IC9) on the AU-109 board and returns to the initial setting.

SECTION 2 SERVICE INFORMATION

2-1. MAIN COMPONENTS LOCATION

TAPE TRANSPORT : TAPE GUIDE, HEAD, MOTOR, SENSOR, SOLENOID etc.

AD1	AIR DAMPER	H1	HEAD, FULL ERASE	M1	MOTOR, SUPPLY REEL	PH1	PHOTO-INTERRUPTER, FRONT COVER SENSOR
G1	GUIDE, POST 1	H2	HEAD, AUDIO PB	M2	MOTOR, TAKE-UP REEL	PM1	SOLENOID, SUPPLY REEL BRAKE
G2	TENSION ARM (S)	H3	HEAD, AUDIO ERASE (ANALOG)	M3	MOTOR, S-SIDE BLOWER	PM2	SOLENOID, TAKE-UP REEL BRAKE
G3	S GUIDE, ROLLER	H4	HEAD, AUDIO REC	M4	MOTOR, T-SIDE BLOWER	PM3	SOLENOID, PINCH ROLLER
G4	GUIDE, POST 2	H5	HEAD, AUDIO MONITOR	M5	MOTOR, THREADING	PR1	PINCH ROLLER
G5	GUIDE, ENTRANCE SLANT (S)			M6	MOTOR, DRUM	D1	LED, TAPE SENSOR
G6	GUIDE, EXIT SLANT (T)			M7	MOTOR, CAPSTAN	Q1	PHOTO TRANSISTOR, TAPE SENSOR
G7	GUIDE, TAPER			M8	MOTOR, FAN		
G8	GUIDE, POST 3			M9	MOTOR, FAN		
G9	GUIDE, POST 4			M10	MOTOR, FAN		
G10	T GUIDE, ROLLER						



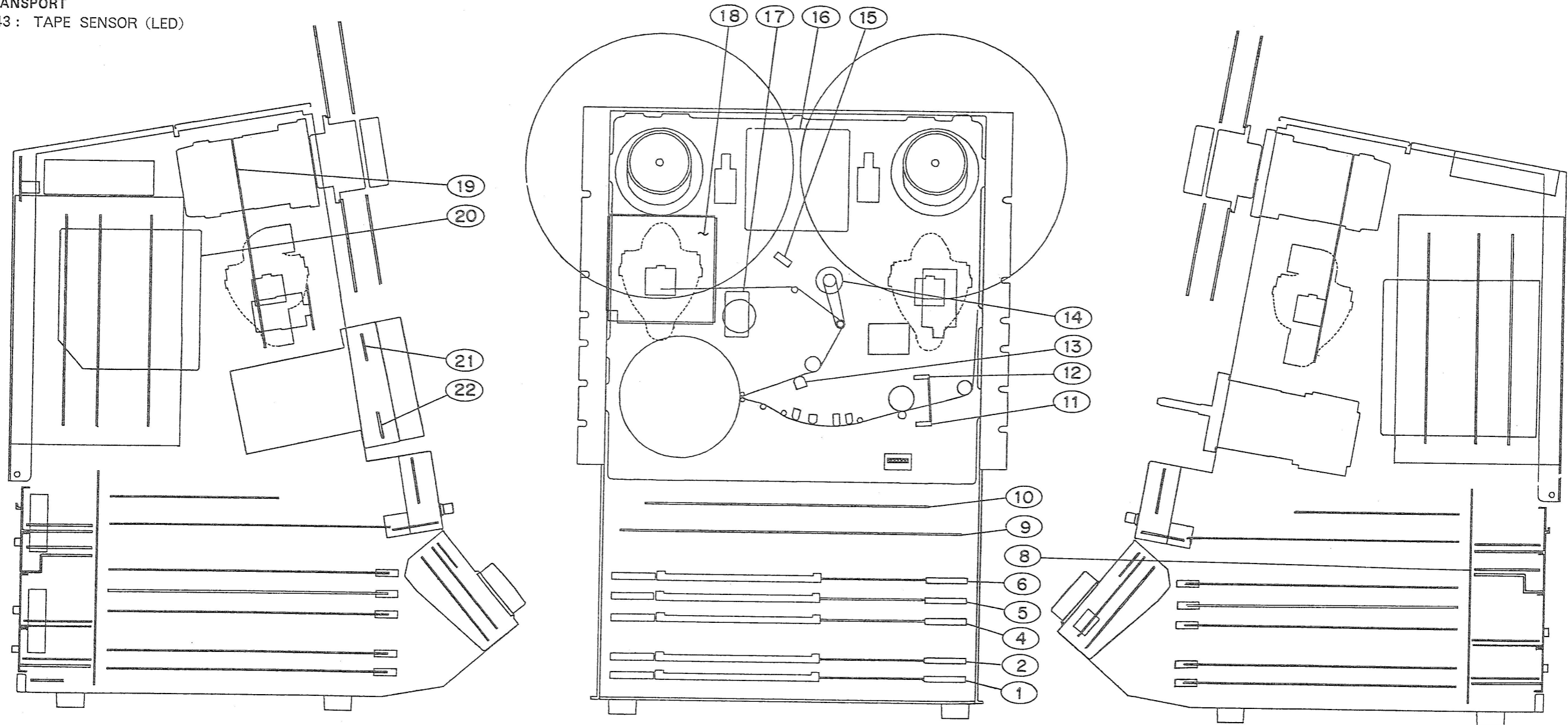
PRINTED CIRCUIT BOARD

CARD RACK

- | | |
|---|--|
| 1. SV-90 : SERVO/LOGIC CONTROL | 12. PS-143 : TAPE SENSOR (PHOTO TRANSISTOR) |
| 2. SY-103 : CPU & TC READER/GENERATOR | 13. HD-06 : FULL ERASE HEAD |
| 3. _____ : | 14. DE-18 : TENSION SENSOR |
| 4. DRC-1 : VIDEO PB EQUALIZER & PB CLOCK PLL (CH-5, 6, 7, 8) | 15. PS-143 : FRONT COVER SENSOR |
| 5. DRC-1 : VIDEO PB EQUALIZER & PB CLOCK PLL (CH-1, 2, 3, 4) | 16. DS-19 : TTP AUX |
| 6. PRD-1 : VIDEO REC EQUALIZER | 17. MC-29 : THREADING SENSOR |
| 7. _____ : | 18. FE-05 : ROTARY ERASE AMPLIFIER |
| 8. MB-199 : MOTHER BOARD | 19. RM-43 : REEL MOTOR DRIVER |
| 9. AU-109 : AUDIO PB EQ, CUE MOD/DEMOD & CPU | 20. CD-37 : CAPSTAN MOTOR / DRUM MOTOR DRIVE AMPLIFIER |
| 10. AP-22 : AUDIO / CUE / TC / CTL REC / PB AMPLIFIER AND ERASE AMPLIFIER | 21. LDR-2 : LOWER DRUM (REC BUFFER) |
| | 22. LDR-3 : LOWER DRUM (PB BUFFER) |

TAPE TRANSPORT

11. PS-143 : TAPE SENSOR (LED)



PRINTED CIRCUIT BOARD

LEVEL CONTROL PANEL

- 31. VR-74 : AUDIO LEVEL CONTROL
- 32. SW-269 : AUDIO MONITOR SELECT KEY & LEVEL METER
- 33. SW-270 : SUB SWITCH BOARD

FUNCTION CONTROL PANEL

- 41. KC-14 : KEY CONTROL
- 42. KY-139 : MAIN KEY
- 43. EN-55 : ENTRY KEY
- 44. DP-63 : SUB KEY
- 45. DET-3 : SEARCH DIAL DETECTOR

CONNECTOR PANEL AND AROUND

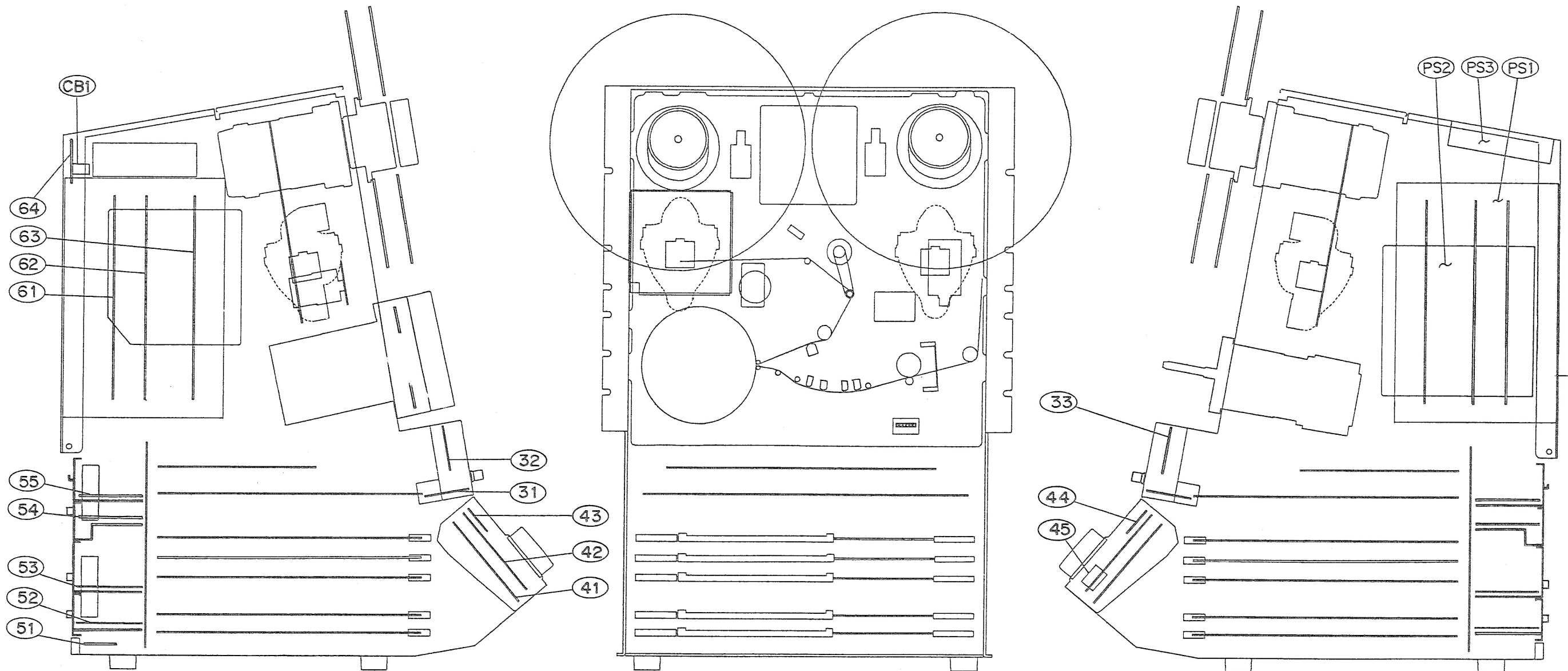
- 51. CN-186 : FAN MOTOR RELAYING
- 52. SE-49 : REMOTE-1, 2 INTERFACE
- 53. DIF-2 : PROCESSOR INTERFACE (VIDEO)
- 54. IF-207 : PROCESSOR INTERFAC (AUDIO & SYSTEM)
- 55. LO-06 : CUE/TC I/O & AUDIO MONITOR OUTPUT AMPLIFIER

POWER SUPPLY

- 61. SP-01 : SWITCHING REGULATOR
(This board is included in the UR-20.)
- 62. SP-02 : SWITCHING REGULATOR
(This board is included in the UR-20.)
- 63. SP-03 : SWITCHING REGULATOR
(This board is included in the UR-20.)
- 64. AC-92 : POWER SWITCH RELAYING

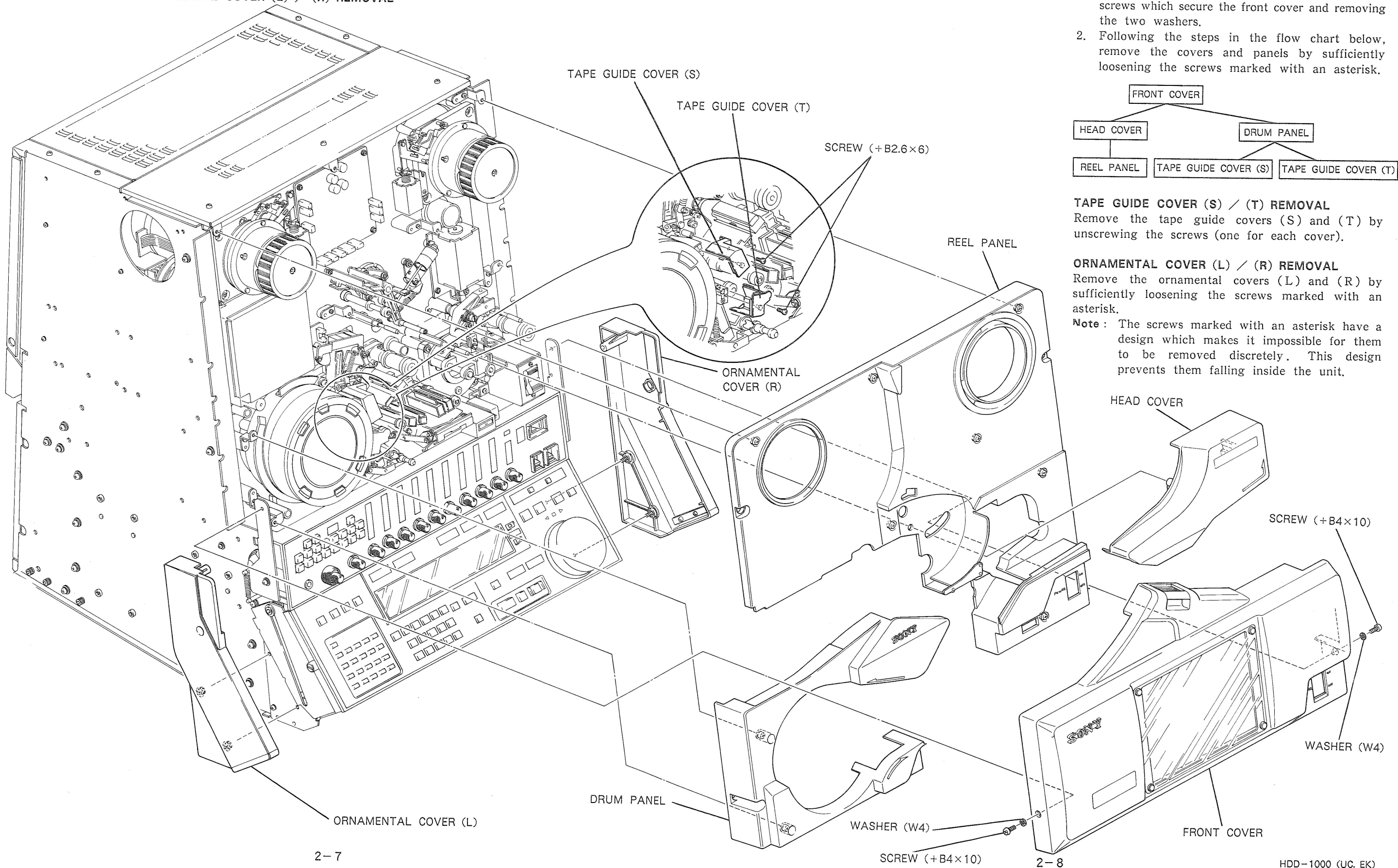
- PS1 : POWER SUPPLY UNIT, UR-20
- PS2 : POWER SUPPLY UNIT, DJ-150AT-75
- PS3 : POWER SUPPLY UNIT, KRV060

CB1 : CIRCUIT BREAKER, 10 A



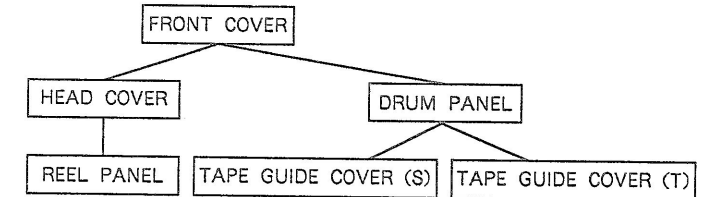
2-2. CABINET REMOVAL

FRONT SECTION & ORNAMENTAL COVER (L) / (R) REMOVAL



FRONT SECTION REMOVAL

1. Remove the front cover by unscrewing the two screws which secure the front cover and removing the two washers.
2. Following the steps in the flow chart below, remove the covers and panels by sufficiently loosening the screws marked with an asterisk.



TAPE GUIDE COVER (S) / (T) REMOVAL

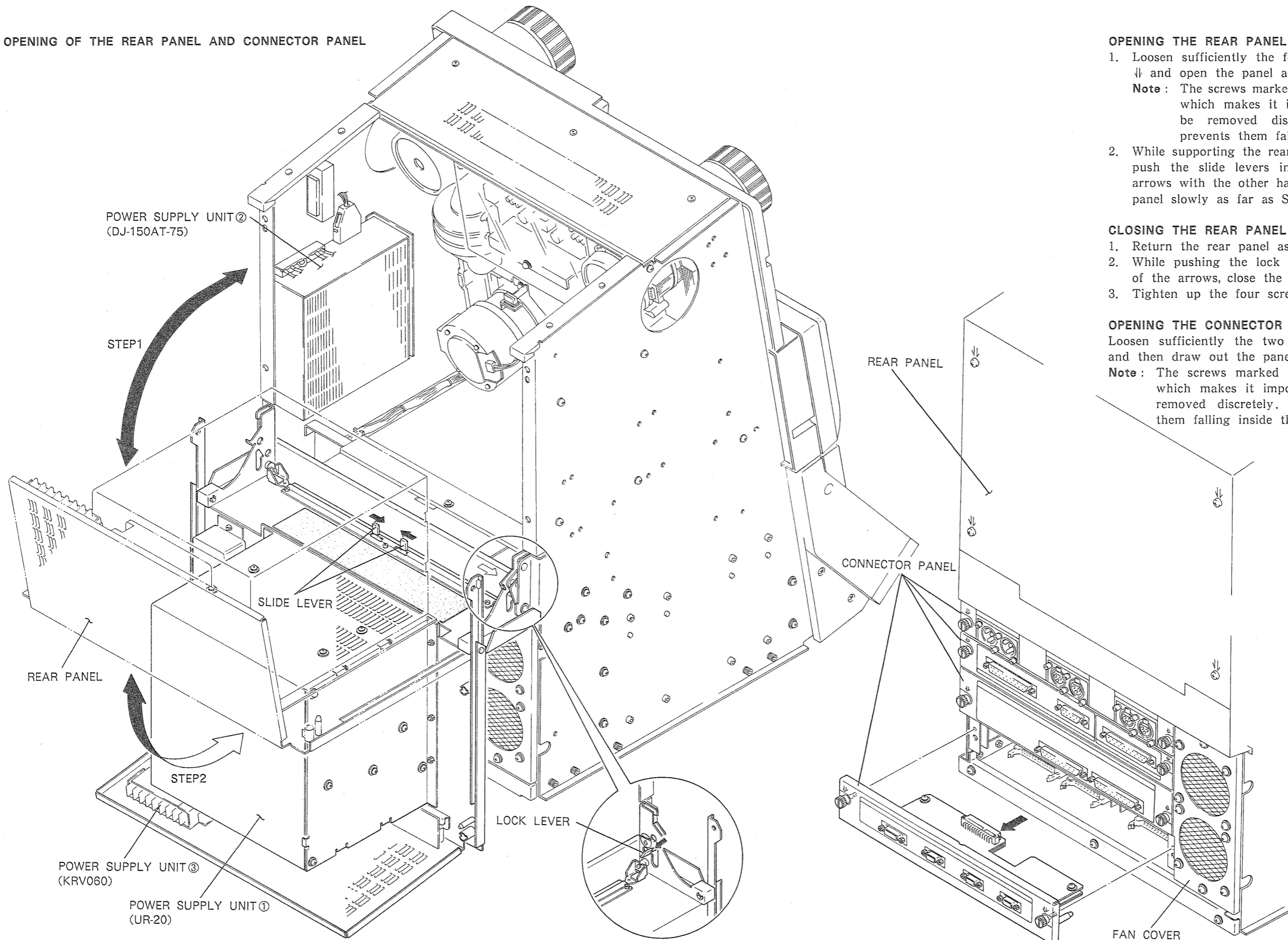
Remove the tape guide covers (S) and (T) by unscrewing the screws (one for each cover).

ORNAMENTAL COVER (L) / (R) REMOVAL

Remove the ornamental covers (L) and (R) by sufficiently loosening the screws marked with an asterisk.

Note: The screws marked with an asterisk have a design which makes it impossible for them to be removed discretely. This design prevents them falling inside the unit.

OPENING OF THE REAR PANEL AND CONNECTOR PANEL



OPENING THE REAR PANEL

1. Loosen sufficiently the four screws marked by ↓ and open the panel as far as STEP 1.
Note: The screws marked with ↓ have a design which makes it impossible for them to be removed discretely. This design prevents them falling inside the unit.
2. While supporting the rear panel with one hand, push the slide levers in the direction of the arrows with the other hand, and lower the rear panel slowly as far as STEP 2.

CLOSING THE REAR PANEL

1. Return the rear panel as far as STEP 1.
2. While pushing the lock levers in the direction of the arrows, close the rear panel.
3. Tighten up the four screws marked by ↓.

OPENING THE CONNECTOR PANEL

- Loosen sufficiently the two screws marked by ↓ and then draw out the panel forward.
- Note:** The screws marked with ↓ have a design which makes it impossible for them to be removed discretely. This design prevents them falling inside the unit.

FUNCTION CONTROL PANEL REMOVAL

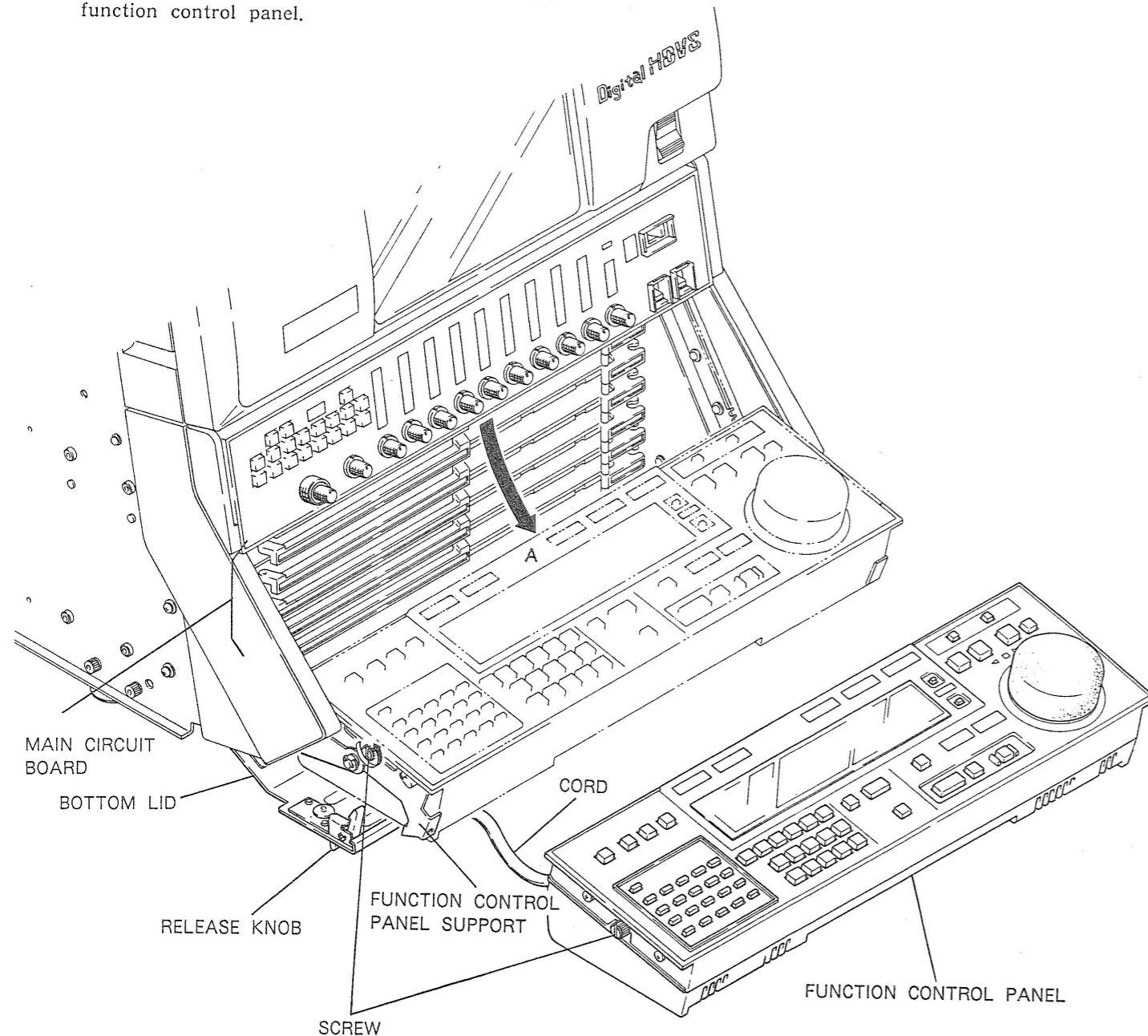
Open and close or remove the function control panel when inspecting and adjusting the main circuit boards.

OPENING/REMOVING THE PANEL

1. While pushing in simultaneously the two release knobs at the bottom of the bottom lid on either side, pull down the bottom lid to open.
2. Pull down the function control panel in the direction of arrow A.
3. Loosen the screws (but do not remove them), push up the panel and disengage it from the left and right function control panel supports.
4. If necessary, unwind the cord at the rear of the function control panel.

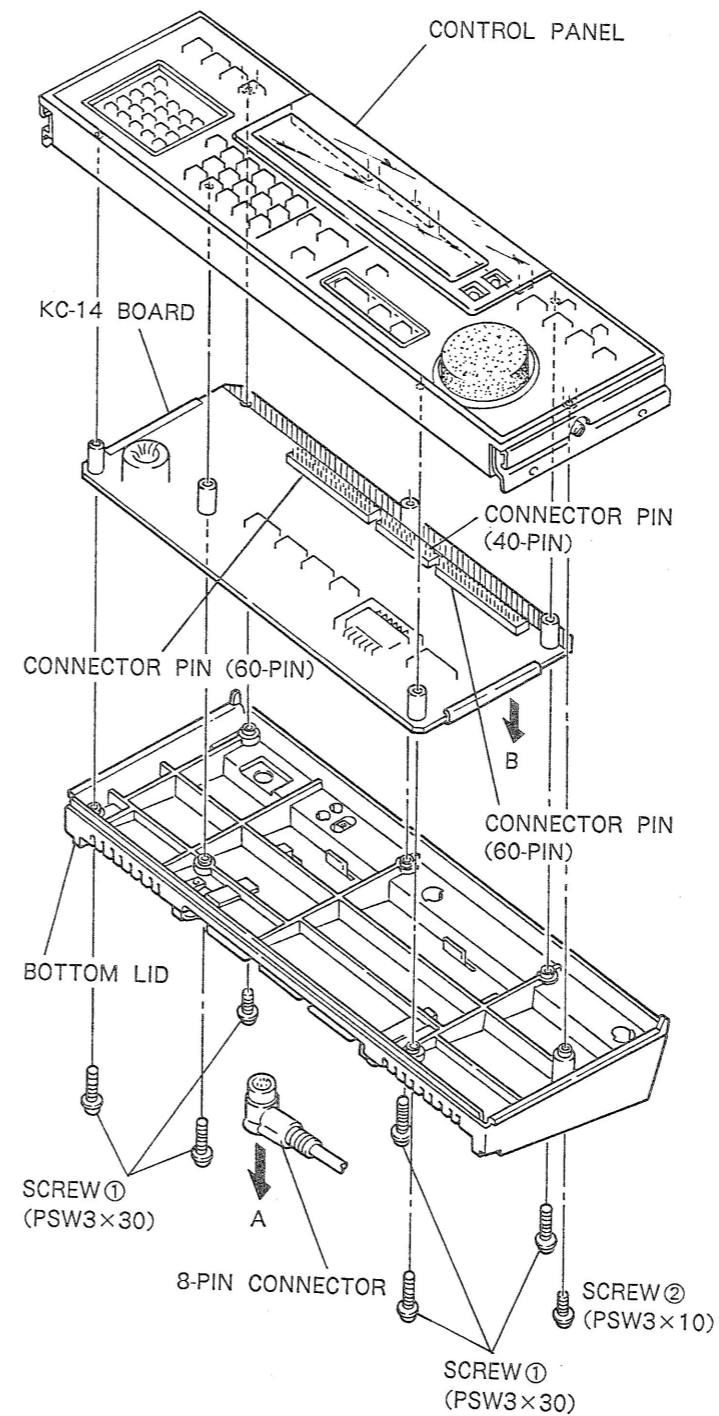
CLOSING THE PANEL

1. Wind up the cord following the arrow marked on the rear of the function control panel.
2. Attach the panel to the panel supports and tighten up the panel mounting screws.
3. While pushing in simultaneously the two release knobs, close the bottom lid.



PARTS ON THE FUNCTION CONTROL PANEL REMOVAL

How to remove the parts that are located inside the function control panel, is described.



REMOVAL

1. Remove the 8-pin connector from the bottom lid in the direction of arrow A.
2. Remove six screws ① and one screw ② and remove the bottom lid.
3. Remove the KC-14 board.
KC-14 board fixes and communicates the signals to the KY-139 board with one 40-pin connector and two 60-pin connectors.

Board Removal

While pushing down the shaded portion of the KC-14 board in the direction of arrow B, open the pin connector equally and then remove the KC-14 board.

Note: When pushing down the board, it is necessary a strong force so that pay attention not to bend the pins due to a heavy load.

4. As for removal of the KY-139/EN-55/DP-63/DET-3 boards and other parts, refer to the exploded views in section D.

LEVEL CONTROL PANEL & AU-109 BOARD REMOVAL

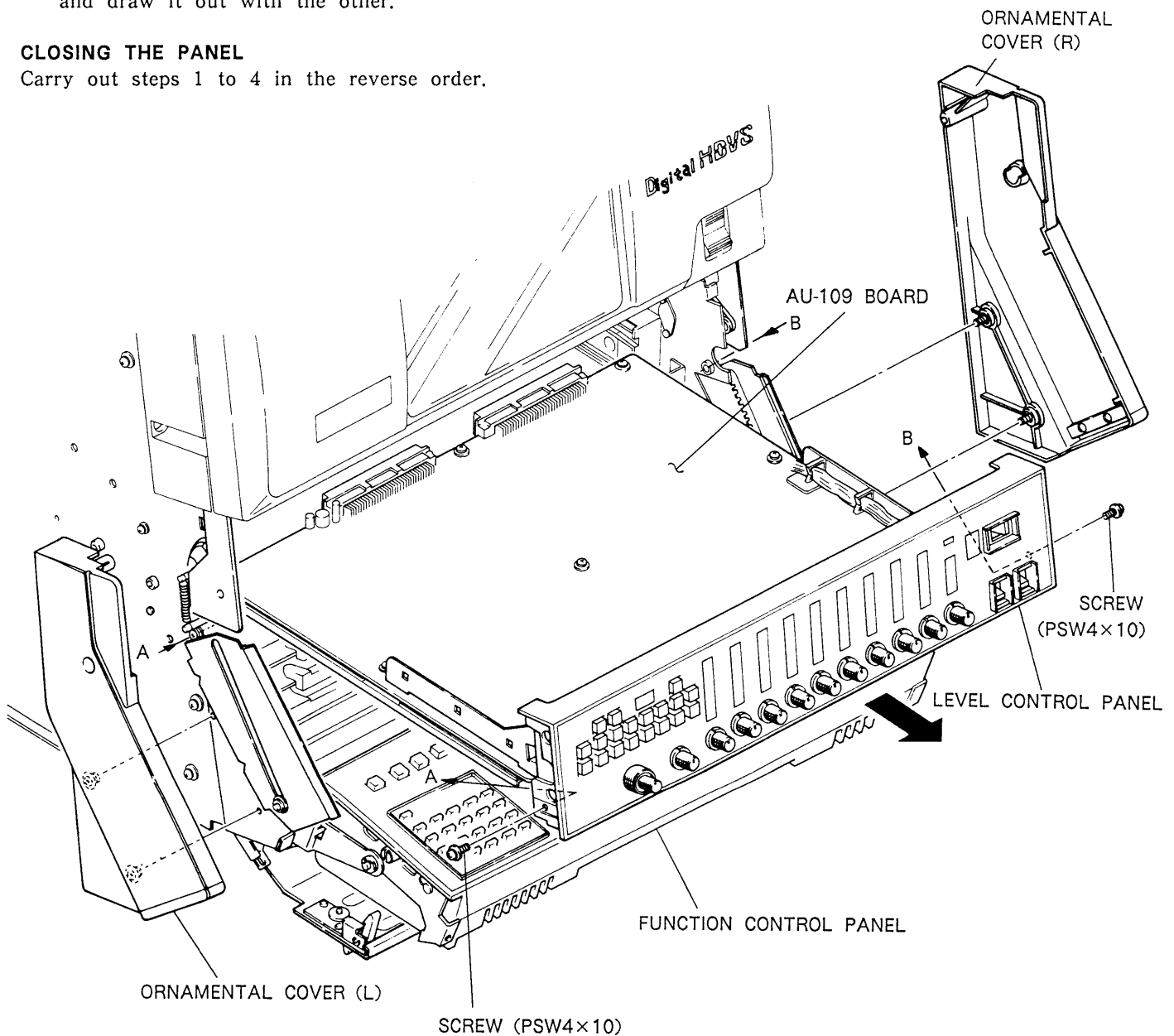
Pull out the level control panel by the following steps when inspecting and adjusting the AU-109 board.

OPENING THE PANEL

1. Open the bottom lid and lower the function control panel. (See the instructions on how to open and close the function control panel.)
2. Remove the ornamental covers (L) and (R). (See the instructions on how to remove the front section and ornamental covers.)
3. Remove the left and right screws that secure the level control panel.
4. Put one hand underneath the level control panel and draw it out with the other.

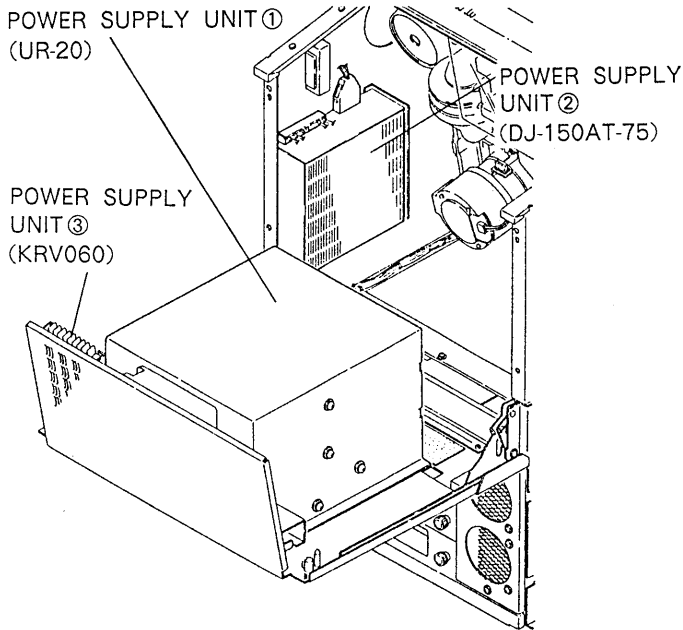
CLOSING THE PANEL

Carry out steps 1 to 4 in the reverse order.



2.3. POWER SUPPLY SECTION PRECAUTIONS

The power supply section of the HDD-1000 is consisted of three power supply units.



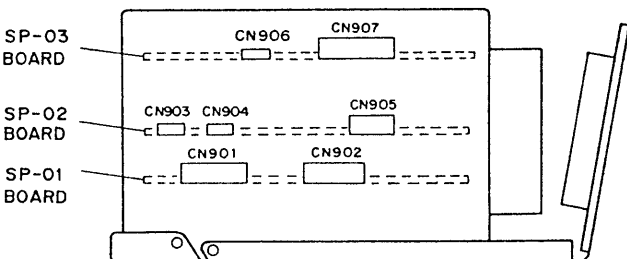
Except power supply unit ① (UR-20), the units can be replaced. This section outlines the precautions applying to power supply unit ①.

2-3-1. Primary Circuit & Electric Shock

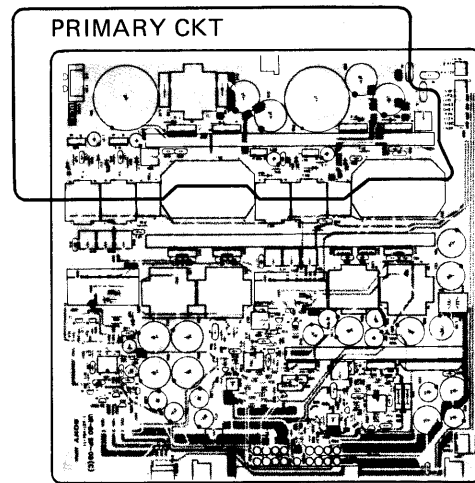
The power supply comprises the SP-01, SP-02 and SP-03 boards, and mounted on the chassis as the power unit.

Since the power supply is mainly on the primary side, it is important to beware of electric shock. The figure below shows the primary side of each board. The heat sinks on the primary zone of the SP-01, SP-02 and SP-03 are also connected to the primary. Note that even after the power switch is turned off, a high voltage remains in the electrolytic capacitors in the power unit and it is dangerous to discharge them rapidly.

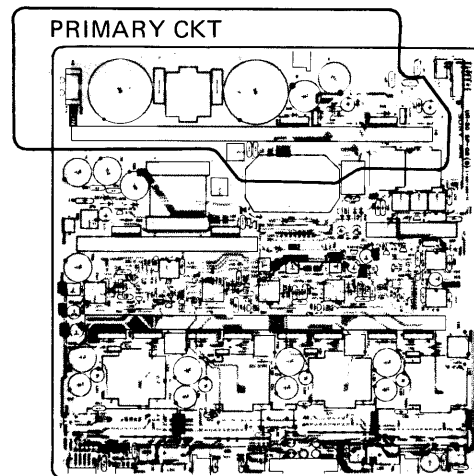
As the input, rectifier circuit and secondary circuit all have different potentials, do not use the same "cold (GND)" for all of them.



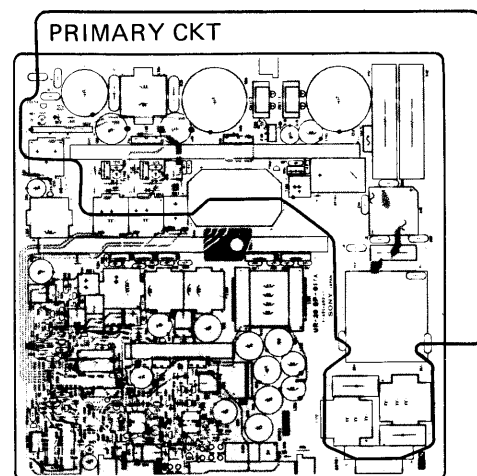
SP-03 BOARD (Component Side)



SP-02 BOARD (Component Side)



SP-01 BOARD (Component Side)



2-3-2. Output Protection Function

If the output of either the ± 5 V, ± 12 V, or ± 18 V preregulator of the power supply unit drops due to a short circuit or if the load across any one of them is unsuitable, all of the outputs will be interrupted. To reset the power supply, first turn the power switch to OFF, wait for about 30 seconds (or for about 2 minutes with a 220/240 V AC power line voltage), and then turn it back to ON again.

2-3-3. LEDs for DC Output Check

Green LEDs are provided on the SP-01 and SP-03 boards for the following output checks :

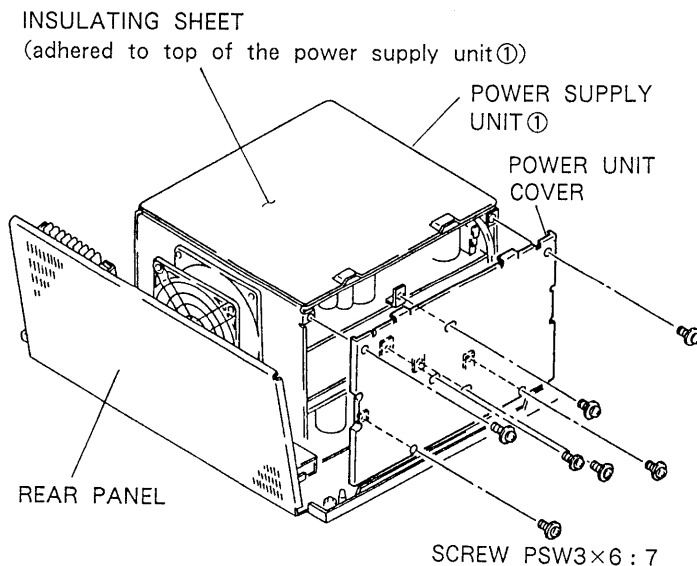
SP-01 board	SP-03 board
D210 : + 5 V	D204 : + 12 V
D217 : - 5 V	D222 : - 12 V
	D220 : + 18 V
	D221 : - 18 V

2-3-4. Power Supply Board Removal

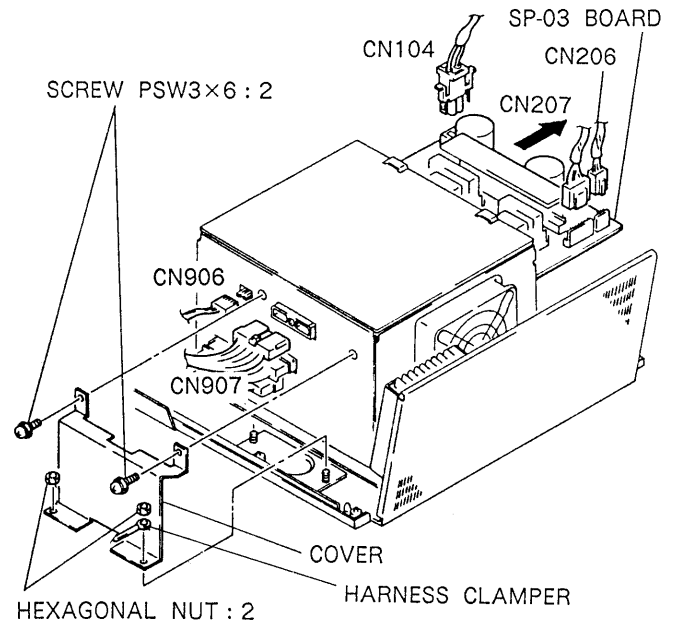
The SP-01, SP-02 and SP-03 power supply boards are located inside the power unit, and they should be removed from the unit as instructed below when they are to be inspected and adjusted.

[SP-03 board removal]

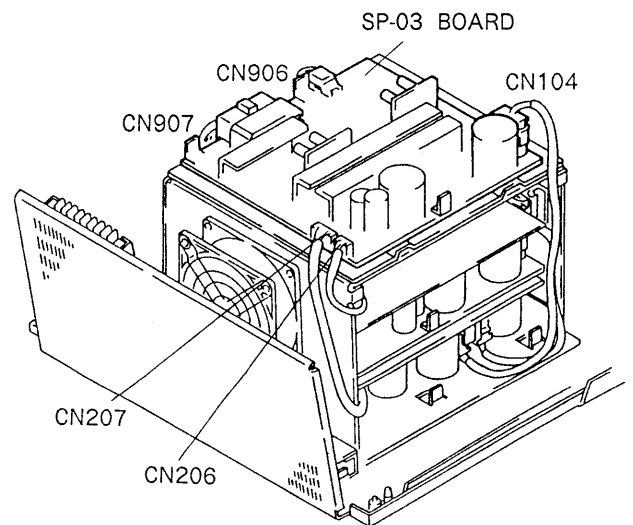
- (1) Refer to section 2-2 and open the rear panel. Remove the cover of the power unit as shown in the figure below.



- (2) Remove the two screws (PSW3 \times 6), the two hexagonal nuts (N3) and the harness clamber. Then, remove the cover.
- (3) Disconnect connectors CN906 and 907. Then, draw out the SP-03 board slightly and disconnect connectors CN104, 206 and 207 from the board.



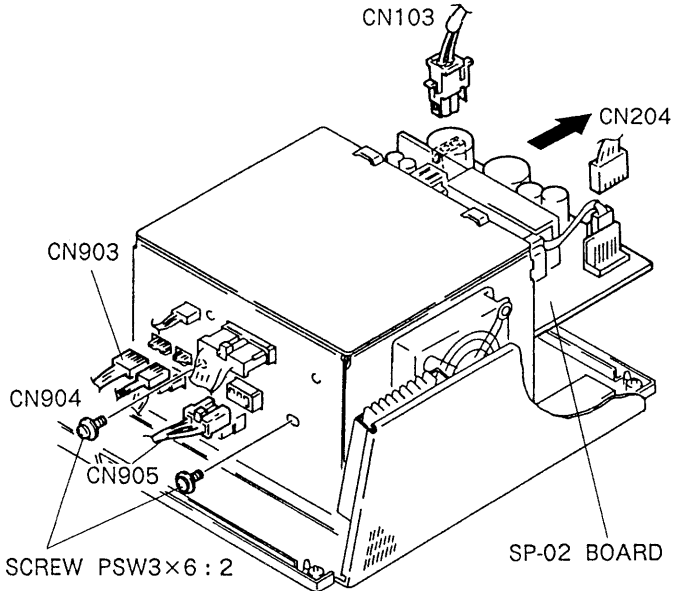
- (4) Place the SP-03 board on top of the power unit and connect connectors CN104, 206, 207, 906 and 907 to the SP-03 board. Now proceed to inspect and adjust the SP-03 board.



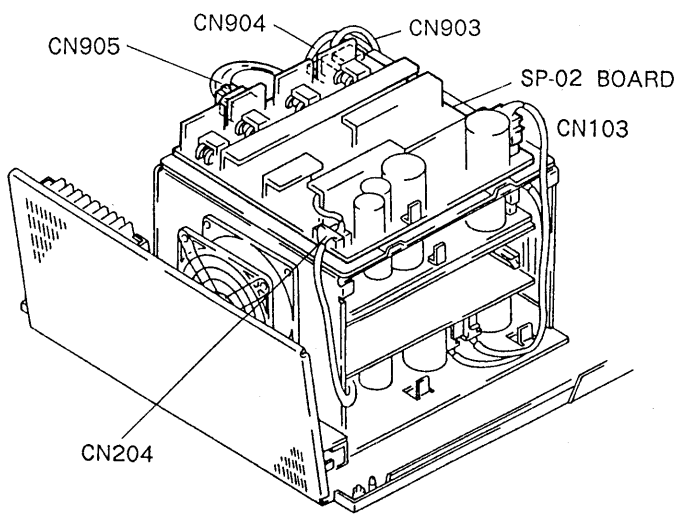
- (5) Upon completion of the inspection and adjustment, return the SP-03 board to the inside of the power unit following the procedure for its removal in reverse.

[SP-02 board removal]

- (1) Remove the cover of the power unit. Refer to step (1) and (2) describing the removal of the SP-03 board.
- (2) Disconnect connectors CN903, 904 and 905 and remove the two screws (PSW3×6). Then, draw out the SP-02 board slightly and disconnect connectors CN103 and 204 from the board.



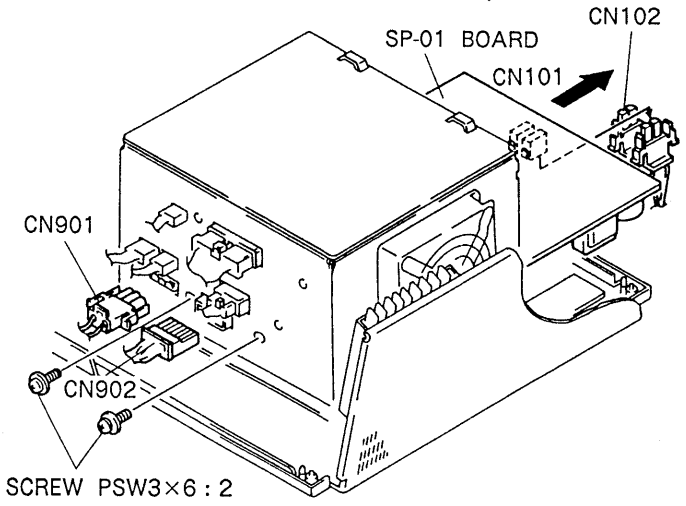
- (3) Place the SP-02 board on top of the power unit and connect connectors CN103, 204, 903, 904 and 905 to the SP-02 board. Now proceed to inspect and adjust the SP-02 board.



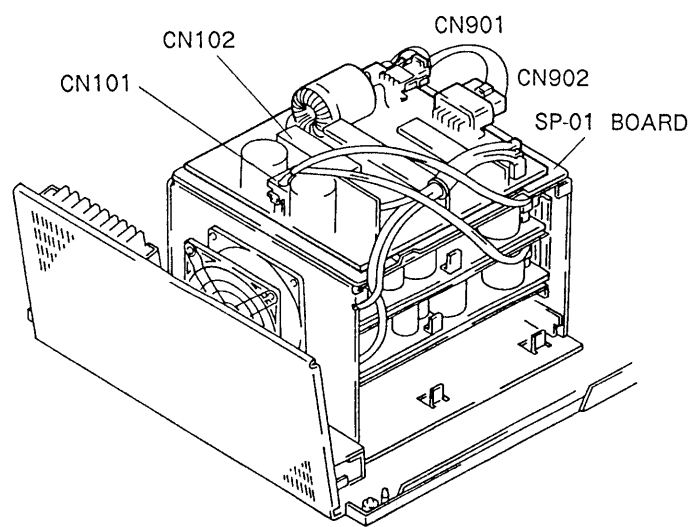
- (4) Upon completion of the inspection and adjustment, return the SP-02 board to the inside of the power unit following the procedure for its removal in reverse.

[SP-01 board removal]

- (1) Remove the cover of the power unit. Refer to step (1) and (2) describing the removal of the SP-03 board.
- (2) Disconnect connectors CN901 and 902 and remove the two screws (PSW3×6). Then, draw out the SP-01 board slightly and disconnect connectors CN101 and 102 from the board.



- (3) Place the SP-01 board on top of the power unit and connect connectors CN101, 102, 901 and 902 to the SP-01 board. If the harnesses of the connectors CN901 and 902 are short, remove their clamping bands. Now proceed to inspect and adjust the SP-01 board.



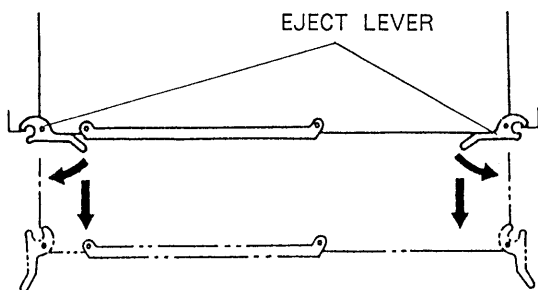
- (4) Upon completion of the inspection and adjustment, return the SP-01 board to the inside of the power unit following the procedure for its removal in reverse.

2.4. PLUG-IN BOARDS PULLING OUT/ INSERTION

Wait at least 2 seconds after having switched off the power before removing or inserting any of the plug-in boards.

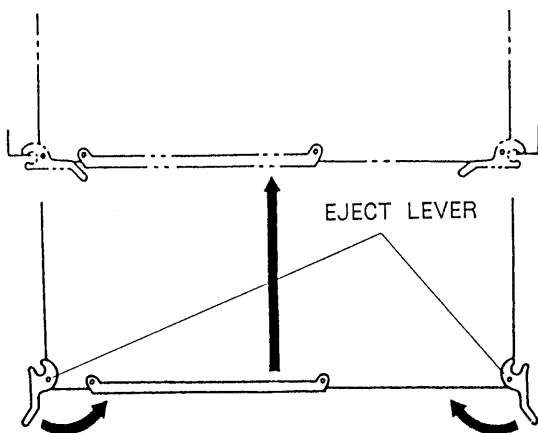
Plug-in boards pulling out

Pull up the eject levers on the board in the direction of the arrow for disconnecting the plug in board from the connectors on the mother boards. Then, pull out the boards.



Plug-in boards insertion

Insert the boards while pulling up the eject levers. Then, firmly press the eject levers in the direction of the arrow for connecting the plug-in board to the connectors on the mother boards.



The AU-109 board is located at the rear of the level control panel. Refer to section 2-2 how to remove the level control panel when removing this board.

2.5. NOTES FOR CHECKING CONNECTOR PANEL

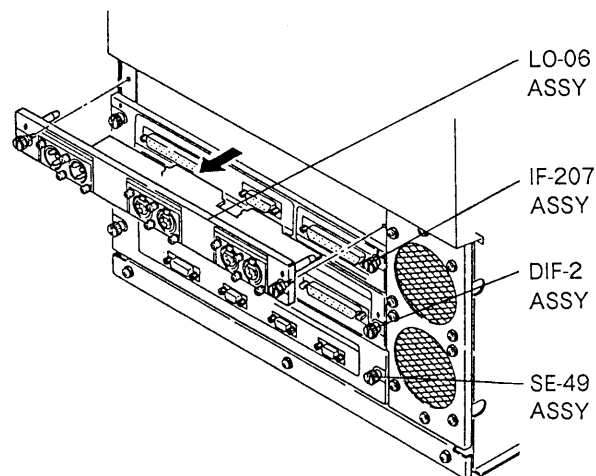
When checking the boards of the connector panels, remove the upper connector panels and open the power supply unit, then check the board of the lower panel.

LO-06 board : Open the power supply unit and check this board.

IF-207 board : Remove the LO-06 ASSY, then open the power supply unit, and check this board.

DIF-2 board : Remove the LO-06 ASSY and IF-207 ASSY, then open the power supply unit and check this board.

SE-49 board : Remove the LO-06 ASSY, IF-207 ASSY, and DIF-2 ASSY, then open the power supply unit and check this board.



2-6. NOTES ON REPAIR PARTS

2-6-1. Notes on Repair Parts

(1) Safety Related Components Warning

Components marked with \triangle on the schematic diagrams, exploded views and electrical spare parts list are critical to safe operation. Replace these components with Sony parts whose part numbers appear in this manual or in service bulletins and service manual supplements published by Sony.

(2) Standardization of Parts

Repair parts supplied from Sony Parts Center may not be always identical with the parts which actually in use due to "accommodating the improved parts and/or engineering changes" or "standardization of genuine parts". This manual's exploded views and electrical spare parts list are indicating the part numbers of "the standardized genuine parts at present".

(3) Change of Parts

Regarding engineering parts changes, refer to Section E. "CHANGED PARTS".

(4) Stock of Parts

Parts marked with "o" SP (Supply Code) column of the spare parts list are not normally required for routine service work. Orders for parts marked with "o" will be processed, but allow for additional delivery time.

(5) Units for Capacitors, Inductors and Resistors

The following units are assumed in schematic diagrams, electrical parts list and exploded views unless otherwise specified.

Capacitors : μ F
Inductors : μ H
Resistors : Ω

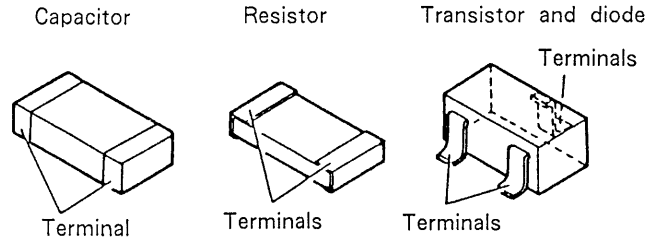
2-6-2. Replacement Procedure of Chip Parts

Required Tools

Soldering iron 20 W ;
If possible, use the soldering iron tip heat-controller at 270 ± 10 °C.
Braided wire ;
SOLDER TAUL or equivalent
Sony part No. 7-641-300-81
Tweezers

Soldering Conditions

Soldering iron temperature ;
 270 ± 10 °C
Soldering time ;
Less than two seconds per a pin



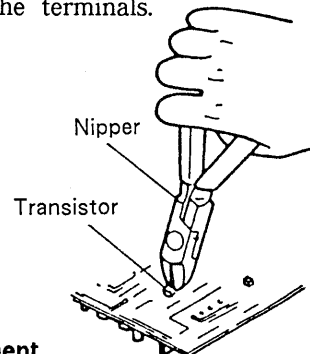
Resistor and Capacitor Replacement

1. Place the soldering iron tip onto the chip part and heat it up until the solder is melted. When the solder is melted, slide the chip part aside.
2. Make sure that there is no pattern peeling, damage and/or bridge around the desoldering positions.
3. After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
4. Place new chip part in the desired position and solder both ends.

Note: Never use the chip part again once it has been removed.

Transistor and Diode Replacement

1. Cut the terminals of the chip part with nippers.
2. Remove the leads cut as above.
3. Make sure that there is no pattern peeling, damage and/or bridge around the desoldering positions.
4. After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
5. Place new chip part in the desired position and solder the terminals.



IC Replacement

1. Using the braided wire, "SOLDER TAUL" Sony Part No. 7-641-300-81, remove the solder around the pins of the IC-chip to be removed.
2. While heating up the pins, remove the pins one by one using sharp-pointed tweezers.
3. Make sure that there is no pattern peeling, damage and/or bridge around the desoldering positions.
4. After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
5. Place new chip part in the desired position and solder the pins.

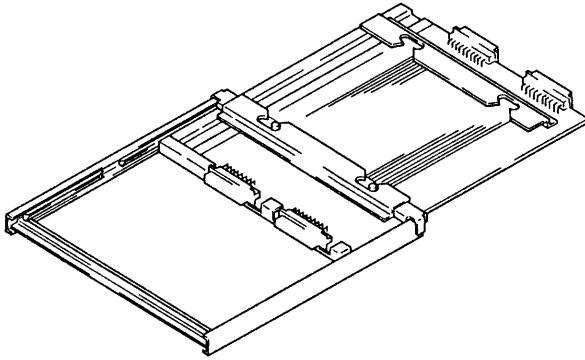
2.7. MAINTENANCE TOOLS/FIXTURES

The test fixtures and the tools for checking and repairing the HDD-1000 and the HDDP-1000 are shown below.

Extension Board EX-136

Sony Part No. A-6001-007-A

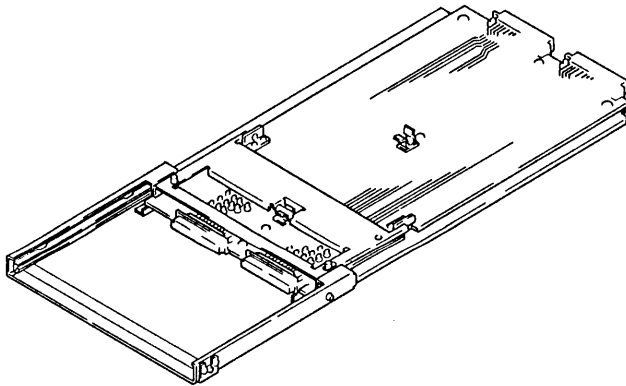
EX-136 board is used when checking or repairing the plug-in circuit board in the card rack. The HDD-1000 has one piece of EX-136 board as an accessory.



Extension Board EX-186

Sony Part No. A-6001-018-A

EX-186 board is used when checking or repairing the plug-in circuit board in the card rack of the HDDP-1000. The HDDP-1000 has one piece of EX-186 board as an accessory.

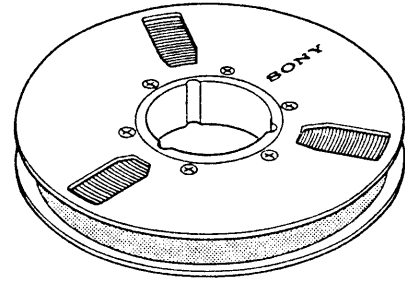


Alignment Tape

Following two kinds of alignment tapes are prepared for the HDD-1000.

FR2-1 : For tape path adjustment
Sony Part No. 8-960-072-11

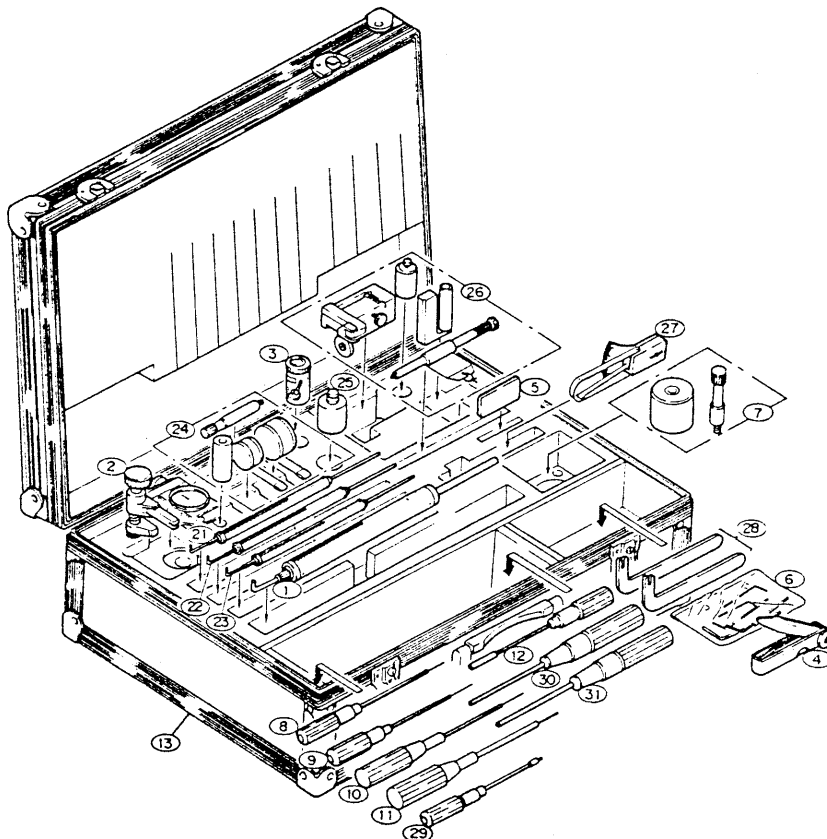
FR5-1 : For electrical adjustment
Sony Part No. 8-960-072-01



BVH-3000 Tool Kit

Sony Part No. J-6252-330-A

Tool kit for the BVH-3000 can be used for the HDD-1000, however, all tools for servicing the HDD-1000 are not included. Prepare a necessary tools referring to the following list.



USED FOR

	BVH-3000	BVH-2XXX series	BVH-1180 series	HDD-1000	HDV-1000
--	----------	-----------------	-----------------	----------	----------

INCLUDED

1. J-6041-640-A Tension Scale, 5 kgrams	○	○	○	○	○
2. J-6250-800-A Drum Eccentricity Adj. Gauge	○	○	○	○	○
3. J-6040-460-A Tapered Screws	○	○	○	○	○
4. J-6041-670-A Thickness Gauge	○	○	○	○	○
5. J-6040-160-A Flat Plate	○	○	○	○	○
6. J-6041-700-B L-shaped Hex. Wrench Set	○	○	○	○	○
7. J-6251-960-A Tension Adjustment Tool	○	○	○	○	○
8. 7-700-766-02 Hex. Screw Driver, 1.4 mm	○	○	○	○	○
9. 7-700-766-03 Hex. Screw Driver, 2 mm	○	○	○	○	○
10. 7-700-766-04 Hex. Screw Driver, 2.5 mm	○	○	○	○	○
11. 7-700-766-05 Hex. Screw Driver, 3 mm	○	○	○	○	○
12. 7-700-751-02 Nut Driver, 5.5 mm	○	○	○	○	○
13. J-6250-232-A Carrying Case	○	○	○	○	○

OPTIONS

21. J-6040-310-A Tension Scale, 500 grams	-	-	○	-	-
22. J-6041-630-A Tension Scale, 200 grams	-	-	○	-	-
23. J-6042-670-A Tension Scale, 1 kgrams	-	○	○	-	-
24. J-6043-120-B Tension Adjustment Tool	-	○	○	-	○
25. 7-741-100-01 Weight, 200 grams	-	-	○	-	-
26. J-6040-320-A Tension Adjustment Tool	-	-	○	-	-
27. 7-732-050-10 Sector Gauge, 20 grams	-	-	○	-	-
28. J-6041-650-A Tension Arm Bending Tools	-	-	○	-	-
29. J-6040-070-A Eccentric Screw Driver	-	○	○	-	○
30. 7-721-050-63 TOTSU Screw Driver, 3 mm	-	○	○	-	○
31. 7-721-050-64 TOTSU Screw Driver, 4 mm	-	○	○	-	○

Upper Drum Eccentricity Adj. Tool (For BVH-3000)**

Sony Part No. J-6250-800-A

Adjustment Pin (HD)

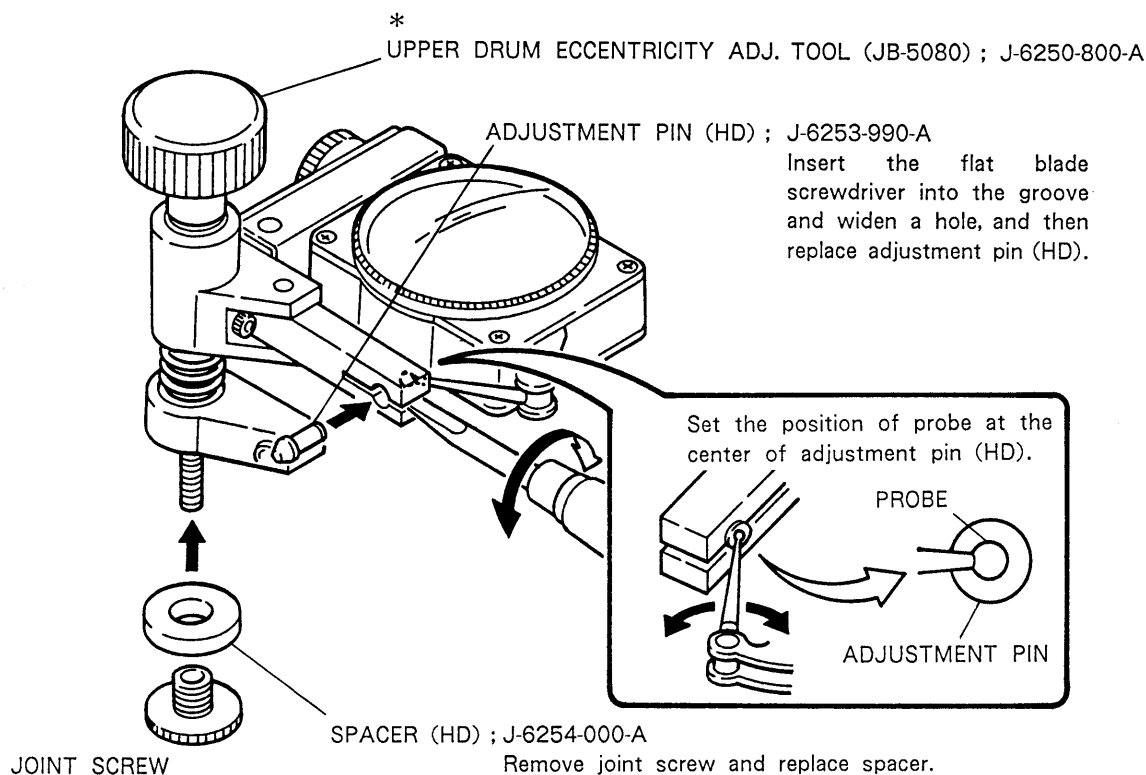
Sony Part No. J-6253-990-A

Spacer (HD)

Sony Part No. J-6254-000-A

Upper Drum Eccentricity Adj. Tool for HDD-1000

This tool is used for adjusting the upper drum eccentricity and for checking the rotary head projection. When servicing the HDD-1000, adjustment pin and spacer should be replaced.



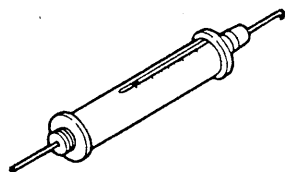
Note :

1. Before replacement, clean the surface of each part.
2. Be sure to keep replaced adjustment pin and spacer for the BVH-3000, if necessary, because they can be used for adjusting the BVH-3000.

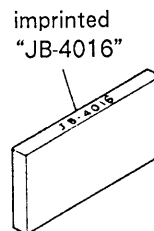
	HDD-1000	BVH-3000 series
Adjustment Pin	J-6253-990-A White	J-6250-810-A Black
Spacer	J-6254-000-A White, 3.77 mm in thickness	J-6254-330-A Black, 3.10 mm in thickness

Note : Tools marked with asterisk (*) are containing with the BVH-3000 tool kit.

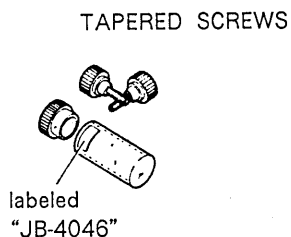
*
Tension Scale 5 kg
 Sony Part No. J-6041-640-A
 The 5 kg tension scale is used when performing the pinch roller pressure adjustment.



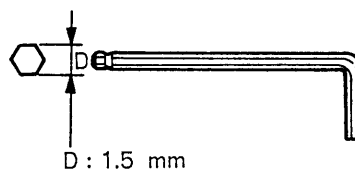
*
Flat Plate
 Sony Part No. J-6040-160-A
 Flat plate is used when adjusting or checking the stationary head zenith.



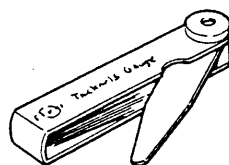
*
Tapered Screw
 Sony Part No. J-6040-460-A
 This tool consists of two tapered screws and used for position adjustment when replacing the upper drum.



*
Ball-Point Hexagonal Wrench
 Sony Part No. 7-721-130-51
 This wrench is used when adjusting the stationary head azimuth.

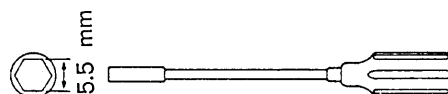


*
Thickness Gauge
 Sony Part No. J-6041-670-A
 Thickness gauge is used when adjusting the position of mechanical parts.



thickness (mm)		
0.03	0.04	0.08
0.09	0.10	0.11
0.12	0.13	0.14
0.15	0.20	0.25
0.30	0.35	0.40
0.45	0.50	0.60
0.75	0.80	0.90
1.00		

*
Nut Screwdriver 5.5 mm
 Sony Part No. 7-700-751-02
 This screwdriver is used when replacing the power unit or the reel motor.

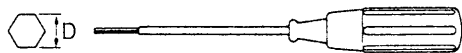


Note : Tools marked with asterisk (*) are containing with the BVH-3000 tool kit.

*

Hexagonal Screwdrivers

- Sony Part No. 7-700-766-02 (1.4 mm)
- Sony Part No. 7-700-766-03 (2.0 mm)
- Sony Part No. 7-700-766-04 (2.5 mm)
- Sony Part No. 7-700-766-05 (3.0 mm)

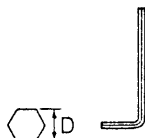


D=1.4, 2.0, 2.5 or 3.0 mm

*

L-shaped Hexagonal Wrench Set

- Sony Part No. 7-700-736-00
- Sony Part No. J-6041-700-B

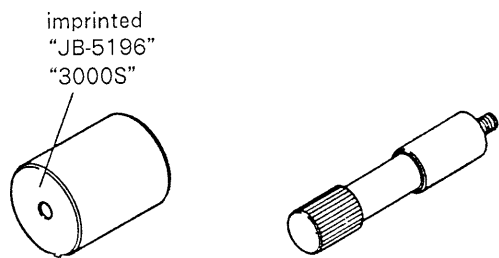


D (mm)	7-700-736-00	J-6041-700-B
1.27	○	
1.4	○	
1.5	○	○
1.58	○	
2.0	○	○
2.5	○	○
3.0	○	○
4.0	○	○
5.0	○	○
6.0	○	
8.0	○	
10	○	

*

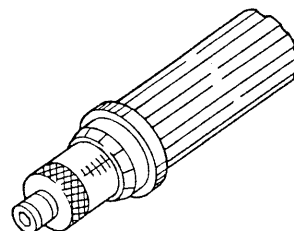
Tension Adjustment Tool

Sony Part No. J-6251-960-A
This tool is used when adjusting the tape tension.



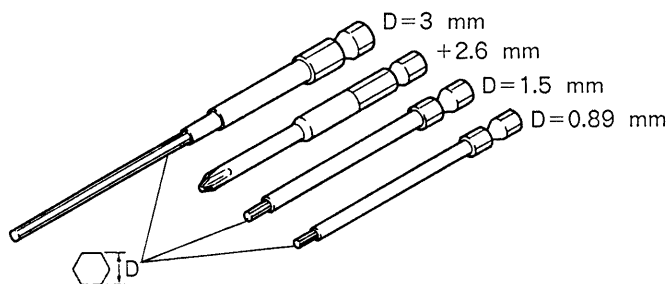
Torque-Screwdriver

Sony Part No. J-6252-510-A 60×10^{-2} N·m {6 kgf·cm}
 Sony Part No. J-6252-520-A 120×10^{-2} N·m {12 kgf·cm}
 Sony Part No. J-6252-530-A 260×10^{-2} N·m {26 kgf·cm}
 Torque-screwdriver is used for specifying the tightening torque when replacing the upper drum and the stationary head.



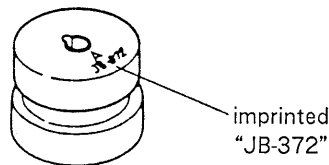
Bits Set of Torque-Screwdriver

Sony Part No. J-6253-970-A
Bits set is used in combination with above torque-screwdriver.



Brake Adjustment Tool

Sony Part No. J-6043-720-A
This tool is used when replacing the reel motor, brake band or brake solenoid.

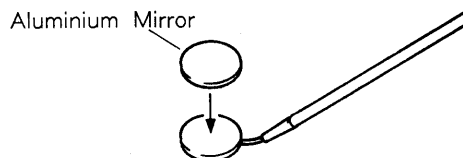


Dental Mirror

Sony Part No. 7-723-902-00
Dental mirror is used for observing the tape path.

Aluminium Mirror

Sony Part No. J-6257-680-A
This aluminium mirror is adhered on the dental mirror like following figure.

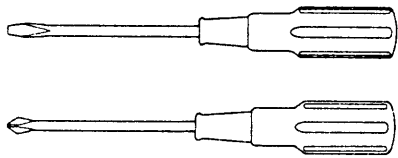


Note: Tools marked with asterisk (*) are containing with the BVH-3000 tool kit.

Flat Blade Screwdriver

Phillips Screwdriver

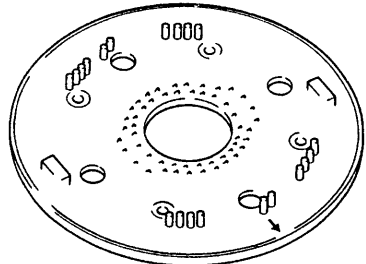
These screwdrivers are necessary for servicing the unit.



Video REC Head Playback Tool, UDR-J1

Sony Part No. J-6265-780-A

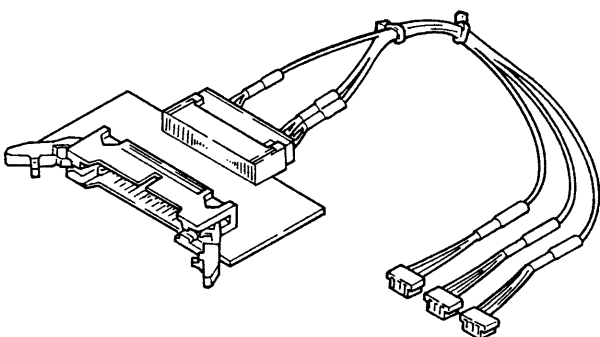
By using this tool, video REC head can be converted as playback head when adjusting the CTL head position.



Audio REC Head Playback Tool

Sony Part No. J-6266-310-A

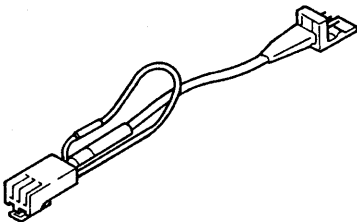
This tool is used when adjusting the height or azimuth of audio REC head. By using this tool, audio REC head can be converted as playback head.



Video Erase Extension Harness

Sony Part No. J-6266-300-A

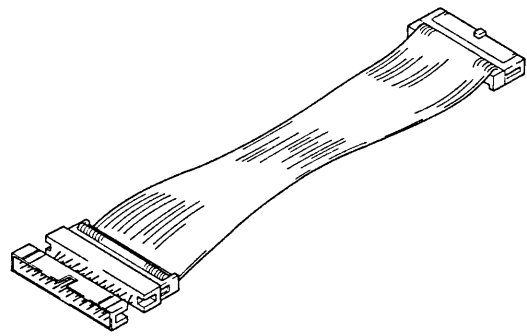
This harness is used when adjusting the video erase current.



Audio REC Extension Harness

Sony Part No. J-6266-030-A

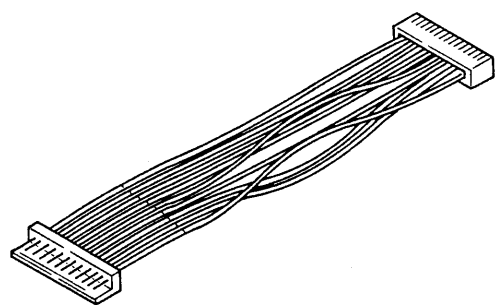
This harness is used when adjusting the audio erase current.



Audio Erase Extension Harness

Sony Part No. J-6266-040-A

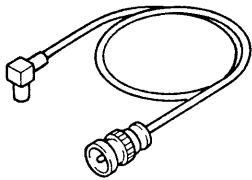
This harness is used when adjusting the CTL, CUE and time code currents.



BNC-UM Cable

Sony Part No. J-6264-360-A

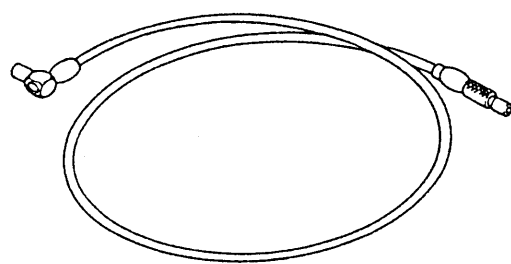
This cable is used for observing the RF waveform.



Coaxial Cable

Sony Part No. 1-942-822-11

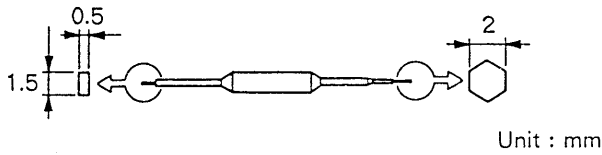
This cable is used as extension cable when checking or repairing the ADA-12 board of the HDDP-1000. Eight cable are necessary and eight cables are supplied with HDDP-1000.



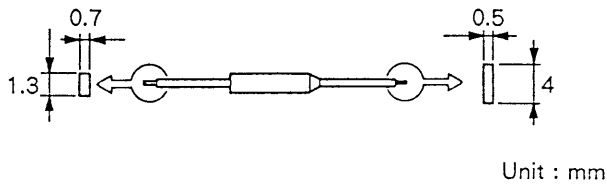
Alignment Screwdriver

Alignment screwdriver is used when adjusting the variable resistors and variable inductors.

① Sony Part No. 7-700-733-01



② Sony Part No. 7-700-733-02



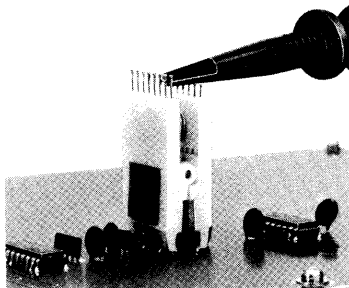
IC Test Clip

Sony Part No. J-6350-280-A (TC-8)

Sony Part No. J-6041-770-A (TC-16)

Sony Part No. J-6041-780-A (TC-20)

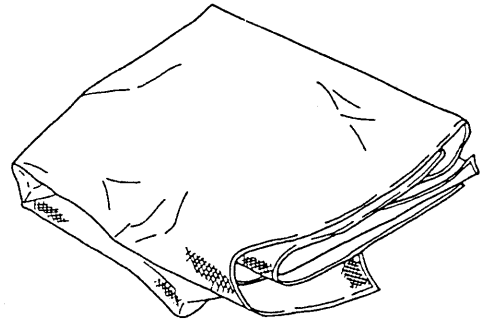
When connecting the test probe to the terminal of DIP integrated circuit, these clips are convenient. Type TC-16 is for DIP 14-pin or 16-pin IC and Type TC-20 is for 18-pin or 20-pin IC.



Cleaning Cloth

Sony Part No. 3-178-770-01

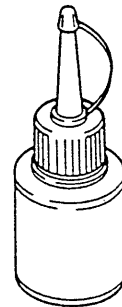
This cleaning cloth is used when cleaning the surface of tape path mechanism (tape guide, drum video head, stationary head).



Cleaning Fluid

Sony Part No. 9-919-573-00

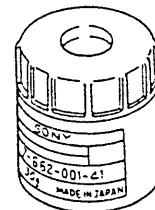
This cleaning fluid is used when cleaning the surface of tape path mechanism (tape guide, drum, video head, stationary head).



MOLITOM Grease 30G (No. 1)

Sony Part No. 7-662-001-41

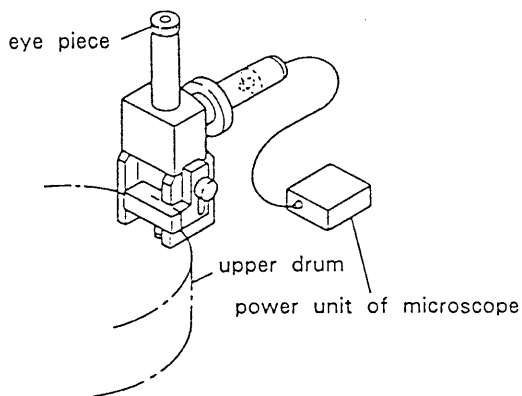
This grease is used as lubricating oil for mechanical parts.



Head Tip Microscope

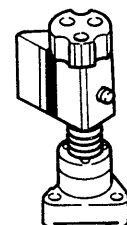
Sony Part No. J-6252-210-A

The head tip microscope is used when observing the surface of rotary heads. Please refer to the instruction sheet supplied to the microscope.



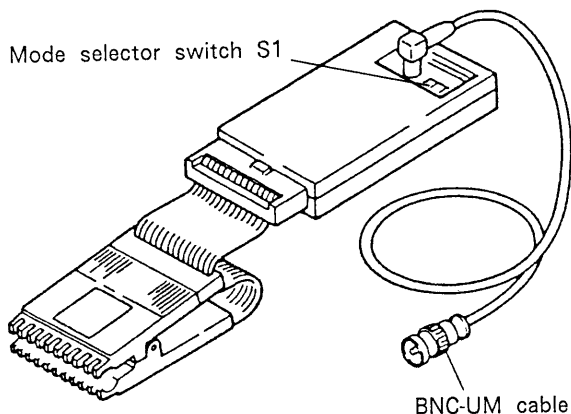
TC Position Adjustment Tool

Sony Part No. J-6256-550-A



Roving DAC

Sony Part No. J-6263-470-A



Supplied with a cable with a BNC plug and a mini-RF plug (BNC-UM cable : J-6264-360-A, 1 m)

Roving DAC is used for checking and diagnosing the digital TBC. The roving DAC is connected to the 8-bit D-type flip flop IC such as LS273/573 (20 pins). It takes out the 8-bit parallel data from the digital circuit, converts those data from digital signals to an analog signal and outputs the analog signal. Check and diagnose the digital circuit easily by observing the output signal with an oscilloscope.

Precautions on Handling the Roving DAC

Pay attention to the following points when using the roving DAC.

- Make sure to turn off the power of the measured equipment before installing or removing.
- Even if a protection circuit against the inverted insertion is provided, check that the pin mark No.1 of the IC before turning the power on. When they are connected properly, the green LED lights on when turning the power on.
- Set the mode selector switch S1 located in the roving DAC according to the pin assignment and the LSB and MSB assignment of the IC to be observed.
- Avoid using ICs other than those specified. It might cause trouble.
- Do not pull or exert a strong force on the cable between the main body and the IC clip, or the connection cable between the main body and the oscilloscope.

Setting of Mode Selector Switch(S1)

In the HDDP-1000, it can be used in accordance with the setting of * 1 and * 2 as shown in table below.

ICs that is set by * 1.

Board Name	IC Ref No.
SP-06	G30, 31, H30, 31, J30, 31, K30, 31

ICs that is set by * 2.

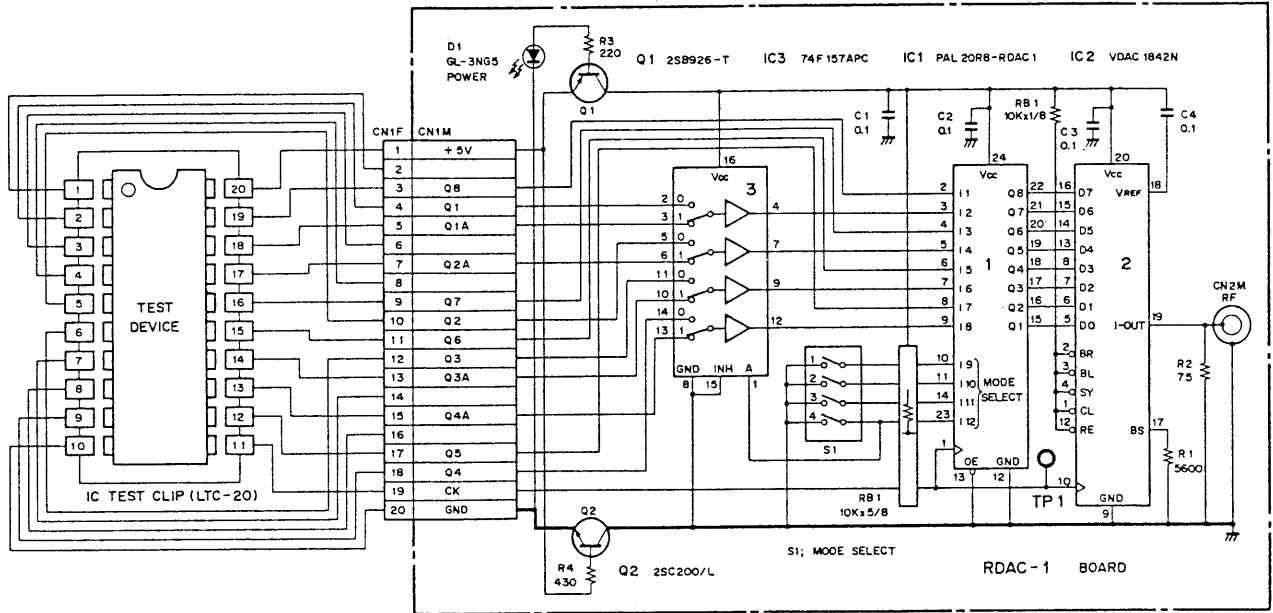
ICs other than * 1.

		PIN ASSIGNMENT (PIN NO.)								S1-4	S1-3	S1-2	S1-1
		D7	D6	D5	D4	D3	D2	D1	D0				
		16	19	2	5	12	15	6	9	ON	ON	ON	ON
		19	16	15	12	9	6	5	2	ON	ON	ON	OFF
* 1		2	5	6	9	12	15	16	19	ON	ON	OFF	ON
		19	2	16	5	15	6	12	9	ON	ON	OFF	OFF
		12	9	15	6	16	5	19	2	ON	OFF	ON	ON
* 2		2	19	5	16	6	15	9	12	ON	OFF	ON	OFF
		19	18	17	16	15	14	13	12	OFF	ON	ON	ON
		12	13	14	15	16	17	18	19	OFF	ON	ON	OFF

Setting of Mode Selector Switch (S1)

Schematic Diagram and Components

The schematic diagram of the roving DAC and the parts list are as follows.



Ref. No. or Qty	Part No.	Description
1pc	J-6263-470-A	ROVING DAC
1pc	————	IC TEST CLIP, LTC-20 Manufacturer ; AP PRODUCTS INCORPORATED
1pc	J-6264-360-A	COAXIAL CABLE ASSY, BNC-UM 1 m
C1, 2, 3, 4	1-161-485-00	CAP, CERAMIC 0.1 50 V
CN1M	1-564-857-11	RECEP, PS 20P, MALE
CN2M	1-561-365-21	RECEP, COAXIAL, MALE
D1	1-719-930-50	DIODE, LED, GL-3NG5 GREEN
IC1	J-6264-370-A	IC, PAL20R8-RDAC1
IC2	————	IC, VDAC1842N ; D/A CONVERTER Manufacturer ; INTECH
IC3	8-759-938-93	IC, 74F157APC
Q1	8-729-808-18	TRANSISTOR, 2SB926-T
Q2	8-729-100-12	TRANSISTOR, 2SC2001L
R1	1-215-439-00	RES, METAL, 5.6 K 1 % 1/6 W
R2	1-215-394-00	RES, METAL, 75 1 % 1/6 W
R3	1-215-405-00	RES, METAL, 220 1 % 1/6 W
R4	1-215-412-00	RES, METAL, 430 1 % 1/6 W
RB1	1-231-410-00	RESISTOR BLOCK, 10 k × 8
S1	1-570-598-11	SWITCH, DIP, 4-CKT



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SECTION 3

DIAGNOSIS FUNCTION

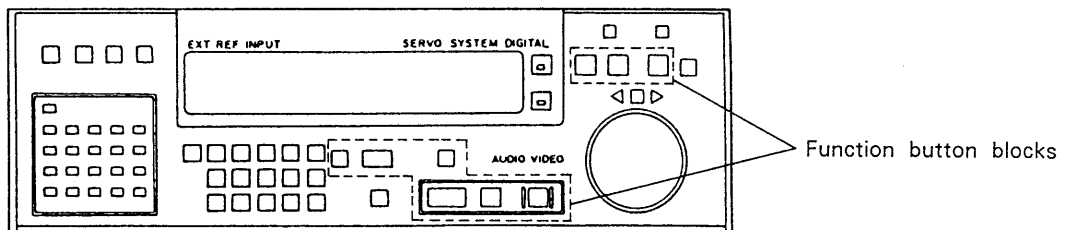
3-1. ERROR MESSAGES

If an error occurs after turning the power on or during operation, an appropriate error message is displayed on the function control panel of the VTR. The error message can be superimposed on the TV monitor by one or the menu settings (S59. MIXED CHARA OUTPUT).

The error messages, and the cause of each error are listed next.

The function buttons are as shown below.

Function control panel



ABORT : If one of the following errors occurs, this message is displayed, and the HDD-1000 automatically stops. This message disappears when one of the function buttons is pressed.

- In the AUTO EDIT or PREVIEW mode, if the synchronization is not done or the servo lock is six frames out before the audio or video IN point.
- In the AUTO EDIT or PREVIEW mode with two VTRs, if PREROLL is done without the cue-up status being set, although the PREROLL command was issued to the other VTR.

AD38 BD : The AD-38 board in the HDDP-1000 is not securely inserted, or the bus-interface of the board or the interface between the HDD-1000 and HDDP-1000 is defective.

ADA12 BD : The ADA-12 board in the HDDP-1000 is not securely inserted, or the bus-interface of the board or the interface between the HDD-1000 and HDDP-1000 is defective.

ADA12 SW : The LOCAL/REMOTE select switch (S1-8/ADA-12 board) in the HDDP-1000 is set to ON. When this message is displayed, set to OFF.

AU109 BD : The AU-109 board in the HDD-1000 is not securely inserted, or the bus-interface of the board is defective.

CF39 BD : The CF-39 board in the HDDP-1000 is not securely inserted, or the bus-interface of the board or the interface between the HDD-1000 and HDDP-1000 is defective.

CI05 BD : The CI-05 board in the HDDP-1000 is not securely inserted, or the bus-interface of the board or the interface between the HDD-1000 and HDDP-1000 is defective.

CI05 SW : The TEST ON/OFF switch (S2-8/CI-05 board) in the HDDP-1000 is set to ON. When this message is displayed, set to OFF.

- CLN HEAD ¹⁾: This message is displayed after the power is turned on or when TAPE OUT is detected. Clean the heads (see Section 5-2 Maintenance). This message disappears when the STOP button is pressed or the front cover is opened and then closed again.
- CLOG DET ¹⁾: The video playback heads may be clogged. Clean the heads (see Section 5-2 Maintenance).
- COM REF: The reference signals for video recording and audio recording/playback are not input. Select the correct reference signal with one of the menus (S12 COMMON REF SELECT, and I80 INPUT ANALOG/DIGITAL). For details, see the operation manual for the HDD-1000, Section 1-4-4 Initial Setup Menu.
- COM REF*: The frequency of the reference signals for video recording and audio recording/playback are incorrect. Select the correct input frequency with either the REF SYNC SELECT switch (S6/SG-151 board) or video input/output signal selection (see the operation manual for the HDD-1000, Section 1-4-4 Initial Setup Menu).
- CONCEAL ¹⁾: This message is displayed when the unit is in the REC or EDIT REC CONFI mode and large errors which can be corrected occur in the video playback signal and are concealed.
- DA28 BD: The DA-28 board in the HDDP-1000 is not securely inserted, or the bus-interface of the board or the interface between the HDD-1000 and HDDP-1000 is defective.
- DATA ERR: If one of the following errors occurs, this message is displayed. The message disappears when one of the function buttons or the C key is pressed.
 - If an invalid value is set as time data (for example, 65 seconds, 35 frames, etc.).
 - If an undefined command is received from the remote controller.
- DEC41 BD: The DEC-41 board in the HDDP-1000 is not securely inserted, or the bus-interface of the board or the interface between the HDD-1000 and HDDP-1000 is defective.
- DEC41 SW: The NORM/TEST switch (SW2/DEC-41 board) in the HDDP-1000 is set to TEST (1 to F). When this message is displayed, set to 0.
- DP95 BD: The DP-95 board in the HDDP-1000 is not securely inserted, or the bus-interface of the board or the interface between the HDD-1000 and HDDP-1000 is defective.
- DRC1 BD: The DRC-1 board in the HDD-1000 is not securely inserted, or the bus-interface of the board is defective.
- EMPH MIS ¹⁾: The emphasis setting displayed when the EMPH button on the level control panel is not identical to the emphasis data in the tape playback signal.
- FORM MIS ¹⁾: This message is displayed if edit preset is performed and the unit put into the PLAY mode when the mode set by the Menu I71 AUDIO DOUBLE RECORD is not identical to the mode of the tape playback signal. In this case, the SERVO alarm lamp lights, and editing cannot be done.
- IF BOARD: The IF-207 board in the HDD-1000 is not securely inserted, or the bus-interface of the board is defective.
- IO33 BD: The IO-33, IO-34, IO-39 or IFA-5 board in the HDDP-1000 is not securely inserted, or the bus-interface of the board or the interface between the HDD-1000 and HDDP-1000 is defective.
- LINE ERR: The CONTROL P or R button of the HDD-1000 has been pressed when the master VTR is connected to one of the REMOTE-1/2 connectors of this VTR. This message disappears when one of the function buttons is pressed.
- LOST LCK: The drum or capstan servo lock has been lost for an instant during recording or editing. Even if this error occurs, the operation in progress will continue. The message disappears when one of the function buttons is pressed in the LOCAL mode, or when a remote function command or the LOST LOCK RESET command is received in the REMOTE mode.

¹⁾ This error message only applies to models with serial number 10201 and higher.

- MUTE ¹⁾ : This message is displayed when errors that cannot be corrected occur in the playback signal of the digital audio channels in the CONF1 setting of the REC or EDIT REC mode.
- NEGATIVE : The OUT point of audio and video is entered before the IN point. Re-enter the correct IN and OUT points.
- NO CTL : This message is displayed when the CTL signal is not recorded on tape correctly during recording or assemble editing.
Since this message appears when the audio head may be clogged, clean the heads.
- NO EOS : The end-of-source point is not found and back space editing cannot be carried out. For details, see the operation manual for the HDD-1000, Section 3-1-3 Multi-Cue Operation.
- NO RF : An RF signal is not obtained when the TAPE/EE select switch is set to TAPE and the STANDBY status is OFF, or when a non-recorded part is played.
- NOV RAM ¹⁾ : This message is displayed when a check sum error occurs in NOV RAM on the MB-199 board when the power is turned on.
- OVERHEAT : The power supply and motors are overheating. Check the power supply and motors, if this occurs.
- PIF3 BD : The PIF-3 board in the HDDP-1000 is not securely inserted, or the bus-interface of the board or the interface between the HDD-1000 and HDDP-1000 is defective.
- PR115 BD : The PR-115 board in the HDDP-1000 is not securely inserted, or the bus-interface of the board or the interface between the HDD-1000 and HDDP-1000 is defective.
- PR115 SW : The AUDIO VTR CONTROL INHIBIT switch (S6-1/PR-115 board) and/or the VIDEO SYSTEM BOARDS MODE SELECT switch (S7-7/PR-115 board) in the HDDP-1000 are set to ON. When this message is displayed, set to OFF.
- PR BATT : The battery voltage on the PR-115 board in the HDDP-1000 is below the reference level. See the maintenance manual for the HDDP-1000, Section 2-5-3 Method for Replacing the Backup Battery.
- PRD1 BD : The PRD-1 board in the HDD-1000 is not securely inserted, or the bus-interface of the board is defective.
- PROC I/F : The interface between the HDD-1000 and HDDP-1000 or the VTR-processor connecting cable is defective.
- PRO REF : The reference signal for video playback is not input.
Select the correct reference signal from the menu (S12 COMMON REF SELECT, I80 INPUT ANALOG/DIGITAL and I82 PROC PB REF SELECT). For details, see the operation manual for the HDD-1000, Section 1-4-4 Initial Setup Menu.
- PRO REF* : The input frequency of the reference signal for video playback is incorrect. Select the correct input frequency of the reference signal with either the REF SYNC SELECT switch (S6/SG-151 board) or the video input/output signal selection (see the operation manual for the HDD-1000, Section 1-4-4 Initial Setup Menu).
- PS183 BD : The PS-183 board in the HDDP-1000 is not securely inserted, or the bus-interface of the board or the interface between the HDD-1000 and HDDP-1000 is defective.
- SG151 BD : The SG-151 board in the HDDP-1000 is not securely inserted, or the bus-interface of the board or the interface between the HDD-1000 and HDDP-1000 is defective.
- SG151 SW : The TEST ON/OFF switch (S3-8/SG-151 board) in the HDDP-1000 is set to ON. When this message is displayed, set to OFF.
- SIF4 BD : The SIF-4 board in the HDDP-1000 is not securely inserted, or the bus-interface of the board or the interface between the HDD-1000 and HDDP-1000 is defective.

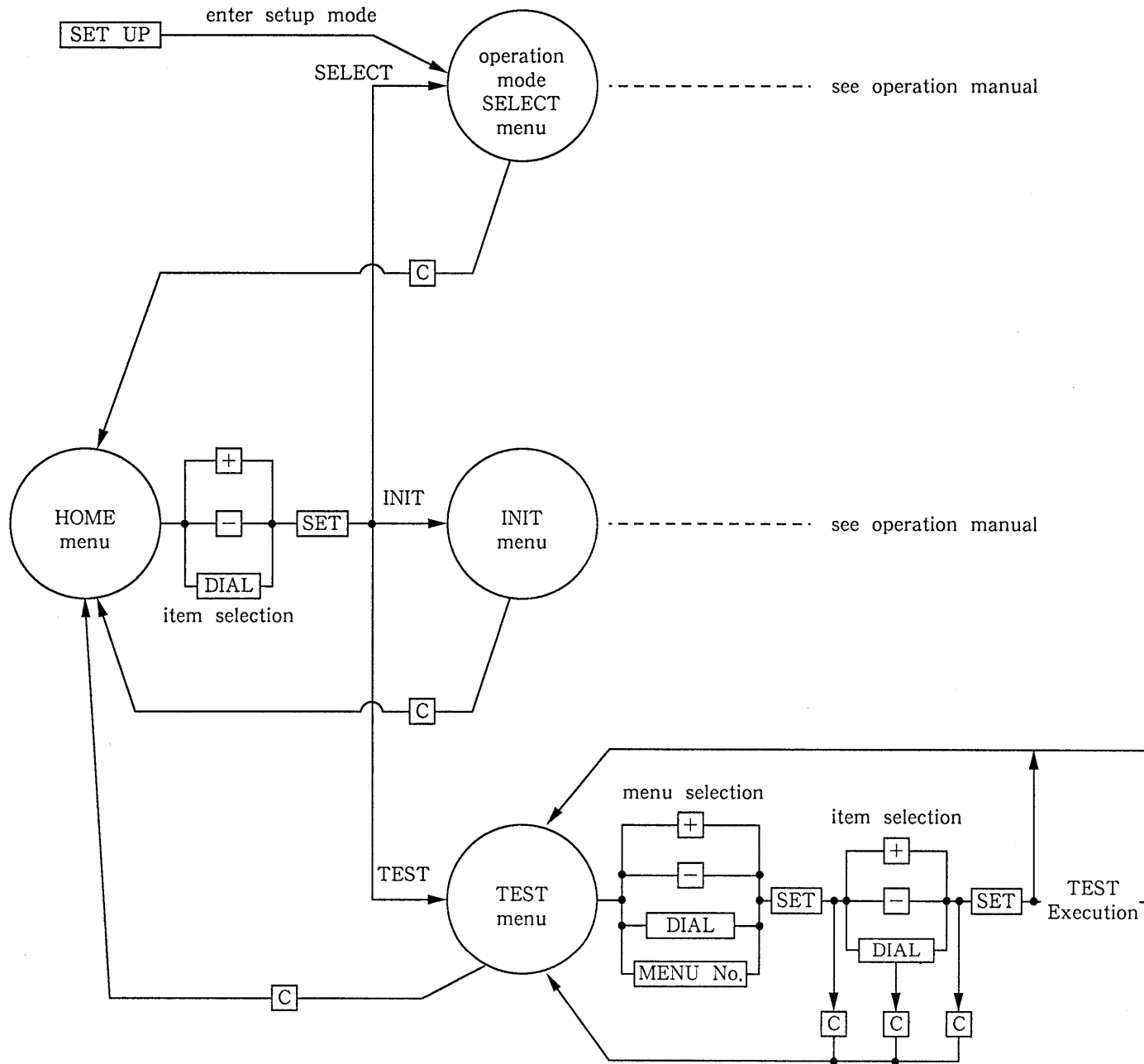
¹⁾ This error message only applies to models with serial number 10201 and higher.

- SP06 BD : The SP-06 board in the HDDP-1000 is not securely inserted, or the bus-interface of the board or the interface between the HDD-1000 and HDDP-1000 is defective.
- SRV ERR : The SY-103 and SV-90 boards cannot communicate with each other due to an error in the servo system.
- SV90 SW : The NORM/STOP switch on the SV-90 board in the HDD-1000 is set to STOP. When this message is displayed, set to NORM.
- SV BOARD : The SV-90 board in the HDD-1000 is not securely inserted, or the bus-interface of the board is defective.
- SY BOARD : The SY-103 board in the HDD-1000 is not securely inserted, or the bus-interface of the board is defective.
- SYS ERR :
 - A key short-circuit error is detected during the initial check after power is turned on.
When this error occurs, the SYSTEM alarm lamp lights up and the buzzer sounds. The buzzer can be stopped by pressing the STOP button.
 - The CPU on the SY-103 board detects an error in the normal operating mode.
- TAPE OUT : The tape is completely wound up on the supply or take-up reel, or the tape is not correctly threaded through the tape sensor. When this error occurs, the VTR automatically stops.
- TB07 BD : The TB-07 board in the HDDP-1000 is not securely inserted, or the bus-interface of the board or the interface between the HDD-1000 and HDDP-1000 is defective.
- TEST MD : After the HDD-1000 is operated in the TEST mode and some Test Mode Menu items are changed, the SET UP lamp is turned off without resetting those items to the defaults.
- VD04 BD : The VD-04 board in the HDDP-1000 is not securely inserted, or the bus-interface of the board or the interface between the HDD-1000 and HDDP-1000 is defective.
- VE18 BD : The VE-18 board in the HDDP-1000 is not securely inserted, or the bus-interface of the board or the interface between the HDD-1000 and HDDP-1000 is defective.

3-2. TEST FUNCTIONS (TEST MENU)

This unit is provided with test functions for performing various tests.

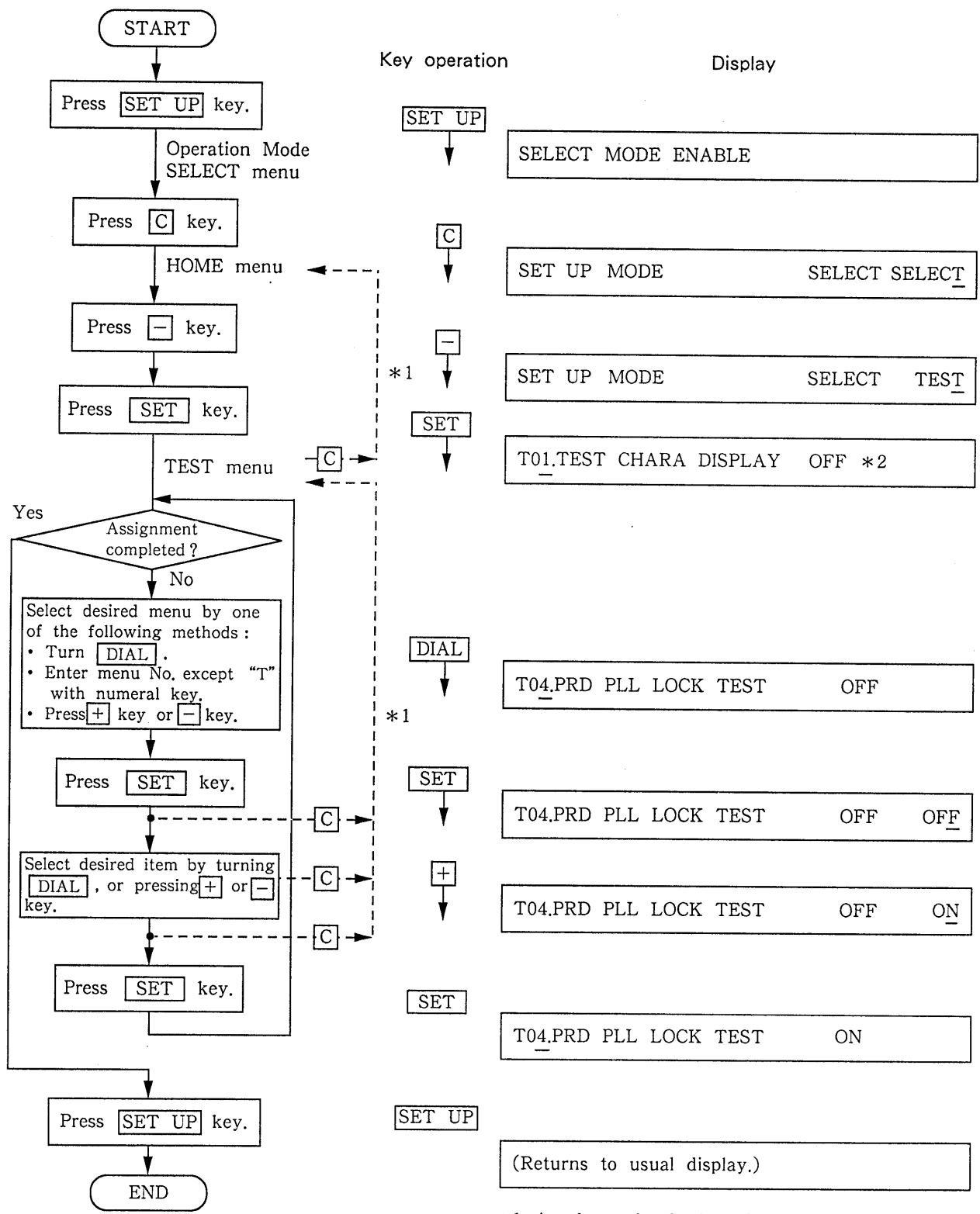
When performing a test, operate the 21-key on the function control panel and select a test menu, as shown below. An operation example is shown on the following page.



- 1) shows key or dial operations.
- 2) Press SET UP key to exit from setup mode.
- 3) Press C Key to return to the previous step.

Operation flow of TEST menu or example of operation

3. DIAGNOSIS FUNCTION



*1. As shown by broken lines, you can return to the previous step by pressing [C] key. However, the selection finalized by pressing [SET] key cannot be canceled by this means.

*2. The last selected menu is displayed.

The contents of the test menus are shown below.

Note 1 : The indication of each item indicates the normal setting.

Note 2 : Upon completion of testing, return each menu to the normal setting before canceling the TEST mode. If the TEST mode is canceled while an individual menu remains activated (when an item not displayed in of the mode is selected), TEST MOD will be displayed on BLOCK 6 of the function control panel.

Note 3 : If the power switch is turned OFF while the test mode of an individual menu remains activated, the TEST mode will be automatically canceled.

MENU No.	MENU	ITEMS	DESCRIPTION
T01	TEST CHARA DISPLAY	ON <input checked="" type="checkbox"/> OFF	Used to specify whether or not to superimpose characters on the picture monitor. When this menu is selected, all types of characters will be displayed, enables the character generator to be checked. ON : Characters are superimposed. OFF : Characters are not superimposed.
T02	CH1-CH4 REC	<input checked="" type="checkbox"/> ON OFF	Used to select whether the signals from the video heads 1 to 4 will be recorded or the recording is prohibited. ON : The normal recording is performed. OFF : The recording is prohibited.
T03	CH5-CH8 REC	<input checked="" type="checkbox"/> ON OFF	Used to select whether the signals from the video heads 1 to 4 will be recorded or the recording is prohibited. ON : The normal recording is performed. OFF : The recording is prohibited.
T04	PRD PLL LOCK TEST	ON <input checked="" type="checkbox"/> OFF	Used to select the PLL on the PRD board to be locked. ON : The PLL is forcibly locked. OFF : Normal operation performs.
T05	PRD REC TEST	ON <input checked="" type="checkbox"/> OFF	Used to test the video recording on the PRD board. ON : The video recording can be tested. OFF : Normal operation performs.
T06	DRC TEST1	<input checked="" type="checkbox"/> OFF STEP1 STEP2 STEP3 STEP4	Normally set to OFF.
T07	CONCEAL	<input checked="" type="checkbox"/> ON OFF	Used to disable the conceal circuit in the processor. ON : Normal operation performs. OFF : The conceal circuit does not operate.
T08	INNER CORRECTION	<input checked="" type="checkbox"/> ON OFF	Used to disable the inner correction circuit in the processor. ON : Normal operation performs. OFF : The inner correction circuit does not operate.
T09	OUTER CORRECTION	<input checked="" type="checkbox"/> ON OFF	Used to disable the outer correction circuit in the processor. ON : Normal operation performs. OFF : The outer correction circuit does not operate.

MENU No.	MENU	ITEMS	DESCRIPTION
T10	ERR FLAG DISP (LINE)	<input type="checkbox"/> OFF MODE1 MODE2 MODE3 MODE4 MODE5 MODE6	This test function enables the error flags of the HDDP-1000 from the LINE OUTPUT connectors to output. Playback data distribution among channels can also be stopped at the same time. *1 OFF: Normal operation performs. MODE1: None of the conceal, inner correction and outer correction circuits operates. MODE2: The conceal and outer correction circuits do not operate. MODE3: The conceal circuit does not operate. MODE4: Data distribution is stopped and channel shift for playback is executed under the MODE1 condition. MODE5: Data distribution is stopped and channel shift for playback is executed under the MODE2 condition. MODE6: Data distribution is stopped and channel shift for playback is executed under the MODE3 condition.
T11	ERR FLAG DISP (MONI)	<input type="checkbox"/> ON <input type="checkbox"/> OFF	This test function enables the error flags of the HDDP-1000 from the MONITOR OUTPUT connector to output. ON: It enables the error flags to output from the MONITOR OUTPUT connector. OFF: It does not enable the error flags to output from the MONITOR OUTPUT connector.
T12	NORMAL FWD TEST	<input type="checkbox"/> ON <input type="checkbox"/> OFF	This test function enables the NORM FWD+EE signals to be activated in the STOP mode. It is used for checking or adjusting the video circuits. ON: The NORM FWD+EE signals are activated. OFF: Normal operation performs.
T13	OSC CONT TEST	<input type="checkbox"/> ON <input type="checkbox"/> OFF	This test function enables the operation of the audio bias/erase oscillator to be controlled. It is used for checking the recording section of the audio system without using a tape. ON: The audio bias oscillator operates. OFF: Normal operation performs.
T14	RESERVED		
T15	LEVEL-CP LAMP TEST	<input type="checkbox"/> ON <input type="checkbox"/> OFF	This test function is used to check whether or not to lamp on the level control panel.
T16	VIDEO REC TEST	<input type="checkbox"/> ON <input type="checkbox"/> OFF	This test function enables the video recording circuit to operate in the STANDBY OFF and STOP modes. It is used to check the recording circuits. ON: The recording circuit can be activated even when the drum is stationary. OFF: Normal operation performs.

MENU No.	MENU	ITEMS	DESCRIPTION
T17	MAINTENANCE	<input type="checkbox"/> OFF TTP ADJ PANEL VERSION EXTEND	Enables the control panel and also the servo system to be checked. For details, refer to section 3-3. OFF : Testing does not perform. TTP ADJ : The tape transport system can be checked or adjusted. PANEL : The control panel can be checked. Use this function to check the indicator lamps and keys, and also to check the version of the soft ware used in the control panel. VERSION : The program CPU version of the VTR and the processor is displayed on the control panel. EXTEND : The extension menu mode (E01 to E18 : see section 3-3) is selected.
T18	SPECIAL REEL MODE	ON <input type="checkbox"/> OFF	Normally set to OFF.
T19	MEMORY DUMP	<input type="checkbox"/> OFF ON (VTR) ON (PRO) ADDRESS	This test function enables the CPU memory to output from the MONITOR OUT connector. OFF : It does not output the memory. ON (VTR) : It enables the SV, SY boards memories to output. ON (PRO) : It enables the AU board and PR board of HDDP-1000 memories to output. ADDRESS : It enables the address of the memories to select.
T20	VIDEO TEST SG	<input type="checkbox"/> OFF COMP CB MB 10S PULSE BB	This test function enables the 6 type signals which are output from the video signal generator in the processor to select. OFF : It does not select. COMP : Composite signal of the color bar, multi burst, pulse & bar and 10 step linearity. CB : Color bar signal MB : Multi burst 10S : 10 step linearity PULSE : Pulse & bar BB : Black burst
T21	CHANNEL DISTRIBUTION	<input type="checkbox"/> ON PB OFF REC OFF ALL OFF	Enables to distribute the video data among channels. ON : Distribution is active for both recording and playback. PB OFF : Distribution is active only for recording. REC OFF : Distribution is active only for playback. ALL OFF : No distribution for both recording and playback.
T22	AUDIO TEST SG	<input type="checkbox"/> OFF 400 Hz 1 kHz 3 kHz	This test function enables the audio signal generator in the processor to operate. The level is not variable, 0 dB (reference level). OFF : It does not operate. 400 Hz : 400 Hz single tone. 1 kHz : 1 kHz single tone. 3 kHz : 3 kHz single tone.

*1. When either of MODE 1 to MODE 6 is set, do not select the analog video output signal (GBR or YPBPr as the reference signal of other units. The sync may be distorted.
The analog sync output signal is selectable as the reference signal.

3-3. MAINTENANCE MENU (T17. MAINTENANCE)

The T17. MAINTENANCE menu among the test menus is used for the tape transport and servo system adjustments and for the function control panel checks. One of the following five items is selected in accordance with the objective at hand. The operation sequences for the menu are in the end of each section.

T17. MAINTENANCE menu

- OFF :** No testing
- TTP ADJ :** This item is selected when checking and/or adjusting the tape transport and servo systems. See section 3-3-1.
Note : When the 0 key in the 21-key section is pressed while the TEST switch(S2) on the SY-103 board is kept depressed, direct entry is made into the TTP ADJ menu.
- PANEL :** This item is selected when conducting checks on the function control panel. See section 3-3-2.
Note : When the TEST switch (S102) on the KC-14 board is pressed, direct entry is made into the PANEL menu.
- VERSION :** This menu is selected when checking the software version of the SY, SV, AU boards and the PR board in the HDDP-1000. See section 3-3-3.
- EXTEND :** This menu is selected to extend the menu. See section 3-3-4.

3-3-1. TTP ADJ Menu

The TTP ADJ menu under the T17. MAINTENANCE menu includes all the menus listed below.

- | | |
|---------|--|
| Group C | <ul style="list-style-type: none"> C0. TEST MODE OFF C5. DAC ADJUST C70. TEN SNS OFFSET C71. TEN SNS GAIN C90. PG ADJ CC0. CAP SPEED ADJ CD. DRUM SPEED ADJ |
| Group T | <ul style="list-style-type: none"> T0. T0 0 START T1. T1 ADJ&START T2. T2 FULL CHECK T3. T3 BRK CHECK T4. T4 CCW BK ADJ T5. T5 CW BK ADJ |

- T8. T8 0 START
- T9. T9 ADJ&START
- TA. TA FULL CHECK
- TB. TB BRK CHECK
- TC. TC CCW BK ADJ
- TD. TD CW BK ADJ

- Group F
- F0. F0 PINCH
 - F1. F1 GUIDE
 - F2. F2 MECHA
 - F3. F3 -----
 - F4. F4 DRUM
 - F5. F5 CAPSTAN
 - F6. F6 S-REEL
 - F7. F7 T-REEL
 - F8. F8 CFG ADJ
 - F9. F9 SFG ADJ
 - FA. FA TFG ADJ

Group C

The Group C menus are used for checking and adjusting the tape transport system while the tape is running. The settings required for the checks/adjustments are performed automatically.

Menu C0. TEST MODE OFF

This is used to cancel the Group C menus. Refer to step ⑩ in the "Operation Sequence for the TTP ADJ Menu".

Menu C5. DAC ADJUST

This is used for section 10-3 servo A/D, D/A converter adjustment.

Menu C70. TEN SNS OFFSET

Menu C71. TEN SNS GAIN

These are used to calibrate the tape tension sensor. Refer to section 9-2.

Menu C90. PG ADJ

This is used to adjust the PG phase. Refer to section 9-8. The settings are made as follows.

Menu CC0. CAP SPEED ADJ

This is used to adjust the tape speed. Refer to sections 6-10 and 9-4.

Menu CD. DRUM SPEED ADJ

This is used to adjust the drum speed. Refer to section 6-2.

Group T

The Group T menus are used to adjust the torques of the reel motors and reel brakes without a tape having been threaded.

The test mode is canceled by pressing the RESET switch (S3) on the SV-90 board or setting the power switch to OFF and then back to ON again.

- Menu T0.** T0 0 START
- Menu T1.** T1 ADJ & START
- Menu T8.** T8 0 START
- Menu T9.** T9 ADJ & START

These are used to measure and adjust automatically the reel motor torque. At menu T0, a voltage is supplied to the supply reel motor for generating a torque of $20 \times 10^{-2} \text{ N} \cdot \text{m}$ {2 kgf·cm}, and the actual torque generated by this motor is measured. Upon completion of the measurement the motor stops. At menu T1, the drive voltage of the supply reel motor is adjusted based on the data measured with T0 and the torque is measured again. Upon completion of the measurement the motor stops. Menus T0 and T1 are for the supply reel motor. Refer to section 6-6-1. Menus T8 and T9 are for the take-up reel motor. Refer to section 6-6-2.

- Menu T2.** T2 FULL CHECK
- Menu TA.** TA FULL CHECK

Voltages are supplied to the reel motor for generating torques of $10 \times 10^{-2} \text{ N} \cdot \text{m}$, $20 \times 10^{-2} \text{ N} \cdot \text{m}$, $40 \times 10^{-2} \text{ N} \cdot \text{m}$ and $80 \times 10^{-2} \text{ N} \cdot \text{m}$ {1, 2, 4 and 8 kgf·cm} and the torques which are actually generated by the reel motor are automatically measured. Upon completion of the measurement the motor stops automatically. Menu T2 is for the supply reel motor and menu TA for the take-up reel motor.

- Menu T3.** T3 BRK CHECK
- Menu TB.** TB BRK CHECK

The mechanical brake torque of the reel tables is automatically measured in both the clockwise and counterclockwise directions. Upon completion of the measurement the motor stops automatically. Menu T3 is for the supply reel table (Refer to section 6-6-1.) and menu TB for the take-up reel table (Refer to section 6-6-2.).

- Menu T4.** T4 CCW BK ADJ
- Menu T5.** T5 CW BK ADJ
- Menu TC.** TC CCW BK ADJ
- Menu TD.** TD CW BK ADJ

The mechanical brake torque of the reel tables is automatically measured. Menus T4 and TC are for counterclockwise rotation and menus T5 and TD are for clockwise rotation. Even when the measurement is completed, the reel motors will still continue to turn. Menus T4 and T5 are for the supply reel table and menus TC and TD for the take-up reel table.

Group F

The Group F menus are used to check and adjust the tape transport without a tape having been threaded.

The test mode is canceled by pressing the RESET switch (S3) on the SV-90 board or setting the power switch to OFF and then back to ON again.

Note: The functions of the **F0**, **F1**, **F2** and **F3** keys are based on the following key operations.

- F0** key: Press the **7** key with the blue **OUT** key kept depressed.
- F1** key: Press the **8** key with the blue **OUT** key kept depressed.
- F2** key: Press the **9** key with the blue **OUT** key kept depressed.
- F3** key: Press the **TAPE/IN** key with the blue **OUT** key kept depressed.

Menu F0. F0 PINCH

When this menu is entered, the capstan rotates and the pinch roller will be pressed against the capstan as below, depending on the operation of the following keys.

When the **F0** key is pressed, the pinch roller is pressed against the capstan.

When the **F1** key is pressed, the pinch roller moves away from the capstan.

When the **F2** key is pressed, the pinch roller will be pressed against the capstan for as long as the key is kept depressed.

This menu is used to adjust the pinch roller pressure. Refer to sections 6-10, 6-11 and 6-12.

Menu F1. F1 GUIDE

When this menu is entered, the moving guide opens and closes as indicated below.

When the **F0** key is pressed, the moving guide opens fully.

When the **F1** key is pressed, the moving guide closes fully.

When the **F2** key is pressed, the moving guide opens halfway.

While the **F3** key is kept depressed, the threading motor is made operational and the moving guide repeatedly opens and closes.

Menu F2. F2 MECHA

This menu enables the operation of the S/T blowers, and S/T reel brake solenoids to be checked. When the **F0** key is pressed, the S blower will operate for as long as the key is kept depressed. When the **F1** key is pressed, the T blower will operate for as long as the key is kept depressed. When the **F2** key is pressed, the S and T reel brake solenoids will be energized (the reel brakes will be released) for as long as the key is kept depressed.

Menu F3. F3 -----

This stops the motors which are operating and releases the solenoids. When adjustments have been made using the F8, F9 and FA menus, the motors will be stopped by menu F3. Refer to step ⑫ in the "Operation Sequence for the TTP ADJ Menu".

Menu F4. F4 DRUM

Menu F5. F5 CAPSTAN

Menu F6. F6 S-REEL

Menu F7. F7 T-REEL

At these menus, the drum motor, capstan motor, supply reel motor and take-up reel motor can be operated at high or low speed and in the clockwise or counterclockwise direction.

The speed and direction of the rotation are as below :

- While the **F0** key is kept depressed :
High speed, CCW rotation
- While the **F1** key is kept depressed :
Low speed, CCW rotation
- While the **F2** key is kept depressed :
Low speed, CW rotation
- While the **F3** key is kept depressed :
High speed, CW rotation

Menu F8. F8 CFG ADJ (Capstan motor)

Menu F9. F9 SFG ADJ (S reel motor)

Menu FA. FA TFG ADJ (T reel motor)

At these menus, the FG duty cycles of the capstan motor, supply reel motor and take-up reel motor are adjusted.

When the **F3** key is pressed, adjustment is conducted automatically for as long as the key is kept depressed. Upon completion of the adjustments, the motors are stopped by menu F3. Refer to sections 6-10 and 9-4 for menu F8, section 6-6-1 for menu F9 and section 6-6-2 for menu FA.

Operation Sequence for the TTP ADJ Menu

Steps ① through ④ below allow entry into the test menus and the subsequent steps up to ⑨ allow entry into the TTP ADJ menu. Instead of proceeding with steps ① through ⑨, the TTP ADJ menu can also be entered by pressing the **0** key in the 21-key section while TEST switch (S2) on the SY-103 board is kept depressed.

- ① Press the **SET UP** key. The OPERATION MODE SELECT menu is automatically selected.
- ② Push the **C** key to select the HOME menu.
- ③ Press the **-** key to select TEST.
- ④ Press the **SET** key to establish the test menu.
(Note) The last selected menu is displayed.

Display

SELECT MODE ENABLE	
SET UP MODE	
SELECT	SELECT
SELECT	TEST
T01. TEST CHARA DISPLAY	
OFF	

Note : The shaded area of the display is not related to the menu selection. The contents of this display are determined by the VTR operation.

- ⑤ The number of the desired menu is assigned using the [0] through [9], [+], and [-] keys or Search Dial. For instance, T17 is selected by keying in [1] and [7].
- ⑥ Press the [SET] key to establish the menu number selection.
- ⑦ Select TTP ADJ using the [+], and [-] keys or Search Dial. (Select PANEL if the PANEL menu is to be entered.)
- ⑧ Press the [SET] key.
- ⑨ Press the [SET] key again to establish the TTP ADJ selection.
The TTP ADJ menu is now entered.

T17. MAINTENANCE	OFF
------------------	-----

T17. MAINTENANCE	OFF	OFF
------------------	-----	-----

T17. MAINTENANCE	OFF TTP ADJ
------------------	-------------

	>_
--	----

	>?_
	>_

Entry into the TTP ADJ menu causes the functions of the keys in the 21-key section to be changed, as indicated below.

Normal mode

[]	SET UP			
		TT SEL	TAPE	CUE SEL
[7]	[8]	[9]	[IN]	[OUT]
				AUTO
[4]	[5]	[6]	[IN]	[OUT]
			AUDIO	
[1]	[2]	[3]	[+]	[-]
[0]	[C]	[T]	[F]	[SET]

TTP ADJ mode

[]	SET UP			
FO	F1	F2	F3	
[7]	[8]	[9]	[TAPE]	[SFT]
E	F	\$;	
[4]	[5]	[6]	[]	[]
B	C	D		
[1]	[2]	[3]	[SPC]	[BS]
A	N	V	W	
[0]	[C]	[T]	[F]	[CR]

[SFT] is the shift key. When, for instance, the [T] key is pressed with the [SFT] key already depressed, the result is the same as if the [V] key had been pressed. [CR] is the carriage return key.

The adjustments and checks are now conducted. The description below uses [C90. PG ADJ] as an example.

- ⑩ Key in [C], [9] and [0], and press the [CR] (SET) key. C90. PG ADJ is now selected.
- ⑪ Proceed with the adjustment. Depending on the item, adjustment is made automatically.

⑫When [F8. CFG ADJ], [F9. SFG ADJ] or [FA. TFG ADJ] has been selected, key in [F] and [3] and press [CR] (SET). The motor which was operating now stops.

	>F8 CFG ADJ
	>_
>F8 CFG ADJ	>F3 STOP
	>_

Now continue with steps ⑬, ⑭ and ⑮ in order to **write the results of the adjustments into the NOVRAM** (non-volatile random access memory). Skip these steps and proceed straight to step ⑯ if there is no need to write the results into the NOVRAM.

⑬Press [C], [T] and [F] in sequence while keeping the [SFT] (OUT) key depressed. This has the same result as if [N], [V] and [W] had been keyed in. Now press the [CR] (SET) key.

	>NVW
	>NVW
	>XXXX XX-XX_

⑭Keep the [+] key depressed. The display will appear as shown in the figure on the right.

	>PUSH NVWR SW
--	---------------

⑮Press the NVWR switch (S2) on the SV-90 board.

>XXXX-XX	>READY_
	>_

These operations save the adjustment data into the NOVRAM. Next, proceed with the operation to **cancel the test mode**. To cancel a Group C menu, proceed to step ⑯. To cancel a Group F menu, proceed to step ⑰.

⑯Press [C], [0] and [CR] (SET) in sequence. In this state, it is now also possible to proceed to step ⑩ again.

>C0	>TEST MODE OFF
	>_

⑰Press the [SET] key while keeping the blue [OUT] key depressed. In this state, it is now also possible to proceed to step ⑤ again.

⑱Press the [SET UP] key or perform any operation of step ⑰. This operation causes a return to the normal operating mode.

If the [C] key is pressed instead of the [SET UP] key, it causes a return to the state after operating step ②.

⑲The operation is completed by any of the following.

- Press the RESET switch (S3) on the SV-90 board.
- Set the power switch to OFF and then back to ON again.

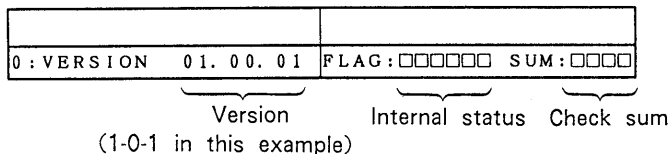
This operation causes a return to the normal operating mode. It is possible in any mode to perform this operation.

3-3-2. PANEL Menu

The following menus are included in the PANEL menus of the T17. MAINTENANCE menu. These enable tests on the function control panel to be conducted.

Menu 0 : VERSION

The software version of the function control panel and check sum, etc., will be displayed as follows.

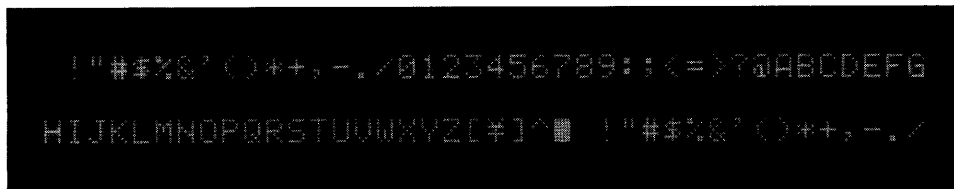


Menu 1 : ALL DOT

All dots on the display will light.

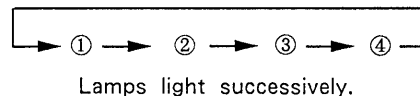
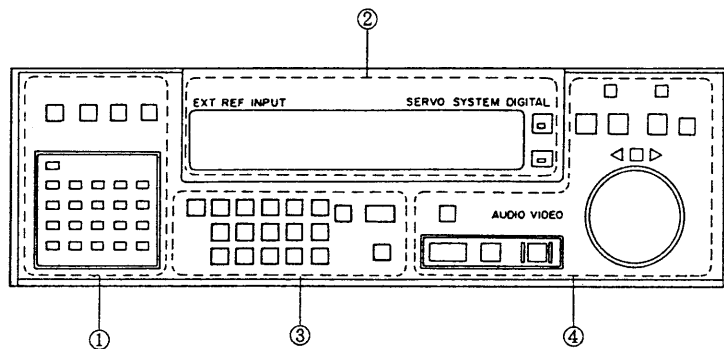
Menu 2 : ALL CHR

All characters on the character generator will appear on the display as shown below.



Menu 3 : LMP TST

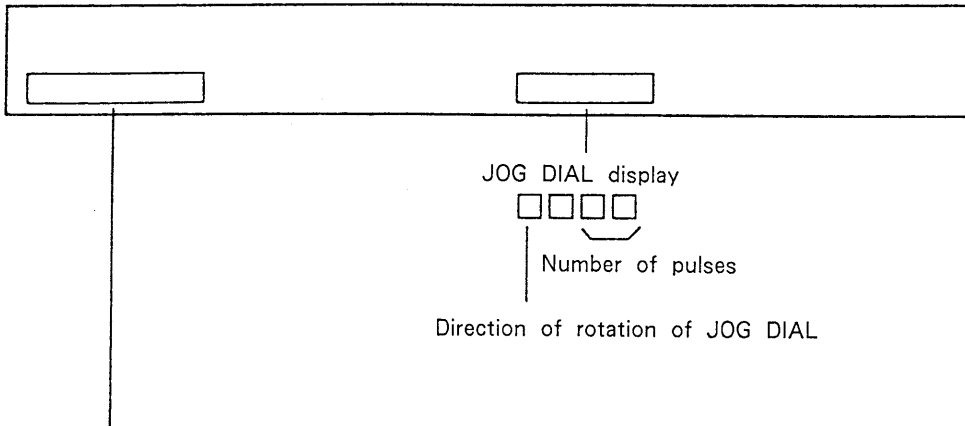
The lamps on the function control panel will be checked. Blocks of lamps light successively at intervals of about 2 seconds, as follows. When the key is pressed, the unit will go into the mode whereby the lit blocks shift each time the key is pressed.



Menu 4 : KEY

When a switch on the function control panel is pressed, the name corresponding to that switch will be displayed.

Simultaneously, the number of pulses and direction data will be displayed in accordance with the rotation of the JOG DIAL.



Switch name will be displayed. See the table shown below.

No.	Switch name	Display	No.	Switch name	Display
1	STOP	STOP	29	CUE	CUE
2	PLAY	PLAY	30	ASSEMBLE	ASSEMBLE
3	REC/EDIT	REC	31	INSERT	INSERT
4	VAR	VARIABLE	32	SPOT ERASE	SPOT ERS
5	VAR MEMORY	VR MMRY	33	INPUT	INPUT
6	JOG	JOG	34	0 (21 key)	0
7	SHUTTLE	SHUTTLE	35	1 (21 key)	1
8	STANDBY	STANDBY	36	2 (21 key)	2
9	PREROLL/SEARCH	PREROLL	37	3 (21 key)	3
10	PREVIEW/REVIEW	PREVIEW	38	4 (21 key)	4
11	CUE ENTRY	CUE ENT	39	5 (21 key)	5
12	RESET	RESET	40	6 (21 key)	6
13	HOLD	HOLD	41	7 (21 key)	7
14	VIDEO IN	VID IN	42	8 (21 key)	8
15	VIDEO OUT	VID OUT	43	9 (21 key)	9
16	AUDIO SPLIT IN	AD SPL I	44	C (21 key)	C
17	AUDIO SPLIT OUT	AD SPL O	45	T (21 key)	T
18	AUDIO SPLIT	AD SPL	46	F (21 key)	F
19	TC	TC	47	+ (21 key)	+
20	DA-1	DA-1	48	- (21 key)	-
21	DA-2	DA-2	49	SET (21 key)	SET
22	DA-3	DA-3	50	IN (21 key)	VIDEO IN
23	DA-4	DA-4	51	AUDIO IN (21 key)	AUDIO IN
24	VIDEO	VIDEO	52	OUT (21 key)	VIDEO O
25	DA-5	DA-5	53	AUDIO OUT (21 key)	AUDIO O
26	DA-6	DA-6	54	SET UP (21 key)	SET UP
27	DA-7	DA-7	55	CONTROL P	CTRL-P
28	DA-8	DA-8	56	CONTROL R	CTRL-R

Menu 5 : BUZZER

A beep tone will be emitted 8 times. By pressing the **SET** key, the test can be performed again.

Menu 6 : END

The PANEL mode will end.

Menu 7 : MONITOR

Used to check the memories of the function control panel and so on. Not normally used.

When the menu has been selected, cancel it by the following key operations.

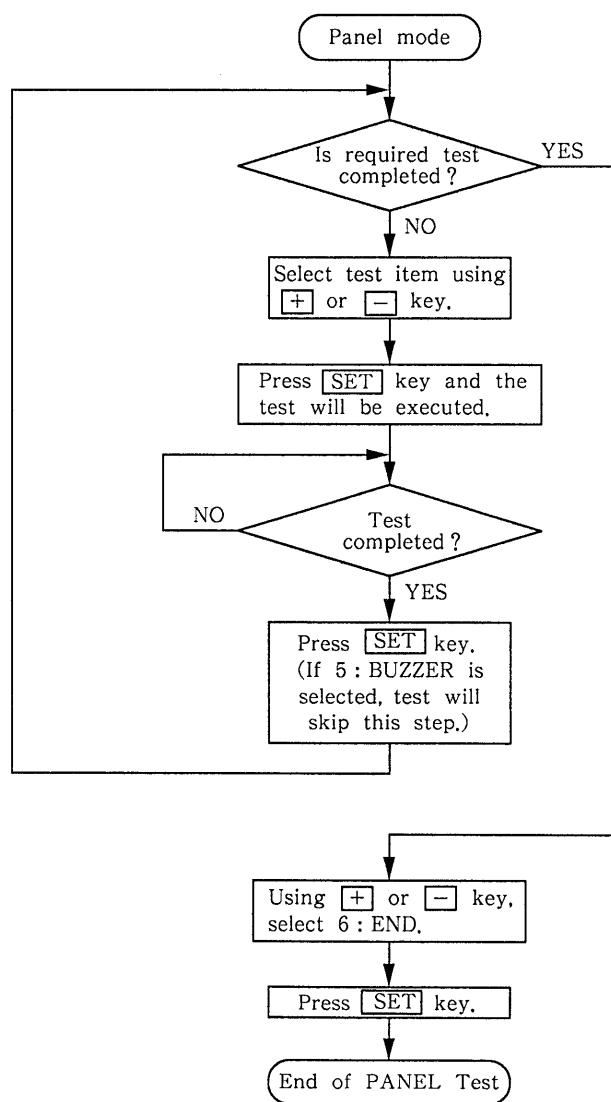
SET → **9** → **SET**

After the operations, [7:MONITOR] will be displayed on the control panel.

Operation Sequence for the PANEL Menu

The test menu and then also the PANEL menu can be entered using the same key operations as for entry into the TTP ADJ menu. Simply select [PANEL] instead of [TTP ADJ] in step ⑦ of the above-mentioned "Operation Sequence for the TTP ADJ Menu", and the PANEL menu will be entered when steps ① through ⑨ are carried out.

Direct entry into the PANEL menu is made by pressing the TEST switch (S102) on the KC-14 board.



By pressing **SETUP** key, unit will return to normal operating mode.

3-3-3. VERSION Menu

The software version of the SY, SV, AU boards and the PR board in the HDDP-1000 is displayed on the function control panel by the VERSION menu under the T17. MAINTENANCE menu.

Ex.

```
SY=1-0-0 SV=1-0-0 SB=1-0-0
```

[SY=1-0-0] shows that the version 1-0-0 program is written onto ICH12 and ICH11 on the SY-103 board.

[SV=1-0-0] shows that the version 1-0-0 main program is written onto ICN5 and ICN3 on the SV-90 board.

[SB=1-0-0] shows that the version 1-0-0 sub program is written onto ICE15 on the SV-90 board.

Press the **SET** key, the software version is displayed as follows.

```
AU=1-0-0 PR=1-0-0 PI=1-0-0
```

[AU=1-0-0] shows that the version 1-0-0 program is written onto IC6 on the AU-109 board.

[PR=1-0-0] shows that the version 1-0-0 program is written onto ICA2 on the PR-115 board in the HDDP-1000.

[PI=1-0-0] shows that the version 1-0-0 program is written onto ICG2 on the PR-115 board in the HDDP-1000.

Press the **C** key under the VERSION menu to return to the state in which the T17. MAINTENANCE menu is set to OFF.

3-3-4. EXTEND Menu

The items shown below are selectable in the EXTEND menu under the T17. MAINTENANCE menu. After the test menu is canceled, the each menu keeps the item selected in the EXTEND menu.

MENU No.	MENU	ITEMS	DESCRIPTION
E01	TAPE/EE AT REC INHI	TAPE EE	When the both the video and audio REC INHIBIT switches (on the level control panel in the VTR or on the PR-115 board of the processor) are set to ON, and TAPE/EE mode is selected, selects the output signal in the STANDBY ON mode. TAPE : Outputs the TAPE signal. EE : Outputs the EE signal.
E03	AUTO SHUT OFF BUZZER	DISABLE ENABLE	Enables the buzzer sound before STILL mode or STANDBY ON mode is automatically released. DISABLE : The buzzer does not sound. ENABLE : The buzzer sounds for notice.
E05	BINARY GROUP FLAG	BINARY ISO	Selects the type of the user bit data by designating the code on BIT 43 and 59 of LTC, and on Bit 55 and 75 of VITC. BINARY : 00 ISO : 10
E07	REC INHI STATUS	AND OR	Selects one of the following cases when the REC INHIBIT status is sent to the SONY 9-pin serial remote command. AND : When both the video and audio REC INHIBIT switches are set to OFF and the editing channels are preset. OR : When either of the video and audio REC INHIBIT switches is set to ON, or when all the editing channels are set to OFF.
E10	HOLD UB SENSE RETURN	DISABLE ENABLE	In the ENABLE mode, enables the HOLD UB (User Bit) data to be sent to the SONY 9-pin serial remote command.
E11	REM2A/REM3 PARA MODE	DISABLE ENABLE	In the ENABLE mode, when RM3 is selected in the menu S01. REMOTE SELECT (see the Operation manual section 1-4-3), the input from the REMOTE-2A connector becomes active. When one of RM1/RM2A/RM2B is selected, the input from the REMOTE-3 connector becomes active.
E13	LOCKED SLOW×1	DISABLE ENABLE	Selects whether or not to lock the CTL during ×1 (normal speed) playback in the VAR mode. DISABLE : The CTL is not locked. ENABLE : The CTL is locked.
E14	TAPE/EE DELAY	DISABLE ENABLE	When TAPE or EE mode is selected during the search operation is done by using the dynamic motion controller DTR-2000, enables the playback picture not to be distorted. DISABLE : The playback picture is distorted after the search operation as the VTR enters STILL mode via STOP mode. ENABLE : The VTR is prevented from entering STOP mode for as long as 20V to avoid the picture distortion.

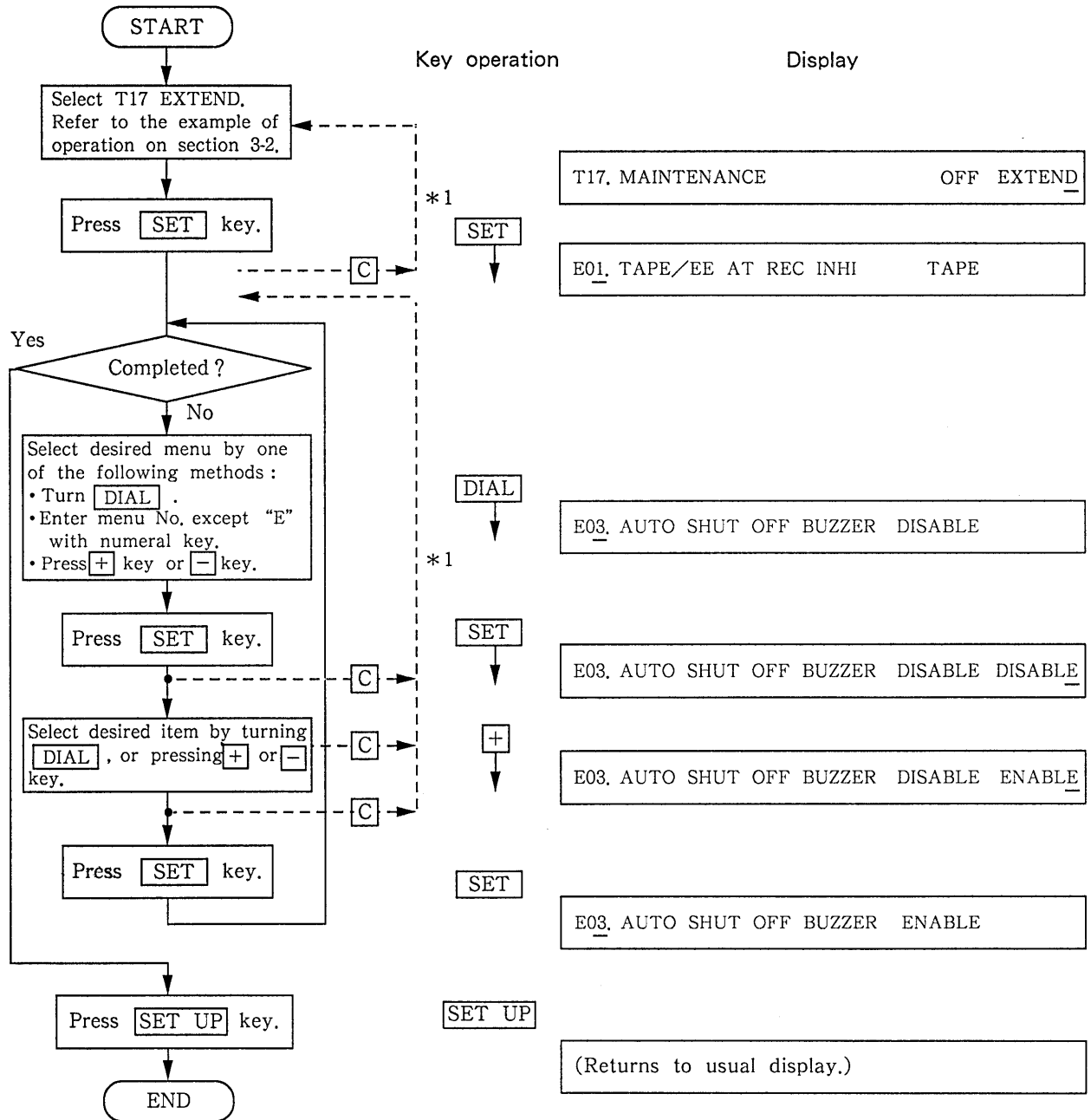
MENU No.	MENU	ITEMS	DESCRIPTION
E15	TC OUTPUT DELAY	0 FRAME <input type="checkbox"/> AUTO 2 FRAME	When editing with 2 VTRs, the time code is output with 2 frames added out of the SONY 9-pin serial remote connector or the TIME CODE connectors. *1 0 FRAME : Time code is through output. AUTO : Time code is output with 2 frames added only when the editing channels are preset. 2 FRAME : Time code is always output with 2 frames added.
E16	SHUTTLE×8 LIMITER	<input type="checkbox"/> DISABLE CLICK <input type="checkbox"/> ENABLE	Used to vary the maximum speed in SHUTTLE mode or to select whether the click operation of the SEARCH dial enables or not. OFF : Maximum speed is fixed to 15 times normal speed. CLICK : The SEARCH dial can be clicked at 8 times normal speed. ON : Maximum speed is fixed to 8 times normal speed in order to check the playback picture.
E17	SPECIAL VAR MODE	<input type="checkbox"/> DISABLE <input type="checkbox"/> ENABLE	Sets to change ×1 (normal speed) playback of the VAR mode. DISABLE : The speed is not changed. ENABLE : The speed is changed to 7/30 times normal speed when the dynamic motion controller DTR-2000 is used to improve operation during slow playback.
E18	SERVO LOCK W/O AUDIO	<input type="checkbox"/> DISABLE <input type="checkbox"/> ENABLE	Enables the servo to be locked, and the editing is performed, even if the digital audio signals are not properly played back, when the capstan and the drum are locked. *2 DISABLE : The servo alarm lamp on the function control panel lights on, when the digital audio signals are not properly played back. Editing is not performed. ENABLE : The servo alarm lamp does not light on, when the capstan and the drum are locked. Editing is performed.

*1. The HDD-1000/HDDP-1000 system outputs the time code with 2 frames subtracted to match the framing of the video signal which comes 2 frames behind because of its processing.

*2. When the following conditions are satisfied, the servo is locked.

- Drum lock
- Capstan lock
- The digital signals are properly played back.

Operation flow of EXTEND menu or example of operation





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SECTION 4 THEORY OF OPERATION

4-1. VIDEO SIGNAL SYSTEM

4-1-1. Outline

The HDD-1000 is provided with 8 recording heads and 8 playback heads. Recording data is transmitted from processor at the rate of 148.5 MHz and input to the DIF-2 board which is the interface between VTR and processor. The input data is latched using the clock signal transmitted together with the data, then sent to the PRD-1 board via the mother board.

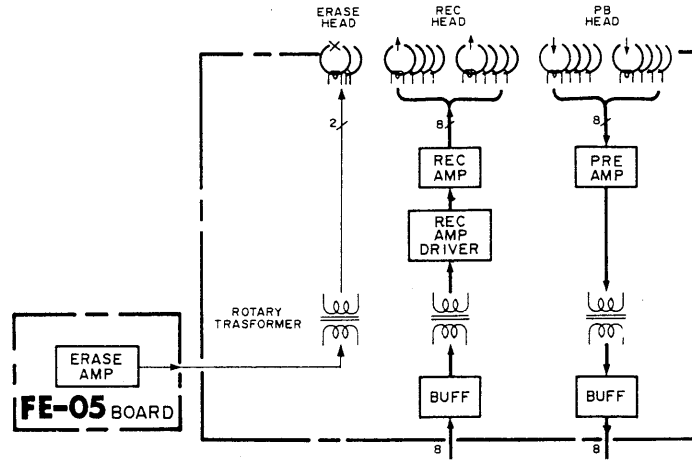


Fig. 4-1-1.

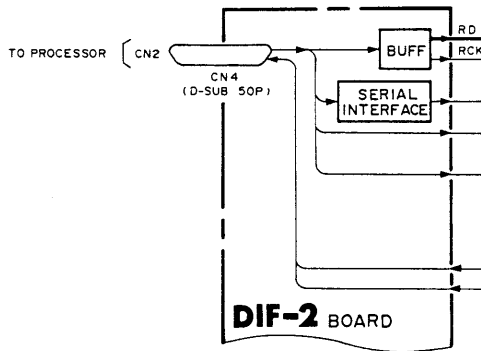


Fig. 4-1-2.

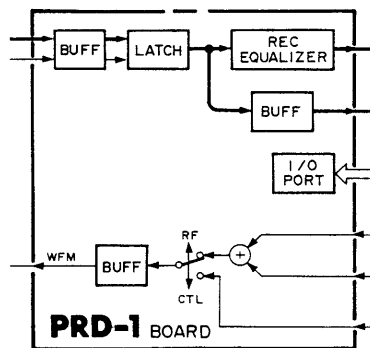


Fig. 4-1-3.

The clock signal output from the processor reaches the latch circuit on the PRD-1 board but does not go further. Only data are transmitted further.

The DRC-1 board works as a data recovery circuit, thus it includes PLL circuit. Since one DRC-1 board covers 4 channels, two DRC-1 boards are provided. In the E-E mode, the data is sent to the DRC-1 board directly from the PRD-1 board without passing through the drum system.

Since the playback system cannot equalize the data if it includes non-linear distortion, the record signal is equalized for reducing distortions before being recorded. 8 channels for this equalizing are provided. Data are equalized appropriately for recording, and then supplied to the drum.

Recording amplifiers are installed in the drum. These amplifiers are near the heads and directly drive them without intermediation of the rotary transformers and harnesses. Otherwise, 148.5 MHz data are hard to be transmitted due to the transmission characteristics of the rotary transformers.

Monolithic IC is adopted as the playback amplifier. This IC is linear amplifier, and the playback signal is supplied through the rotary transformer directly. The playback equalizer equalizes the data for reducing errors. The comparator checks "1" or "0" in reference to zero cross point and converts the equalized data into digital signals.

The E-E signal and playback signal are switched in the DRC-1 board in accordance with the system mode. The PLL circuit is activated to generate the clock signal paired with data, which is then latched. Clock with 1-to-1 phase relation to data is output to the processor in parallel with the data.

The DRC-1 board detects the RF envelope. One board covers 4 channels, and the RF envelope of 8 channel in total is selected and output to the processor. The processor outputs to the waveform monitor by switching with the video signal.

Heads are mounted on 6 bases including four 4-chip bases and erase bases. The PRD-1 board has a circuit generating the video-logic signal, which generates the record/playback switching timing and erasure switching timing.

The DIF-2 board offers, via the video system connectors, the video data interface including the clock signal, RF envelope interface, and the interface with the system controls of the processor and VTR.

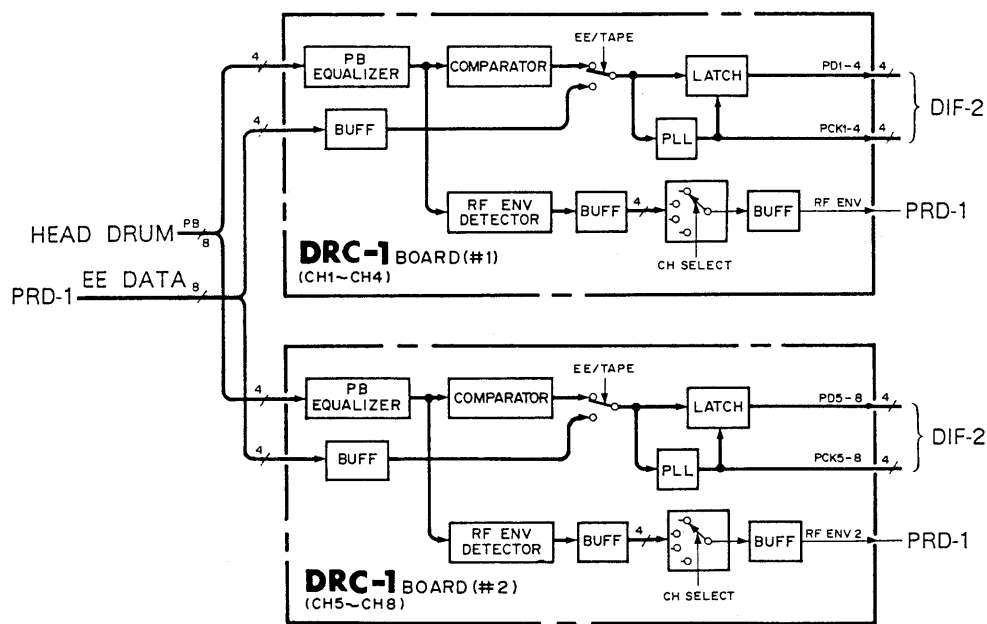


Fig. 4-1-4. DRC-1 Board Block Diagram

4-1-2. DIF-2 Board

1. Outline

The DIF-2 board is a board for transferring signals to/from the processor. Video signal is transferred as an ECL differential signal and control data is with the RS-422 interface.

2. REC/PB Data

In the recording system, the line receiver receives 8-channel video data from the processor in order to be latched with the clock signal for proper timing and output to the VTR.

In the playback system, the line receiver buffers video data and outputs to the processor. For secure timing permission adjustment, the line receiver is double-staged to delay the data.

3. Serial Interface and Other I/O Signals

The serial interface is a circuit which receives and transfers the control data between VTR and processor. The data is interfaced with RS-422 level. The sync signal is supplied from processor to obtain the servo reference signal. The character signal is output from VTR to processor in order to superimpose the data such as the time code, alarm message, etc. on the monitor screen. The character signal generator is provided with the system control. The WFM signal is passed through the DIF-2 board.

The MIX IN signal is used for CUE recording. This signal is selected or mixed from optional digital audio signal in the processor, and then supplied into the VTR.

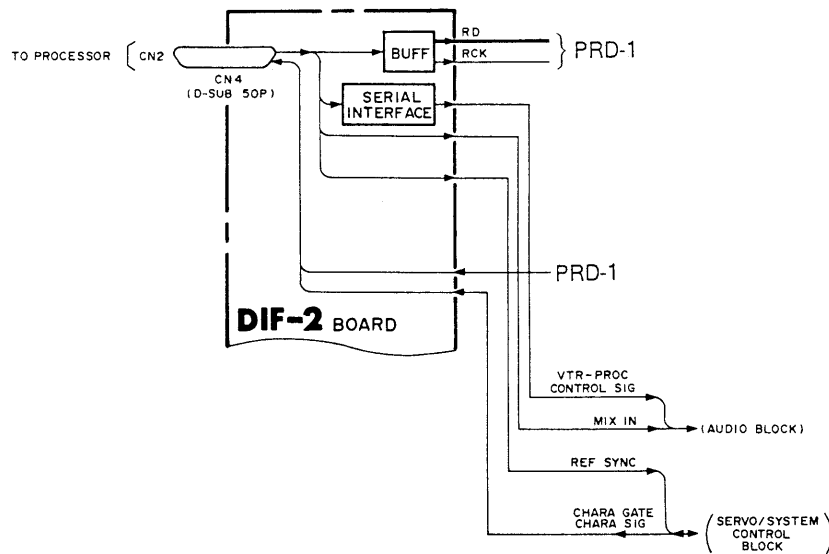


Fig. 4-1-5. DIF-2 Board Block Diagram

4-1-3. PRD-1 Board

The 8-channel recorded data and clock input from the processor via the DIF-2 board are equalized and output to the head drum. In the EE mode, they are directly supplied to the DRC-1 board without passing through the head drum. The switching timing signal is transferred to/from the servo/system control via the SV bus. The WFM signal is returned to the processor via the DIF-2 board.

Timing of I/O port (IC7) is controlled by the command from the system control. The PLL circuit consisting of the IC37, IC35, crystal X1, IC27, IC29, IC30 and IC34 generates the timing clock from the reference SYNC signal transmitted from the processor and the reference V generated by the servo board. The crystal X1 for the VCO oscillates at 27.00 MHz. That is, 800 times as high as f_H , from which $4f_H$ is fetched and is used as the clock for the ROM address counter to generate the timing signal.

The REC amplifier control signals (REC CTRL 1 and 2), flying erase ON/OFF signals (ERASE CTRL 1 and 2) and REC RELAY signal for activating the relay which deactivates the erase amplifier oscillation are produced at the timing generated by the timing generator.

The EE/TAPE phase control and EE/TAPE selecting signals (EE/TAPE 1 and 2) are output to the DRC-1 board. The system control outputs the envelop signals A0 to A2 to the DRC-1 board via the I/O ports. The SENSE CTRL is the sense control signal for checking existence/absence of the DRC board and for self diagnosis together with the NO RF 1 and 2 signals. The envelop signal A2 has the invert signal ($-ENV A2$) in order to select either of the two DRC-1 boards.

Various signals indicating NO RF detection, drum servo active condition, drum open condition, normal/bi-directional mode, etc. are transmitted to the DRC-1 board via the I/O ports of the PRD-1. The CTL and RF signals are output to the processor via the buffer and the DIF-2 board by switching the system control command. The VTR carries out this switching only since it has the RF and CTL only. The processor switches the video signals and RF/CTL for WFM.

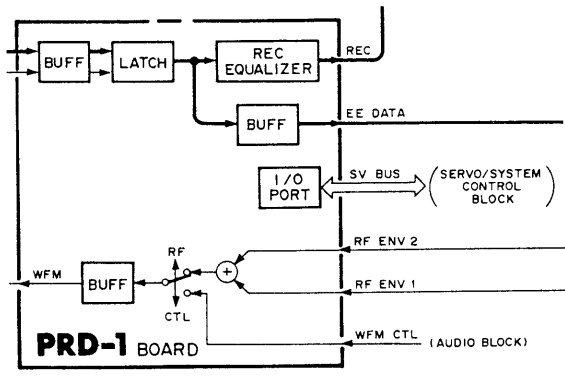


Fig. 4-1-6. PRD-1 Board Block Diagram

4-1-4. DRC-1 Board

1. Outline

HDD-1000 is provided with two identical DRC-1 boards. The DRC-1 board is data recovery circuit which contains an equalizer circuit, PLL circuit, and other circuits.

The E-E data passed through the PRD-1 board, is input to the DRC-1 board. The clock is generated from the E-E data; the data and clock are returned together to the processor.

Each board has 4-channel data circuits. Playback signal is once amplified by the drum playback amplifier, then reaches the DRC-1 board via the rotary transformer.

The DRC-1 board has functions of the playback equalizer, PLL circuit, and transmitting the RF envelop signals of channels 1 to 8 as one of the waveform monitor output to the processor.

The RF envelop detector is also used for detecting errors such as failure in playback due to the head clogging or lack of recording. It is actually used for head clog alarm.

The EE data is supplied from the PRD-1 board. E-E or playback mode is switched with IC1. Even in the E-E mode, the signal is input to the PLL circuit, generating the clock signal.

The PLL should extract the clock component from data. Though no clock exists in data, exclusive-OR applied to the input data and its delayed signal from both sides have the effect of differentiation, enabling clock component to be extracted.

Differentiated clock is locked with the VCO clock consisting of IC109 and D107, which is latched by IC107 to match the timing of clock and data. Each of them is output to the processor via the DIF-2 board.

A coaxial connector is provided for monitoring on an oscilloscope at the front of the board. IC108 is the buffer for the clock, which is output via CN102, CN202, CN302, and CN402. The RF waveform signal just before being input to the comparator in the rearmost part of the equalizer is output to the connector through the buffer Q102. The eye pattern of the data can be observed by triggering using the clock.

The PLL circuit consists of phase comparator, lock phase controller and PLL controller to control the PLL lock when power is turned on, process the trace of a non-recorded portion in the normal playback mode and control the unit in the search mode.

Playback signal supplied from the head drum is first sent to the playback amplifier and detected by the integrator consisting of R149 and C132.

The equalizer consists of the above detection circuit mainly, phase equalizer, peaking circuit for raising the declination in the high-frequency range, and cosine equalizer easily controlled externally.

The RF envelop can be observed at the test point TP101. The switching IC4 selects the one channel RF envelop from 4 channels, and sends it to the waveform monitor. The envelope signal is also used for detecting existence/absence of RF to control the alarm LED and to display a message to the system control.

4-2. AUDIO SIGNAL SYSTEM

4-2-1. Outline

The audio system of the VTR mainly consists of the AU-109 and AP-22 boards. In addition, it includes the interface board VR-74.

The AU-109 board has 8-channel digital playback equalizers, time code and cue channel recording/playback amplifiers, and CPU.

The AU-22 board has the eraser, recording and playback amplifiers of the stationary head system.

4-2-2. VR-74 Board

The VR-74 is the audio level control board and it consists of following controls and amplifier.

- Digital audio recording level control
- Digital audio master playback level control
- CUE recording level control
- Tracking level control
- Audio monitor level control
- Headphone amplifier

5 Vdc is supplied to the digital audio master playback level VR and the digital audio recording level VR and voltage output from potentiometer is A/D converted by IC5 and is supplied to the CPU on the AU board. A/D converter IC5 converts 8 kinds of voltages. Remaining 2 kinds of voltages are time-divided by IC6. The cue level signal double-rectified by the AU board is supplied to pin 15 of IC6. The cue recording level adjusting circuit consists of a potentiometer and buffer amplifier. The tracking adjustment circuit consists of a potentiometer and switch.

IC1 is a buffer amplifier and Q1 through Q4 are the power on muting circuits.

4-2-3. IF-207 Board

The IF-207 board receives and drives the signal sent from the processor via the D-sub 50-pin connector CN653 using the RS-422 interface. The D-sub 50-pin connector CN651 is for parallel remote control connection (REMOTE-3). The 9-pin D-sub I/O connector CN652 includes a connector for future expansion.

This board is provided with the I/O ports for expansion of the CPUs on the SV-90 board IC6 and IC1 (remote I/O expander). The REMOTE 3 is controlled by the CPU on the SV-90 board.

The CPU V25 on the AU-109 board has 2 communications systems. One of them is reserved for future remote control via the 9-pin D-sub connector CN652. It is for control including monitor selection, video level control, etc.

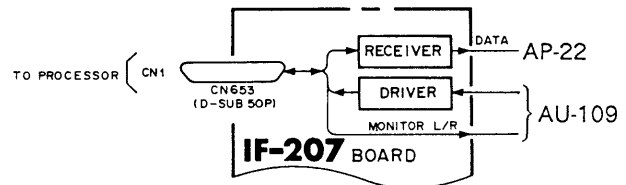


Fig. 4-2-1. IF-207 Board Block Diagram

4-2-4. LO-06 Board

1. Outline

The LO-06 board consists of the VTR cue and time code I/O amplifier and audio monitor output amplifier.

2. Line Input Circuit

Fig. 4-2-2 figure shows the line input circuit of the cue channel. The cue and time code (TC) signals are input through the CUE LINE IN and TC LINE IN connectors respectively. 600-ohm terminators for these inputs can be connected and disconnected by inserting and removing short pins.

The cue channel is a high gain circuit for connecting a microphone. When using a microphone, insert short pins J29 and J30 and remove J1 (microphone input is 600-ohm terminated).

The time code circuit is the same as the cue circuit, except that it has a short pin for selecting a 600-ohm terminator.

3. Line Output Circuit

The input circuit on the line out side of the cue channel consists of IC9, which converts single-phase input signal into differential signals. Signals are amplified in this IC and input to power on muting circuit Q1, Q2, Q3 and Q4. Diodes D1 to D16 connected to these power on muting transistors are constant-current diodes. Diodes are used, instead of resistors, in these circuits since use of resistors may cause remarkable fluctuation of the base current depending on signal levels. Signals pass through the power on muting circuits and are input to the XLR output connector.

The time code (TC) and monitor (MONI) circuit have the same configuration; IC13 is the time code amplifier, IC12 is the L-channel monitor amplifier, and IC18 is the R-channel monitor amplifier.

CUE/TC I/O & Audio Monitor Output Amplifier

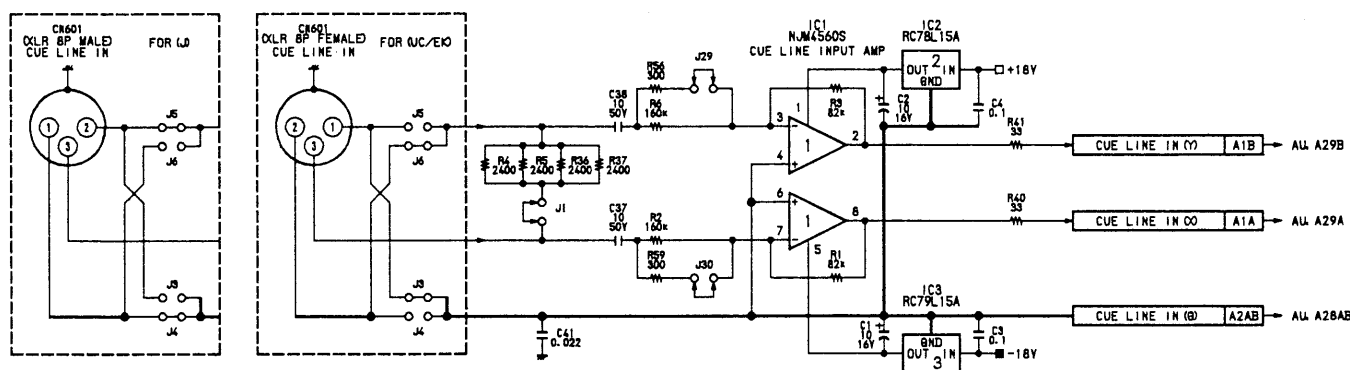


Fig. 4-2-2. Line Input Circuit

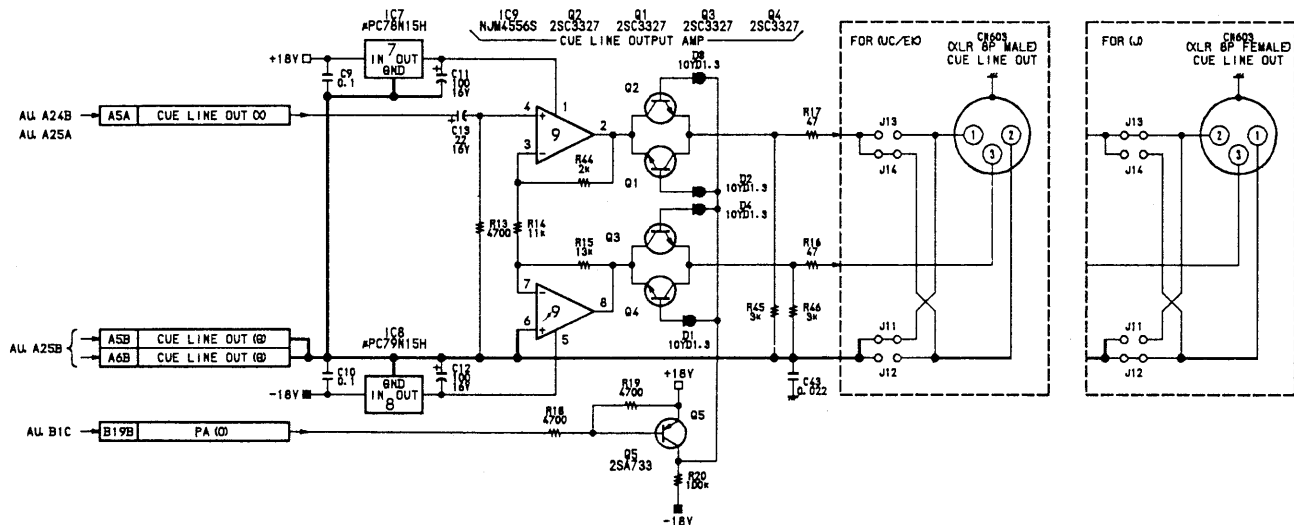


Fig. 4-2-3. Line Output Circuit

4-2-5. AU-109 Board

1. Cue and Monitor Signals

The Mix In signal sent from the processor via the 50-pin D-sub cable and the CUE Line In signal from the LO-06 board are input.

These signals are received by the buffer IC908 and input to the Mix In/Cue Line In selector switcher IC909.

Selected signal is once output from this board and input to the VR-74 board, which controls the level. Level-controlled signal is returned to the AU-109 board as the Cue VR In signal. This signal is amplified by IC902 and input to the switch IC909, which is for muting the modulator input signal for spot erasure.

Before frequency modulation, the low-pass filter 20 kHz limits the band-width. The signal passes through pre-emphasis and is divided into two channels, i.e., the normal and invert channels. The signal in the invert channel is inverted by IC902.

The modulator IC904 for the normal cue channel performs modulation at 500 kHz carrier frequency. The modulator IC903 for the invert channel performs modulation at 300 kHz carrier frequency. Output signals of these modulators are divided by half into 250 kHz and 150 kHz carrier frequencies for recording respectively.

The signal output from the modulator passes through the selector switch IC910, which selects the modulator output and the playback signal (cue playback signal) from the frequency doubler (ICs 21 and 22), and is input to the cue demodulator. This demodulator actually prevents the demodulation level from changing during variable speed playback. A monostable multivibrator is triggered by the edge of input pulse. Since the interval of the pulses changes during variable playback, duty increases at higher speed and decreases at lower speed, resulting in variance of the demodulation level. This circuit maintain the duty constant. 2-channel output signals have the same polarity and phase.

Having passed the variable duty circuit, signal is input to the switcher IC914. This switcher selects a proper track if dropout occurs in another track since dropout rarely occurs in two tracks simultaneously. When dropout occurs, the S/N ratio is deteriorated since wow and flutter are not canceled. However, it is an instantaneous phenomenon and does not have serious effects. Following this circuit, there is a circuit which holds or mutes signal if dropout occurs in both tracks simultaneously.

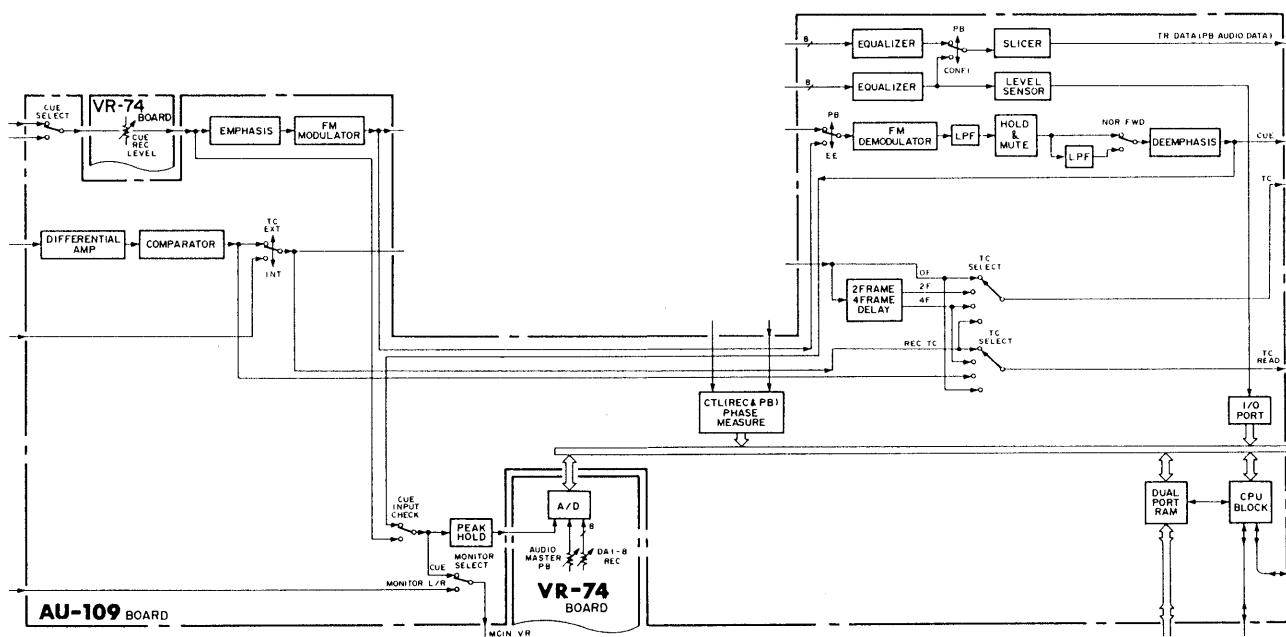


Fig. 4-2-4.

The adder IC901 adds these 2-channel signals. Noises originating from wow and flutter are canceled at this point of time. Then, a low-pass filter IC902 limits the band width to remove the carrier frequency. This low-pass filter IC902 is the same as the low-pass filter IC901 used on the modulator side.

The following switches IC915 and IC916 form a holding circuit. The hold signal is generated when a long-term dropout occurs. Detected dropout is once read in and processed by the timer controlled by the CPU, then returned as the hold signal via the timer output.

Having passed the holding and muting circuits, signal pass through the de-emphasis circuit and is input to the buffer IC917. The buffer output branches into two lines: Cue Line Out (A24B) is output to the LO-06 board, and another is input to IC942 (cue line/input select). This IC is for checking input signal. Then, IC919 and IC920 (CUE meter amplifier) double-wave rectifies the signal, IC941 sample-holds. Sample-held value is output to the VR-74 board as CUE level from pin 13A of CN802. On the other hand, the signal passing through the selector IC942 is input to IC923 and IC922. These ICs select the signal of the buffer IC921 (i.e., monitor L and R signals sent from the processor) and the cue channel signal.

Selected signal is transmitted to the VR-74 board via 17A and 17B of CN804. Signal is level-controlled by this board and is supplied to the headphone jack. It is returned to the AU-109 board again via the headphone switch, and is input to the LO-06 board again. If a headphone plug is inserted into the jack, the signal to the monitor line is cut off.

2. Digital Audio Playback/Confi Signal

Channels for track 1 to track 8 are identical. Taking TR1 CONF1 as an example, IC104 to IC106 cosine-equalize the input signal at 1 MHz peak. Signal is then input to the confi detector IC105 and IC108. This is an RF level detector and is connected to the CPU port. Channel-1 to -8 signals are input to the selectors (IC111 to IC811). These are channel selector circuits for Confi during insertion. They allow any detector for non-insert channel to be used. At present, Confi operation is allowed only in recording and is impossible in insert operation. Playback signal is input as TR1 PB. The playback system has same cosine equalizers IC101 to IC103. IC114 switches the input playback signal (PB) and the CONF1 signal having passed the selector IC111.

The signal is input to the low-pass filter IC107 to eliminate high-frequency noises to the extent that no influence is on the waveform. It is then input to the zero-cross detector, converted into TTL level, then output.

3. CPU

IC9 is the CPU on the AU-109 board. This CPU incorporates the peripheral circuits and 2 communication lines. One is for communication with the processor via the DIF-2 board. Another is connected to the remote control for future extension via the IF-207 board.

The CPU also performs communication with the CPU on the SV-90 board, i.e., transfers data to/from the CPU on the SV-90 board via the dual-port RAM IC1 (interface RAM). This RAM is connected to the SV data bus, SV address bus and read/write, and transfers data. This RAM also serves as the working RAM of the CPU IC9. Peripheral circuits also include the address decoder IC5 and ROM IC6. There are IC19 and IC20 as the I/O ports for extension of this CPU. Select signal is output via these ports.

Another I/O port (IC935) is controlled by the CPU on the SV board in the VTR.

External time code is input to IC925 for selection of the signal sliced by IC926 or the signal input to the internal TC generator (B12C), i.e., external TC or internal TC. The selected signal is then output from B10B terminal as TC REC signal.

The signal to the TC READ or TC LINE OUT is selected by IC933 and output. The through playback signal, 2-frame or 4-frame delayed signal, or TC PB is selected.

TC LINE OUT is input to a filter (TC filter & switch) which ensures the specified rise time of the waveform only during $\times 1$ and EE playback operations since the rise time of the TC waveform is specified during $\times 1$ and EE operations. In other operations, the TC waveform rises in shorter period of time than normal.

The counters IC15, IC16 and IC17 are controlled by the CPU. Each IC incorporates 3 counters. IC15 incorporate the playback time code counter and two MOD AFC counters. The CUE carrier frequency is once read by the counter. The CPU checks the shift of the carrier frequency and changes the duties of the MOD AFC outputs of IC17 and IC16. Then, the carrier frequency is equalized by the CR filter and returned to the modulator for control.

The DO DET below IC17 checks the interval of the playback cue channel signals. It checks the traveling speed since the pulse interval changes in the variable speed operation. It regards irregular pulse interval as drop-out.

This output is used to trigger the DOC P GEN IC16 and to determine the time width of the actual DO. IC13 and IC14 performs selection of holding; holding only when dropouts occur in both tracks during normal playback, or holding when dropout occurs in either track during shuttle playback.

Counter IC18 generates the clock signal for activating the TC DELAY CLK, i.e., 2-frame/4-frame delay circuit, connected to IC903 to IC932 and IC927 to IC929. For variable speed time codes, this clock signal is changed.

The timing counter output as INT PO works as CPU interruption counter. Its output is input to pin 60 of CPU IC9 for interruption.

An erase frequency counter outputs the frequency for the TC, cue and CTL erase amplifiers on the AP-22 board. The frequency is approx. 192 kHz.

In the CTL phase measure, the CPU reads the phase difference between the playback CTL of the recording head and the playback CTL and outputs it to the servo.

4-2-6. AP-22 Board

The AP-22 board consists of the audio recording/playback amplifier and erase amplifier.

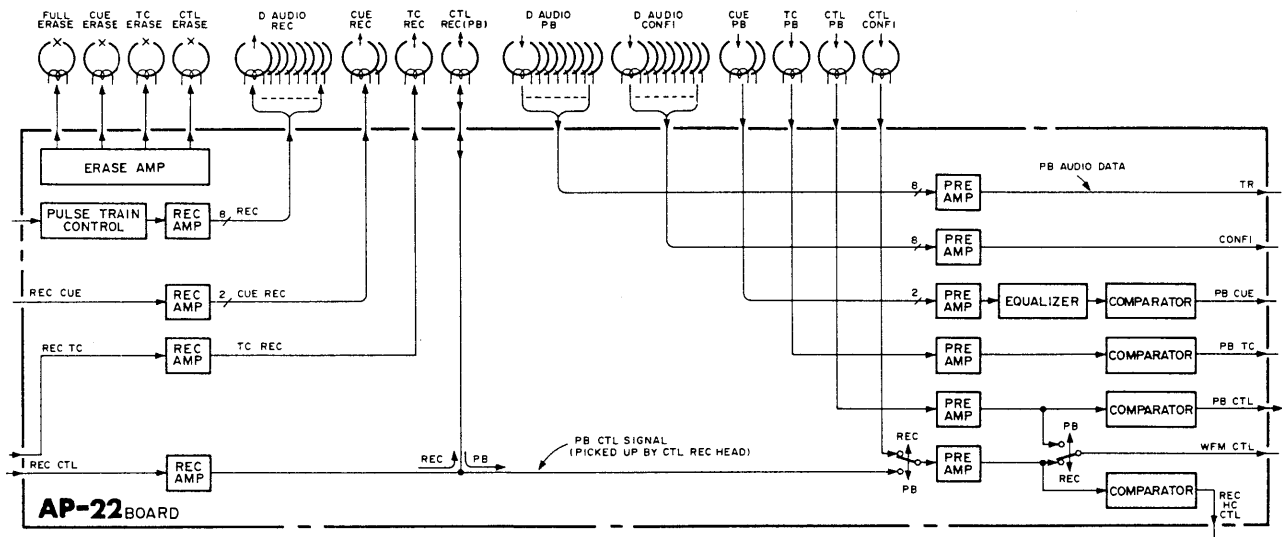


Fig. 4-2-5. AP-22 Board Block Diagram

Data 1 and Data 2 input via 27C and 27B terminals of CN317 include time-shared multiplexed channel 1 to channel 4 and channel 5 to channel 8 data respectively.

These data are serial-parallel converted by IC33 and IC32 and separated into signals of each channel. These 8-channel outputs are transferred to the following recording amplifier (IC582, IC581, IC562, IC561, IC542, IC541, IC522 and IC521). This is merely a switching amplifier, whose output current is controlled by power voltage control.

The power supply is IC29, which converts single-phase into differential level. Q7 and Q9 output current to the recording amplifier, which current is controlled with RV7.

Q6 and Q8 prevent voltage from being applied to the recording amplifier when power is turned on. They are activated by POWER ACT signal input via 23C terminal of CN317.

IC34, IC35 and IC36 detect improper transmission of the data and clock of the recording amplifier to the AP-22 board due to poor contact of the connector, etc.

IC37 is the REC Enable controller. It can control up to 48 channels since it is originally designed for PCM-3348. It is used for 8 channels in this circuit. The CTL, time code and recording amplifier IC501, IC482, IC502 and IC481 operate equivalent to the ICs for the digital tracks. Their power voltage is controlled likewise, using IC28, Q3, Q5 and RV7.

IC30 divides the signal from 23B and 23A of CN317 (modulator output). IC13, IC31 and IC39 delay the timing of two cue tracks by approximately 1msec so that signals in these tracks are heard naturally when the edit function is turned on and off. IC38 activates and deactivates recording of the CTL signal from 24C of CN317 based on the signal from 29A. This circuit enables the CTL signal to be recorded as soon as the rectangular wave is switched.

IC461, IC441 and IC421 are hybrid ICs for the erase amplifiers. Capacitors C462 and C463 in the former stage determine the time constant of waveform slope. R461 controls the erase level. 192 kHz rectangular wave is input to the PULSE pin (pin 11), which is output from the OUT3 pin (pin 12) and resonated by LV464, C464 and C465 to be made into the erase frequency sine wave. It passes through the erase drive amplifier between IN3 and OUT4, and is oscillated secondary by C466 and LV462 to be made into the final erase current.

The above circuits are provided for three lines: cue, time code, and CTL.

The LV1 is a canceller of cross-talk which may be caused by closeness of the adjacent cue and time code tracks. The full erase circuit is a self-exciting circuit whose oscillation frequency is determined by the impedance of full erase head and capacitor C85.

The signal from the head is stepped up to 20 dB by a transformer, and is amplified by an extra-low-noise amplifier.

An amplified signal is further amplified by IC2 (1/2) and IC2 (2/2). Two IC2's are used here since the cue carrier frequency is 250 kHz and one IC cannot obtain sufficient gain for the reason of the frequency response of the amplifier when signals are amplified to higher frequency when using the shuttle mode. Feedback is applied to IC7 by R38, C53 and R39 to lower its threshold in order to prevent the output level from lowering during slow playback. There are time code and CTL playback amplifiers. Each is 1-stage amplifier following the extra-low-noise amplifier since the cue band width is not so wide.

The feedback time constant following the above is determined in order to cover the time code and CTL amplitude which remarkable varies from the speed in comparison with the cue.

The switcher IC17 and IC18 change and connect the CTL recording head to the transformer since it is also used for playback.

IC101 is extra-low-noise amplifier. Following IC102 offer 2 stages of amplification with the time constants which ensure total frequency response flat to approximately 1.5 MHz.

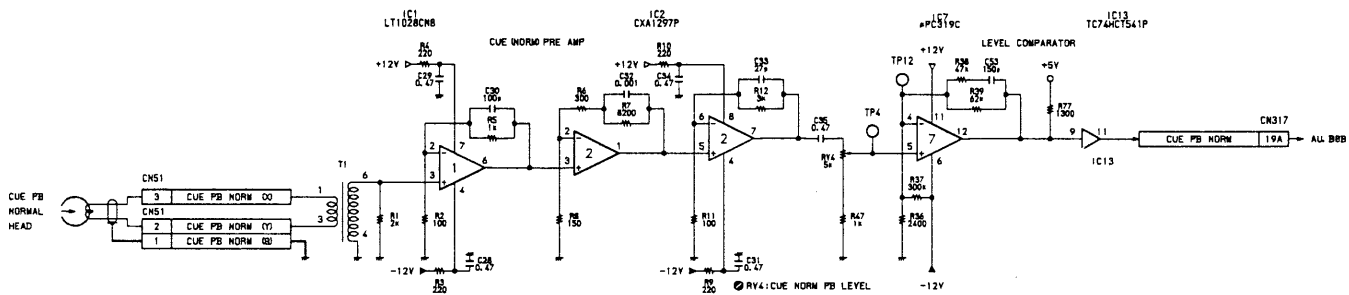


Fig. 4-2-6.

4-3. SERVO/SYSTEM CONTROL/TC SYSTEMS

4-3-1. Outline

The construction of servo and system control in HDD-1000 is shown below.

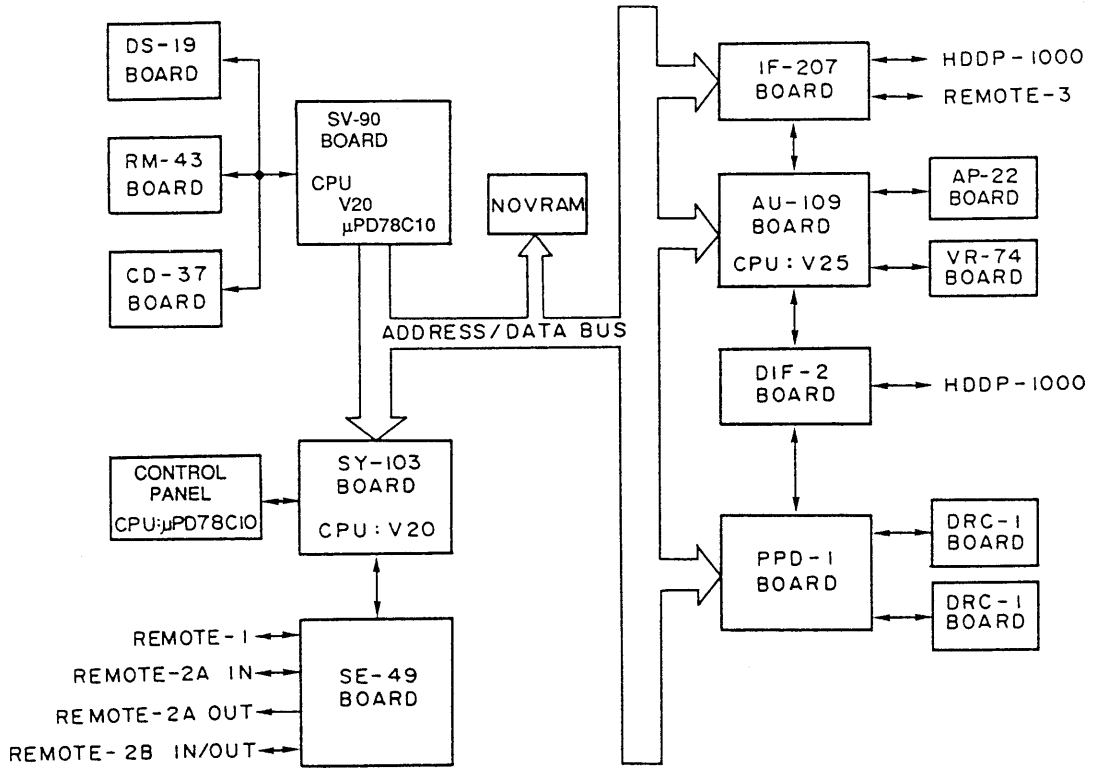


Fig. 4-3-1. Servo and System Control Block Diagram

4-3-2. Servo System

1. Outline

Servo system of HDD-1000 consists of the following boards.

- SV-90 board : Main CPU
Address decoder
Video logic controller
Reference pulse generator
Sub CPU
Motor servo circuit
Tape transport interface
- VH-20 board : Reference sync separator
FG/PG half divider
- CD-37 board : Capstan motor driver
Drum motor driver
- RM-43 board : S-reel motor driver
T-reel motor driver
- DS-19 board : Solenoid driver
Movable guide motor driver
Sensor output level converter

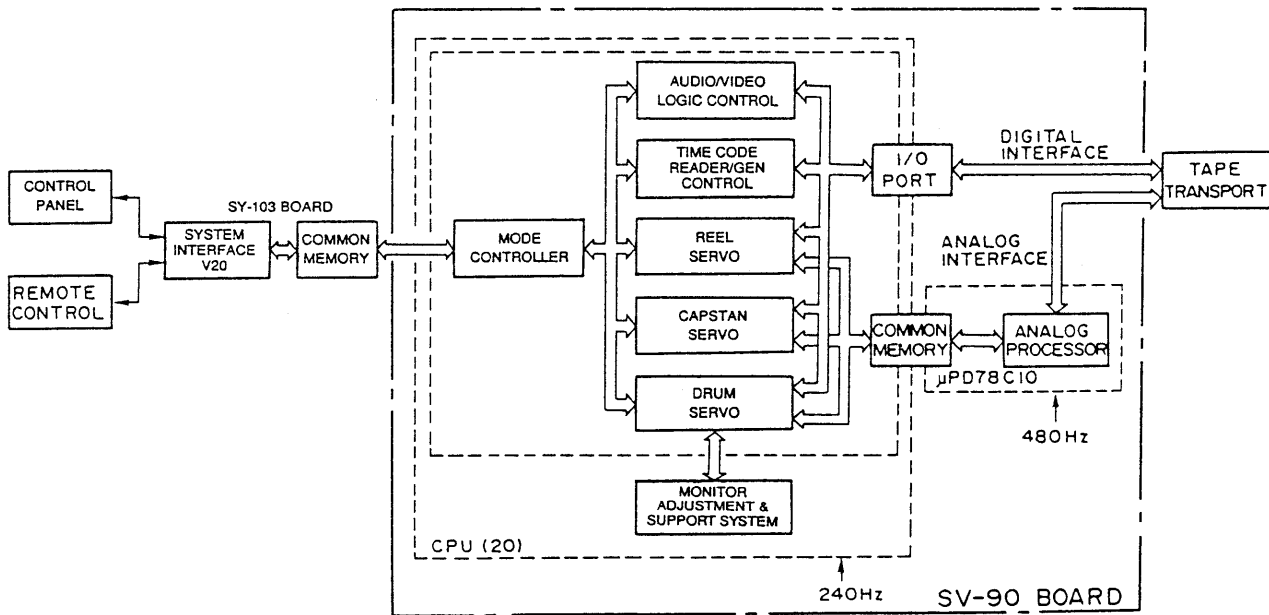


Fig. 4-3-2. Servo System Block Diagram

2. SV-90 Board

The SV-90 board controls all operations after the mode controller, communication with the parallel remote (REMOTE 3), and video and audio system logic processing. The tape transport control signal and video logic signal which are generated by this board are parallel data, and other control signals are supplied to AU, PRD, SY and IF boards via the common bus.

The SV-90 board has the main CPU (ICK19 : CXQ70108P-8) and the sub CPU with a built-in A/D converter (ICB15 : μ PD78C10G). The main CPU controls the motor servo, CTL processing and timer processing. The RAM (ICE16) connected to the sub CPU is used for communication with the main CPU. Most of the servo systems are software controlled. Processed data is latched by the boards via the common bus and used as the control signals. Each motor is controlled by the CPU servo. Transient response not covered by the CPU processing is regulated by the analog damping loop (analog servo). Obtained analog control voltage is overlapped onto the CPU servo control voltage.

The CPU servo shapes the waveform of the FG and PG pulses generated in accordance with rotation of each motor and supplies its output to the PTC (programmable timer counter) and the PFC (phase and frequency counter) to measure the phase and speed.

The main and sub CPUs on the SV-90 board calculate the optimum control voltage for each motor from the input data and supply it to the D/A converter ICA16. Output of the D/A converter is time-shared by the analog switcher and is supplied to each motor as the digital servo motor control voltage via the sampling hold circuit.

The value of the potentiometer on the supply (S) side tension arm shaft (S-REEL TEN), capstan FG (CPADT, CPBDT, CPADD, CPBDD), T reel FG (T-REEL FG A, T-REEL FG B), S reel FG (S-REEL FG A, S-REEL FG B), drum motor control voltage (DMVLD) and capstan motor control voltage (CPVLD) are multiplexed by ICF9, ICF10 and ICF11, then supplied to the analog input pins of the sub CPU ICB15 (A-SIG0 to A-SIG3).

Each drum and capstan analog velocity loop measures the time difference between the FG A pulse and FG B pulse per pulse and converts it into voltage. The analog velocity loop for the drum motor is active if the velocity is within the normal revolution $\pm 6\%$; that for the capstan motor is active if the velocity deviation in the normal play mode is within $\pm 6\%$. Thus, in the variable mode, the capstan motor is controlled by the CPU digital servo only.

The torque and drum PG of each motor can be controlled on the control panel using the setup menu. These set values are stored in the non-volatile memory IC1 on the MB-199 (mother board). These stored value eliminates the necessity of re-adjustment of the servo system if the SV-90 board is replaced.

3. VH-20 Board

The VH-20 board half divides the FG and PG to supply its output to the SV-90 board. Since the reference signal is characteristic to the High Vision, the reference frame signal must be produced from the references SYNC transmitted from the processor. This frame detection is also performed by the VH-20 board. The VH-20 board is a piggy-back board and is located on the SV-90 board.

4. CD-37 Board

The CD-37 board consists of the capstan motor and drum motor drive amplifier.

Each motor is driven through current control and voltage control by the analog signal MDA from the SV-90 board.

The MDA controls the supply voltage of the motor drive circuit up to 40 V for the capstan or up to 80 V for the drum for their voltage control. The variable power supply for the capstan motor is built in the UR-20 power unit.

Since the capstan motor and drum motor are three-phase DC motors, the polarity should be reversed by the drive circuits. Signals for reversing the polarity are generated in each motor. The CD-37 board also detects the drum PG.

5. RM-43 Board

To the RM-43 board, the analog control voltages (T REEL MDA, S REEL MDA) as well as the TRTCW and SRTCW signals indicating the torque direction are supplied from the SV-90 board to control the drive voltage and current of the S and T reel motors. Similarly to the drum motor, the drive voltage is obtained by controlling the variable power supply in the power unit. Its maximum is set to 80 V.

Since the reel motors are three-phase DC motors, the polarity should be reversed by the drive circuits. Signals for reversing the polarity are generated in the motors. The RM-43 board also detects the reel motor FG output and rotational direction.

4-3-3. System Control/TC Systems

1. Outline

Main system control and time code circuits are incorporated in the SY-103 board and the control panel. The SY-103 board has the following functions:

- (1) Control of main/machine interface and interface with the editor, etc. (So called system control)
- (2) Time code reader/generator control

The above circuits are independent. Function (1) is controlled by the CPU on the SY-103 board. Function (2) is controlled by the CPU on the SV-90 board. The time-code-related circuit on the SY-103 board can be regarded as a part of the SV-90 board.

2. System Control

The CPU ICH14 on the SY-103 board receives the control signals from external devices via REMOTE-1, 2A and 2B and button signals from the control panel, converts them into the VTR control signal, and writes data in the common RAM ICJ3 used for communication with the CPU on the SV-90 board. The CPU ICK19 on the SV-90 board decodes commands from the SY-103 board into the port data for each board and transfers them to each video and audio board.

3. Character Generator

A suitable character generator is required for 1125 scanning lines. For this purpose, the CH-23 board is mounted on the SY-103 board.

4. Time Code Generator/Reader

The CPU on the SV-90 board controls all time code system. The CPU on the SY-103 board obtains necessary data via the common memory ICJ3 (RAM). Only the LTC generator and reader operate on the HDD-1000 since VITC is written/read as digital data in HDDP-1000.

SECTION 5 PERIODIC CHECK AND MAINTENANCE

5-1. PERIODIC INSPECTION SCHEDULE

The table presents the time periods for cleaning, checking or replacing major parts.

The replacement period depends upon usage conditions, so use the period indicated as a reference when making maintenance inspection schedules. This table includes the periodic inspection schedule for the HDDP-1000. The times indicated here are according to a head hours meter.

If the part in question cannot be clearly determined, refer to the relevant page (Page of Section D column in table) of the maintenance manual.

Note: The symbol "↑" in the table means that when the part indicated in the upper column is replaced, it is done so automatically.

○ : Cleaning △ : Check ☆ : Replace

	BLOCK NAME OR PART NAME	PART NUMBER	PAGE OF SECTION D	HEAD HOURS METER (TIME)						REMARKS			
				DAILY	MON-THLY	3000	6000	9000	12000		15000	18000	
HDD-1000	TAPE TRANSPORT BLOCK UPPER/LOWER DRUMS (inc. rotary head) STATIONARY HEAD TAPERED GUIDE			○								As for cleaning, refer to section 5-2-1.	
	LOWER DRUM LEAD				○							As for cleaning, refer to section 5-2-1.	
	FAN MOTOR				○							As for cleaning, refer to section 5-2-1.	
	TRACKING CHECK											Check tracking every 250 hours in accordance with section 5-2-2.	
	UPPER DRUM ASSY (DHR-01-R)	A-6052-113	D-11, 12									Check head projection every 500 hours in accordance with section 5-2-3. As for replacement of the upper drum assembly, refer to section 6-1. When the drum assembly has been replaced, the upper drum assembly is automatically replaced.	
	DRUM ASSY (DHH-01A-R)	A-6050-622	D-11, 12				☆		☆		☆	As for replacement, refer to section 6-2.	
	BRUSH/SLIP RING ASSY	A-6053-056	D-11, 12			☆	↑	☆	↑	☆	↑	As for replacement, refer to section 6-3. When the drum assembly has been replaced, brush/slip ring assembly is automatically replaced.	
	FULL ERASE HEAD (EF274-51)	8-825-501-50	D-13, 14, 15									Perform replacement in accordance with section 6-18 as necessity.	
	AUDIO PB HEAD ASSY (PF313-5112)	A-6036-087	D-16, 17, 18			△	☆	△	☆	△	☆	As for replacement, refer to section 6-14.	
	AUDIO ERASE HEAD ASSY (EF312-5103)	A-6036-090	D-16, 17, 18									Perform replacement in accordance with section 6-15 as necessity.	
	AUDIO REC HEAD ASSY (RS306-5112)	A-6036-089	D-16, 17, 18			△	☆	△	☆	△	☆	As for replacement, refer to section 6-16.	
	AUDIO MONITOR HEAD ASSY (PF313-5112)	A-6036-088	D-16, 17, 18			△	☆	△	☆	△	☆	As for replacement, refer to section 6-17.	
	MOVABLE GUIDE ASSY	A-6046-073	D-13, 14, 15						☆		☆	As for replacement, refer to section 6-4. When the movable guide assembly has been replaced, the entrance/exit slant guide assembly is automatically replaced.	
	S-REEL MOTOR ASSY	A-6039-032	D-5, 6			△	△	☆	△	△	☆	Check the mechanical brake torque in accordance with section 6-6-1. As for replacement, refer to section 6-6-1.	
	T-REEL MOTOR ASSY	A-6039-033	D-5, 6			△	△	☆	△	△	☆	Check the mechanical brake torque in accordance with section 6-6-2. As for replacement, refer to section 6-6-2.	
	TENSION ARM ASSY	A-6042-027	D-7, 8			△	△	☆	△	△	☆	Check the tension in accordance with section 9-2. As for replacement, refer to section 6-9.	
	PINCH ROLLER	A-6035-036	D-19, 20									As for replacement, refer to section 6-11. Pinch roller should be replaced together with the upper drum assembly replacement.	
	PINCH SOLENOID	1-454-432-11	D-19, 20				△	☆		△	☆	Check the operation of pinch solenoid. As for replacement, refer to section 6-12.	
	PINCH SOLENOID JOINT PIN	3-714-535	D-19, 20					☆			☆	As for replacement, refer to section 6-12.	
	CAPSTAN MOTOR	8-835-232-01	D-19, 20				☆		☆		☆	As for replacement, refer to section 6-10.	
	BEARING OF ROLLER GUIDE (G9)	3-656-948	D-7, 8			☆	☆	☆	☆	☆	☆	As for replacement, refer to section 6-13.	
	BLOWER	1-541-424-11	D-31, 32				☆		☆		☆	As for replacement, refer to section 6-20.	
	FAN MOTOR (CONNECTOR PANEL)	1-541-327-11	D-29, 30				☆		☆		☆		
	FAN MOTOR (POWER BLOCK)	1-541-337-21	D-27, 28					☆			☆		
	POWER SWITCH	1-570-936-11	D-9, 10					☆			☆		
	HDDP-1000	LITHIUM BATTERY (PR-115 BOARD)	1-528-218-11				☆		☆		☆	As for replacement, refer to section 2-5-3.	
		FAN MOTOR (CONNECTOR PANEL POWER BLOCK)	1-541-651-11	D-9, 10 D-13, 14, 15		○		☆		☆		☆	As for cleaning, refer to section 5-2-1.
		POWER SWITCH	1-570-052-11	D-3, 4					☆		☆		

5-2. MAINTENANCE

5-2-1. Cleaning

Basic Knowledge

A. Clean the following positions.

1. Cylindrical surface and rotary heads of the upper drum
2. Cylindrical surface and lead surface of the lower drum
3. Stationary heads (full erase head and audio head)
4. Tape path system (tape guides, capstan and pinch roller)
5. Ventilation fans (including HDDP-1000's fan motors)

B. When performing cleaning, be sure to turn off the power.

C. After the completion of cylindrical surface cleaning, be sure to wipe with a dry cloth.

1. Cleaning of cylindrical surface and rotary heads of upper drum

1) Cleaning of cylindrical surface and rotary heads of the upper drum is carried out by pressing a cleaning cloth soaked in alcohol up against them, then slowly rotating the upper drum by hand in the circumference direction for two or three turns.

- Cleaning cloth

Sony Part No. 3-731-449-01

- Cleaning fluid (or equivalent to alcohol)

Sony Part No. 9-919-573-00

2) After cleaning, be sure to wipe them for two or three times with dry cloth.

Perform cleaning once a day at the beginning of operation.

Cleaning when changing the video tape

Whenever changing the video tape, be sure to clean the cylindrical surface of the upper drum and the rotary head chips with cleaning cloth for two or three times to prevent the head clogging.

During the rewind mode, the tape running at the end of the video tape may be unstable. This gives that magnetic material adheres to the cylindrical surface of the upper drum and the rotary head chips, and induces the head clogging.

Note 1 : When cleaning the rotary heads, always clean along the circumference direction. Cleaning the heads in a vertical direction can produce damages. Also, do not use a cotton swab to clean the rotary heads.

Note 2 : Clean the shaded area (lower edge of upper drum) shown in Fig. 5-2-1 meticulously when cleaning the cylindrical surface of the upper drum.

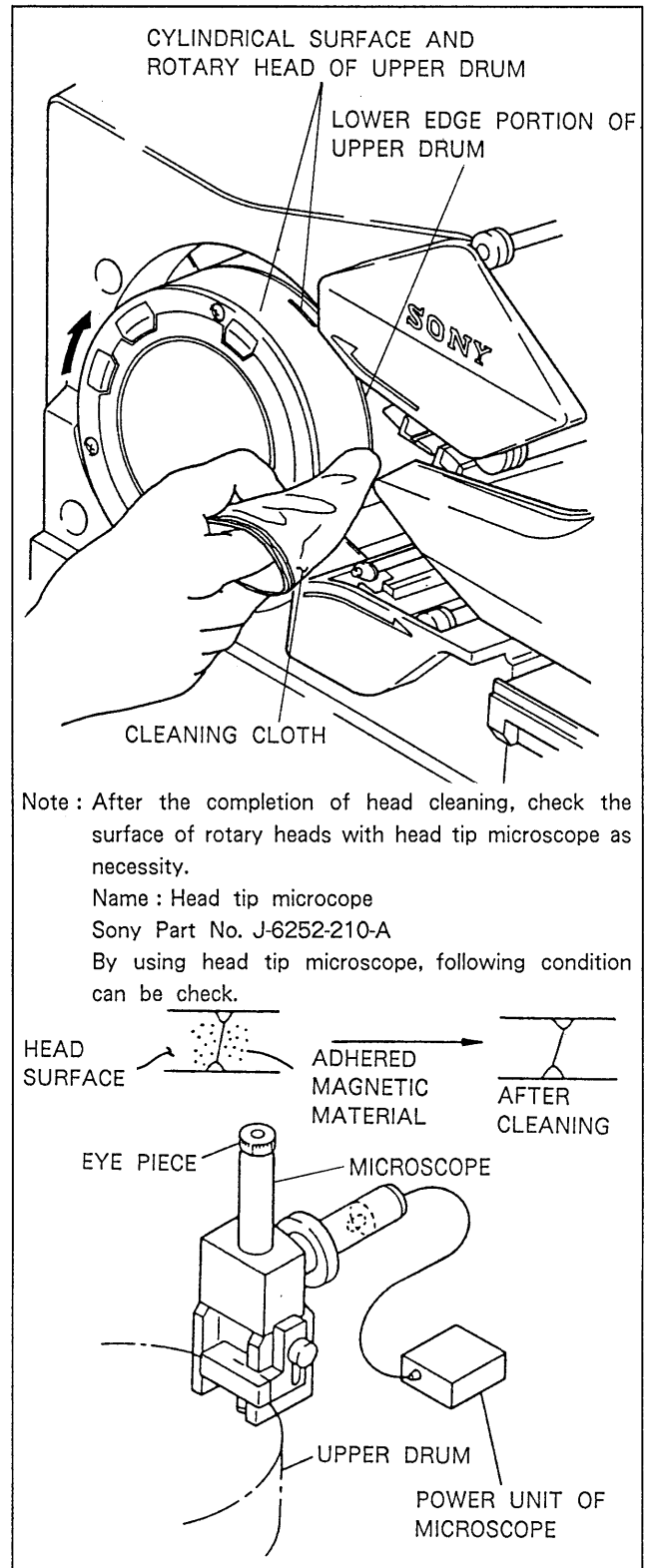


Fig. 5-2-1. Cleaning of Cylindrical Surface and Rotary Heads of Upper Drum

2. Cleaning of cylindrical and lead surfaces of lower drum

- 1) In order to prevent bad influence upon tracking due to magnetic material adhered to the lead surface of the lower drum, remove magnetic material, etc. with toothpick (or equivalent) as shown in Fig. 5-2-2.

Note : Be very careful when cleaning the lower drum not to scratch the lead surface and the cylindrical surface.

- 2) Clean the lead surface and the cylindrical surface of the drum with cleaning cloth soaked in alcohol.
 - Cleaning cloth
Sony Part No. 3-731-449-01
 - Cleaning fluid (or equivalent to alcohol)
Sony Part No. 9-919-573-00
- 3) After cleaning, be sure to wipe them for two or three times with dry cloth.

Cylindrical surface of lower drum

Perform cleaning once a day at the beginning of operation.

Lead surface of lower drum

Perform cleaning once a month.

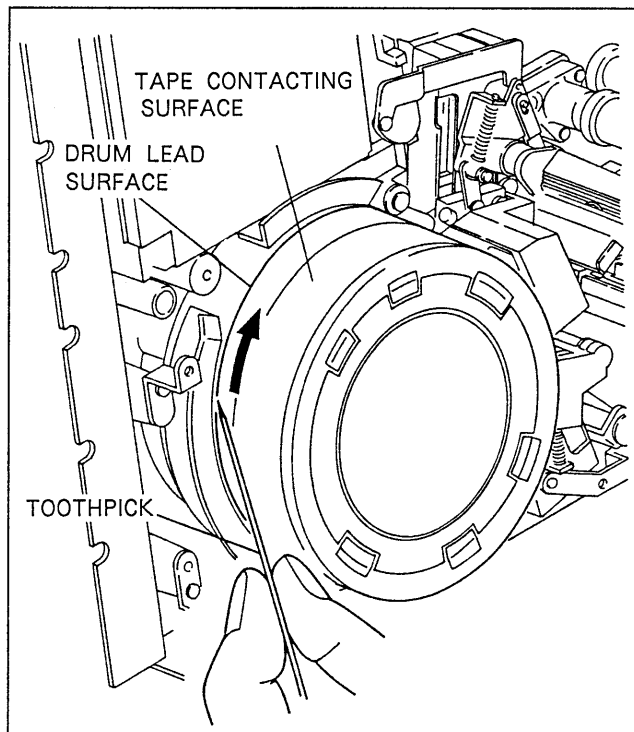


Fig. 5-2-2. Cleaning of Cylindrical and Lead Surfaces of Lower Drum

3. Cleaning of stationary head

- 1) In order to prevent malfunction in recording or playback due to magnetic material adhered to head-gap of the stationary head, clean the contact surface of stationary head in a horizontal direction with cleaning cloth soaked in alcohol.

Note 1: There are projection on the head core portion of the PB head and monitor head.

Head may be damage when clean the head in the vertical direction. So, clean the head in the horizontal direction without applying the excessive force.

Note 2: When cleaning the audio head, open the front shield plate in a direction A by hand. After opening the plate by hand, be sure to return it to its original position. If left in this position, however, air threading cannot be done.

- Cleaning cloth

Sony Part No. 3-731-449-01

- Cleaning fluid (or equivalent to alcohol)

Sony Part No. 9-919-573-00

- 2) After cleaning, be sure to wipe them for two or three times with dry cloth.

Perform cleaning once a day at the beginning of operation.

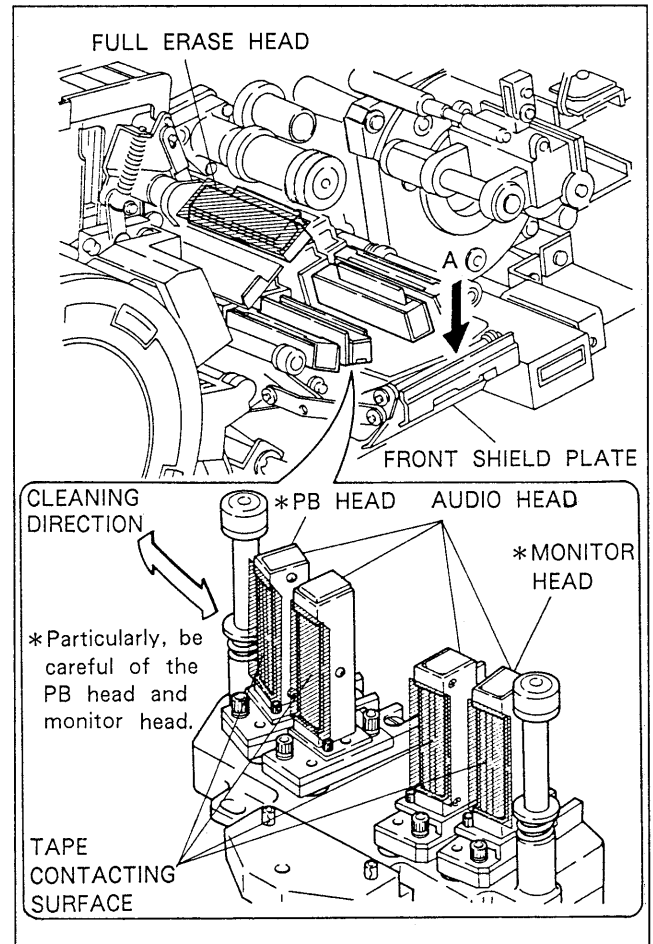


Fig. 5-2-3. Cleaning of Stationary Head

4. Cleaning of tape path system

- 1) Clean the parts shown by the arrows in Fig. 5-2-4 with a cleaning cloth soaked in alcohol.
 - Cleaning cloth
Sony Part No. 3-731-449-01
 - Cleaning fluid (or equivalent to alcohol)
Sony Part No. 9-919-573-00
- 2) After cleaning, be sure to wipe them for two or three times with dry cloth.

Perform cleaning once a day at the beginning of operation.

Note : Guide pins of the entrance and exit slant guides especially are apt to adhere the tape magnetic material or back coating material. Open the movable guide and clean the slant guides completely.

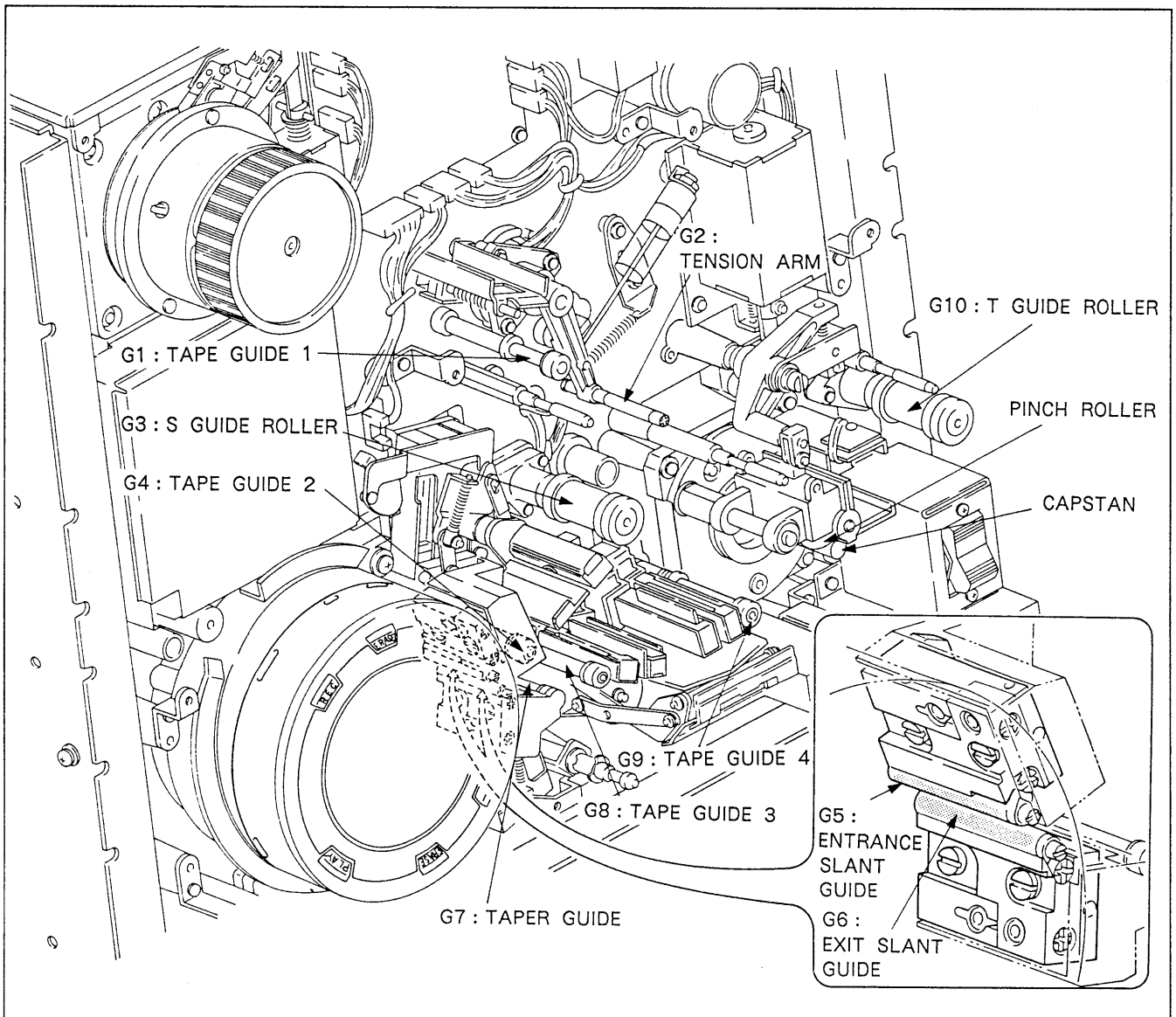


Fig. 5-2-4. Cleaning of Tape Path System

5. Cleaning of fan motor

Method of cleaning the fan motors in the HDD-1000 and the HDDP-1000 will explain here.

Perform cleaning once a month.

Cleaning of HDD-1000's fan motor

Clean the fan motors at the rear panel and the power panel as shown in Fig. 5-2-5.

- (a) Cleaning of fan cover
While brushing a dust from fan cover by dry brush, inhale a dust with vacuum cleaner as shown in Fig. 5-2-6 (a).
- (b) Cleaning of fin
Clean the fins as shown in Fig. 5-2-6 (b) and (c). As for disassembly, refer to section D of Volume 2 manual. Method of cleaning is the same as fan cover.

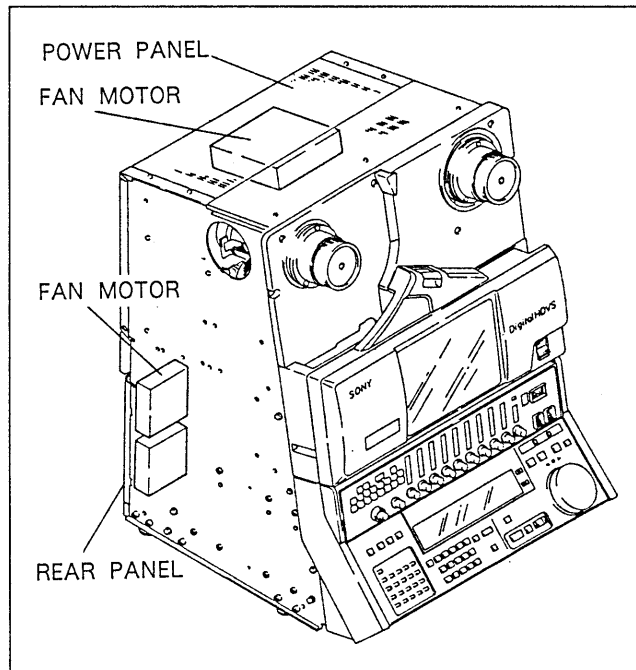


Fig. 5-2-5. Cleaning of Fan Motor (1)

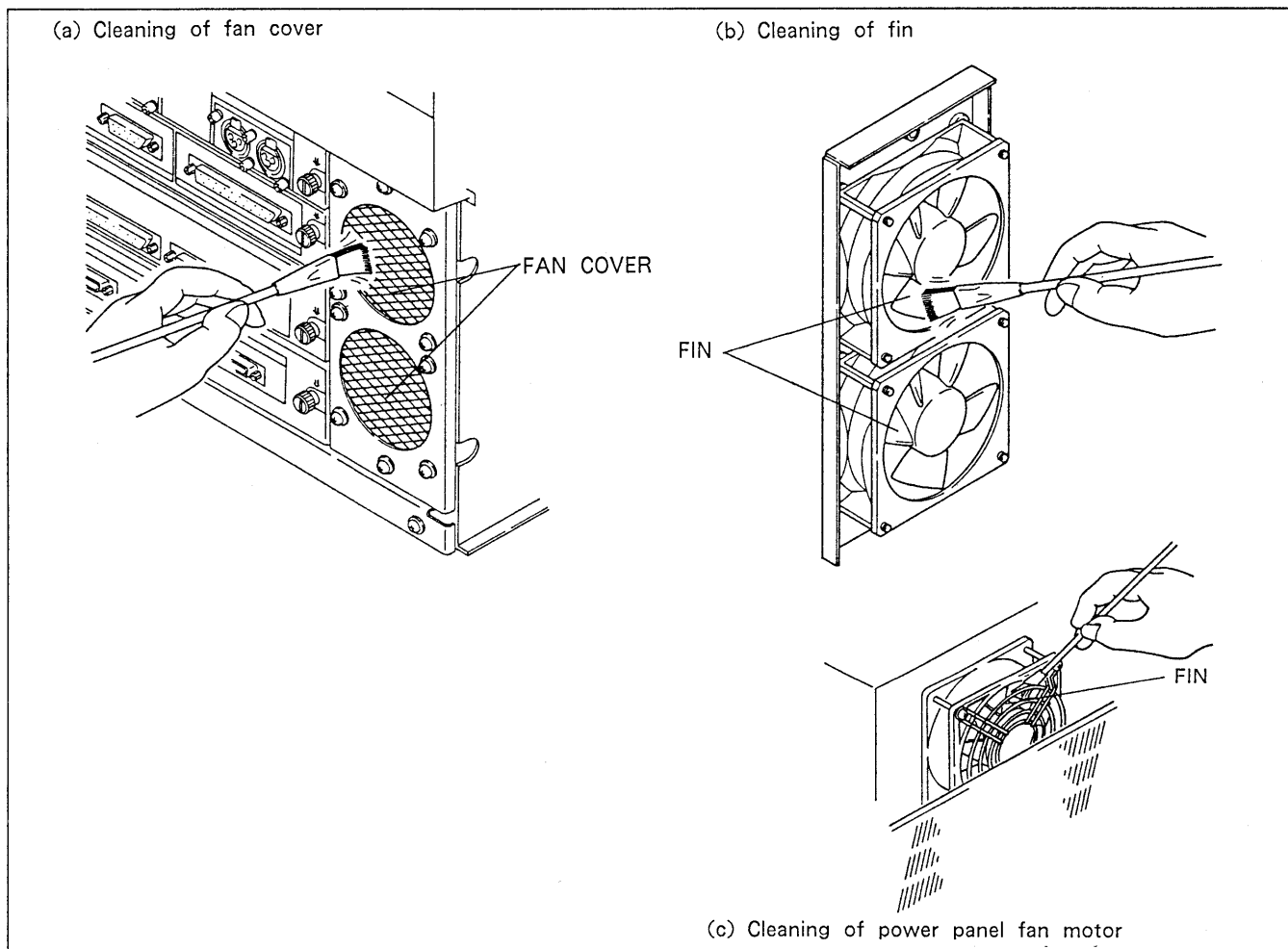


Fig. 5-2-6. Cleaning of Fan Motor (2)

Cleaning of HDDP-1000's fan motor

- 1) Cleaning of front panel
While brushing a dust from the surface and the back side of the front panel by dry brush, inhale a dust with vacuum cleaner as shown in Fig. 5-2-7.
- 2) Cleaning of fan motor
Clean the fan motors inside the rear panel as shown in Fig. 5-2-8.
 - (a) Cleaning of fan cover
While brushing a dust from fan cover by dry brush, inhale a dust with vacuum cleaner as shown in Fig. 5-2-9 (a).
 - (b) Cleaning of fin
Clean the fins as shown in Fig. 5-2-9 (b). As for disassembly, refer to section D of Volume 2 manual. Method of cleaning is the same as fan cover.

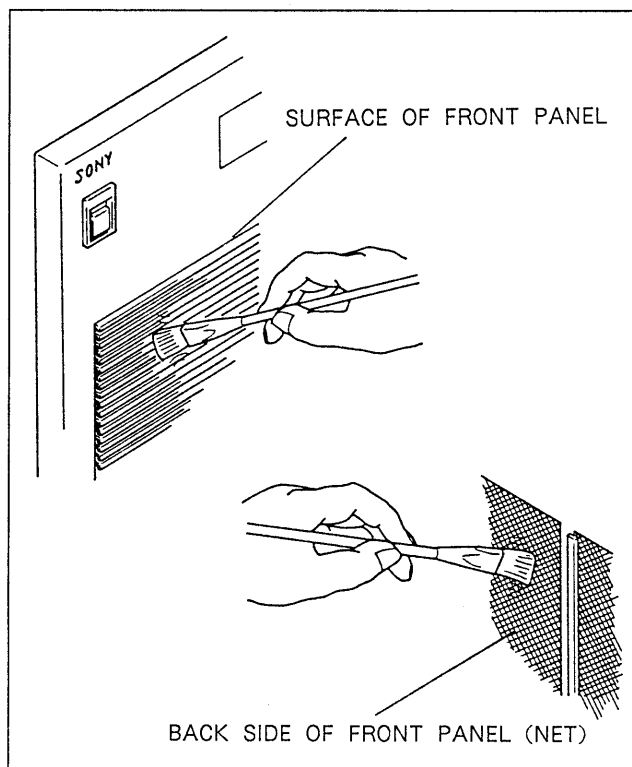


Fig. 5-2-7. Cleaning of Front Cover

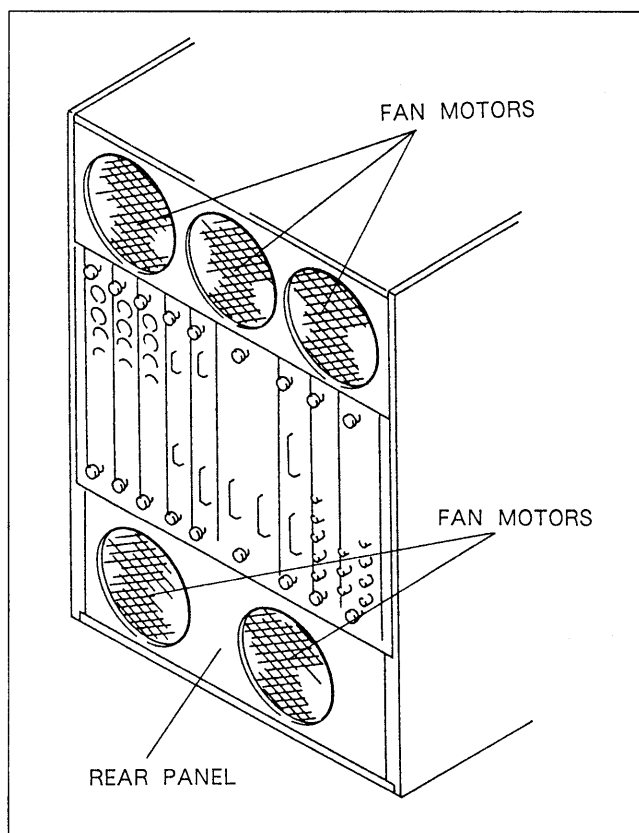


Fig. 5-2-8. Cleaning of Fan Motor (1)

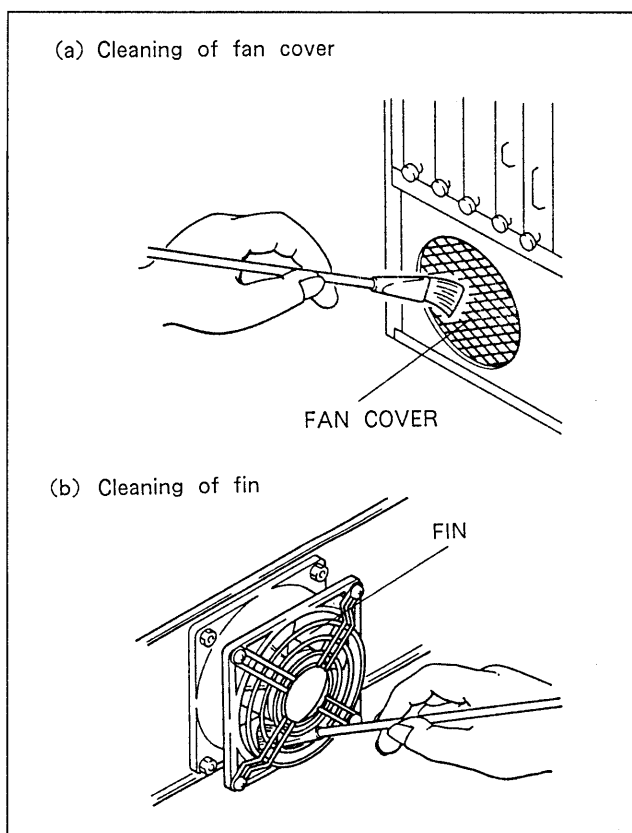


Fig. 5-2-9. Cleaning of Fan Motor (2)

5-2-2. Tracking Check

Basic Knowledge

- A. In order to check the tracking, prepare the following material.
- Alignment Tape : FR2-1
Sony Part No. 8-960-072-11
 - BNC-UM Cable
Sony Part No. J-6264-360-A
- B. In case when the upper drum assembly has just been replaced, idle the unit about 20 minutes using an ordinary tape in the recording mode.

Check

1. Connect BNC connector side of the BNC-UM cable to oscilloscope.
Trigger : TP2/SV-90 Board (slot No.1)
2. Connect UM connector side of the BNC-UM cable to CH-1 terminal on the DRC-1 board (slot No.5) as shown in Fig. 5-2-10.
3. Play back the alignment tape.
4. Turn the TRACKING control and stop where the playback RF waveform maximizes.
5. Confirm that the waveform of the RF envelope meets the specifications in Fig. 5-2-11.
6. Confirm that the RF waveform of CH-2/3/4 and CH-5/6/7/8 (DRC-1 board : slot No.4) in sequence. If the specifications are not met, perform tracking adjustment in section 9-5.

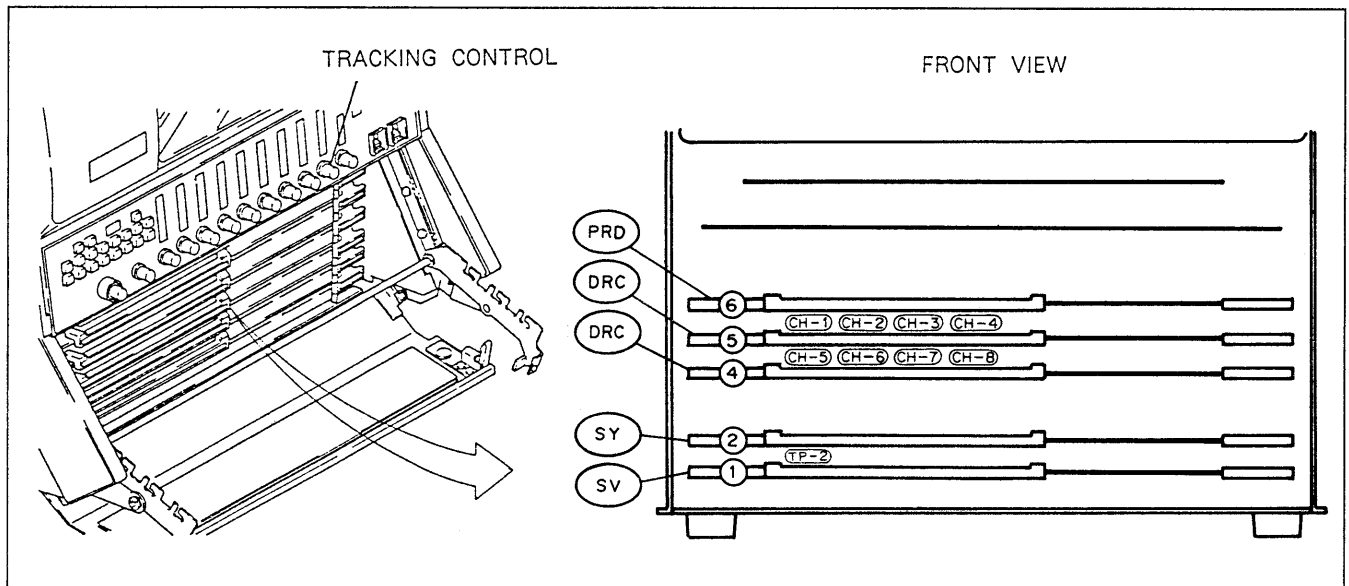


Fig. 5-2-10. Boards Allocation

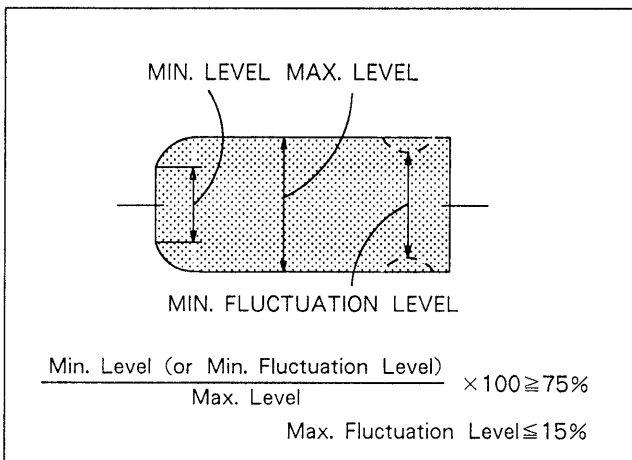


Fig. 5-2-11. Tracking Check

5-2-3. Head Projection Check

Basic Knowledge

- A. Each head mounted on the upper drum assembly is guaranteed to operate for 500 hours under normal operating conditions.
- B. If the projection (length from drum surface to head tip) of the video head is $30\ \mu\text{m}$ or less, replacement of the upper drum is recommended.
- C. In order to measure the head projection, prepare the following gauge.
 - Upper Drum Eccentricity Adj. Gauge

This gauge can be obtained by modifying the upper drum eccentricity gauge (Sony Part No. J-6250-800-A). For detail, refer to section 2-7.
- D. Before checking the head projection, be sure to clean the tip of the measurement pin because the heads might be damaged if there are foreign material stuck to the measurement pin.

Check

1. Open the front cover and remove the drum panel.
2. Confirm that the dial gauge probe is positioned at the center of the measurement pin inserted into the measurement arm of the upper drum eccentricity adjustment gauge as shown in Fig. 5-2-12. If it is not at the center, adjust its position as shown in Fig. 5-2-12.
3. Turn the zero adjustment screw counterclockwise for two to three turns.

While touching the stopper of gauge at the side surface of the lower drum, turn the fixing knob clockwise and fix the gauge.

After fixing the gauge, confirm that the stopper touches the side surface of the lower drum.

Note: In order to prevent head damage, be careful not hit the dial gauge to the head when installing the gauge.

4. Turn the dial gauge in the direction of the arrow A as shown in Fig. 5-2-13, then move it in the direction of arrow B or arrow C until the circular mark engraved on the shaft of the fixing knob is half hidden, then return the dial gauge towards the drum.

Note: In order to prevent head damage, be careful not hit the measurement pin to the head when returning the dial gauge towards the drum.

5. Turn the upper drum assembly slowly by hand so as to bring the video head close to the measurement pin.
6. Turn the zero adjustment knob so that the gauge indicates zero.
7. Confirm the projection of 18 heads (except erase heads) in turn by turning the upper drum assembly clockwise. If the projection of either head is below $30\ \mu\text{m}$, we recommend that the upper drum assembly be replaced.

8. Turn the zero adjustment screw counterclockwise for two to three turns, then remove the gauge.

Note: In order to prevent head damage, be careful not hit the gauge to the head when removing the dial gauge.
9. Install the drum panel and close the front panel.

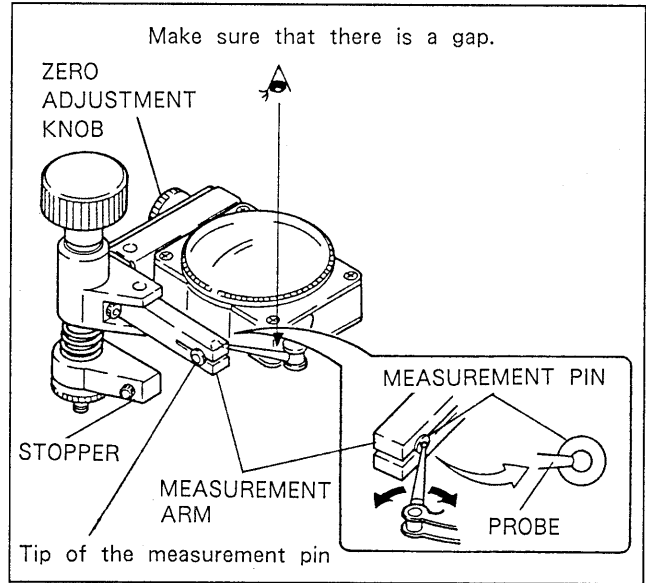


Fig. 5-2-12. Upper Drum Eccentricity Adjustment Gauge

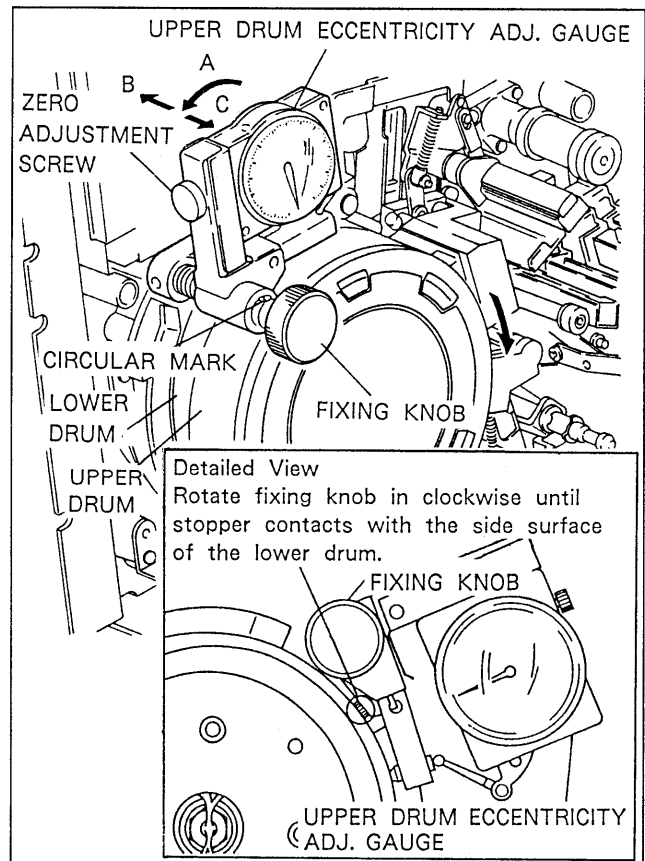


Fig. 5-2-13. Head Projection Check

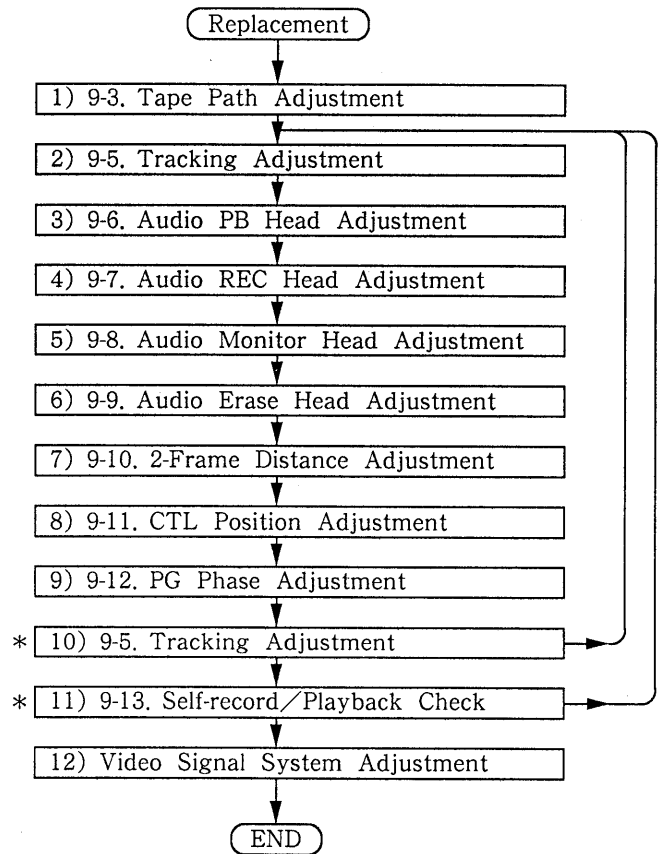
SECTION 6

PARTS REPLACEMENT

6-1. UPPER DRUM ASSEMBLY (LDR-2/LDR-3 BOARDS) REPLACEMENT

Preliminary Information

- A. Prepare the following fixtures for adjustment after parts replacement.
- Upper drum eccentricity adjustment gauge :
Sony part No. J-6250-800-A
This gauge should be modified before using it for the HDD-1000. Refer to section 2-7 for modification procedure.
 - Tapered screws
Sony part No. J-6040-460-A
- B. Replacement procedure for the LDR-2/LDR-3 boards located inside drum assembly is also explained.
- C. When the upper drum assembly is once removed or replaced, check the following as shown by flowchart.



Note : When any adjustment (parameter change) is executed in the step that carries * mark, return to the specified step that is shown by the arrow mark and follow the procedure.

Removal

1. Remove the three screws ① shown in Fig. 6-1-1, and remove the upper drum lid.
2. Remove the four screws ② (including spring washer and flat washer) and remove the upper drum.

Hexagonal wrench screwdriver: 3 mm (Opposite side)

Note 1 : When removing screws ② spring washer (SW4) and flat washer (W4) come off together with screw, so that take care not to lose them.

Note 2 : Take extreme care not to give any scar or damage to the upper drum and the lower drum when removing the upper drum.

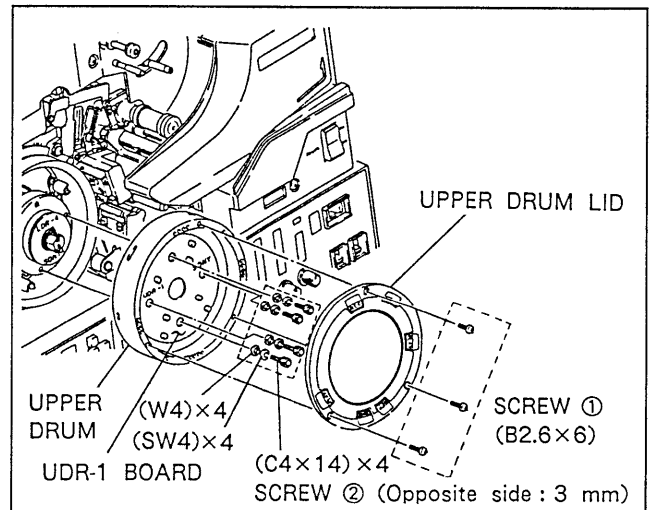


Fig. 6-1-1. Upper Drum Replacement

If the LDR-2 and LDR-3 boards are needed to be removed or replaced, go to step 3-1 or 3-2. If it is not necessary, go to step 4 and followings.

[LDR-2 Board Replacement]

3-1. The LDR-2 board and the brush assembly are fix in common. When replacing the LDR-2 board, refer to Fig. 6-1-2. After the replacement, it is necessary to adjust the position of the brush assembly.

[Brush Assembly Position Adjustment]

Adjustment

Touch the brush to the external circumference of drum flange and tighten the two screws ③ temporarily. Bend the brush about 0.15 mm in thickness which correspond to a thickness of the brush leaf, then tighten the two screws ③.

Check

Rotate the drum flange for one turn by hand and check to see that the brush does not detach from the circumference of drum flange during rotation. If it is, perform readjustment.

[LDR-3 Board Replacement]

3-2. Replace the LDR-3 board by removing the three screws ③ shown in Fig. 6-1-2.

Note 1: When installing the new boards, wipe each contacting pins of the LDR-1 and LDR-2 (or LDR-3) boards with dry cleaning cloth or gauze. Check also to see that no foreign material is stuck on the contacting pins or other contacting parts.

Note 2: Tightening torque of fixing screws

Screw ③

for board : $60 \times 10^{-2} \text{ N} \cdot \text{m}$ {6 kgf · cm}

for brush assembly : $45 \times 10^{-2} \text{ N} \cdot \text{m}$ {4.5 kgf · cm}

supporting screw : $80 \times 10^{-2} \text{ N} \cdot \text{m}$ {8 kgf · cm}

(use nut screwdriver : opposite side 5.5 mm)

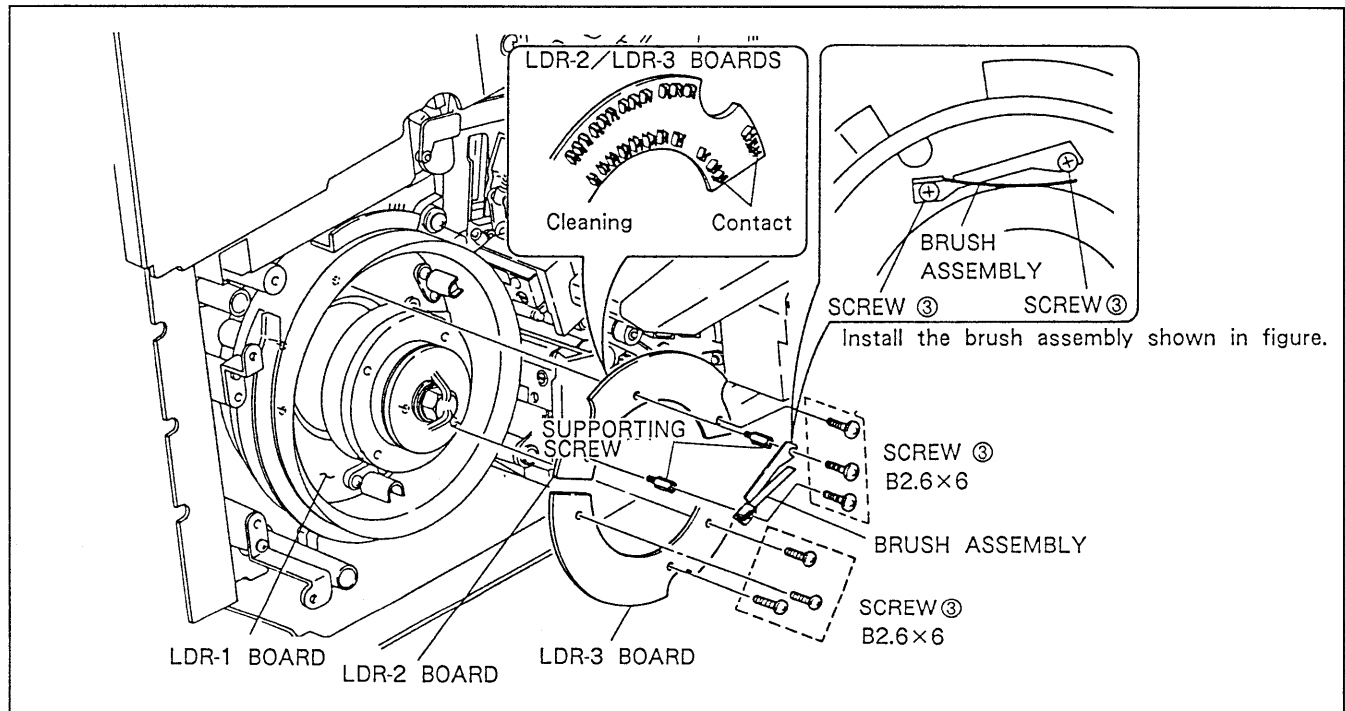


Fig. 6-1-2. LDR-2 and LDR-3 Boards Replacement

6. PARTS REPLACEMENT

4. Remove the four screws ④ shown in Fig. 6-1-3 from the new upper drum assembly. While pulling the UDR-1 board straight upward, remove the upper drum assembly.

The reason why the UDR-1 board is removed in this step, is to make easy the upper drum eccentricity adjustment.

Note : When pulling the UDR-1 board straight upward, take care not to bend the contacting pins.

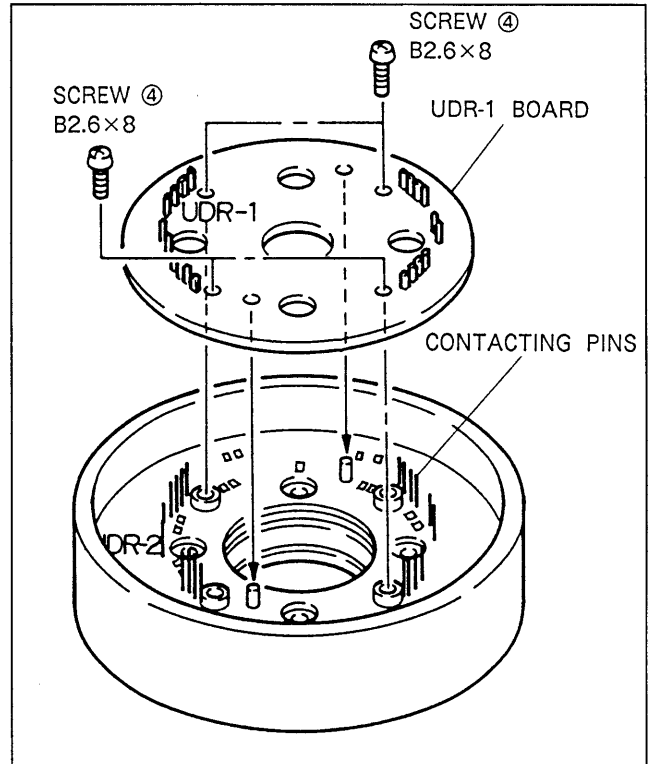


Fig. 6-1-3. UDR-1 Board Removal

[Cleaning]

5. Wipe the flange surface (on which the upper drum is installed) and the new upper drum contacting surface, with cleaning cloth (cloth or gauze) soaked with alcohol.

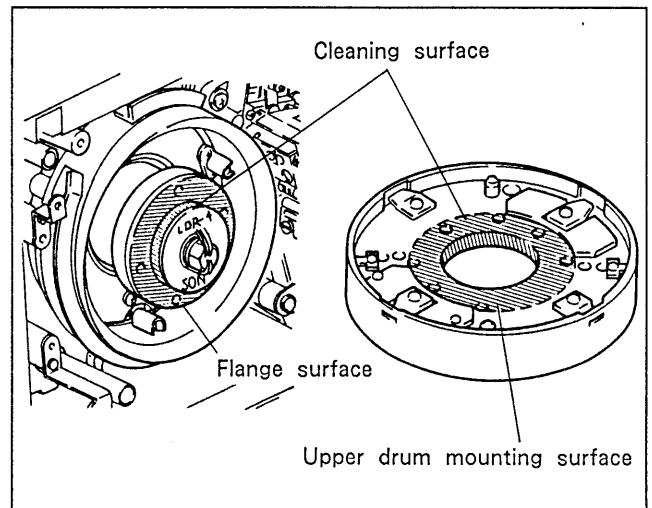


Fig. 6-1-4. Upper Drum Mounting Surface

(6-1. UPPER DRUM ASSEMBLY REPLACEMENT)

Installation

6. Align the mounting direction of the LDR-4 board on the flange and that of the UDR-2 board on upper drum so that alphanumeric letters on them are pointed toward the same direction as shown in Fig. 6-1-5. Furthermore, align the screw holes (four positions) of the upper drum and that of flange as shown in Fig. 6-1-5.

Note 1 : If the upper drum mounting position is mistaken, all video system adjustments are troubled. Please take good care.

Note 2 : Take extreme care not to damage the cylindrical surface of the upper drum and that of the lower drum when installing the upper drum.

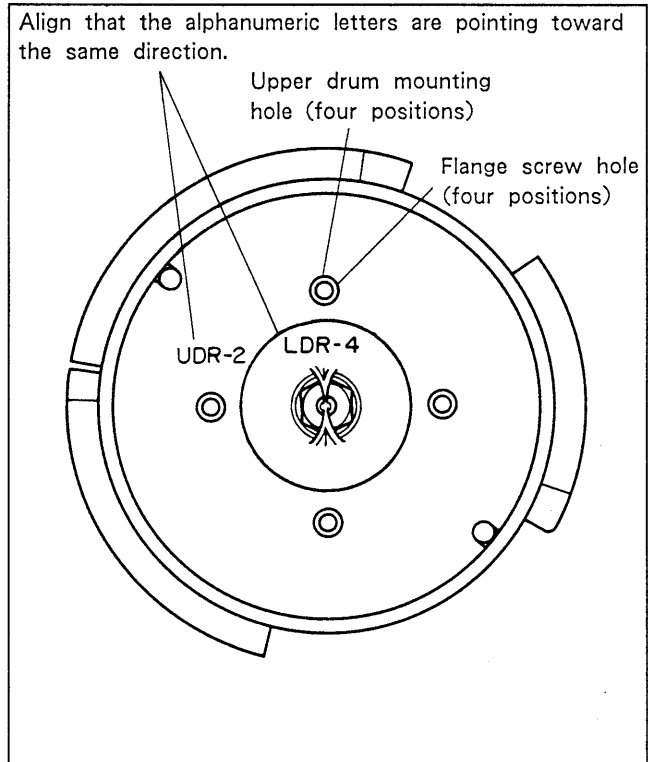


Fig. 6-1-5. Upper Drum Installation (Aligning Positions)

7. Install the two tapered screws into the holes shown in Fig. 6-1-6 (on a diagonal line) temporarily, and tighten them. These tapered screws are used to determine the mounting position of the upper drum.

Insert the two screws ② (together with spring washer and flat washer) to the holes of the upper drum assembly and tighten them temporarily. (It can be accomplished by tightening them firm once, and turn them in the loosening direction by 1/4 turn to 1/2 turn.)

Hexagonal wrench screwdriver: 3 mm (Opposite side)
Remove the two tapered screws and tighten the two screws ② (together with spring washers and flat washers) temporarily into the holes of the upper drum.

Note : After temporary tightening the screws, clean the cylindrical surface of the upper drum with dry cloth.

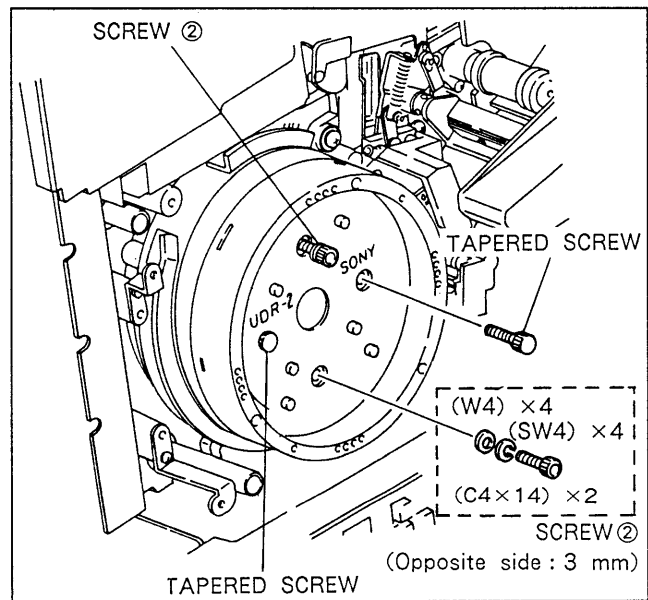


Fig. 6-1-6. Temporary Installation of the Upper Drum

- [Installation of Upper Drum Eccentricity Adj. Gauge]
- Confirm that the upper drum eccentricity adj. gauge probe is positioned at the center of the measurement pin as shown in Fig. 6-1-7. If the probe is not located in the center of the pin, readjust the probe position with finger.
 - Check to see that there is no foreign material or scar on the top end of the measurement pin. Any scar or foreign material will give scar on the upper drum cylindrical surface of the upper drum during measurement. Clean the top end of the measurement pin positively before starting measurement.
 - Turn the zero adjustment knob of the gauge in counterclockwise direction two or three turns.

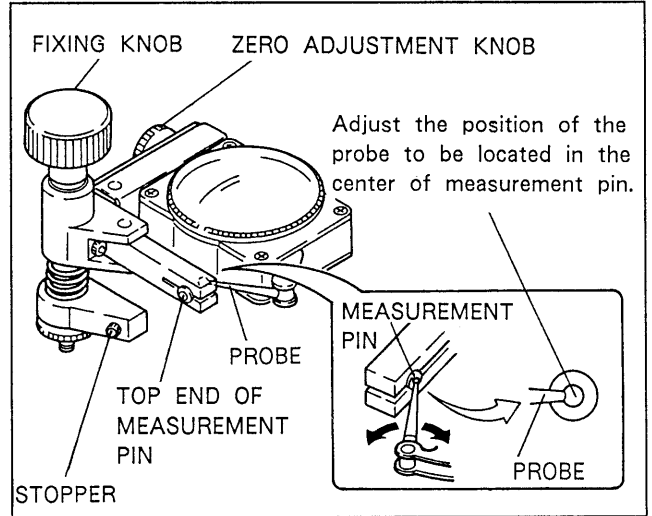


Fig. 6-1-7. Upper Drum Eccentricity Adj. Gauge

- While positioning the gauge stopper as shown in Fig. 6-1-8, so that it contacts with the bottom side of the lower drum, install the eccentricity adj. gauge and tighten its fixing knob.

Note 1 : Take extreme care that the gauge will not contact with the head tip when installing the gauge.

Note 2 : Check to see that the gauge's stopper keeps contacting with the side face of the lower drum as shown in detailed view of Fig. 6-1-8 (a). If the stopper is distant from the lower drum face, measurement will be inaccurate.

- In order to take measurement, turn the dial gauge into the A direction. Pull it up next in the B direction and then slowly rotate it in the C direction.

Note : When the measurement pin is already positioned in the B direction, this step is not necessary.

Refer to detailed view of Fig. 6-1-8 (b) for the position of the measurement pin.

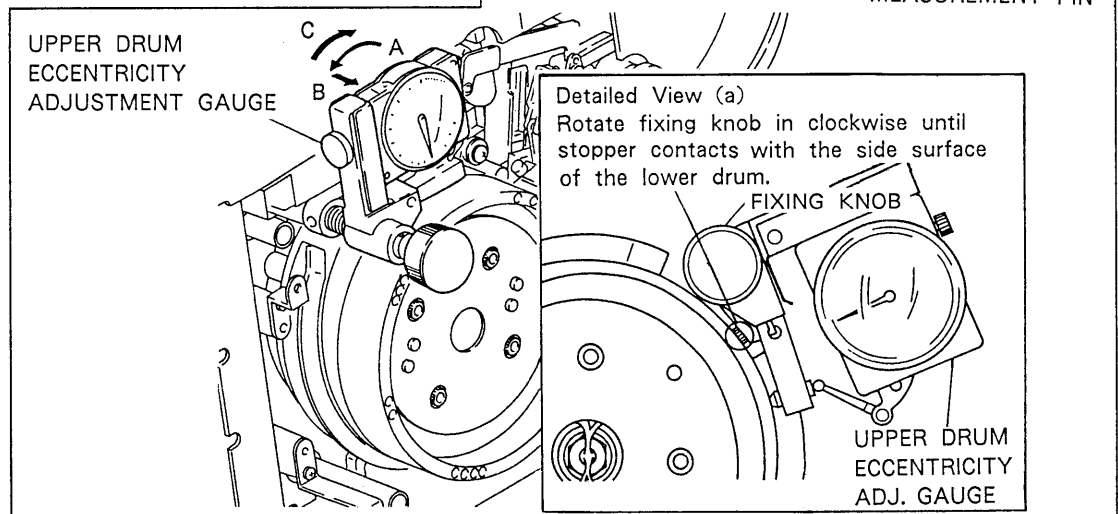
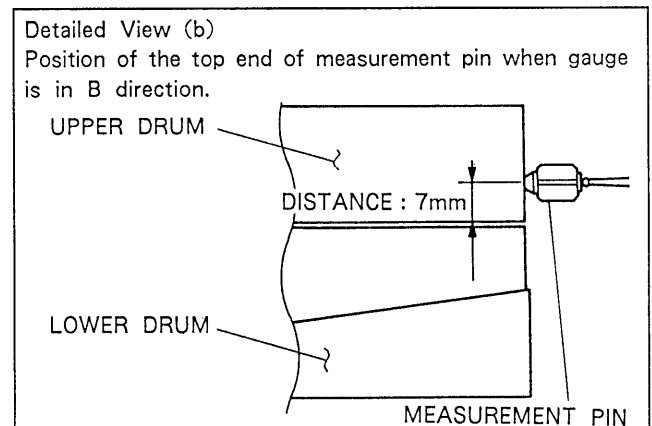


Fig. 6-1-8. Upper Drum Eccentricity Adjustment

13. Rotate the zero adjustment knob slowly until the dial needle indicates zero.
14. Rotate the upper drum in the clockwise direction slowly for one complete rotation with finger, check to see that amount of the needle swing is within $3\ \mu\text{m}$. If it is within $3\ \mu\text{m}$, perform steps 16 and later. If it is not $3\ \mu\text{m}$, perform step 15.

[Upper Drum Eccentricity Adjustment]

15. This is the adjustment so that the dial gauge needle swing stays within $3\ \mu\text{m}$.
 - a) Turn the upper drum slowly by finger and stop where the needle swing maximizes.
 - b) Use handle of a screwdriver or nylon hammer, tap the inside of the upper drum where is the opposite to the gauge until the needle swing shows about $1/2$ of the maximum swing reading.

Knack of Adjustment

If a tap of handle results in too large amount of dial gauge displacement, tighten the screw ② a little to increase their tightening torque. If a tap of handle results in no movement of dial gauge, loosen the screw ② very little to decrease their tightening torque.

- c) Until the swing becomes within $3\ \mu\text{m}$, repeat steps a) and b) alternately.
16. Tighten the four screws ② alternately in the sequence that is shown in Fig. 6-1-9. After completion, check again the dial gauge swing is within $3\ \mu\text{m}$.

Tightening torque : $160 \times 10^{-2}\ \text{N} \cdot \text{m}$ {16 kgf·cm}.

17. Rotate the zero adjustment knob of the gauge in the counterclockwise direction for two or three turns. Rotate the fixing knob counterclockwise and remove the gauge.

[Installation of the UDR-1 Board]

18. Clean the connector pins on the UDR-1 and UDR-2 boards shown in Fig. 6-1-10 with dry cleaning cloth. Check that no foreign material is attached on the connector pins.

Note: When cleaning pins with dry cloth, take care not to bend the pins.

19. Position the UDR-1 board to fit the UDR-2 board in the manner that the alphanumeric letters of these two boards are directing to the same direction while the UDR-1's two guide holes mate with the two guide pins on the UDR-2 board. Insert the UDR-1 onto the UDR-2.

Note: Take care note to bend contacting pins when inserting the UDR-1 board into the UDR-2 board.

20. Tighten the four screws ④ and fix the UDR-1 board.

Tightening torque : $60 \times 10^{-2}\ \text{N} \cdot \text{m}$ {6 kgf·cm}.

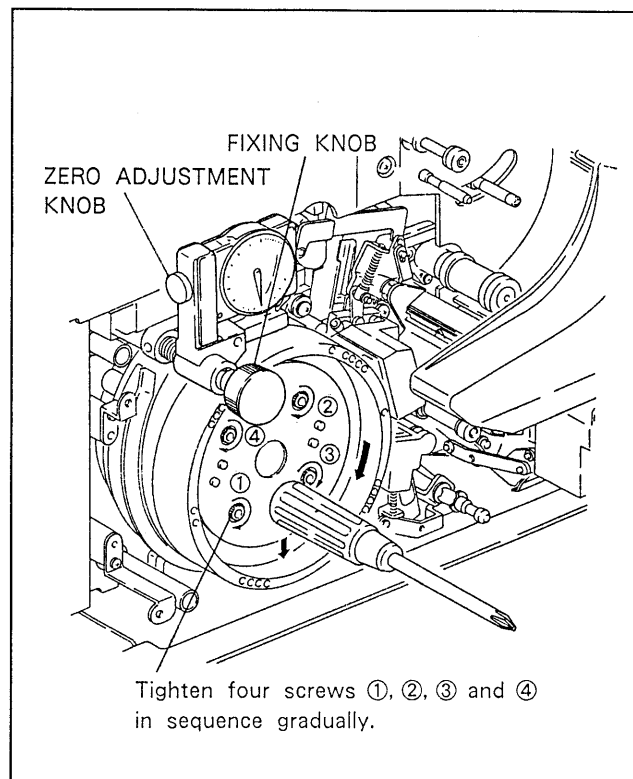


Fig. 6-1-9. Upper Drum Installation (Final Tightening)

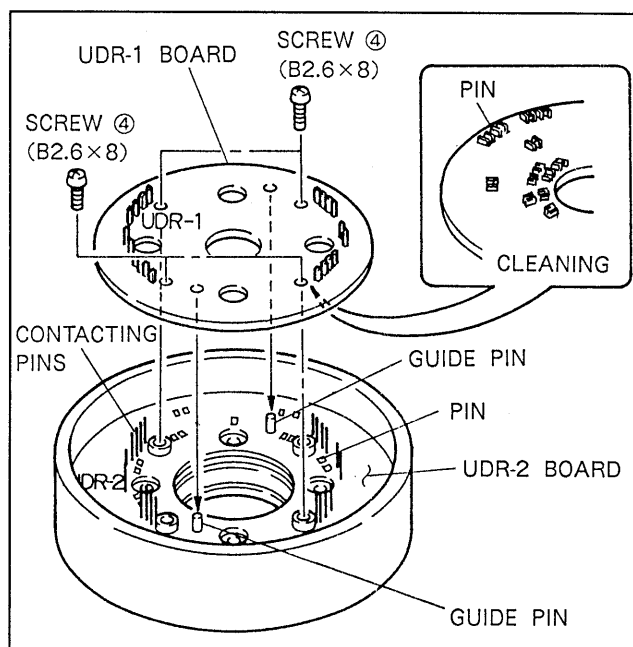


Fig. 6-1-10. Installation of the UDR-1 Board

[Installation of the Upper Drum Lid]

21. The upper drum lid should be installed in the correct angle with respect to the rotary heads. The upper drum lid has the silkscreened lettering that indicate position of the rotary heads (REC, ERASE, PLAY).

Align the "REC" letters on the upper drum lid with the "UDR-1" letters on the UDR-1 board as shown in Fig. 6-1-11 then tighten the three screws ①.

Tightening torque : $45 \times 10^{-2} \text{ N} \cdot \text{m}$ (4.5 kgf · cm)

22. Proceed to the **tape run check**.
Refer to item C of preliminary information.

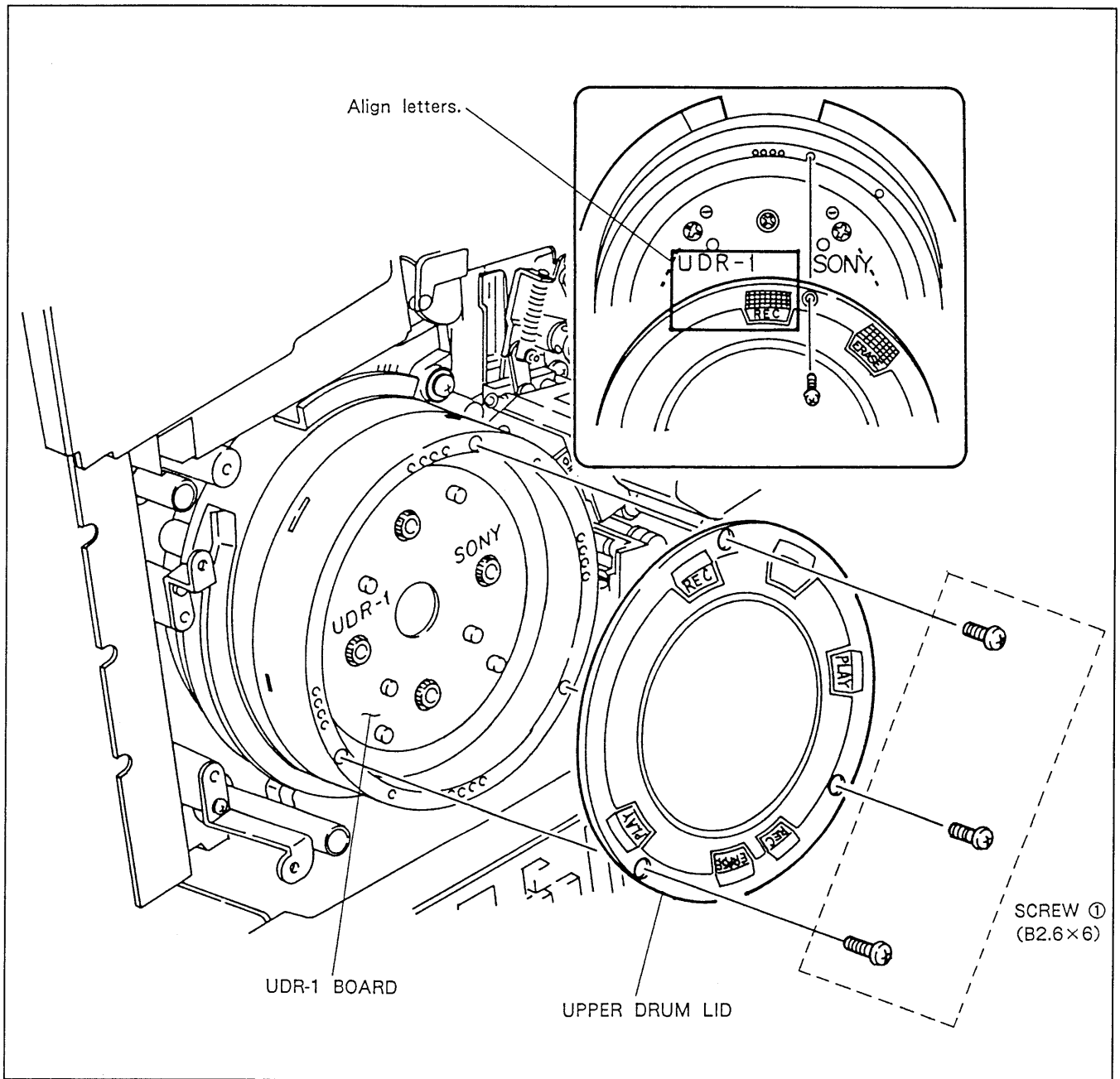
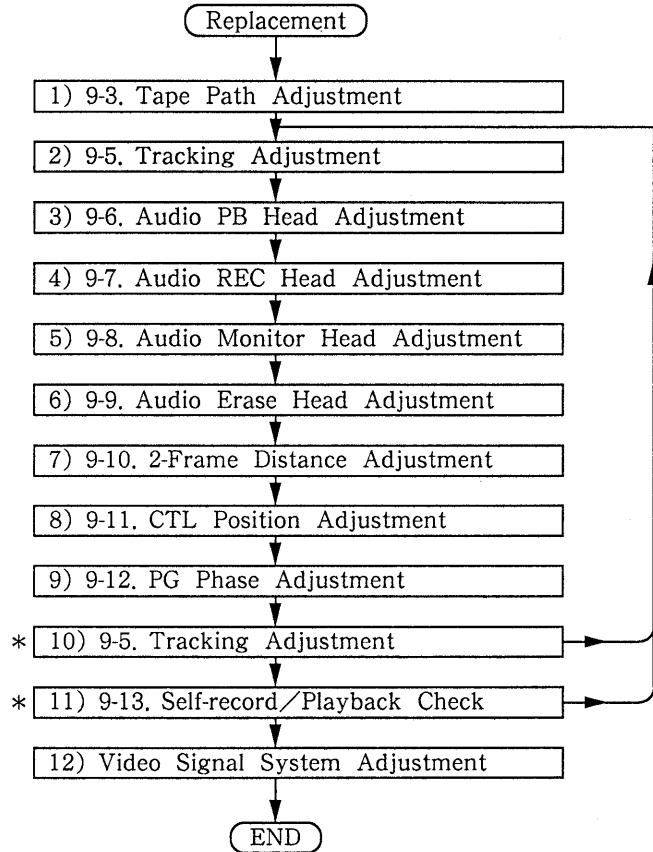


Fig. 6-1-11. Installation of the Upper Drum Lid

6.2. DRUM ASSEMBLY REPLACEMENT

Preliminary Information

- A. Drum assembly must be replaced in the following cases.
- Correct RF waveform cannot be obtained regardless of how often the tracking is adjusted because of wear of rabbet guide surface of the lower drum.
 - Tape-contacting-surface (on cylindrical surface) and rabbet guide of the lower drum got scars that cannot be repaired.
 - Wear on the rotor component bearing has exceeded the tolerable degree, resulting in deterioration of video or audio signal characteristics.
- B. Whenever the drum assembly is removed or replaced, check the following in the sequence as shown.



Note : When any adjustment (parameter change) is executed in the step that carries * mark, return to the specified step that is shown by the arrow mark and follow the procedure.

Removal

1. Remove the three screws ① and remove the upper drum lid.
2. Go to rear of the VTR. Remove the line connector panel, and remote connector panel and then open the power supply panel.
3. Disconnect the ten connectors, as shown in Fig. 6-2-2, from the CD-37 board, MB-199 board and drum motor.
 CD-37 board : CN102,CN105,CN110
 MB-199 board : CN334,CN335,CN336,CN337,CN340
 Drum motor : CN291,CN292
4. Remove shield panel of the FE-05 board from front of VTR and disconnect the two connectors.
 FE-05 board : CN263,CN264

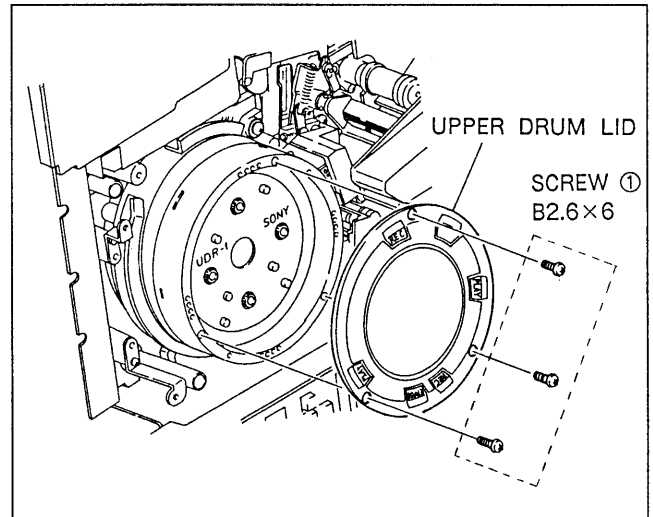


Fig. 6-2-1. Drum Lid Removal

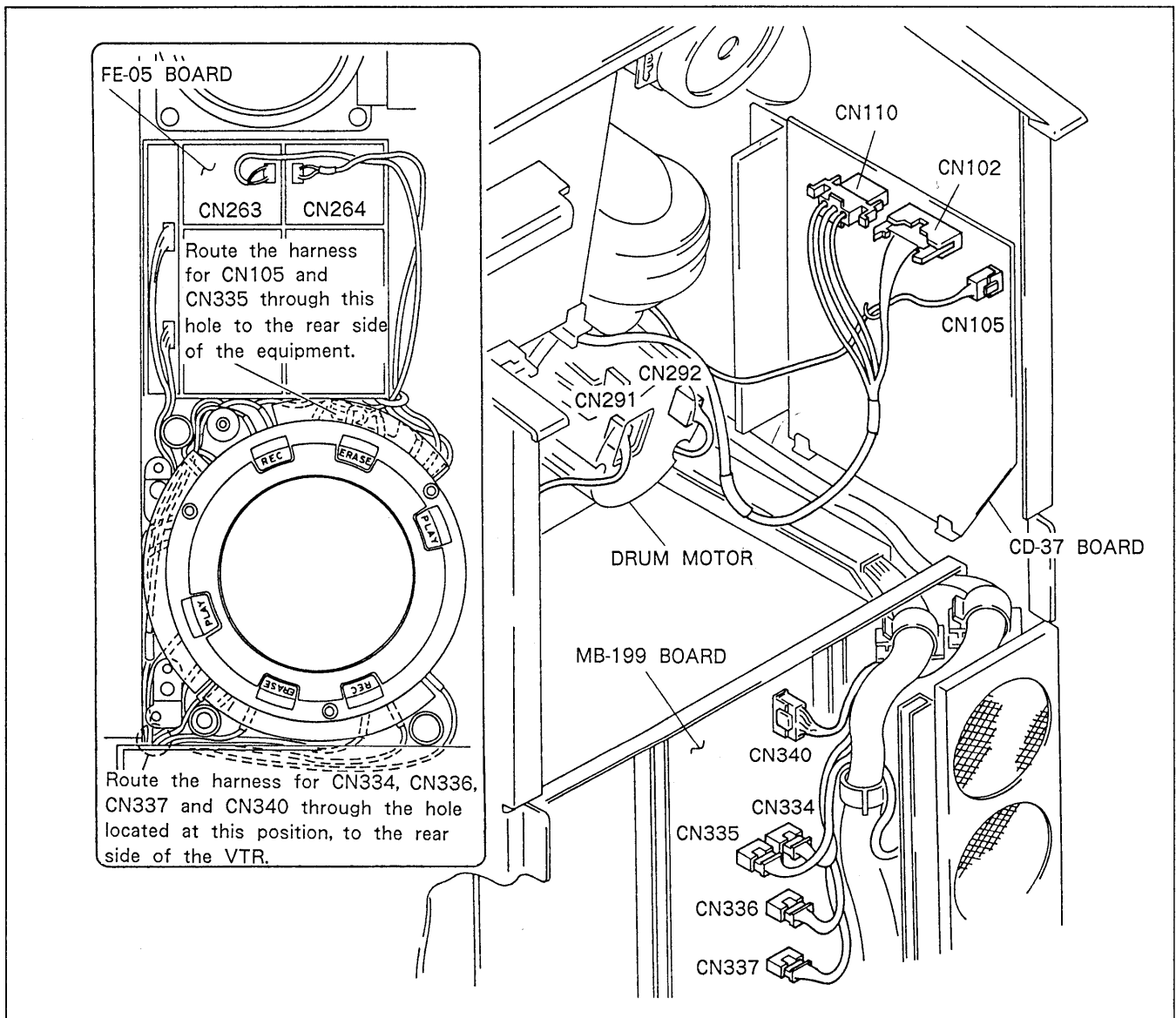


Fig. 6-2-2. Drum Harness Removal/Installation

(6-2. DRUM ASSEMBLY REPLACEMENT)

5. When the slant guide assembly is closed, open the slant guide assembly by inserting the tip of flat-blade screwdriver into the drive lever cut-out portion as shown in Fig. 6-2-3 and rotate the screwdriver shown by the arrow.

Note: When rotating the screwdriver, take extreme care not to damage the photo-interrupter on the MC-29 board.

6. Loosen the four screws ② slightly. Push the B portions of the movable guide assembly with finger and move the movable guide assembly toward arrow A direction until the positioning pin of the movable guide is detached from the lower guide side surface.

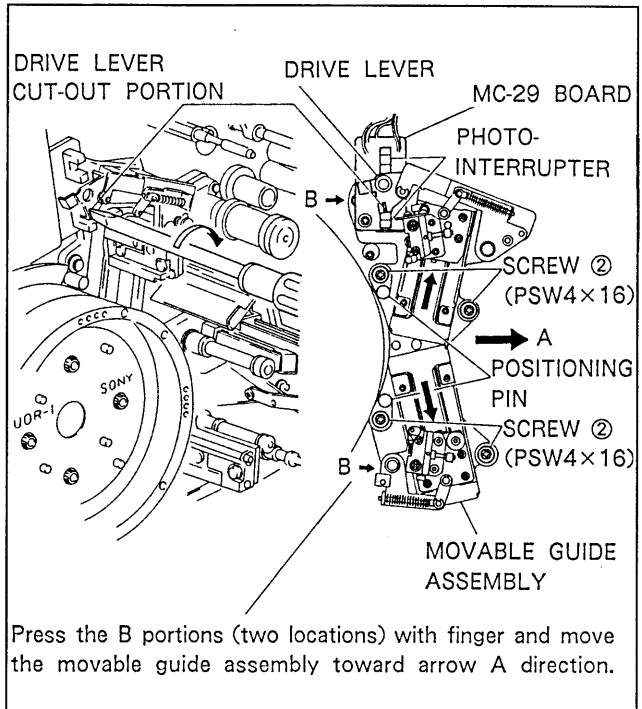


Fig. 6-2-3. Drum Assembly Removal (1)

7. Find the two holes ($\phi 6$) on the upper drum shown in Fig. 6-2-4. Slowly rotate the upper drum to look for the drum mounting screws (three positions) by looking through the holes.

When the drum mounting screws are found through the holes, insert hexagonal wrench through the upper drum holes ($\phi 6$) and loosen these three screws.

Drum mounting screws are located on the same circumference with 120 degree intervals.

Note: The drum mounting screws cannot be removed because they are held by screw-stopper rings.

Hexagonal wrench screwdriver: 3 mm (Opposite side)

8. Remove the drum assembly from the base plate.

Note: Since the drum assembly weights approximately 4 kg and many harnesses are accompanied, take extreme care so as not to contact with other mechanical blocks or hooking them.

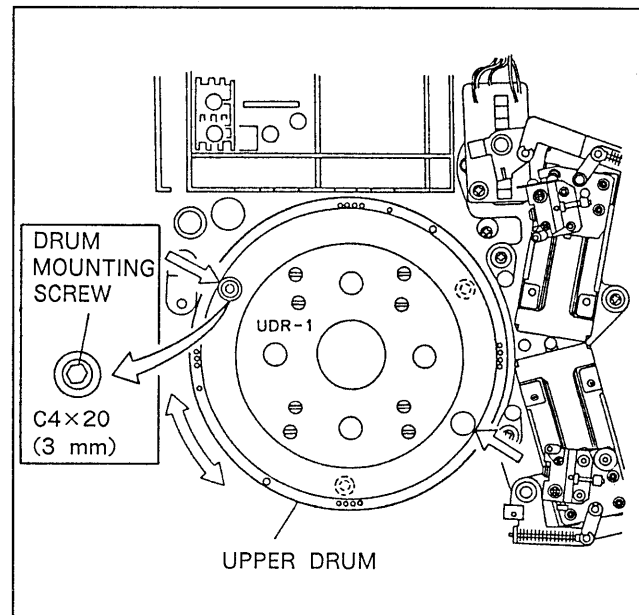


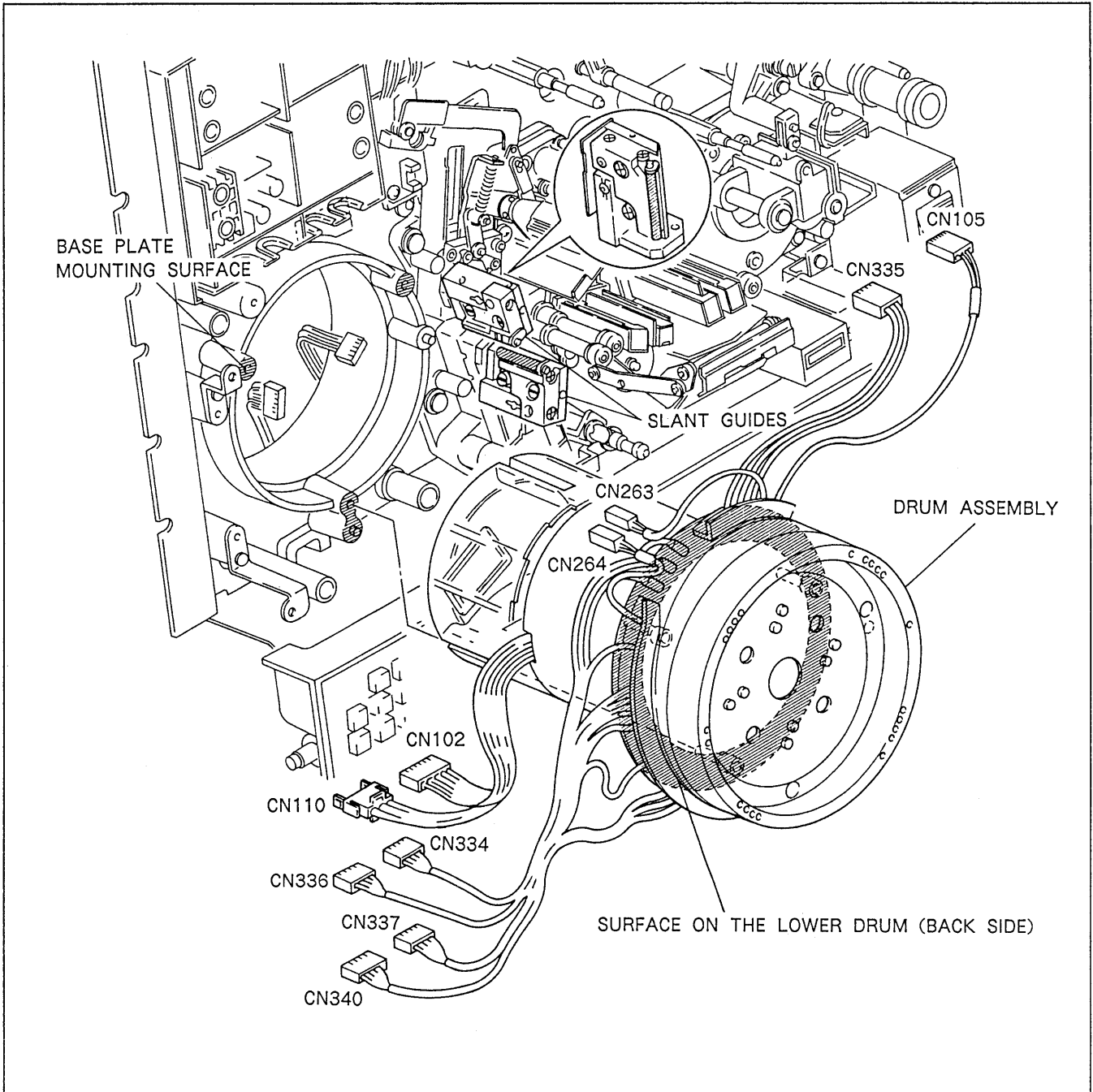
Fig. 6-2-4. Drum Assembly Removal (2)

[Cleaning]

9. Wipe the slant guides and the surface of the tape transport with cleaning cloth (cloth or gauze) soaked with alcohol.

Note: Wipe the slant guides with dry cloth after using alcohol.

10. Place the drum harnesses in the position shown in Fig. 6-2-5. (The two harnesses: one harness coming from the side of the lower drum and another harness coming from drum motor, should be place in their positions.)



6. PARTS REPLACEMENT

Fig. 6-2-5. Cleaning

Installation

11. 1) Route the harness for CN102 and CN110 shown in Fig. 6-2-6 through the base plate hole to the rear side of the VTR.
- 2) Hold the new drum assembly tight with posture of the drum where the CN335 neck is facing toward up as shown in Fig. 6-2-6.
- 3) Insert the pin A of base plate into the lower drum's guide hole securely and temporarily fasten the new drum assembly on the base plate.

Note : Check for no play of the new drum assembly.

[Position Determination of the Drum Assembly]

12. While pressing the drum assembly toward the pin B, tighten the three drum mounting screws.
 13. Confirm that the clearance between pin B and surface of the lower drum assembly meets the specification A.
- Spec. A : Spacer of $t=0.02$ mm stops.
If not, repeat step 12.

[Connection of Drum Harness]

14. Connect following connectors as shown in Fig. 6-2-2.

FE-05 board :	CN263, CN264	}	Connect them from the rear of the VTR.
CD-37 board :	CN102, CN105, CN110		
MB-199 board :	CN334, CN335, CN336, CN337, CN340		
Drum motor :	CN291, CN292		

After completion, reduce a slack harnesses.
Restore the power supply panel, line connector panel and remote connector panel.
15. Install the shield plate to the FE-05 board.

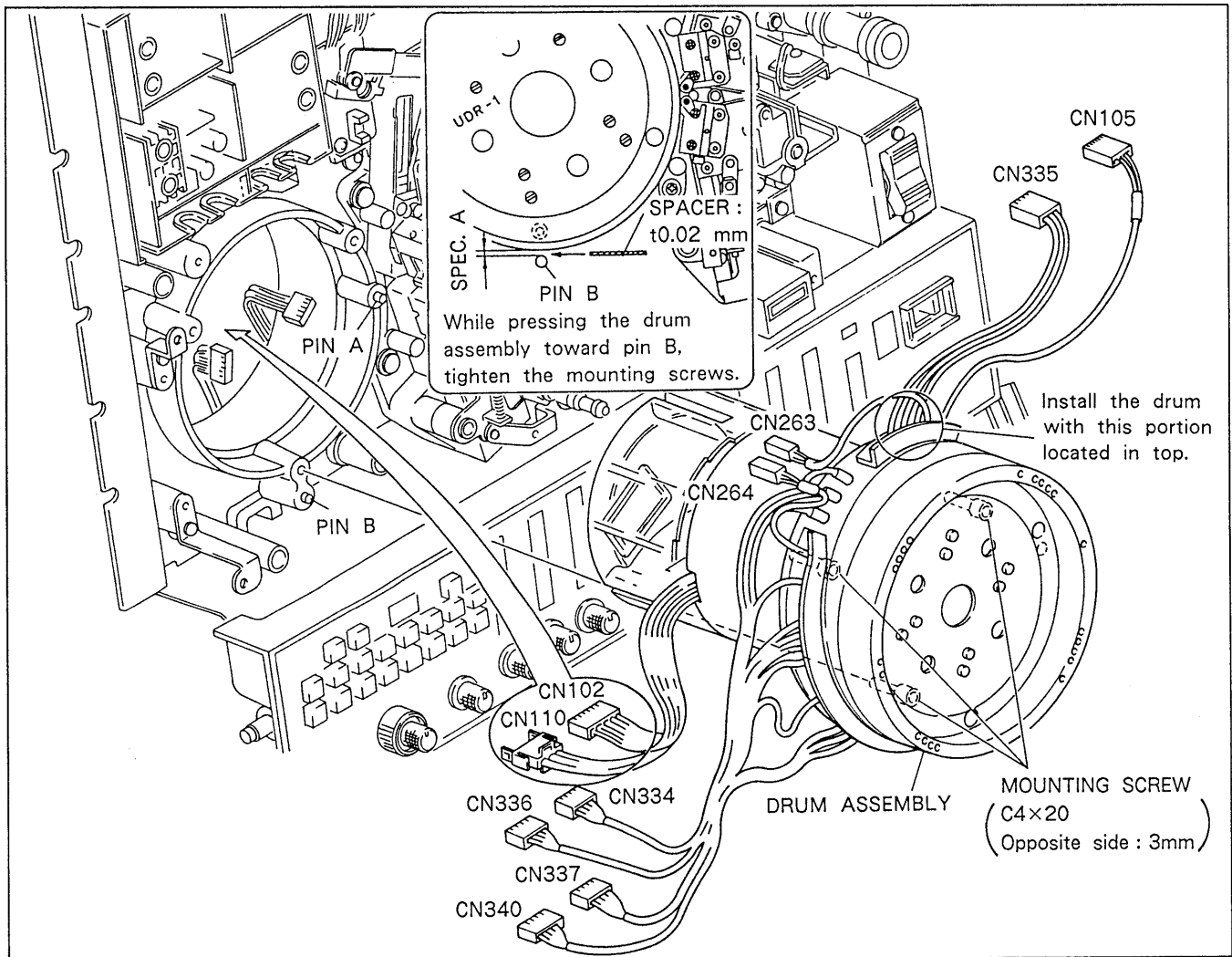


Fig. 6-2-6. Drum Assembly Installation

6. PARTS REPLACEMENT

[Installation of the Upper Drum Lid]

16. The upper drum lid should be installed in the correct angle with respect to the rotary heads. The upper drum lid has the silkscreened lettering that indicate position of the rotary heads (REC, ERASE, PLAY).

As shown in Fig. 6-2-7, align the "REC" letters on the upper drum lid with the "UDR-1" printing of the UDR-1 board by tightening the three screws ①.

Tightening torque : $45 \times 10^{-2} \text{ N} \cdot \text{m}$ (4.5 kgf · cm)

[Position Determination of the Movable Guide Assembly]

17. While pressing the movable guide assembly toward drum and in the directions of arrow B and arrow C at the same time, as shown in Fig. 6-2-8, tighten the four screws ②. After tightening, the clearance of three positions where are marked by asterisk "*", meet the specification B.

Spec. B : Spacer of $t = 0.02 \text{ mm}$ stops.

If not, loosen the screws ② again and adjust the movable guide position.

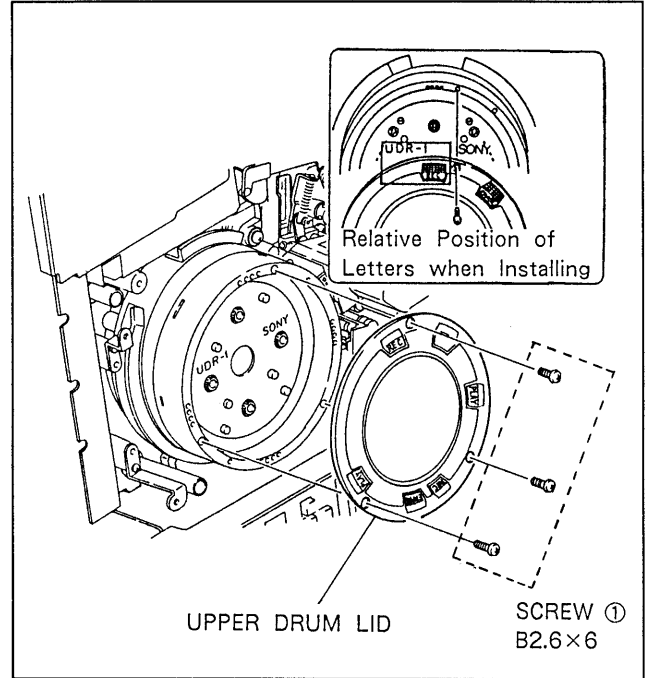


Fig. 6-2-7. Position of the Upper Drum Lid

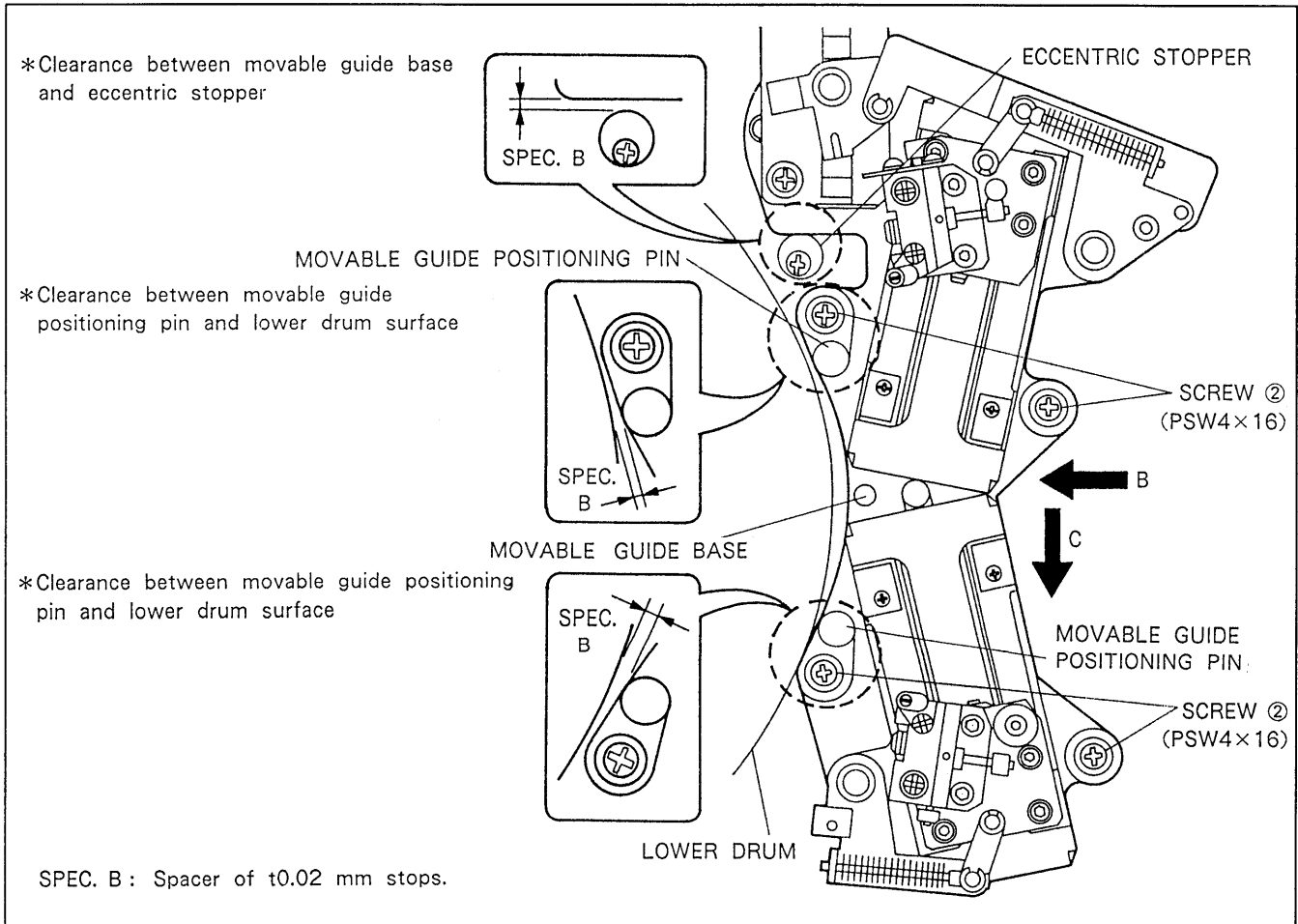


Fig. 6-2-8. Position Adjustment of the Movable Guide Assembly

[Guide Clearance Check]

18. Close the slant guide assembly by inserting the flat blade screwdriver into the cut-out portion of the drive lever as shown in Fig. 6-2-9.

- Entrance side guide clearance check
Check that the clearance meets the specifications C and D in step 11 of section 6-5-1.
If not, readjust step 11 of section 6-5-1.

- Exit side guide clearance check
Check that the clearance meets the specifications C and D in step 10 of section 6-5-2.
If not, readjust step 10 of section 6-5-2.

Note 1 : Take extreme care not to give any scar or damage to the rotary heads when inserting the thickness gauge.

Note 2 : When performing the clearance check, insert the thickness gauge into the side of the upper drum where there is no head tip.

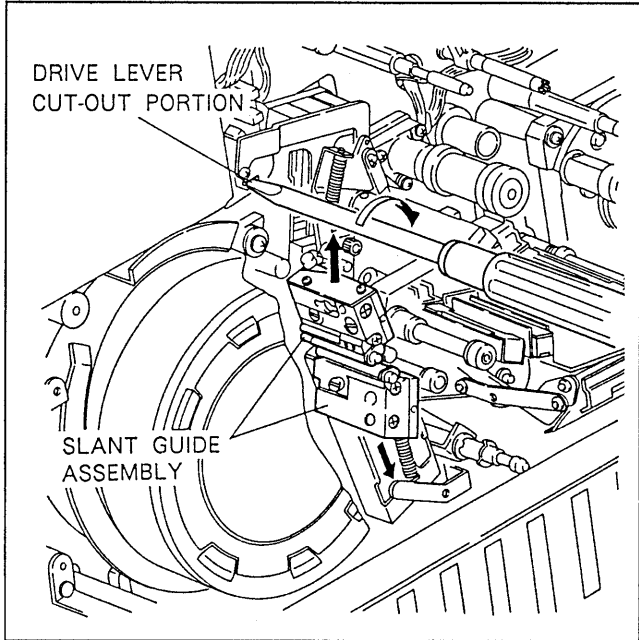


Fig. 6-2-9. Slant Guide Position Check

[Drum Speed Adjustment]

19. While pressing the switch S2 on the SY-103 board, press the [0] key of 21-key section to set the TTP ADJ mode.

20. Load the alignment tape.

21. Set the machine into STANDBY mode.

22. Press the [C] key and [D] key (When keying "D", press the [3] key while pressing the blue-colored [OUT] key.) of 21-key section in turn, and then press the [SET] key.

23. While pressing the blue-colored [OUT] key, press the blue-colored [IN] key until the four digit display with arrow attached in Fig. 6-2-10 becomes 0000 ± 50 (FFB0 to 0050).

24. Confirm that the "DR" LED on the SV-90 board blinks.

25. Set the machine into STANDBY OFF mode.

26. While pressing the blue-colored [OUT] key, press the [C], [T], [F] keys and then press the [SET] key.

27. Press the [+] key until the display shows "PUSH NVWR SW".

28. Press the NVWR button on the SV-90 board.

29. Press the [C] and [0] keys on the 21-key section and press [SET] key.

30. Perform the tape path check. Refer to item B of preliminary information.

STEP	DISPLAY READING
21	> _
24	> CD_ > DRM SPEED ADJ_ XXXX 0000 XXXX > _
28	> DRUM SPEED ADJ > NVW XXXX 0000 XXXX > XXXX XX-XX
29	> XXXX XX-XX > XXXX XX-XX XXXX 0000 XXXX > PUSH NVWR SW
30	> PUSH NVWR SW_ > READY_ XXXX 0000 XXXX > _
31	> CO > TEST MODE OFF > _

Fig. 6-2-10. Display Reading During Drum Speed Adjustment

6. PARTS REPLACEMENT

6-3. SLIP RING ASSEMBLY REPLACEMENT

Preliminary Information

- A. Electrically conductive grease must not be applied to the area where the slip ring and brush make contact.
- B. There is no particular need for adjustments after the slip ring assembly has been replaced, however, check that the brushes are placed in the grooves of the slip ring properly.

Removal

1. Disconnect connector CN291 which is connected to the drum assembly.
2. Loosen sufficiently the three screws ① which secure the rear cover to the drum assembly and remove the rear cover.
Note : The screw ① cannot be removed because it is equipped with screw stopper.
3. Loosen the screw ② for two turns that secures the brush stopper and remove the brush stopper from the pin.
4. Release the connector lock on the SR-44 board, and disconnect the SR-43 board.
5. Remove the three screws ③ which secure the slip ring assembly and remove this assembly while drawing it to the front and taking care that it does not come into contact with the brush stopper.

Note : Take sufficient care not drop the three screws ③ when remove them.

[Cleaning]

6. Wipe the connecting terminal portion of the SR-37 board and contacting portion of the SR-38 board with dry cleaning cloth (cloth or gauze).
Note : Take care not to bend the connector pins on the SR-37 board.

Installation

7. Fit the positioning pin on the SR-38 board into the hole on the SR-37 board. Install the slip ring assembly using the three screws ③.
- Note :** Take sufficient care to avoid bringing the brush into contact with the brush stopper or screwdriver.
8. Insert the SR-43 board into the connector on the SR-44 board and then lock the connector.
9. Align the brush stopper with the pin and tighten up the screw ②.
10. Check that the brush has not worked free from the groove in the slip ring.
11. Install the rear cover with three screws ① and insert the connector CN291 into its prescribed position.

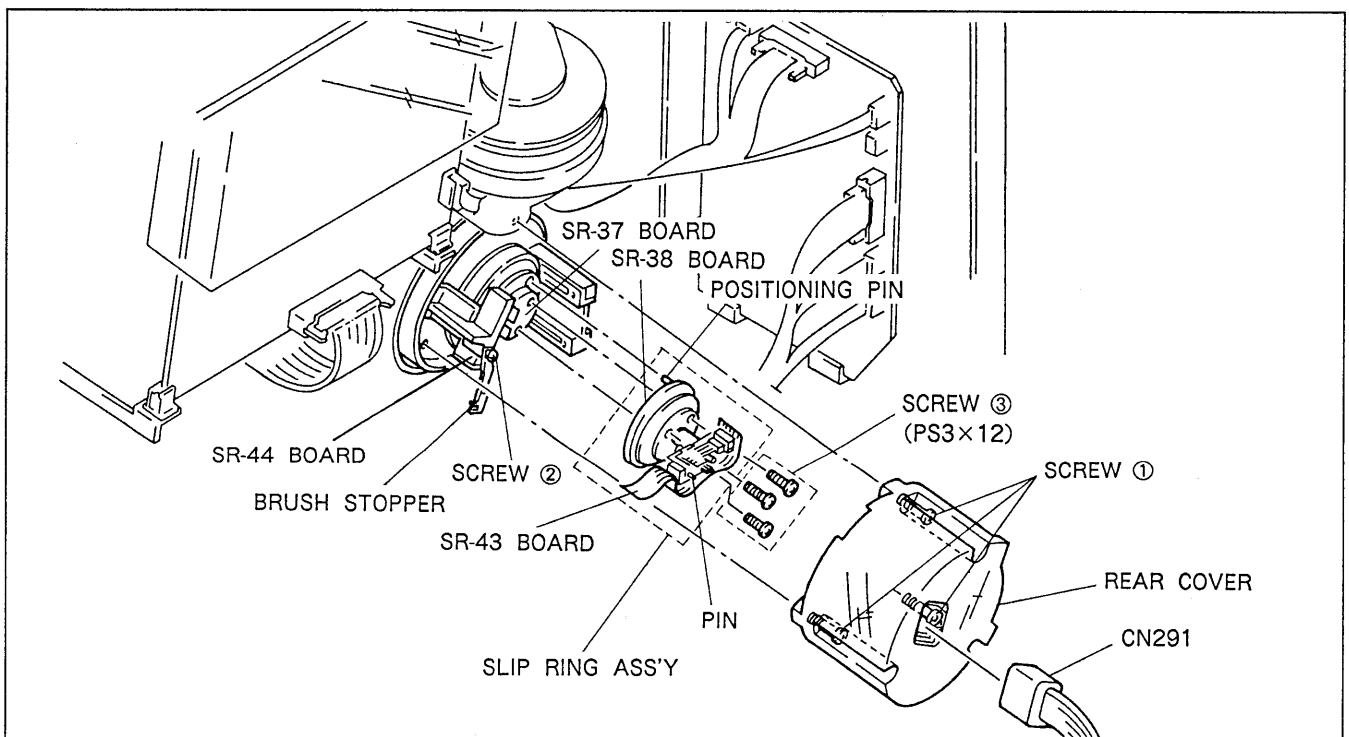


Fig. 6-3. Slip Ring Assembly Replacement

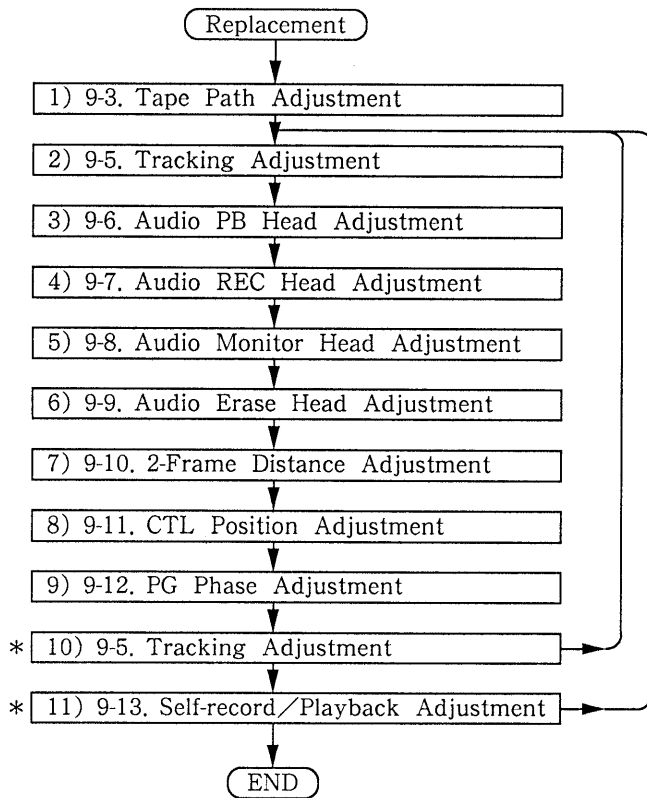
6-4. MOVABLE GUIDE REPLACEMENT

Preliminary Information

- A. The movable guide assembly consists of the movable mechanism to move the entrance and exit slant guides, during tape threading mode and unthreading mode. The movable guide assembly is fabricated with the precision machined components.
The entrance and exit slant guides are the most important tape guides among all tape guides to control tape run. Pay utmost care in handling these component during replacement.
- B. As for replacement procedure of whole movable guide block, refer to section 6-5.
As for the other components replacement, refer to section D (D-13, 14 and 15).
- C. For the purpose of preventing the upper drum's rotary head from crash and maintaining good RF envelope of the entrance/exit guides, the following adjustments should be carefully done.
- Installation position adjustment of the movable guide assembly with respect to the lower drum.
 - Clearance adjustment between the entrance/exit slant guides and the upper drum.
- D. Following check and adjustments are necessary when the movable guide assembly is once removed or replaced.

Removal

1. Disconnect the connector CN006 from the DS-19 board as shown in Fig. 6-4-1 and then remove the harness from the harness clamber.



Note : When any adjustment (parameter change) is executed in the step that carries * mark, return to the specified step that is shown by the arrow mark and follow the procedure.

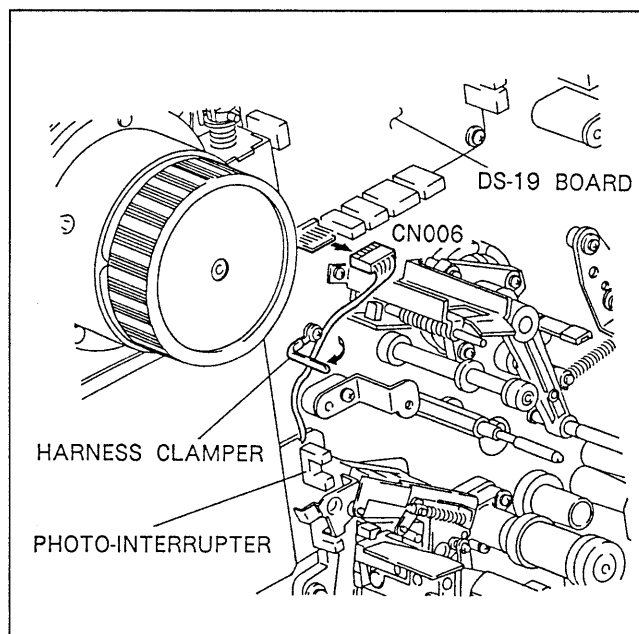


Fig. 6-4-1. Harness Removal

2. When the entrance and exit slant guides are closed as shown in Fig. 6-4-2, open the slant guide by inserting the tip of flat blade screwdriver into the cut-out portion of the drive lever.

Note: When rotating the screwdriver, take extreme care not to damage the photo-interrupter on the MC-29 board.
3. Pull out the erase arm drive lever from the pressing lever (S)'s pin to the arrow direction as shown in Fig. 6-4-3.
4. Pull out the reverse lever pin from the pressing lever (T).
5. While rotating the upper drum slowly with finger as shown in Fig. 6-4-4, stop the drum rotation at the position where video heads are most far from the movable guide assembly.

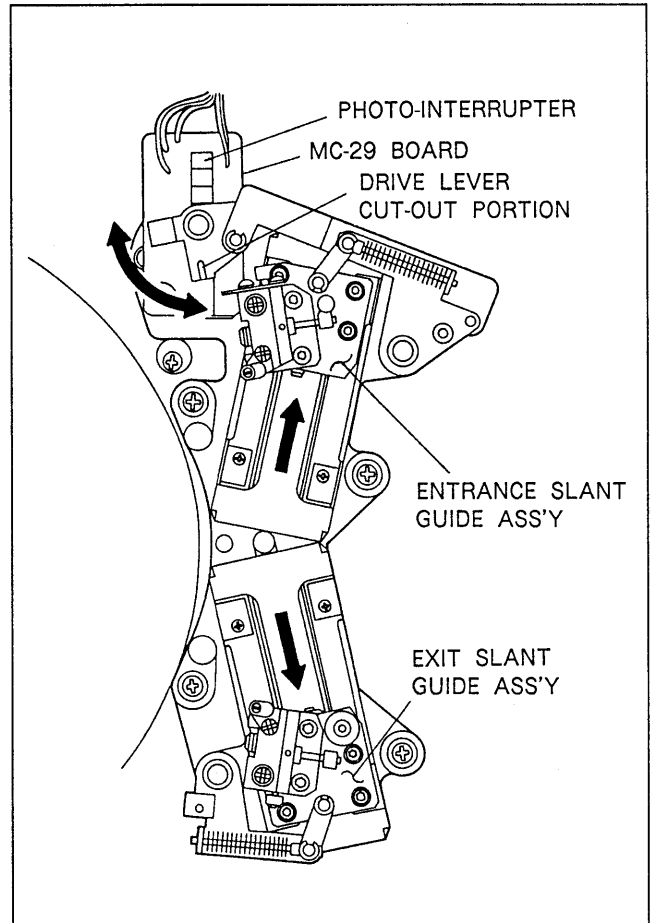


Fig. 6-4-2. Movement of Slant Guides

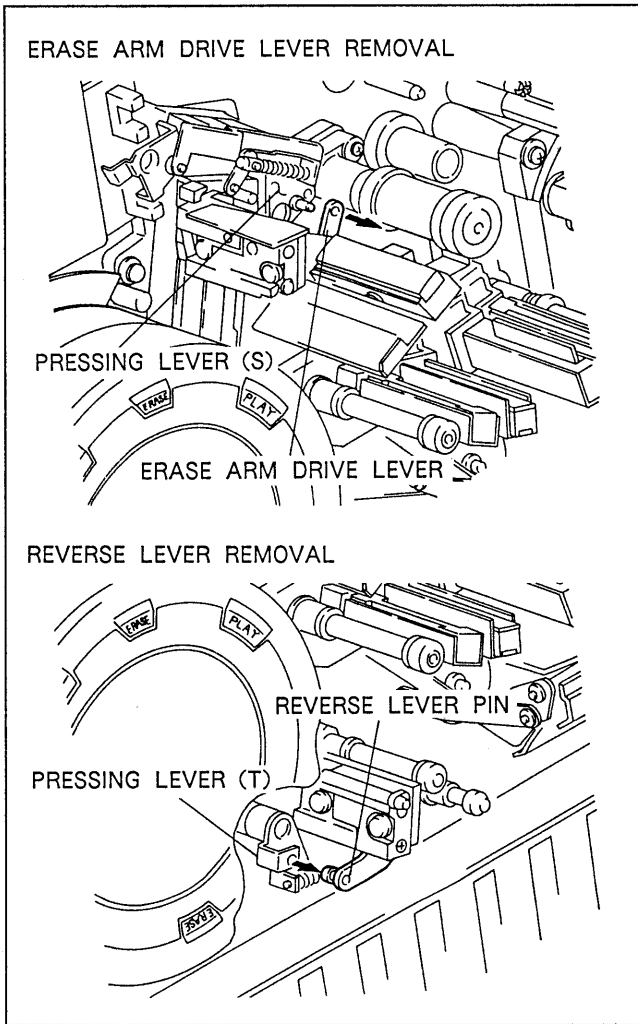


Fig. 6-4-3. Removal of Erase Arm Drive Lever/Reverse Lever

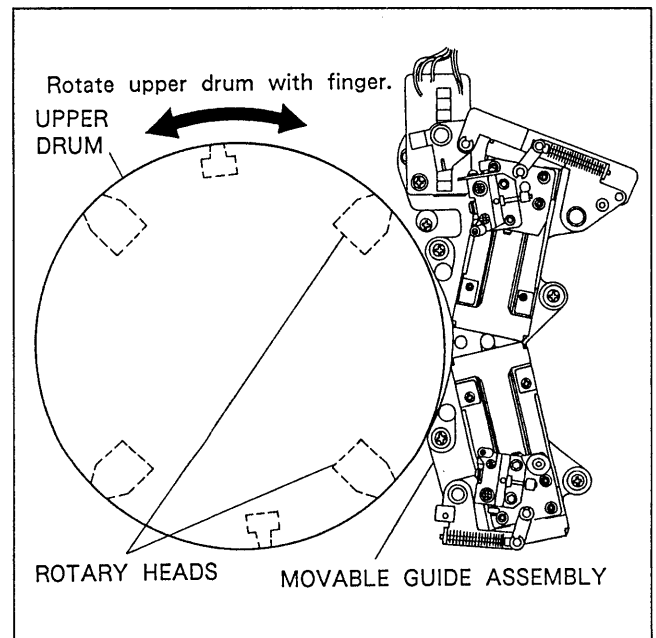


Fig. 6-4-4. Upper Drum Stop Position

(6-4. MOVABLE GUIDE REPLACEMENT)

6. Remove the movable guide assembly by removing the four screws ① shown in Fig. 6-4-5.

Note : When removing, pay utmost attention so that the movable guide should not contact with the tape running surface of the drum.

[Cleaning]

7. Wipe the mounting surfaces of the base plate and movable guide base shown in Fig. 6-4-6 with cleaning cloth (cloth or gauze).

Installation

8. Confirm that the entrance and exit slant guide blocks of the movable guide assembly are opened as shown in Fig. 6-4-7.

When they are closed, open the movable guides by inserting the tip of flat blade screwdriver into the drive lever cut-out portion and then rotate the screwdriver.

9. While rotating the upper drum slowly with finger, stop the drum rotation at the position where video head is most far from the movable guide assembly as shown in Fig. 6-4-4.

10. Install temporarily the movable guide assembly on the base plate by turning the fixing screw ① lightly (Tighten the screws once and rotate them counterclockwise by 1/4 to 1/2 turn.).

Note : When installing the movable guide assembly, pay utmost care not to contact with tape running surface of drum.

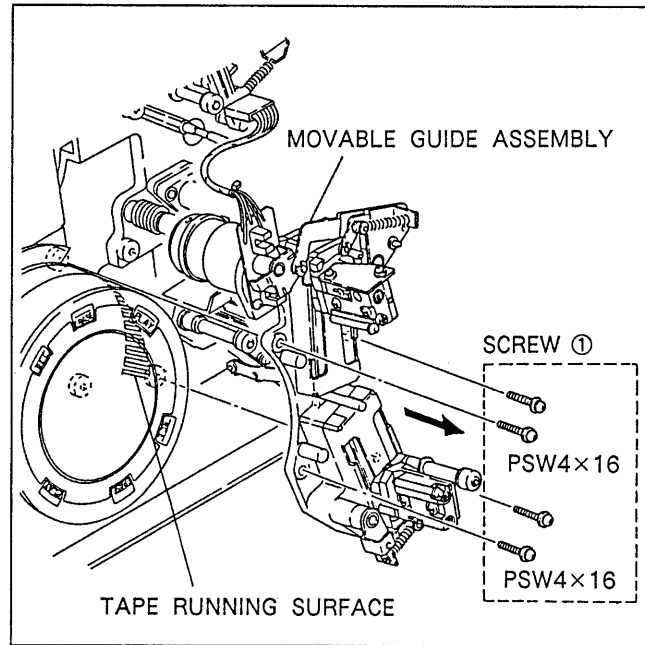


Fig. 6-4-5. Movable Guide Assembly Removal

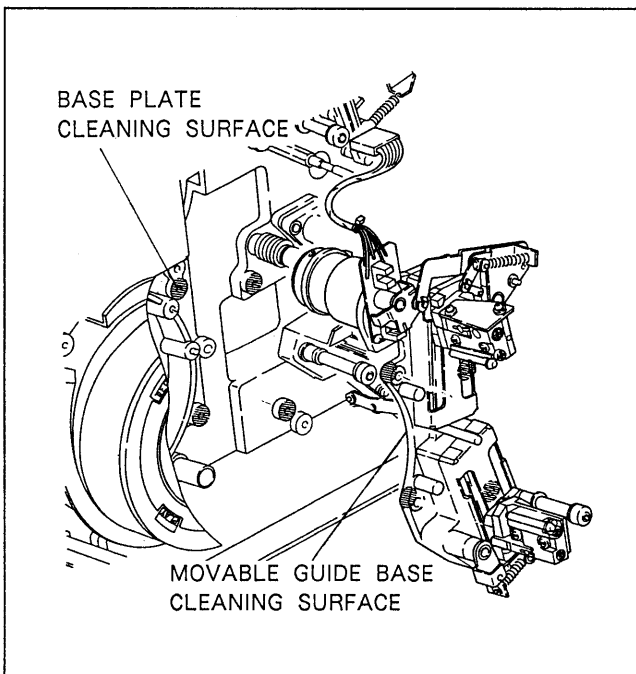


Fig. 6-4-6. Mounting Surface Cleaning

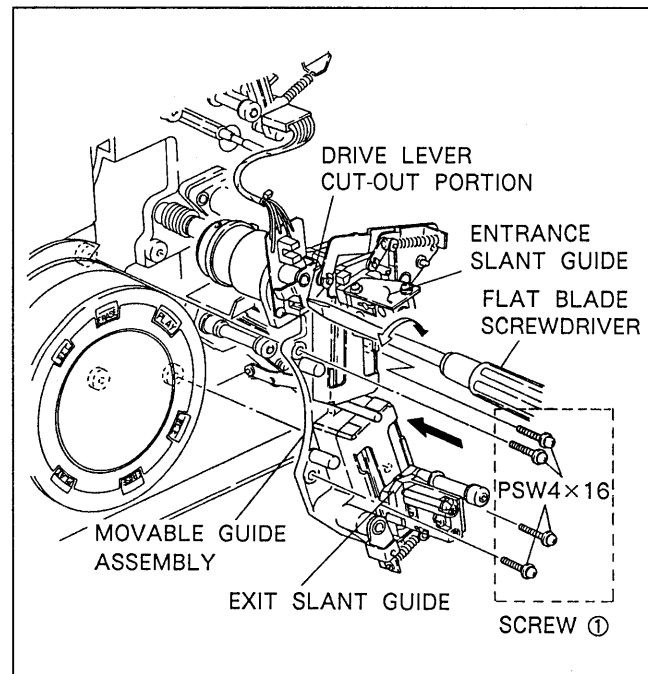


Fig. 6-4-7. Movable Guide Assembly Installation

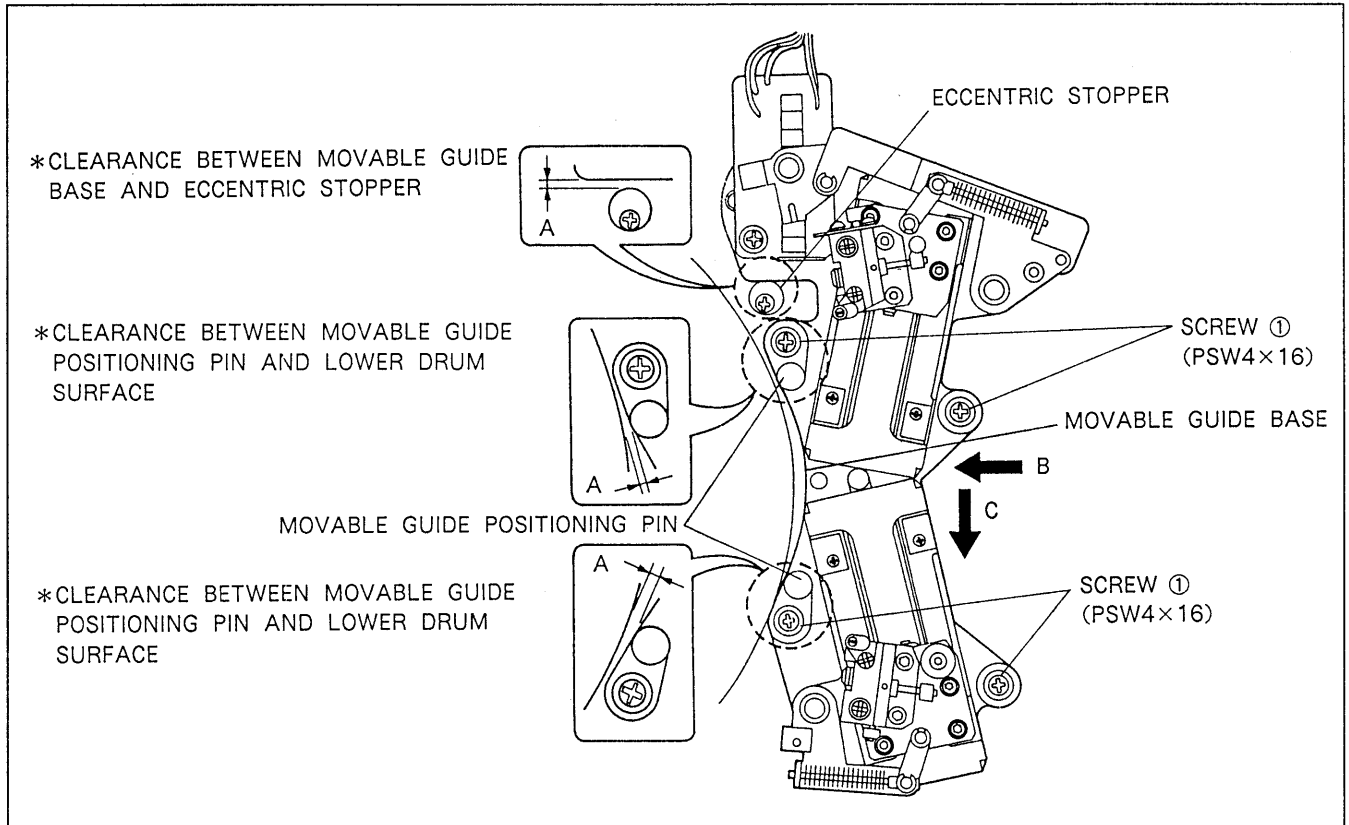


Fig. 6-4-8. Installation Position Adjustment of Movable Guide Assembly

[Position Determination of Movable Guide Assembly]

11. While pressing the movable guide assembly toward drum in the directions of arrows B and C at the same time, as shown in Fig. 6-4-8, tighten the four screws ① until clearance of three positions marked with asterisk (*) meets the specification A.

Spec. A : Spacer of t0.02 mm stops.

If not, loosen the four screws ① again and adjust the movable guide position.

[Applying Grease]

12. Apply small amount of grease to pin of the pressing lever (S) and the hole of the pressing lever (T) as shown in Fig. 6-4-9 so that thin grease film is formed.
13. Re-assemble parts by reversing the steps 1 through 4.

[Slant Guide Clearance Check]

14. Perform steps 18 through 20 of section 6-2.
15. Perform **tape path check**.
Refer to item D of preliminary information.

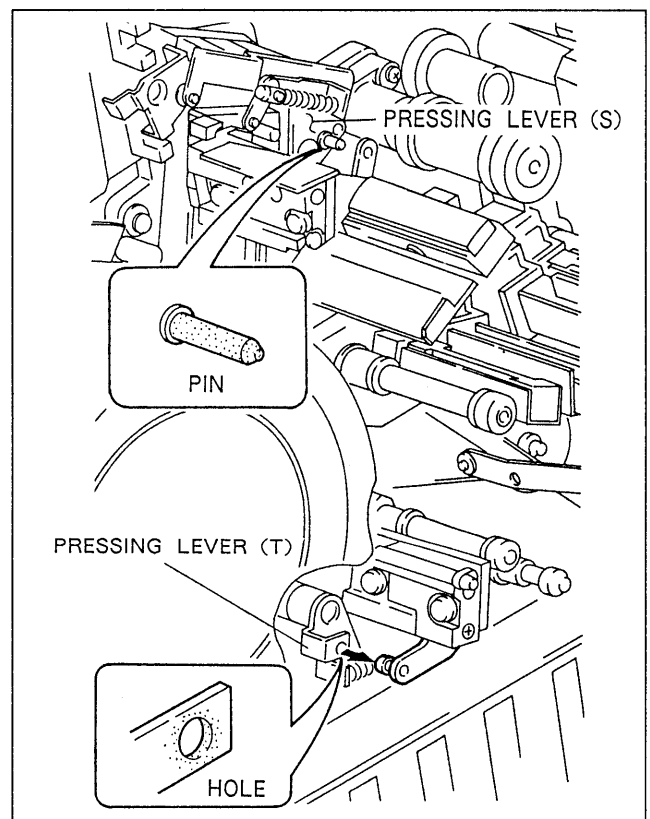
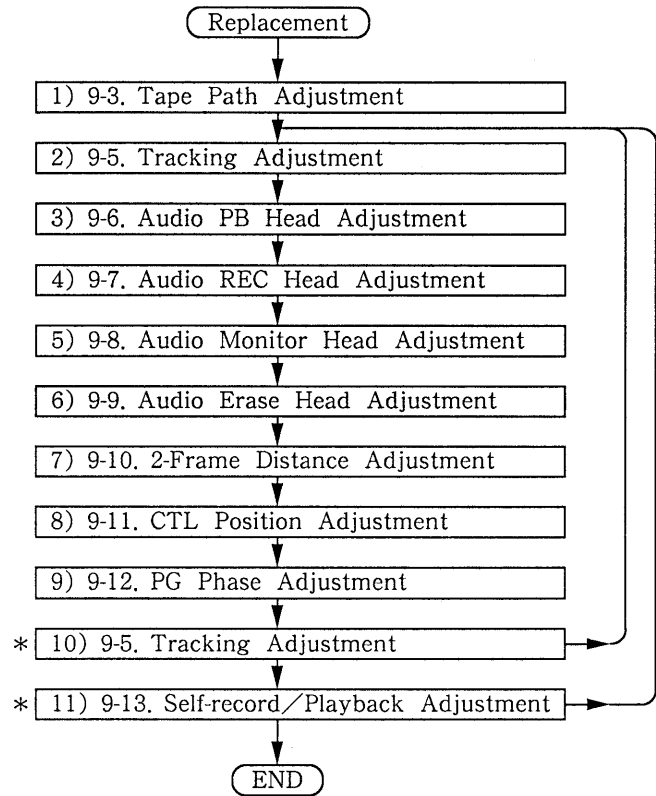


Fig. 6-4-9. Applying Grease

6-5. SLANT GUIDE ASSEMBLY REPLACEMENT

Preliminary Information

- A. The movable guide assembly consists of the two slant guide assemblies. The entrance slant guide control the tape path system for the entrance side and the exit slant guide control the tape path system for the exit side. The entrance and exit slant guides are the most important tape guides among all tape guides to control tape path. Pay utmost care in handing these component during replacement.
- B. When slant guide is replaced, following adjustment is necessary in order to prevent the upper drum's rotary head from crash and maintaining good RF envelope of the entrance and exit guides.
- Adjustment of the clearance between the entrance/exit guides and the upper drum.
- C. Prepare the following gauge when replacing the slant guide assembly.
- Thickness gauge
- Sony Part No. J-6041-670-A
- D. Following check and adjustments are necessary when a slant guide is once removed or replaced.



Note : When any adjustment (parameter change) is executed in the step that carries * mark, return to the specified step that is shown by the arrow mark and follow the procedure.

6-5-1. Entrance Slant Guide Assembly Replacement

Removal

1. When the slant guide is closed, as shown in Fig. 6-5-1, open the slant guide by inserting the tip of flat blade screwdriver into the drive lever cut-out portion and then rotate the screwdriver.

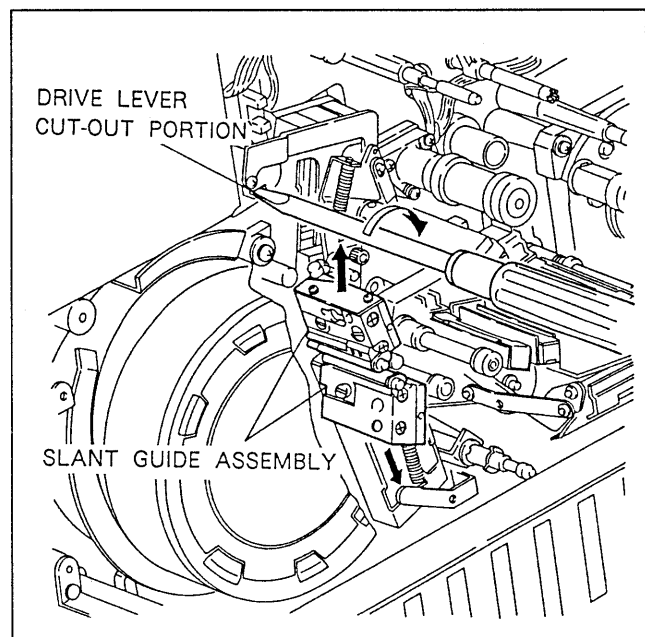


Fig. 6-5-1. Movement of Entrance/Exit Slant Guides

2. Check that the tips of the setscrews ① and ② in Fig. 6-5-2, are coming in contact with the side surface of guide holder of the entrance slant guide.

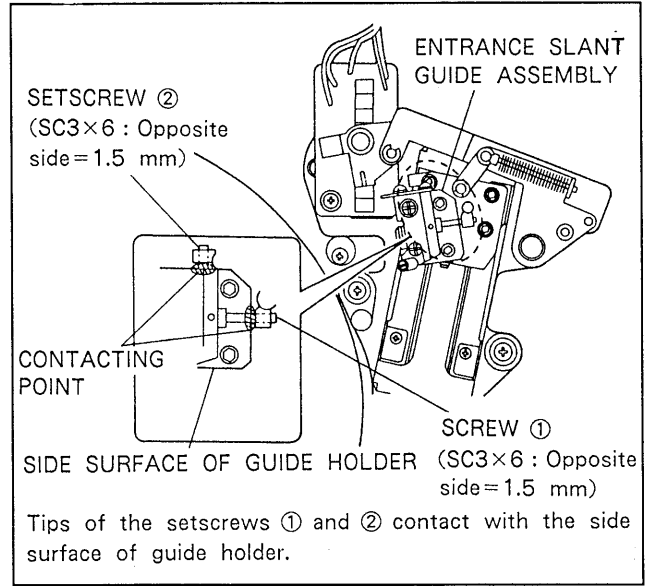


Fig. 6-5-2. Screw Position of Entrance Slant Guide

3. Remove the two screws ③ and ④ (including spring washer and flat washer) and remove the entrance slant guide assembly.
Hexagonal wrench screwdriver: 2.5 mm(Opposite side)
Note: When removing screws, spring washer (SW3) and flat washer (W3) come off together with screw, so that take care not to lose them.
4. Remove the two screws ⑤ and remove fence.
5. Replace the parts that need replacement in the entrance slant guide assembly. For removal of parts, refer to section D (D-13, 14 and 15).

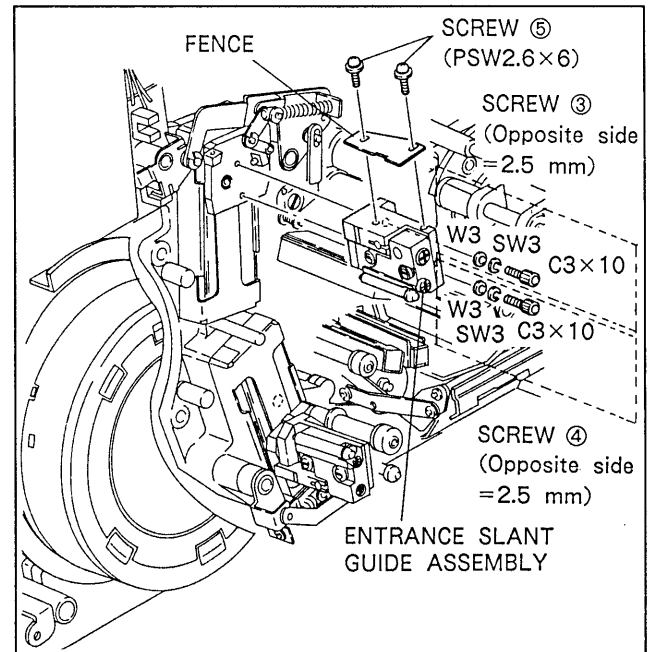


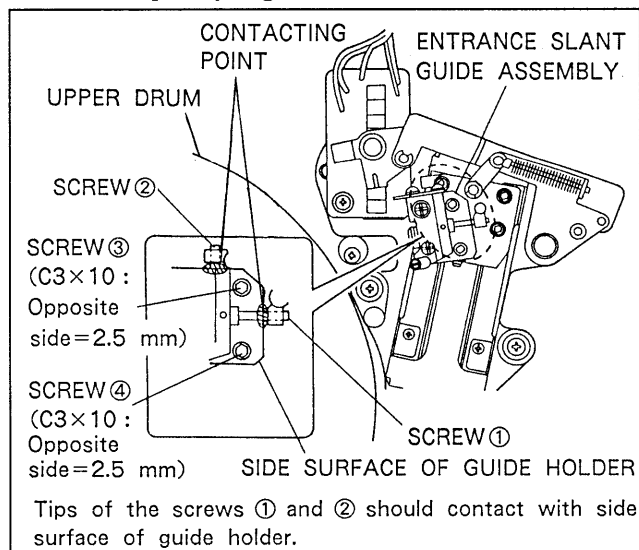
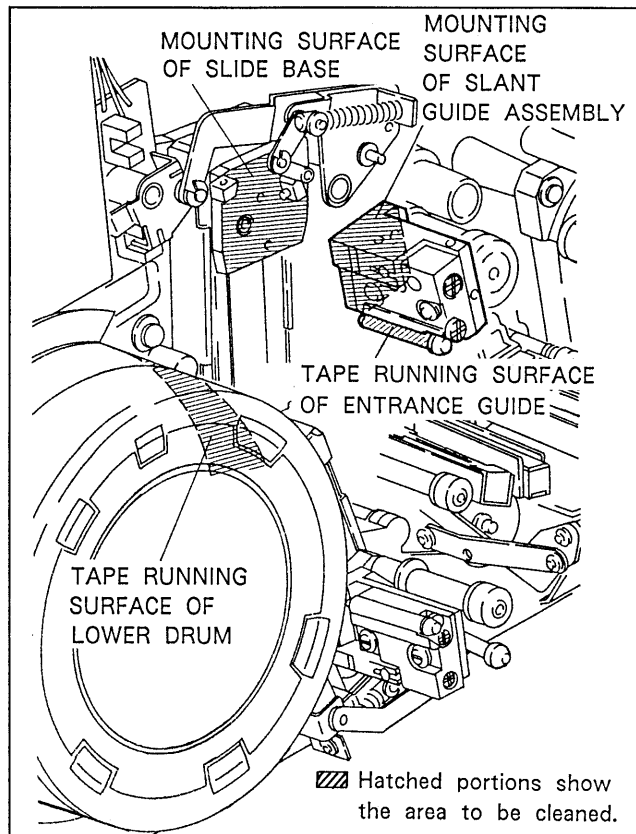
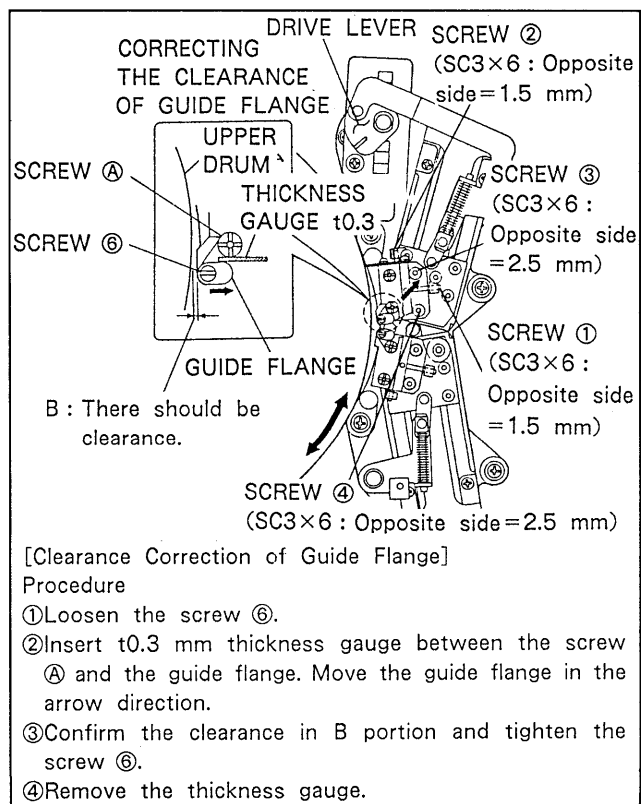
Fig. 6-5-3. Entrance Slant Guide Assembly Removal

Installation**[Cleaning]**

6. Wipe each mounting surface shown in Fig. 6-5-4 with cleaning cloth (cloth or gauze) soaked with alcohol.
 - Each mounting surface of slant guide assembly and slide base.
 - Tape running surface of entrance slant guide
 - Tape running surface of lower drum
7. Loosen the screw ① shown in Fig. 6-5-5 counterclockwise for one turn.
Hexagonal wrench screwdriver: 1.5 mm (Opposite side)
Note: Do not loosen the screw ②.
8. Install temporarily the entrance slant guide to the slide base by lightly tightening the screws ③ and ④ (including the spring washer and flat washer). Tighten these screws once and rotate them counterclockwise for 1/4 to 1/2 turn. When installing the entrance guide, be sure to contact the guide holder's side surface of slant guide assembly with tip of the screws ① and ②.
9. While rotating the upper drum slowly with finger, stop the drum rotation at the position where video heads are most far from the entrance slant guide.

As shown in Fig. 6-5-6, rotate the moving guide drive lever using a flat blade screwdriver to close the slant guide assembly. When closing it, take utmost care so that guide flange should not contact with upper drum and close surely. If the guide flange should have chance to contact with upper drum, loosen the guide flange's screw ⑥ and correct its mounting position. (As for procedure, refer to Fig. 6-5-6.)

10. Tighten the screw ③ surely. The screw ④ is in the temporary tightened condition.

**Fig. 6-5-5. Entrance Slant Guide Assembly Installation****Fig. 6-5-4. Cleaning****Fig. 6-5-6. Entrance Slant Guide Assembly Installation (1)**

[Entrance Side Guide Clearance Adjustment]

11. Insert $t0.28$ mm thickness gauge between upper drum and guide pin underneath the guide flange. Adjust the position of the slant guide assembly by turning the screws ① and ② until specification C is fulfilled.

Note 1 : Take extreme care not to give any scar or damage to the rotary heads when inserting the thickness gauge.

Note 2 : When performing the clearance check, insert the thickness gauge into the side of the upper drum with no head tips.

Spec. C : Thickness gauge $t0.26$ to 0.28 mm can go through.

When clearance is too wide :

Loosen the screw ② then adjust with screw ① by turning it in the clockwise direction.

When clearance is too narrow :

Loosen the screw ① then adjust with screw ② by turning it in the clockwise direction.

After adjustment, check the clearance between upper drum and guide flange so that it is within the specification D.

Spec. D : more than 0.10 mm

12. Tighten the screws ③ and ④ firmly and check again the step 11. Loosen the screws ① and ② once and tighten them again firmly. Apply a drop of locking agent (such as screw lock paint) on screw head.

13. Install the fence that was removed in step 4, as follows.

① Temporarily install the fence with two screws ⑤. While pressing the fence backwards, press the lower portion of the fence toward side surface of lower drum.

② Insert the $t0.15$ mm thickness gauge into clearance between upper drum and fence and move fence top until specification E is fulfilled. Tighten the two screws ⑤.

Spec. E : Thickness gauge $t0.14$ mm go

Thickness gauge $t0.20$ mm stop

③ Apply a drop of locking agent on head of two screws ⑤.

14. Perform **tape path check**.

Refer to item D of preliminary information.

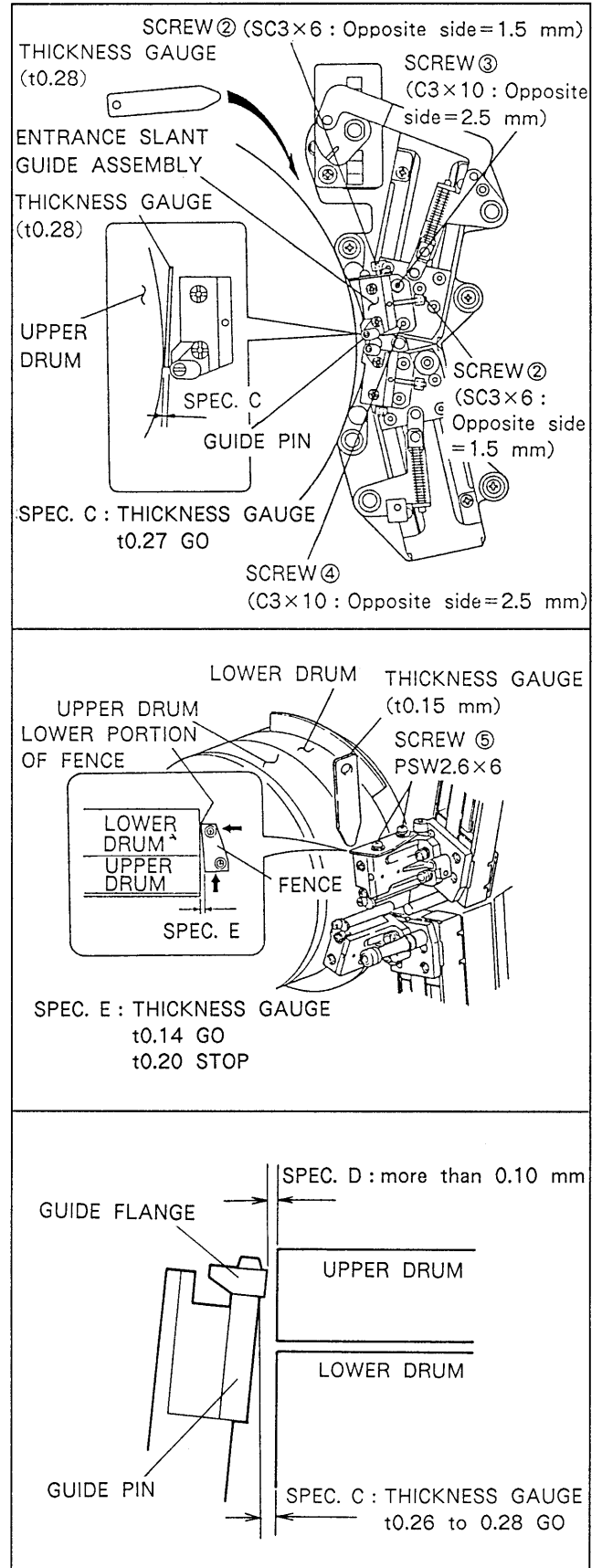


Fig. 6-5-7. Entrance Side Guide Flange Clearance Adjustment

6-5-2. Exit Slant Guide Assembly Replacement

1. When the slant guide is closed as shown in Fig. 6-5-8, open the slant guide by inserting the tip of flat blade screwdriver into the drive lever cut-out portion and then rotate screwdriver. (Both the entrance and exit slant guides are opened.)
2. Check that the tips of the setscrews ① and ② in Fig. 6-5-9, are coming in contact with the guide holder's side surface of exit slant guide assembly.
3. Remove the two screws ③ and ④ (including the spring washer and flat washer) and remove the exit slant guide assembly as shown in Fig. 6-5-10. Hexagonal wrench screwdriver: 2.5 mm (Opposite side)
Note: When removing screws, spring washer (SW3) and flat washer (W3) come off together with screw, so that take care not to lose them.
4. Replace the parts that need replacement in the exit slant guide assembly. For removal of parts, refer to section D (D-13, 14 and 15).

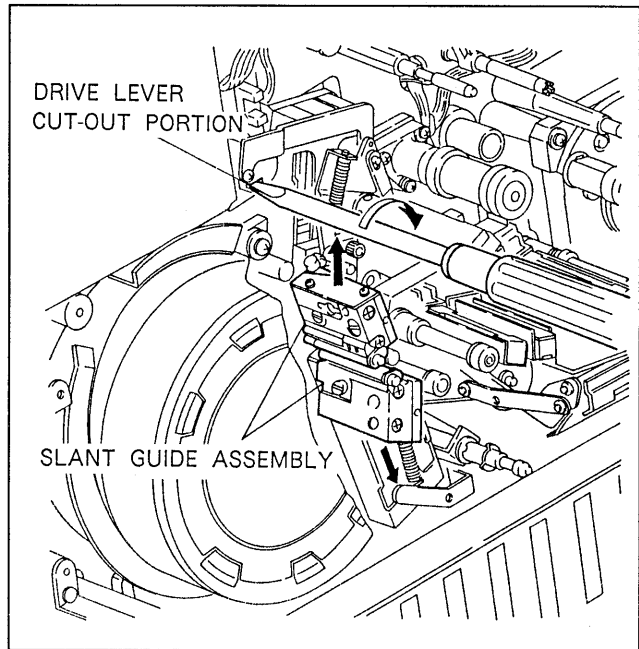


Fig. 6-5-8. Movement of Entrance/Exit Slant Guide Assembly

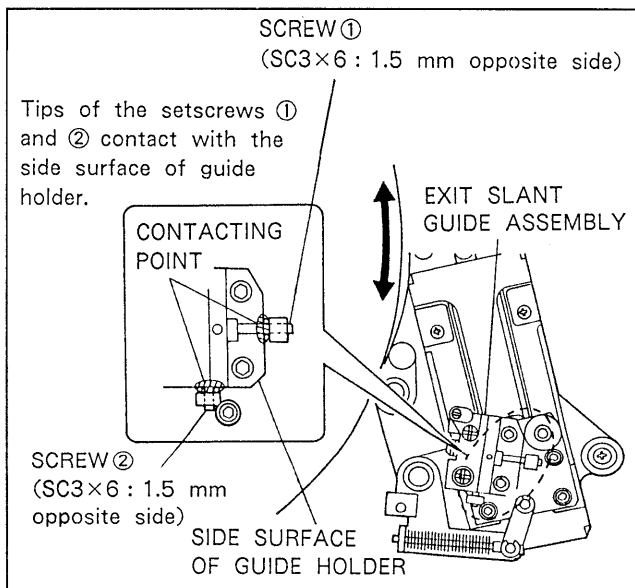


Fig. 6-5-9. Screw Position of Exit Slant Guide Assembly

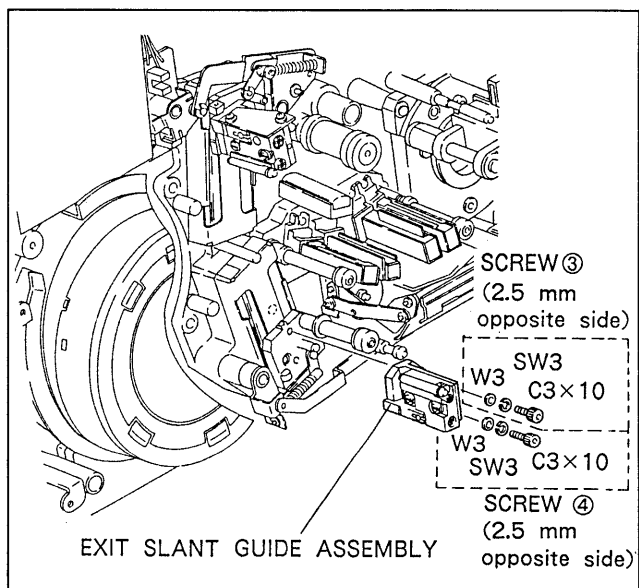
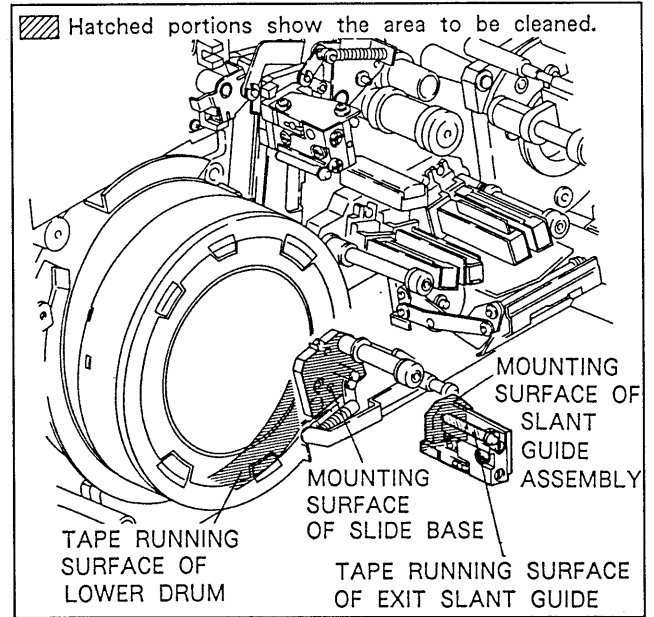


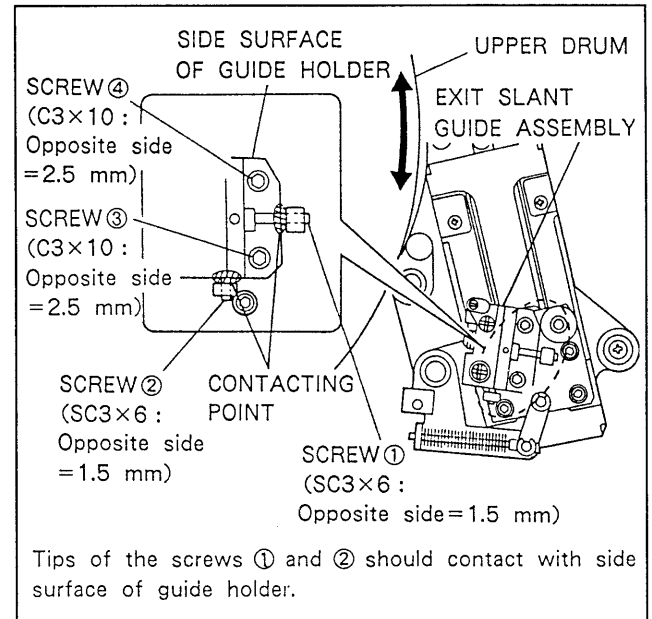
Fig. 6-5-10. Exit Slant Guide Assembly Replacement

Installation**[Cleaning]**

5. Clean each mounting surface with cleaning cloth (cloth or gauze) soaked with alcohol as shown in Fig. 6-5-11.
 - Each mounting surface of slant guide assembly and slide base.
 - Tape running surface of exit slant guide
 - Tape running surface of lower drum

**Fig. 6-5-11. Cleaning**

6. Turn the screw ① shown in Fig. 6-5-12 counterclockwise for one turn and loosen it.
Hexagonal wrench screwdriver: 1.5 mm(Opposite side)
Note: Do not loosen the screw ②.
7. Install temporarily the exit slant guide by lightly tightening the screws ③ and ④ (including the spring washer and flat washer). (Tighten these screws once and rotate them counterclockwise for 1/4 to 1/2 turn.) When installing the exit slant guide, be sure to contact the guide holder's side surface of entrance slant guide with tip of the screws ① and ②.

**Fig. 6-5-12. Location of Screws for Exit Slant Guide Ass'y**

(6-5-2. Exit Slant Assembly Replacement)

8. While rotating the upper drum slowly with finger, stop the drum rotation at the position where rotary heads are most far from the exit slant guide. Rotate the drive lever using a flat blade screwdriver to close the slant guide. When closing it, take utmost care so that guide flange should not contact with upper drum and close surely. If the guide flange should have chance to contact with upper drum, loosen the guide flange's screw ⑤ and correct it mounting position. (As for procedure, refer to Fig. 6-5-13.)
9. Tighten the screw ③ surely. (The screw ④ is in the temporary tightened condition.)

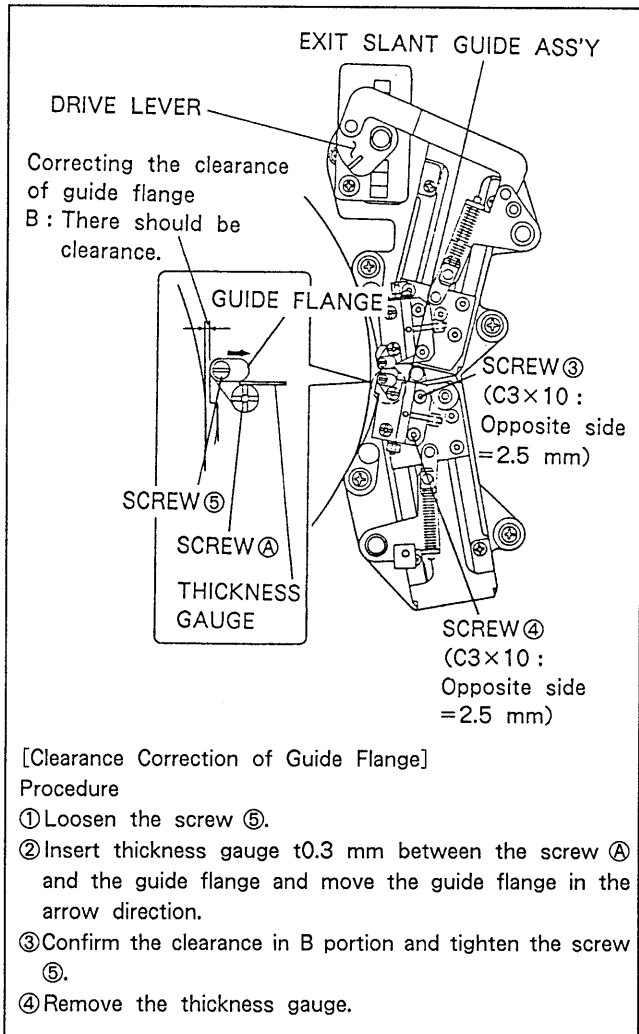


Fig. 6-5-13. Confirmation of Exit Slant Guide Ass'y Installation

[Exit Side Guide Clearance Adjustment]

10. Insert t0.11 mm thickness gauge between upper drum and guide pin which is equivalent to the height of rotary head. Adjust the screws ① and ② until specification C is fulfilled.

Note 1 : Take extreme care not to give any scar or damage to the rotary heads when inserting the thickness gauge.

Note 2 : When performing the clearance check, insert the thickness gauge into the side of the upper drum with no head tips.

Spec. C : Thickness gauge t0.10 mm can go through.

When clearance is too wide :

Loosen the screw ② then adjust with screw ① by turning it in the clockwise direction.

When clearance is too narrow :

Loosen the screw ① then adjust with screw ② by turning it in the clockwise direction.

After adjustment, check the clearance between upper drum and guide flange so that it is within the specification D.

Spec. D : more than 0.06 mm

11. Tighten the screws ③ and ④ firmly and then check again the step 10. Loosen the screws ① and ② once and tighten them again firmly so that apply a drop of locking agent (such as screw lock paint) on screw head.
12. Perform **tape path check** referring to item D of preliminary information.

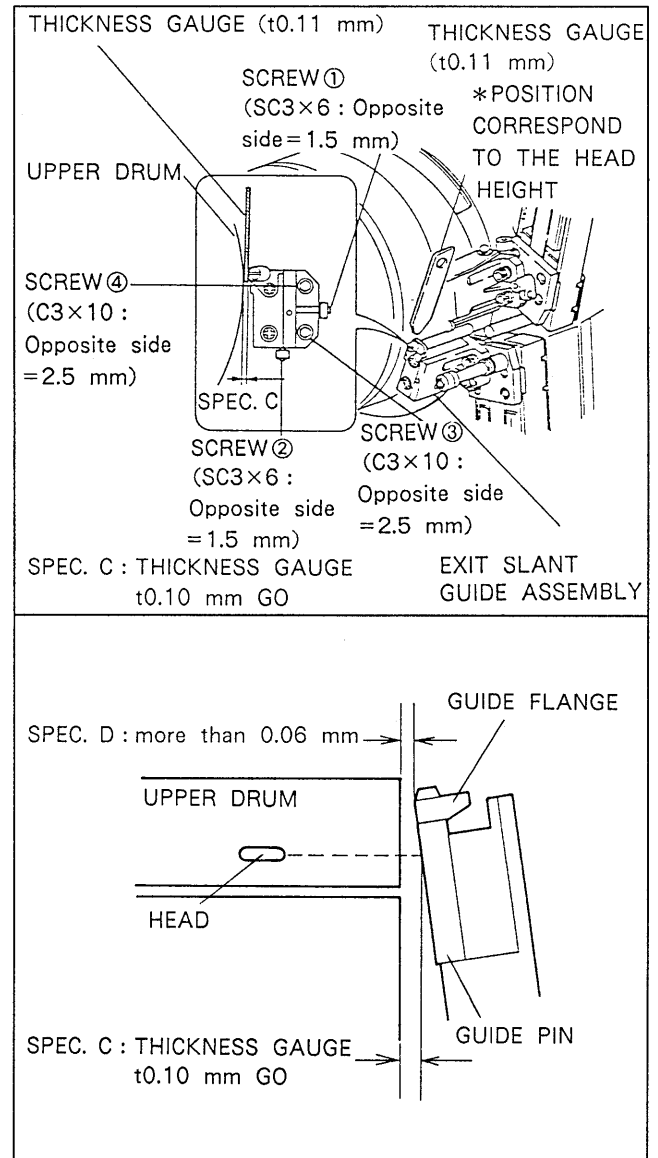
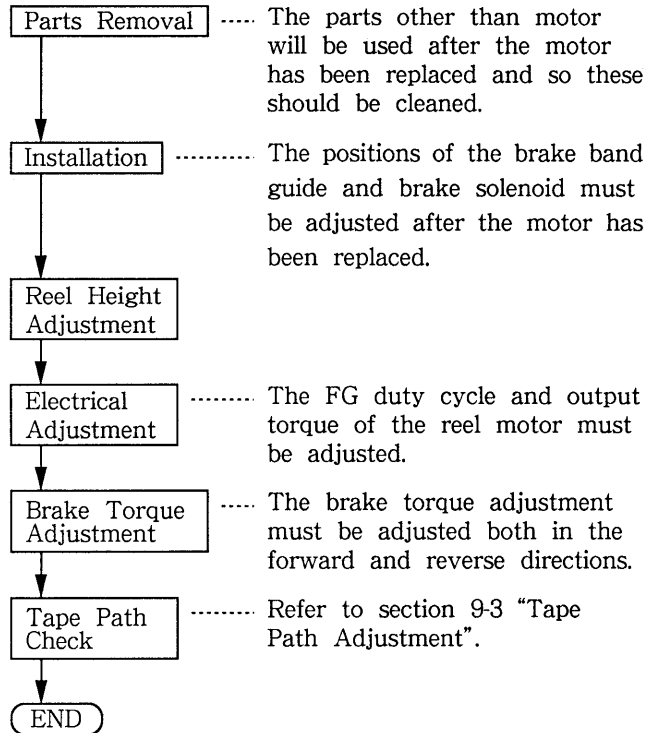


Fig. 6-5-14. Clearance Adjustment of Exit Slant Guide

6-6. REEL MOTOR REPLACEMENT

Preliminary Information

- A. The reel motor assembly has two types ; supply reel motor assembly and take-up reel motor assembly. Here, replacement for respective motors are explained.
- B. The replacement and the adjustment after the replacement are performed in accordance with the rough summary below.



- C. The mechanical brake is operated together with the electromagnetic brake when the power is turned off while the tape is still running or when the tape sensor senses that there is no tape. In the test mode, the drive torque of the motor that applies when the motor is operated at a constant speed with the mechanical brake applied is indicated as the mechanical brake torque. This means that the amount of the braking force is in direct proportion to the size of the value displayed.
- D. Prepare the following fixtures when performing the adjustment.
 - Brake adjustment tool
Sony Part No. J-6043-720-A
 - Thickness gauge
Sony Part No. J-6041-670-A

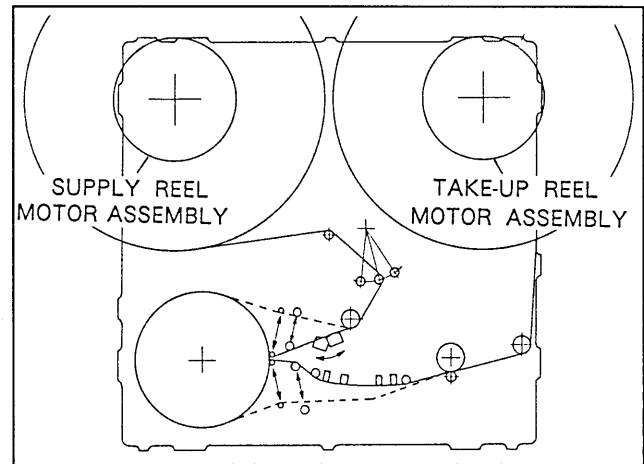


Fig. 6-6-1. Reel Motor Assembly

(6-6-1. Supply Reel Motor Assembly Replacement)

[Brake Band Guide Position Adjustment]

15. Turn the side of the prepared brake adjustment tool, that is marked "A" "JB-372" to the front and mount the tool onto the reel motor shaft as shown in Fig. 6-6-3.
16. Secure the brake band guide properly using the three screws ⑤ while pressing the brake band guide lightly against the brake adjustment tool.
17. Remove the brake adjustment tool.

[Link Stopper Position Adjustment]

18. Arrange the brake link as shown in Fig. 6-6-2. Insert it into the brake support and secure it using the E-ring ④.
19. Attach the springs between the link stopper and brake link.
20. Secure the brake solenoid assembly loosely using screw ③.
21. While pressing the plunger of solenoid to be absorbed by hand, turn the side of the brake adjustment tool marked B to the front and attach the tool onto the reel motor shaft.

22. Adjust the position of the link stopper so that the clearance between the link stopper and brake link (top) meet the specification A shown in Fig. 6-6-4 without the plunger of solenoid being absorbed.
Spec. A : 1.0 ± 0.2 mm

[Brake Solenoid Position Adjustment]

23. Press the plunger of solenoid to be absorbed by hand. Adjust the position of the brake solenoid adjustment tool and brake band is not less than 0.2 mm in the entire Z area range without the brake bands becoming deformed in the vicinity shown by X and Y in the figure. After the adjustment, tighten up the mounting screws ③ properly and secure the solenoid.
24. Remove the brake adjustment tool while pressing the plunger of solenoid to be absorbed by hand.
25. After having cleaned the bottom cylinder area of the reel table (the area where the brake band comes into contact), press the plunger of solenoid to be absorbed by hand and mount the reel table onto the reel motor shaft.
26. While pressing the reel table lightly in the motor direction, tighten up the two setscrews ① and secure.
27. Connect the CN001 to the DS-19 board.

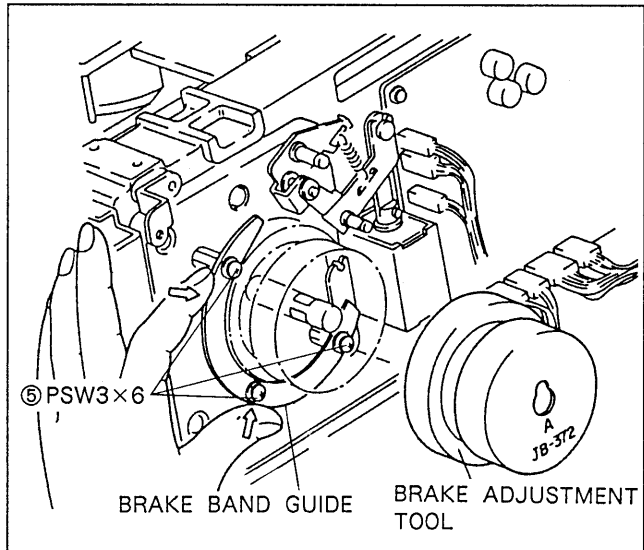


Fig. 6-6-3. Brake Band Guide Position Adjustment

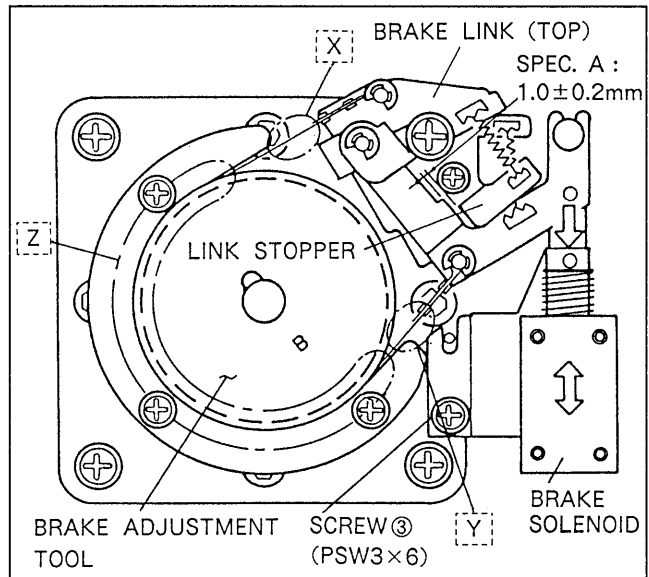


Fig. 6-6-4. Link Stopper/Brake Solenoid Position Adjustment

[Reel Table Height Adjustment]

28. Load a tape which does not have any wrinkles or other such damage. Set the VTR to the F.FWD mode and check that the tape does not come into close contact with the reel flange. Conduct the same check for the REW mode. If it does make close contact, perform adjustment according to the next step. If the tape curls at any location except the reel flange, make the adjustment in accordance with the section 9-3 "tape path adjustment".

29. Proceed to adjust the height in the following sequence.

a. Remove the tape and then remove the reel cover while referring to Fig. 6-6-5.

Hexagonal wrench screwdriver: 5 mm(Opposite side)

b. Loosen the two setscrews ① which secure the reel table and rotate the height adjustment screw.

Hexagonal wrench screwdriver: 2 mm(Opposite side)

Note 1: The height will change by 0.7 mm with every turn of the height adjustment screw.

Note 2: Rotate the height adjustment screw as follows in accordance with the symptom.

- Rotate it clockwise when the tape makes contact with the top reel flange.
- Rotate it counterclockwise when the tape makes contact with the bottom reel flange.

c. Tighten the two setscrews ① while pushing the reel table gently in the motor direction. After having checked again the height of the reel table as in step 28, reinstall the reel cover.

[Supply Reel Motor FG Duty Cycle Adjustment]

30. Adjust the FG duty cycle of the motor by the following procedure.

a. Press the **[0]** key in the 21-key section while keeping the switch S2 on the SY-103 board depressed.

b. Press the **[F]**, **[9]** and **[SET]** keys in the 21-key section in sequence.

c. While pressing the blue **[OUT]** key in the 21-key section, press the blue **[IN]** key until the upper and lower 2 digits (part shown by the white arrow in Fig. 6-6-6) of the 4-digit indication at the bottom left of the display enter in D3 through D7 (hexadecimal notation). This operation causes the FG duty cycle to be adjusted to 50 %.

d. Press the **[F]**, **[3]** and **[SET]** keys in the 21-key section in sequence so that the reel motor stops.

e. Press the **[C]**, **[T]** and **[F]** keys in sequence while pressing the blue **[OUT]** key.

f. Press the **[SET]** key and then press the **[+]** key until "PUSH NVWR SW" appears on the display.

g. Press the NVWR button on the SV-90 board.

h. Press the RESET switch S3 on the SV-90 board.
(Operation will be returned to the ordinary mode.)

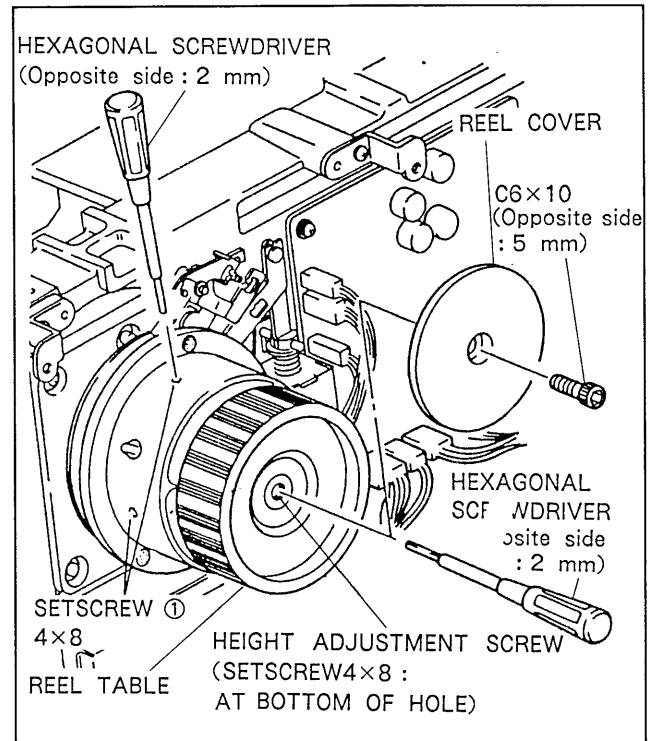


Fig. 6-6-5. Supply Reel Table Height Adjustment

STEP	DISPLAY READING
30-a	> _
30-b	> F9 SFG ADJ_ abcd XXXX XXXX > _
30-e	> NVW
30-f	> PUSH NVWR SW
30-g	> PUSH NVWR SW_ > READY_ > _

Fig. 6-6-6. FG Duty Cycle Adjustment

[Supply Reel Motor Torque Adjustment]

31. Adjust the drive torque of the reel motor by the following procedure.

- a. Press the **[0]** key in the 21-key section while keeping the switch S2 on the SY-103 board depressed.
- b. Press the **[T]**, **[0]** and **[SET]** keys in sequence.
- c. Check that the supply reel automatically turns in the forward and reverse directions and stops.
- d. After the motor has stopped running, check that the 2 digits (area indicated by the black arrow in Fig. 6-6-7) are within 63 through 65 (hexadecimal notation). If they are not, proceed to adjust from steps e through g.
- e. Press the **[T]**, **[1]** and **[SET]** keys in the 21-key section in sequence.
- f. Check that the supply reel automatically turns in the forward and reverse directions and stops.
- g. After the motor has stopped running, check that the 2 digits (area indicated by the white arrow in Fig. 6-6-7) are within 63 through 65 (hexadecimal notation). If they are not, repeat the adjustment from step e.

Reference : By the step e setting, reel motor torque is set automatically.

- h. Press the **[C]**, **[T]** and **[F]** keys while pressing the blue **[OUT]** key in the 21-key section.
- i. Press the **[SET]** key and then press the **[+]** key until "PUSH NVWR SW" appears on the display.
- j. Press the NVWR button on the SV-90 board.
- k. Press the RESET switch S3 on the SV-90 board. (Operation will be returned to the ordinary mode.)

STEP	DISPLAY READING
31-a	> _
31-b	> TO 0 START > XX XX XX XX XX > XX XX XX XX
31-d	> XX XX XX XX ab > XX > _
31-e	> T1 ADJ & START > XX XX XX XX XX > XX XX XX XX
31-g	> XX XX XX XX ab > XX > _
31-h	> NVW
31-i	> PUSH NVWR SW
31-j	> PUSH NVWR SW_ > READY _ > _

Fig. 6-6-7. Supply Reel Motor Torque Adjustment

[Mechanical Brake Torque Adjustment]

- 32. Adjust the mechanical brake torque as follows.
 - a. Press the **0** key in the 21-key section while pressing the switch S2 on the SY-103 board.
 - b. Press the **T**, **3** and **SET** keys in the 21-key section in sequence.

The S-reel automatically turns in the forward and reverse directions and stops.

During rotating the reel, check that the "ab" indication (black arrow in Fig. 6-6-8) and the "ef" indication (white arrow) meet the following specifications.

MODE	SPECIFICATIONS (HEX.)	
REVERSE	ef	*05
FORWARD	ab	*1E to 2D

* : Check that the hexadecimal notation when the value is almost stabilizing.

If not satisfied, perform the following adjustment. If they are satisfied, proceed to step e.

- c. If the "ab" indication does not satisfy the specification, change the position of the adjustment spring (FWD/CCW) shown in Fig. 6-6-9. If the "ef" indication does not satisfy the specifications, change the position of the adjustment spring (REV/CW) shown in Fig. 6-6-9.

- d. Repeat steps b and c until the specifications are satisfied.
- e. Press the RESET switch S3 on the SV-90 board. (Operation will be returned to the ordinary mode.)

- 33. Perform **tape path check**. Refer to section 9-3.

STEP	DISPLAY READING
32-a	> _
32-b	> T3 BRK CHECK > ab cd ef gh > xx xx xx xx

Fig. 6-6-8. Mechanical Brake Torque Adjustment (1)

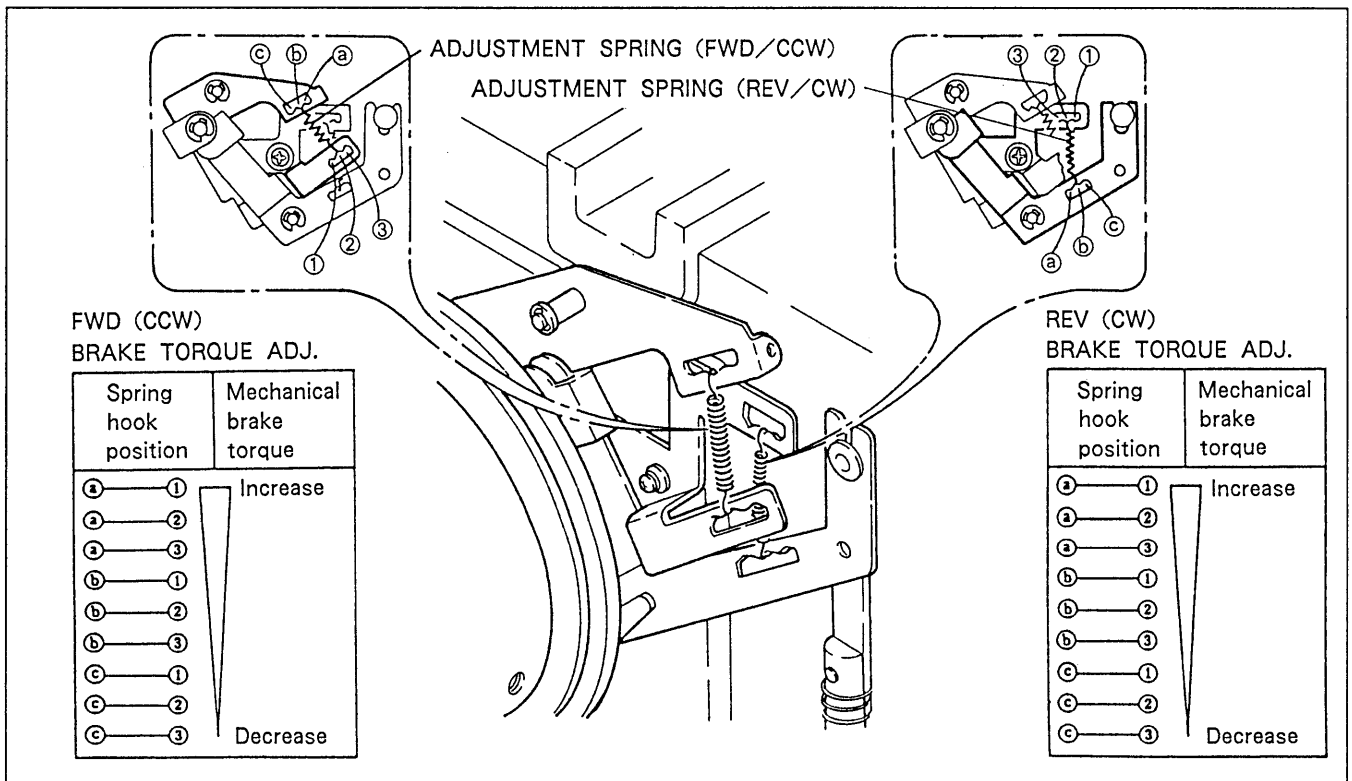


Fig. 6-6-9. Mechanical Brake Torque Adjustment (2)

6-6-2. Take-up Reel Motor Assembly Replacement

Removal

1. Disconnect connector CN009 from the DS-19 board.
2. Move to the rear of the VTR and open the power supply unit. Then disconnect connectors CN201, CN204 and CN206 from the RM-43 board.
3. Loosen the two setscrews ① shown in Fig. 6-6-10, and remove the reel table while pressing the plunger of solenoid to be absorbed by hand. Hexagonal wrench screwdriver: 2 mm (Opposite side)
4. Remove the two E-rings ② and remove the brake band.
5. Remove screw ③ and remove the brake solenoid assembly.
6. Disengage one end of the two springs installed between the link stopper and brake link. Then remove the E-ring ④ and remove the brake link.
7. Remove the three screws ⑤ and remove the brake band guide.
8. Remove the three brake band supports ⑥. Nut screwdriver: 5.5 mm (Opposite side)
9. Remove the screw ⑦ which secures the link stopper and then remove the brake support ⑧. Nut screwdriver: 7 mm (Opposite side)
10. Remove the four screws ⑨ and remove the take-up reel motor.

11. Clean the top surface of the boss on which the motor is mounted and also the parts which have just been removed.

Note: Take sufficient care not to bend the brake band.

Installation

12. Pass the three harnesses of the new reel motor to the rear through the holes in the base plate and secure the reel motor using the four screws ⑨. Then move to the rear of the VTR and connect connectors CN206, CN204 and CN201 to their prescribed positions on the RM-43 board.
13. Secure the link stopper with the brake support ⑧ and then tighten the screw ⑦.
14. Mount the three brake band supports ⑥.

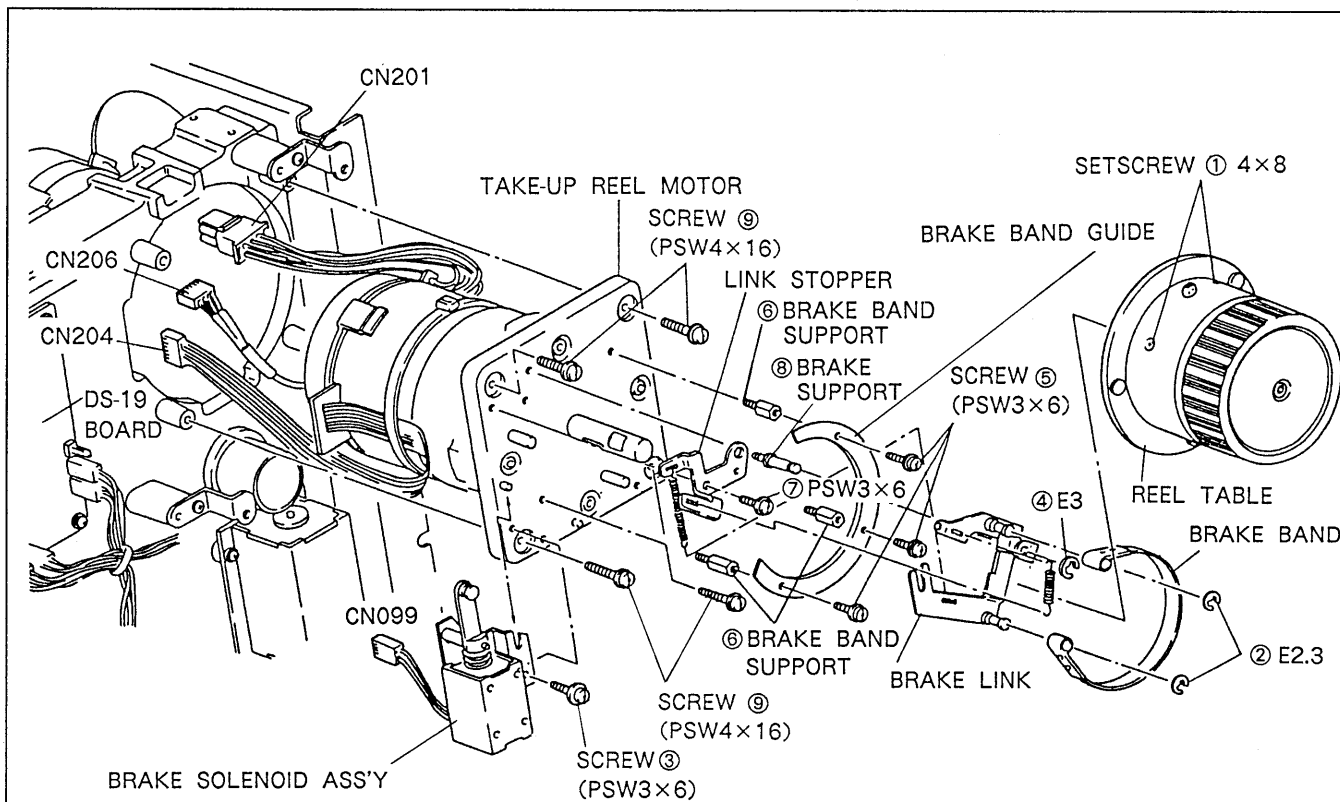


Fig. 6-6-10. Take-up Reel Motor Replacement

[Brake Band Guide Position Adjustment]

15. Turn the side of the prepared brake adjustment tool, that is marked "A" "JB-372" to the front and mount the tool onto the reel motor shaft as shown in Fig. 6-6-11.
16. Secure the brake band guide properly using the three screws ⑤ while pressing the brake band guide lightly against the brake adjustment tool.
17. Remove the brake adjustment tool.

[Link Stopper Position Adjustment]

18. Arrange the brake link as shown in Fig. 6-6-10. Insert it into the brake support and secure it using the E-ring ④.
19. Attach the spring between the link stopper and brake link.
20. Secure the brake solenoid assembly loosely using screw ③.
21. While causing the plunger of solenoid to be absorbed by hand, turn the side of the brake adjustment tool marked B to the front and attach the tool onto the reel motor shaft.
22. Adjust the position of the link stopper so that the clearance between the link stopper and brake link (top) meet the specification B shown in Fig. 6-6-12 without the plunger of solenoid being absorbed.
Spec. B : 1.0 ± 0.2 mm

[Brake Solenoid Position Adjustment]

23. Press the plunger of solenoid to be absorbed by hand. Adjust the position of the brake solenoid adjustment tool and brake band is not less than 0.2 mm in the entire Z area range without the brake bands becoming deformed in the vicinity shown by X and Y in the Fig. 6-6-12. After the adjustment, tighten up the mounting screw ③ properly and secure the solenoid.
24. Remove the brake adjustment tool while pressing the plunger of solenoid to be absorbed by hand.
25. After having cleaned the bottom cylinder area of the reel table (the area with which the brake band and comes into contact), press the plunger of solenoid to be absorbed by hand and mount the reel table onto the reel motor shaft.
26. While pressing the reel table lightly in the motor direction, tighten up the two setscrews ① and secure.
27. Connect the CN009 to the DS-19 board.

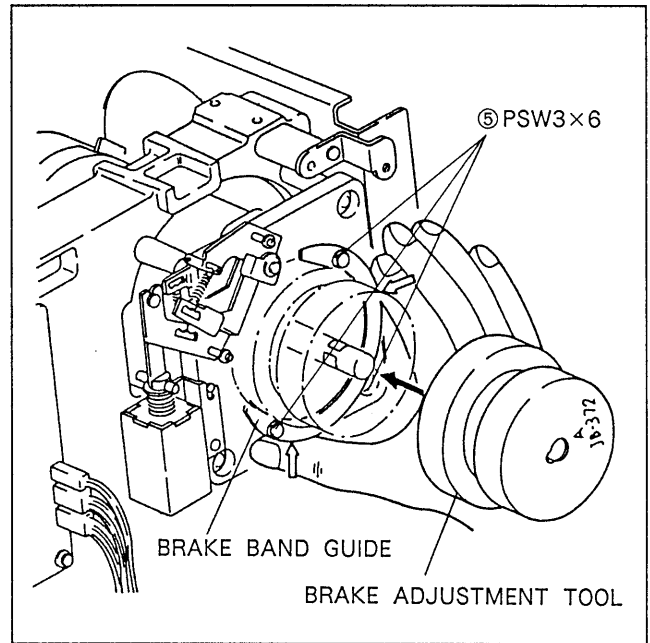


Fig. 6-6-11. Brake Band Guide Position Adjustment

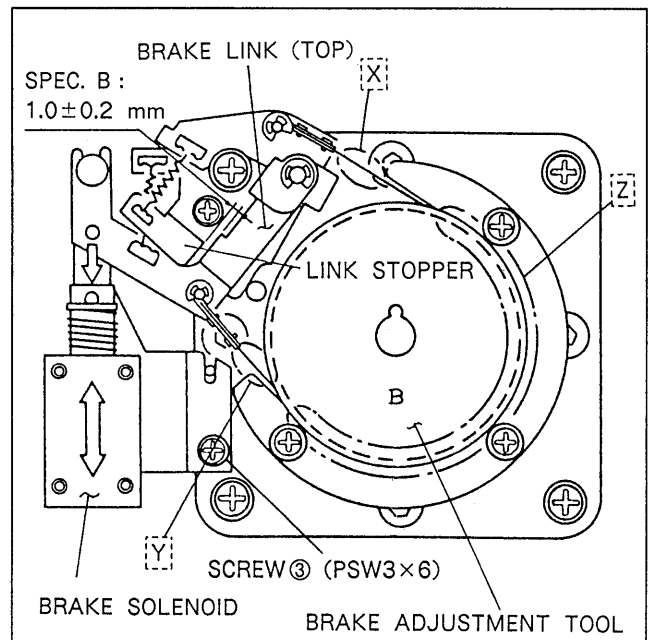


Fig. 6-6-12. Link Stopper/Brake Solenoid Position Adjustment

[Reel Table Height Adjustment]

28. Load a tape which does not have any wrinkles or other such damage. Set the VTR to the F.FWD mode and check that the tape does not come into close contact with the reel flange. Conduct the same check for the REW mode. If it does make close contact, perform the following step. If the tape curls at any location except the reel flange, make the adjustment in accordance with the section 9-3 "tape path adjustment".
29. Proceed to adjust the height in the following sequence.
 - a. Remove the tape and then remove the reel cover while referring to Fig. 6-6-13.
Hexagonal wrench screwdriver: 5 mm(Opposite side)
 - b. Loosen the two setscrews ① which secure the reel table and rotate the height adjustment screw.
Hexagonal wrench screwdriver: 2 mm(Opposite side)

Note 1: The height will change by 0.7 mm with every turn of the height adjustment screw.

Note 2: Rotate the height adjustment screw as follows in accordance with the symptom.

 - Rotate it clockwise when the tape makes contact with the top reel flange.
 - Rotate it counterclockwise when the tape makes contact with the bottom reel flange.
 - c. Tighten the two setscrews ① while pushing the reel table gently in the motor direction. After having checked again the height of the reel table as in step 28, reinstall the reel cover.

[Take-up Reel Motor FG Duty Cycle Adjustment]

30. Adjust the FG duty cycle of the motor by the following procedure.
 - a. Press the **[0]** key in the 21-key section while keeping the switch S2 on the SY-103 board depressed.
 - b. Press the **[F]**, **[A]**(A is executed by pressing **[0]** key while pressing the blue **[OUT]** key) and **[SET]** keys in the 21-key section in sequence.
 - c. While pressing the blue **[OUT]** key in the 21-key section, press the blue **[IN]** key until the upper and lower 2 digits (part shown by the arrow in Fig. 6-6-14) of the 4-digit indication at the bottom left of the display enter in D0 through DA (hexadecimal notation). This operation causes the FG duty cycle to be adjusted to 50 %.
 - d. Press the **[F]**, **[3]** and **[SET]** keys in the 21-key section in sequence so that the reel motor stops.
 - e. Press the **[C]**, **[T]** and **[F]** keys in sequence while pressing the blue **[OUT]** key.
 - f. Press the **[SET]** key and then press the **[+]** key until "PUSH NVWR SW" appears on the display.

- g. Press the NVWR button on the SV-90 board.
- h. Press the RESET switch S3 on the SV-90 board.
(Operation will be returned to the ordinary mode.)

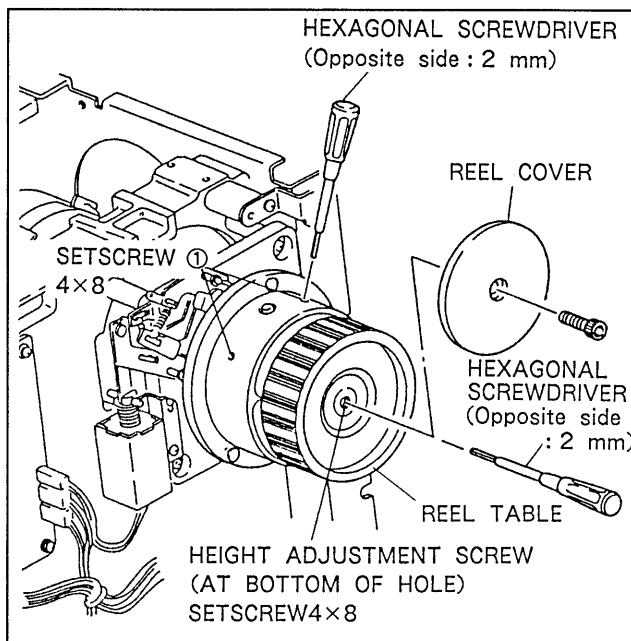


Fig. 6-6-13. Take-up Reel Table Height Adjustment


STEP	DISPLAY READING
30-a	> _
30-b	 > FA TFG ADJ_ abcd XXXX XXXX > _
30-e	> NVW
30-f	> PUSH NVWR SW
30-g	> PUSH NVWR SW_ > READY_ > _

Fig. 6-6-14. FG Duty Cycle Adjustment

6. PARTS REPLACEMENT

[Take-up Reel Motor Torque Adjustment]

31. Adjust the drive torque of the reel motor by the following procedure.
- Press the **[0]** key in the 21-key section while keeping the switch S2 on the SY-103 board depressed.
 - Press the **[T]**, **[8]** and **[SET]** keys in sequence.
 - Check that the take-up reel automatically turns in the forward and reverse directions and stops.
 - After the motor has stopped running, check that the 2 digits (area indicated by the black arrow in Fig. 6-6-15) are within 63 through 65 (hexadecimal notation). If they are not, proceed to adjust from steps e through g.
 - Press the **[T]**, **[9]** and **[SET]** keys in the 21-key section in sequence.
 - Check that the take-up reel automatically turns in the forward and reverse directions and stops.
 - After the motor has stopped running, check that the 2 digits (area indicated by the white arrow in Fig. 6-6-15) are within 63 through 65 (hexadecimal notation). If they are not, repeat the adjustment from step e.
- Reference : By the step e setting, reel motor torque is set automatically.**
- Press the **[C]**, **[T]** and **[F]** keys while pressing the blue **[OUT]** key in the 21-key section.
 - Press the **[SET]** key and then press the **[+]** key until "PUSH NVWR SW" appears on the display.
 - Press the NVWR button on the SV-90 board.
 - Press the RESET switch S3 on the SV-90 board. (Operation will be returned to the ordinary mode.)

STEP	DISPLAY READING
31-a	> _
31-b	> T8 0 START > XX XX XX XX XX > XX XX XX XX
31-d	> XX XX XX XX ab > XX > _
31-e	> T9 ADJ & START > XX XX XX XX XX > XX XX XX XX
31-g	> XX XX XX XX ab > XX > _
31-h	> NVW
31-i	> PUSH NVWR SW
31-j	> PUSH NVWR SW_ > READY _ > _

Fig. 6-6-15. Take-up Reel Motor Torque Adjustment

[Mechanical Brake Torque Adjustment]

32. Adjust the mechanical brake torque as follows.
- Press the **[0]** key in the 21-key section while pressing the switch S2 on the SY-103 board.
 - Press the **[T]**, **[B]** (B is executed by pressing the **[1]** key while pressing the **[OUT]** key.) and **[SET]** keys in the 21-key section in sequence.
The T-reel automatically turns in the forward and reverse directions and stops.
During rotating the reel, check that the "ab" indication (black arrow is Fig. 6-6-16) and the "ef" indication (white arrow) meet the following specifications.

MODE	SPECIFICATIONS (HEX.)	
REVERSE	ef	*1E to 2D
FORWARD	ab	*05

* : Check that the hexadecimal notation when the value is almost stabilizing.

If not satisfied, perform the following adjustment.
If they are satisfied, proceed to step e.

- If the "ab" indication does not satisfy the specification, change the position of the adjustment spring (FWD/CCW) shown in Fig. 6-6-17.
- If the "ef" indication does not satisfy the specifications, change the position of the adjustment spring (REV/CW) shown in Fig. 6-6-17.

- Repeat steps b and c until the specifications are satisfied.
- Press the RESET switch S3 on the SV-90 board.
(Operation will be returned to the ordinary mode.)

33. Perform **tape path check**.
Refer to section 9-3.

STEP	DISPLAY READING
32-a	> _
32-b	> TB BRK CHECK > $\left\{ \begin{array}{c} ab \\ cd \end{array} \right\} \left\{ \begin{array}{c} ef \\ gh \end{array} \right\}$ > XX XX XX XX

Fig. 6-6-16. Mechanical Brake Torque Adjustment (1)

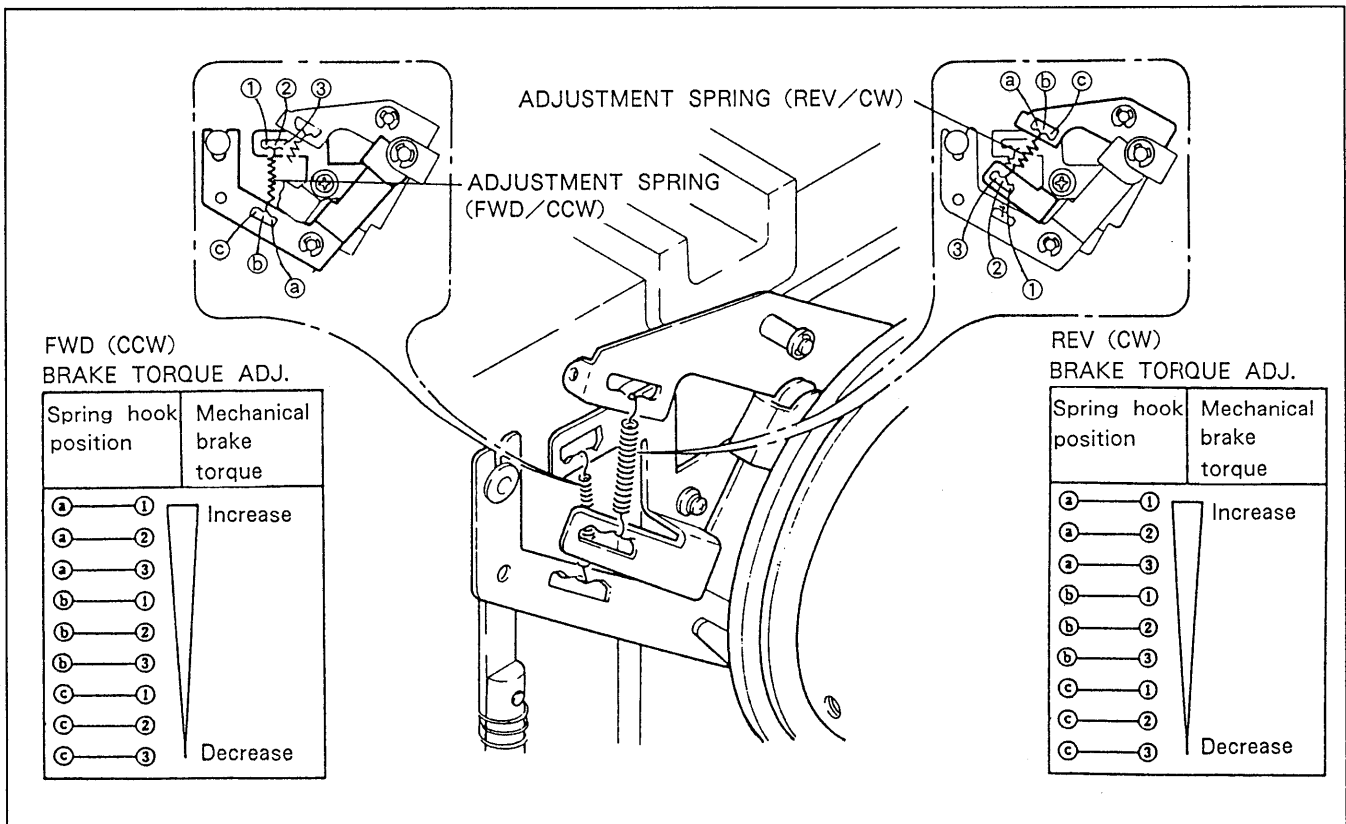


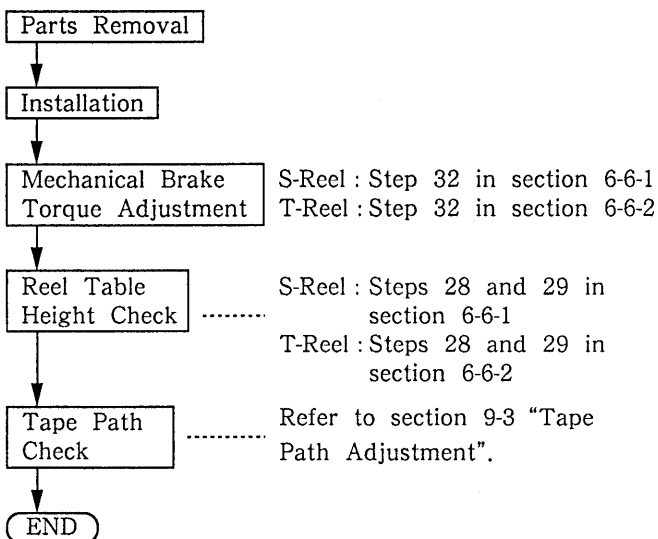
Fig. 6-6-17. Mechanical Brake Torque Adjustment (2)

6. PARTS REPLACEMENT

6-7. BRAKE BAND REPLACEMENT

Preliminary Information

- A. The mechanical brake functions when the power is turned off and when no tape has been loaded. Therefore, it follows that if this brake is properly adjusted, the reels can be stopped without any tape damage even if the power is turned off by accident while the tape is running.
- B. The mechanical brake needs to be replaced when its torque cannot be adjusted no matter how the position where the adjustment spring is attached is changed.
- C. The brake band replacement and the adjustments after the replacement are outlined as follows :



Removal

1. Loosen the two setscrews which fix the reel table. Remove the reel table while causing the plunger of solenoid to be absorbed. Clean the area where contact was made with the brake band at the bottom cylindrical area of the reel table.
2. Remove the two E-rings and remove the brake band.

Installation

3. Mount the new brake band in the position shown in the figure and secure it using the two E-rings.
4. While causing the plunger of solenoid to be absorbed by hand, turn the side of the brake adjustment tool marked "B" to the front, as shown in the figure, and insert the tool onto the reel motor shaft.
5. Check that the clearance between the link stopper and brake link (top) is $1.0 \text{ mm} \pm 0.2 \text{ mm}$ without causing the plunger of solenoid to be absorbed. If the clearance does not satisfy this value, adjust the position of the link stopper.
6. Remove the brake adjustment tool while causing the plunger of solenoid to be absorbed and install the reel table. Secure the reel table by tightening up the two setscrews while pushing it lightly in the motor direction.

This illustration shows the supply side as the example but replacement is conducted in exactly the same way for the take-up side.

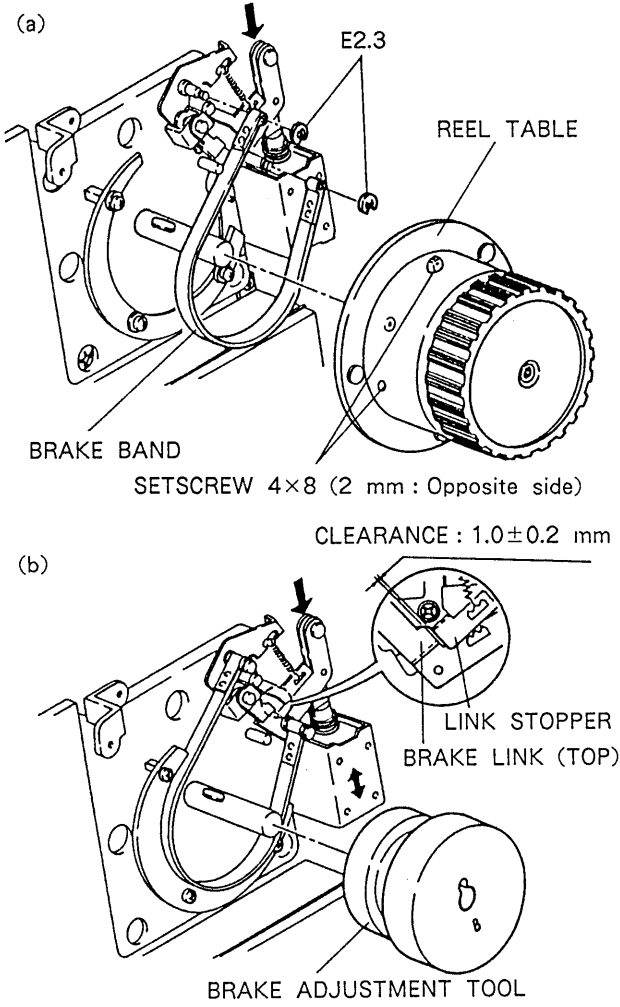


Fig. 6-7-1. Brake Band Replacement

Mechanical Brake Torque Adjustment

7. Adjust the brake torque according to step 32 in section 6-6-1 for the supply side and step 32 in section 6-6-2 for the take-up side.

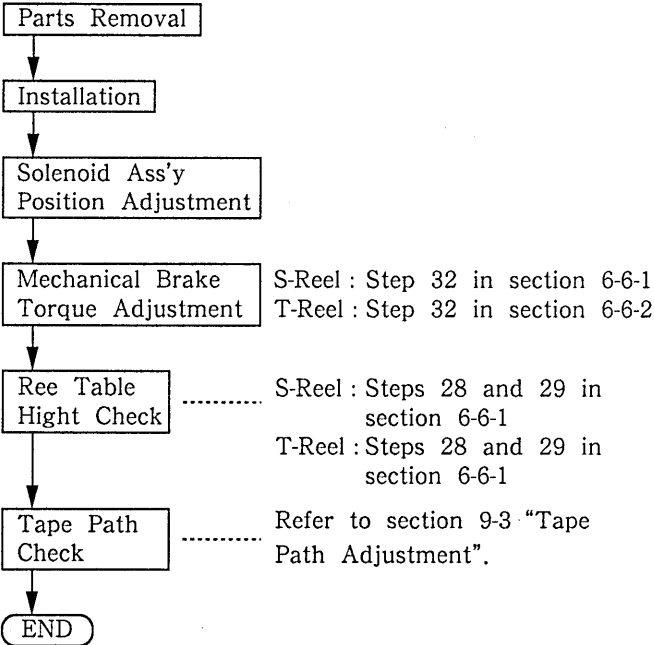
Reel Table Height Check

8. Load a tape which does not have any wrinkles or any other such damage. Set the VTR into the F.FWD mode and check that the tape does not come into close contact with the reel flange. Conduct the same check for the REW mode. If it does make close contact to an extent that the tape is damaged, perform steps 28 and 29 in section 6-6-1 for the supply side and steps 28 and 29 in section 6-6-2 for the take-up side.
9. Perform **tape path check**. Refer to section 9-3.

6.8. BRAKE SOLENOID REPLACEMENT

Preliminary Information

The brake solenoid is replaced as follows :



Removal

1. Loosen the two setscrews which secure the reel table. Draw out the reel table while causing the plunger of solenoid to be absorbed.
2. As in Fig. 6-8-1, remove the screw ① and remove the brake solenoid assembly.
3. Disassemble the brake solenoid assembly while referring to the Fig. 6-8-1.

Installation

4. Replace with new solenoid and re-assemble the solenoid assembly. Install the solenoid assembly so that the bracket can be moved lightly.
5. As shown in Fig. 6-8-2, first adjust so that the clearance between one end of the brackets long hole and the solenoid pin is $5.0 \text{ mm} \pm 0.5 \text{ mm}$. Then secure the bracket firmly.

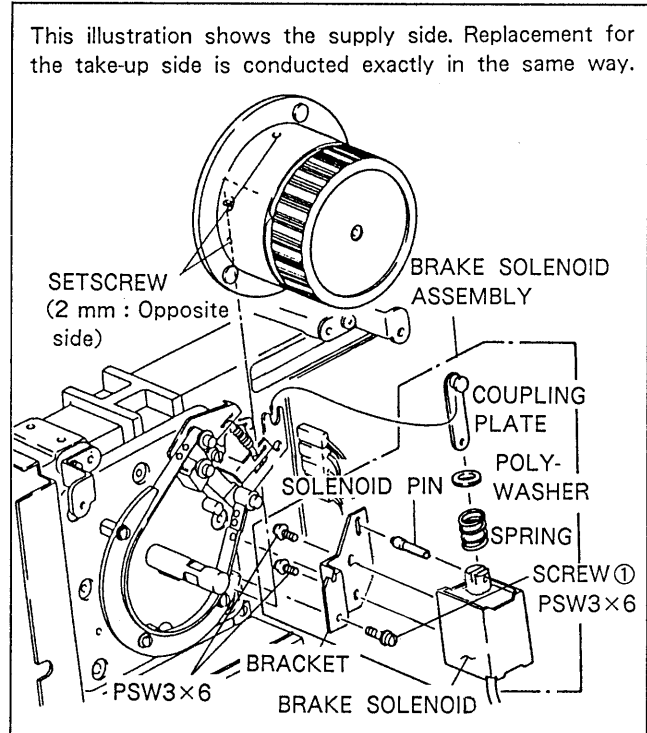


Fig. 6-8-1. Brake Solenoid Replacement

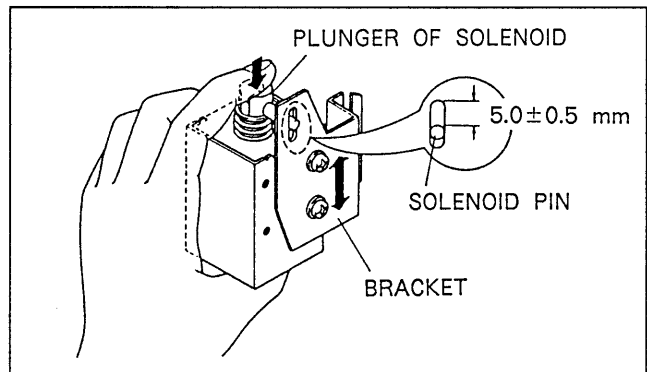


Fig. 6-8-2. Bracket Mounting Position Adjustment

- Temporarily tighten the solenoid assembly with screw ① (after tightening once, loosen it for 1/4 to 1/2 turn).

[Solenoid Assembly Position Adjustment]

- Turn the surface marked "B" on the brake adjustment tool in front while pressing the plunger of solenoid to be absorbed by hand and insert the tool onto the reel motor shaft.
- While pressing the plunger of solenoid to be absorbed by hand, adjust the position of the brake solenoid so that the clearance between the brake adjustment tool and brake band is not less than 0.2 mm in the entire Z area range without the brake band becoming deformed in the vicinity shown by X and Y in the Fig. 6-8-3. After the adjustment tighten screw ① properly and secure the brake solenoid.
- Remove the brake adjustment tool while pressing the plunger of solenoid to be absorbed by hand and mount the reel table.
- Secure the reel table by tightening the two setscrews while pushing it in the motor direction.
- Perform the **mechanical brake** and **reel table height adjustments** also **tape path check** in accordance with the preliminary information.

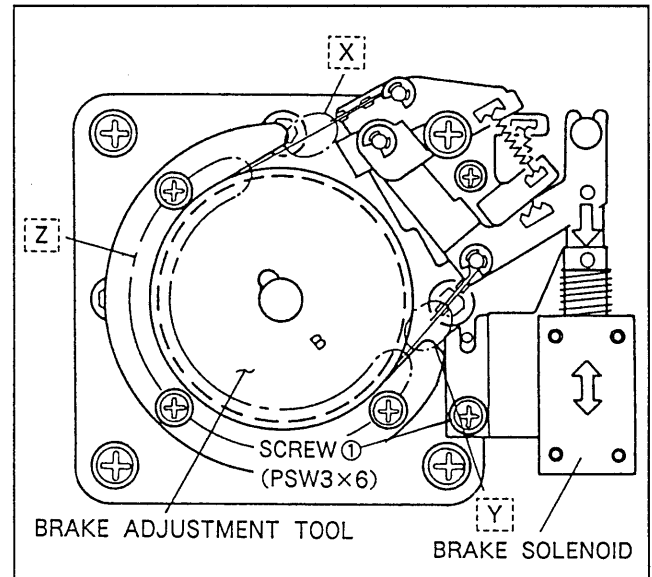


Fig. 6-8-3. Solenoid Assembly Position Adjustment

6-9. TENSION ARM ASSEMBLY REPLACEMENT

Preliminary Information

- The tension arm assembly needs to be replaced when the tape tension cannot be adjusted properly.
- The tension coil spring used with the tension arm assembly has a great effect on the tape tension. The hook area should not be bent and the spring should be replaced only with the specified spring.
- Take care not to apply any force to the board, which is mounted on the tension arm assembly.
- Prepare the following tool and equipment for adjusting the tape tension.
 - Tension adjustment tool
 - Sony Part No. J-6251-960-A
 - Digital voltmeter

Replacement

- Disconnect connector CN003 from the DS-19 board.
- Remove the spring from the spring holder.
- Remove the nut ① and remove the rod from the air dumper from the tension arm assembly.
- Remove the three screws ② shown in the figure and then remove the tension arm assembly.
- Clean the mounting surface of the tension arm assembly with cloth (or gauze) soaked with alcohol.
- Install the new tension arm assembly by proceeding in reverse from steps 1 through 3.

Adjustment

- Adjust the tape tension as in section 9-2.
- Perform section 9-3 "Tape Path Adjustment".

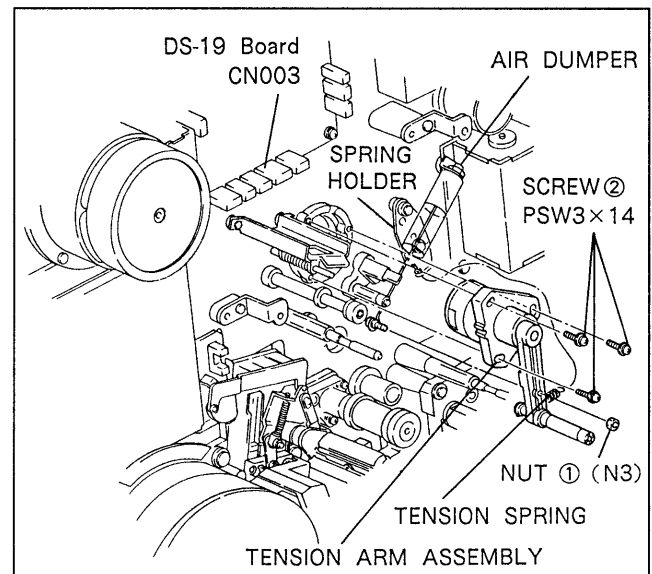
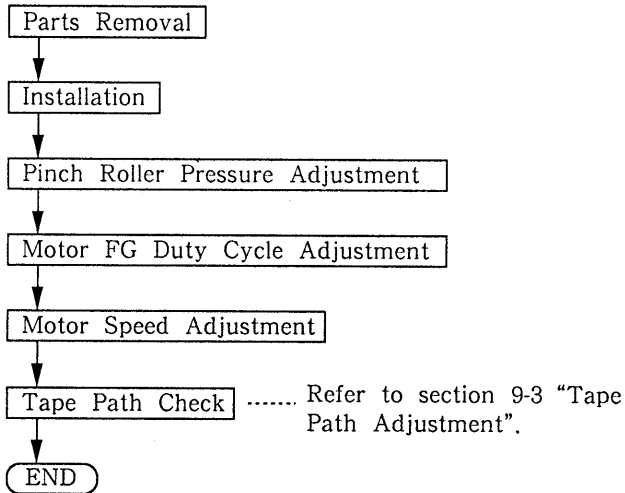


Fig. 6-9-1. Tension Arm Replacement

6-10. CAPSTAN MOTOR REPLACEMENT

Preliminary Information

A. The capstan motor is replaced as follows :



B. Prepare the following tool in order to adjust the pressure of the pinch roller.

- Tension scale (MAX 5 kg)
Sony Part No. J-6041-640-A
- String : 20 cm in length

C. Depending on the stretching direction, the value indicated on the tension scale will differ slightly.

Before proceeding with the measurement, therefore, point the tension scale in the stretching direction beforehand and adjust the zero point on the scale

Removal

1. Move to the rear of the VTR and open the power supply panel. Then disconnect connectors CN107 and CN108 from the capstan motor.
2. Remove the screws ① and ② which secure the ES mount and C shaft ground assembly.
3. Remove the E-ring and then remove the pinch roller assembly and poly-washer.
4. Remove the pinch roller support.
Spanner : Use 10 mm to the opposite side.
5. Remove the four screws ③ and remove the capstan motor.
6. Cut the retaining band for the C motor shield case and remove the C motor shield case and the C cushion as shown in Fig. 6-10-1.

Installation

7. Install the C cushion and C motor shield case into the capstan motor by proceeding in reverse order of step 6 and fix them with retaining band.
8. Clean the mounting surface of the capstan motor with cleaning cloth (or gauze) soaked with alcohol.
9. Secure the capstan motor using the four screws ③.
10. Re-assemble the parts by proceeding in reverse form steps 1 through 4.

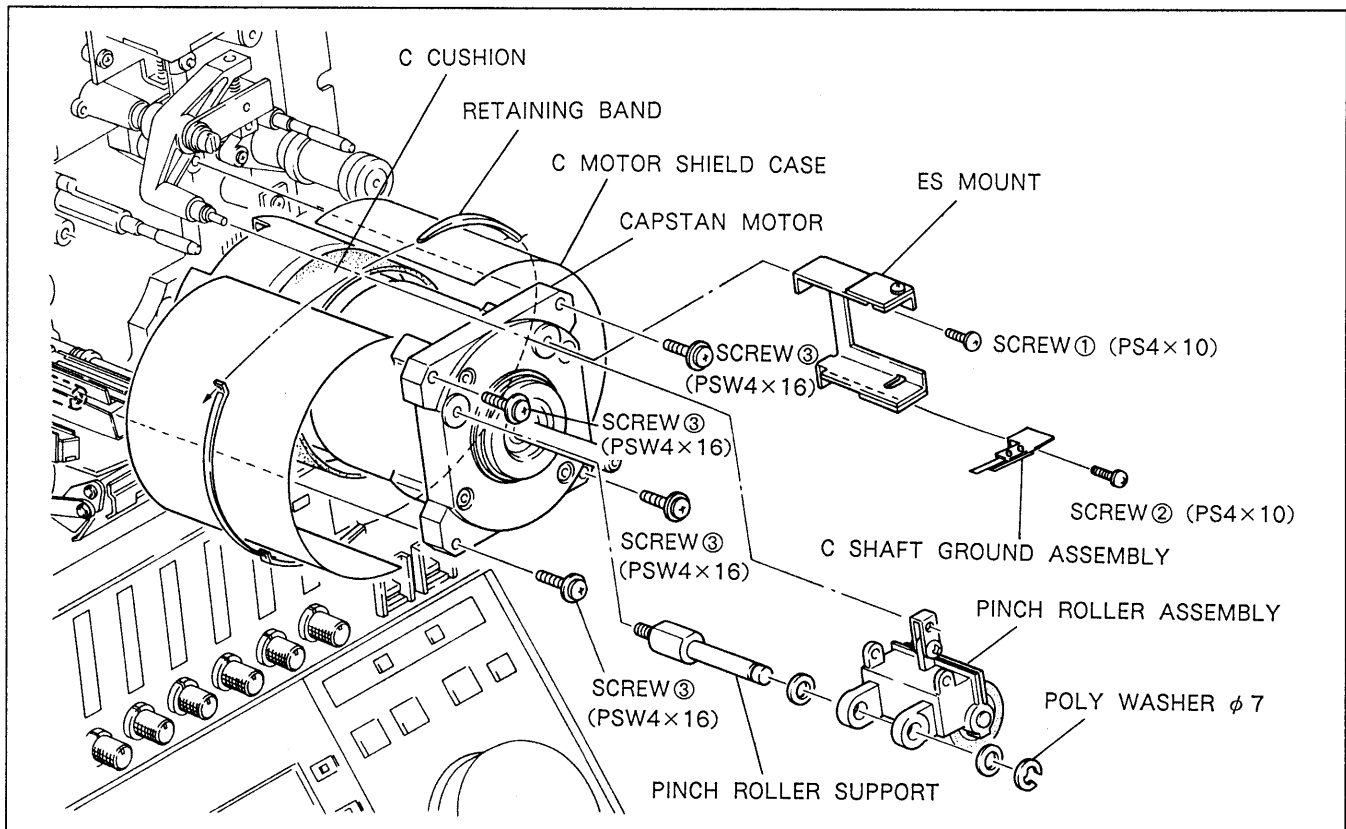


Fig. 6-10-1. Capstan Motor Replacement

[Pinch Roller Pressure Adjustment]

11. Press the **[0]** key in the 21-key section while keeping the switch S2 on the SY-103 board depressed.
12. Press the **[F]**, **[0]** and **[SET]** keys in the 21-key section in sequence.

> F0	> PINCH
------	---------

13. In order to press the pinch roller against the capstan, press the **[7]** key while pressing the blue **[OUT]** key in the 21-key section.
14. Attach the max. 5 kg tension scale to the pinch roller arm, as shown in Fig. 6-10-2. Stretch the tension scale in the direction which connects the pinch roller and capstan, as shown by the arrow in detail figure (a) and wait until the pinch roller moves free from the capstan and the pinch roller stops rotating. Return the tension scale in the capstan direction and check that the value indicated on the scale is 4.0 through 4.3 kg when the pinch roller starts to rotate again. If this value is not satisfied, perform the following adjustments.
15. Turn the adjustment screw in accordance with the symptom, as shown in detail figure (b).
16. With the pinch roller pressed into position, check that the clearance between the pinch lever and stopper is 0.3 ± 0.1 mm, as shown in detail figure (b). If this value is not satisfied, adjust the stopper position. Then apply locking agent such as paint lock on the thread section of the adjustment screw.
17. Press the **[8]** key while pressing the blue **[OUT]** key in the 21-key section. This causes the pinch roller to move away.
18. Press the **[F]**, **[3]** and **[SET]** keys in the 21-key section in sequence. This causes the capstan to stop rotating.
19. Press the RESET switch S3 on the SV-90 board. This operation will be returned to the ordinary mode.

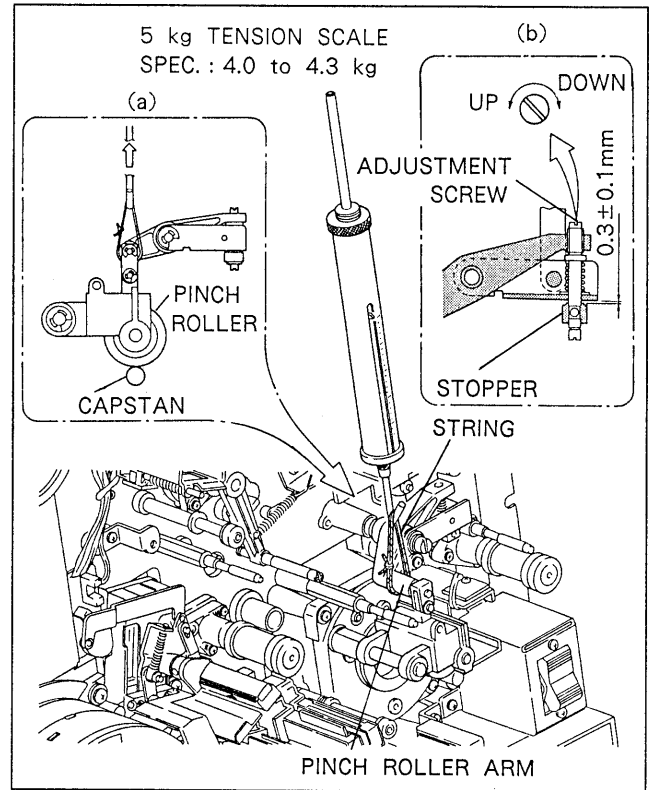


Fig. 6-10-2. Pinch Roller Pressure Adjustment

[FG Duty Cycle Adjustment]

20. Press the **[0]** key in the 21-key section while keeping the switch S2 on the SY-103 board depressed.
21. Press the **[F]**, **[8]** and **[SET]** keys in the 21-key section in sequence.
22. While pressing the blue **[OUT]** key in the 21-key section, press the blue **[IN]** key until the upper and lower 2 digits of the 4-digit indication abcd (shown by the white arrow in Fig. 6-10-3) at the bottom left of the display enter in D3 through D7.
23. Press the **[F]**, **[3]** and **[SET]** keys in the 21-key section in sequence.
24. Press the **[C]**, **[T]** and **[F]** keys in sequence while pressing the blue **[OUT]** key in the 21-key section.
25. Press the **[SET]** key and then press the **[+]** key until "PUSH NVWR SW" appears on the display.
26. Press the NVWR button on the SV-90 board.
27. Press the RESET switch S3 on the SV-90 board. Operation will be returned to the ordinary mode.

[Motor Speed Adjustment]

28. Set the REC INHIBIT switches on the meter panel to on. (Set both AUDIO and VIDEO to on.)
29. Press the **[0]** key in the 21-key section while keeping the switch S2 on the SY-103 board depressed.
30. Play back the alignment tape.
31. Press the **[C]**, **[C]**, **[0]** and **[SET]** keys in the 21-key section in sequence.
32. Press the **[IN]** key while pressing the blue **[OUT]** key in the 21-key section until the 4-digit "abcd" display (shown by the arrow in Fig. 6-10-4) at the bottom left of the display enters in 0FA0±A (0F96 through 0FAA).
33. Set the VTR into the standby off mode.
34. Press the **[C]**, **[T]** and **[F]** keys in sequence while pressing the blue **[OUT]** key.
35. Press the **[SET]** key and then press the **[+]** key until "PUSH NVWR SW" appears on the display.
36. Press the NVWR button on the SV-90 board.
37. Press the **[C]**, **[0]** and **[SET]** keys in sequence.
38. Press the **[SET]** key while pressing the blue **[OUT]** key. Operation will be returned to the ordinary mode.
39. Perform section 9-3 "tape path check".


STEP	DISPLAY READING
20	> _
22	 > F8 CFG ADJ > _
24	> NVW
25	> PUSH NVWR SW
26	> PUSH NVWR SW_ > READY_ > _

Fig. 6-10-3. Motor FG Duty Cycle Adjustment


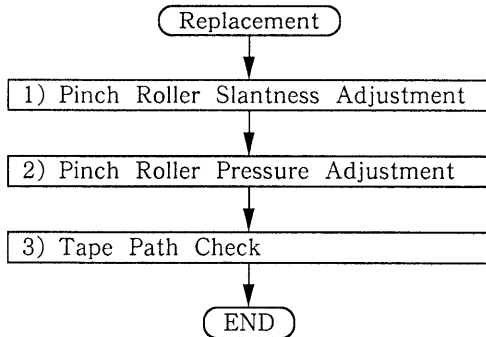
STEP	DISPLAY READING
32	 > CCO > CAP SPEED ADJ > _
34	> NVW
35	> PUSH NVWR SW
36	> PUSH NVWR SW_ > READY_ > _

Fig. 6-10-4. Motor Speed Adjustment

6-11. PINCH ROLLER REPLACEMENT

Preliminary Information

- A. When the pinch roller has been replaced, it is necessary to adjust the slantness of pinch roller against the capstan shaft. If it is not adjusted properly, which causes wow and flutter due to change the shape of pinch roller, or causes tape damage.
- B. Outline of pinch roller replacement is as follows:



- C. Prepare the following tools:
- Tension scale : 5 kg (Max.)
Sony Part No. J-6041-640-A
 - String : 20 cm in length

Replacement

1. Remove the E-ring the remove the pinch roller assembly as shown in Fig. 6-11-1.
2. Loosen the two setscrews ① sufficiently that secures the pinch roller shaft and remove the pinch roller from the pinch roller assembly.
3. Clean the pinch roller shaft with cleaning cloth (or gauze) soaked with alcohol.
4. Replace the pinch roller with a new one and reassemble the components in the reverse order of steps 1 and 2.

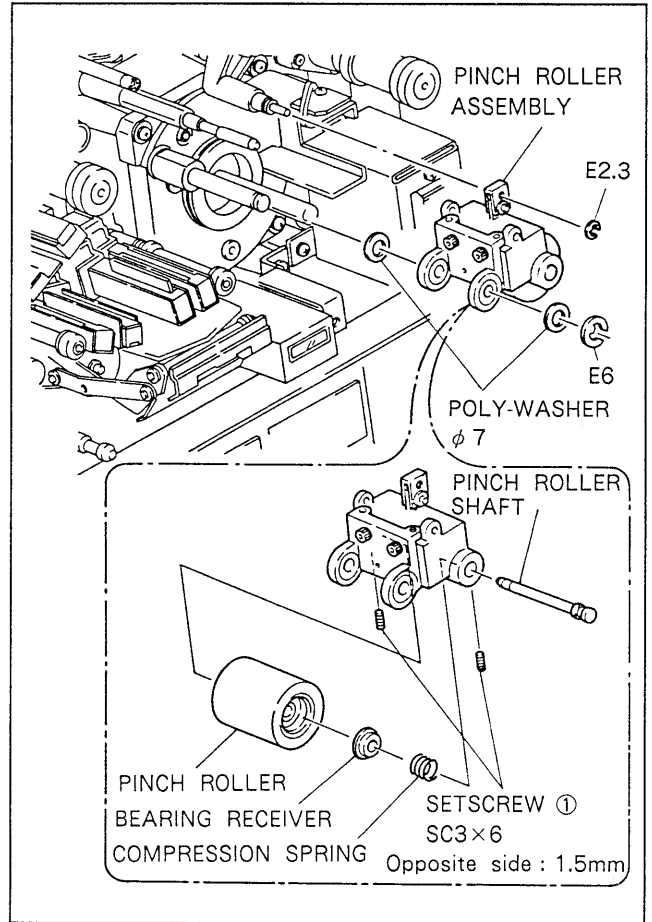
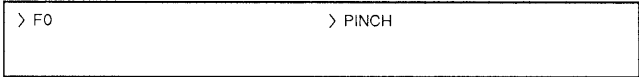


Fig. 6-11-1. Pinch Roller Replacement

[Pinch Roller Slantness Adjustment]

5. Loosen the two locking screws ① about a half turn as shown in Fig. 6-11-2.
6. While pressing S2 on the SY-103 board, press [0] key in the 21-key section.
7. Press [F], [0] and [SET] in sequence on the 21-key section.



8. In order to press the pinch roller against the capstan, press [7] key while pressing the blue [OUT] key on the 21-key section.
9. To release the pinch roller from the capstan, press [8] key while pressing the blue [OUT] key on the 21-key section.
10. Repeat steps 8 and 9 several times, then press the pinch roller against the capstan.
11. Check that the pinch roller contacts with the capstan using a flashlight.
12. While pressing the blue [OUT] key, press [8] key in the 21-key section.
13. Thread the tape.
14. Set the initial setup menu "IO7, REEL MODE SHUTTLE" to enable. For more detail, refer to "Operation Select Menu" in section 1-4-3 of operation manual.
15. Run a tape with SHUTTLE ×1 mode.
16. Press the PLAY button and press the pinch roller against the capstan.
Check to see that there is no change in tape path around the guide post 4 and T guide roller.
 - No tape wrinkle
 - While watching at the clearance between tape and flange, be sure not to tug a tape upward or downward excessively.
17. While repeating STOP and PLAY modes several times, check the tape path so that it does not change.
When tape path runs in normal during PLAY mode, tighten the two locking screws ① alternately while running the tape.
18. After tightening the two locking screws ①, check to see that there is no change in tape path.
If there is tape wrinkle, etc., readjust from step 5.
19. Set the initial setup menu "IO7, REEL MODE SHUTTLE" to disable.
While running a tape with VAR-1/30 speed, check to see that the tape does not tug upward or downward.
If it does, readjust from step 5.
20. Apply screw locking compound a little to the two locking screws ①.

[Pinch Roller Pressure Adjustment]

21. Perform steps 13 through 19 in section 6-10.
22. Perform the section 9-3 "tape path check".

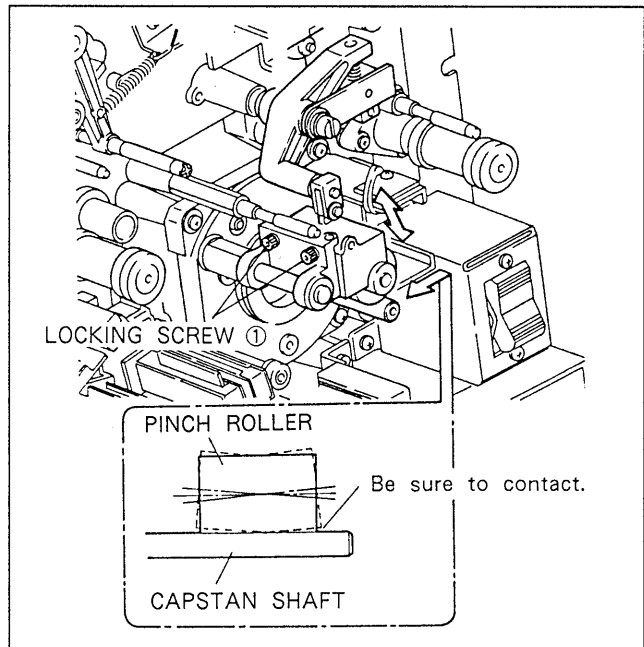


Fig. 6-11-2. Pinch Roller Slantness Adjustment

6-12. PINCH ROLLER SOLENOID REPLACEMENT

Preliminary Information

- A. When installing the solenoid into the bracket, mounting position must be adjusted. If it is not adjusted properly, it will not be possible to adjust properly the pressure applied by the pinch roller, the clearance between the capstan and pinch roller will not be correct and it may become difficult to load the tape.
- B. After the solenoid has been replaced, the pressure of the pinch roller must be adjusted.
- C. Prepare the following tools.
 - Tension scale : 5 kg (Max.)
 - Sony Part No. J-6041-640-A
 - String : 20 cm in length

Replacement

1. Disconnect connector CN008 from the DS-19 board.
2. Loosen the nut ① and remove the air damper from the damper holder.
3. Remove the screw ② which secures the damper holder.
4. Remove the E-ring and two screws ③ shown in Fig. 6-12-1. Then rotate the support screw and remove the pinch roller solenoid assembly.
5. Replace the solenoid with a new one and re-assemble. Secure the solenoid loosely to the bracket with four screws ④ so that it can still be moved by hand.

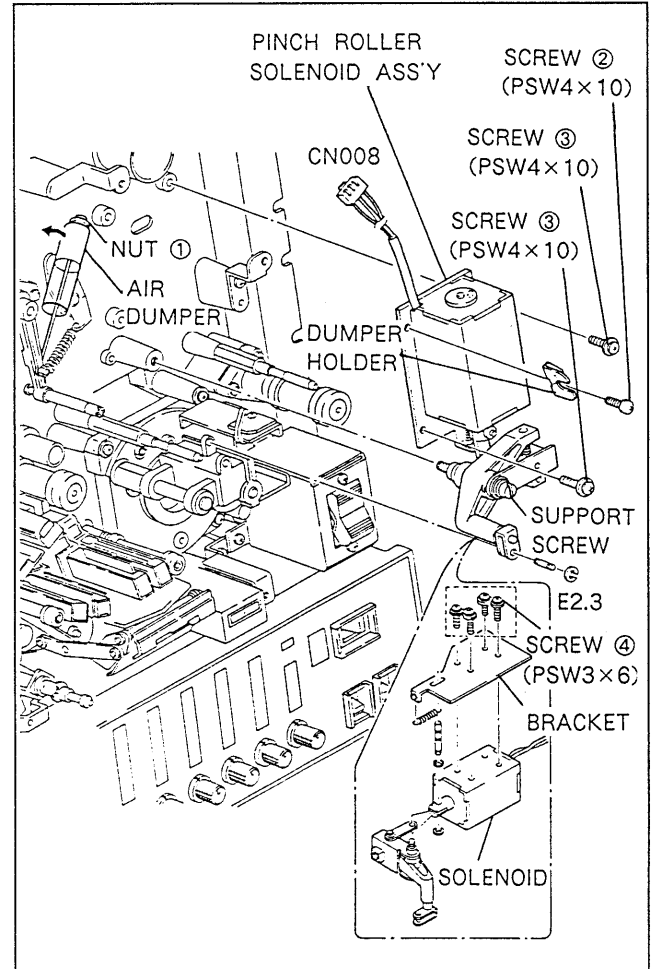


Fig. 6-12-1. Pinch Roller Solenoid Replacement

[Pinch Roller Solenoid Position Adjustment]

6. With the plunger of solenoid caused to be absorbed, as shown in Fig 6-12-2, adjust the mounting position of the pinch roller solenoid so that the clearance between the connecting rod and cushion is set to 7.0 ± 0.2 mm. After adjustment, tighten the four screws ④.
7. Install the pinch roller solenoid assembly in the reverse order of steps 1 to 4.

[Pinch Roller Pressure Adjustment]

8. Perform steps 11 through 19 of section 6-10.
9. Perform the section 9-3 "tape path check".

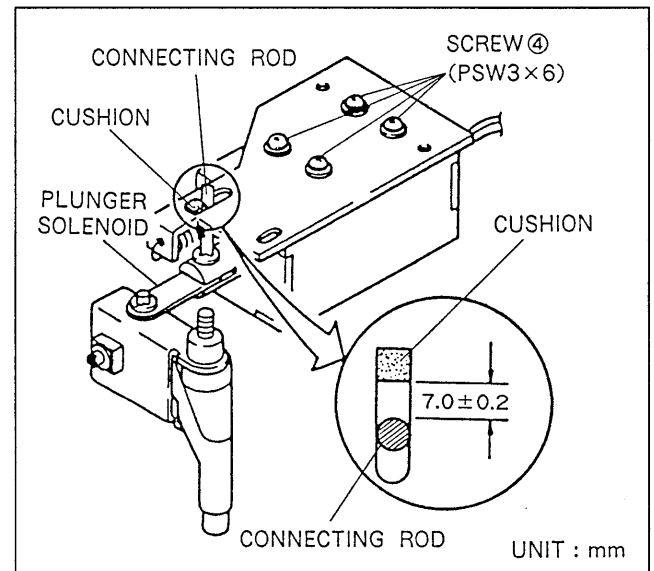


Fig. 6-12-2. Pinch Roller Solenoid Position Adjustment



6-13. TAPE GUIDE ASS'Y REPLACEMENT

Preliminary Information.

- A. As shown in Fig. 6-13-1, HDD-1000 guarantees the tape path by nine tape guides.
- The roller guide is only the G3, G10 guide and the other tape guides become fixed guides. In addition, as a material of the fixed guides, ceramic which has stronger abrasion resistance and less tape damage is used.
- B. The tape guide plays an important role to record and playback video and audio signals or to guarantee interchangeability between video tapes. Therefore, when the tape guide is changed, the following confirmation or adjustment is necessary after replacement.
- Guides G1, G2, G3, G6, G7, G8, G9 and G10
In accordance with section 9-3 "tape path check", the tape path around each guide is confirmed.
 - Guides G5 and G6 (entrance/exist slant guides)
Refer to section 6-5 "slant guide assembly replacement".

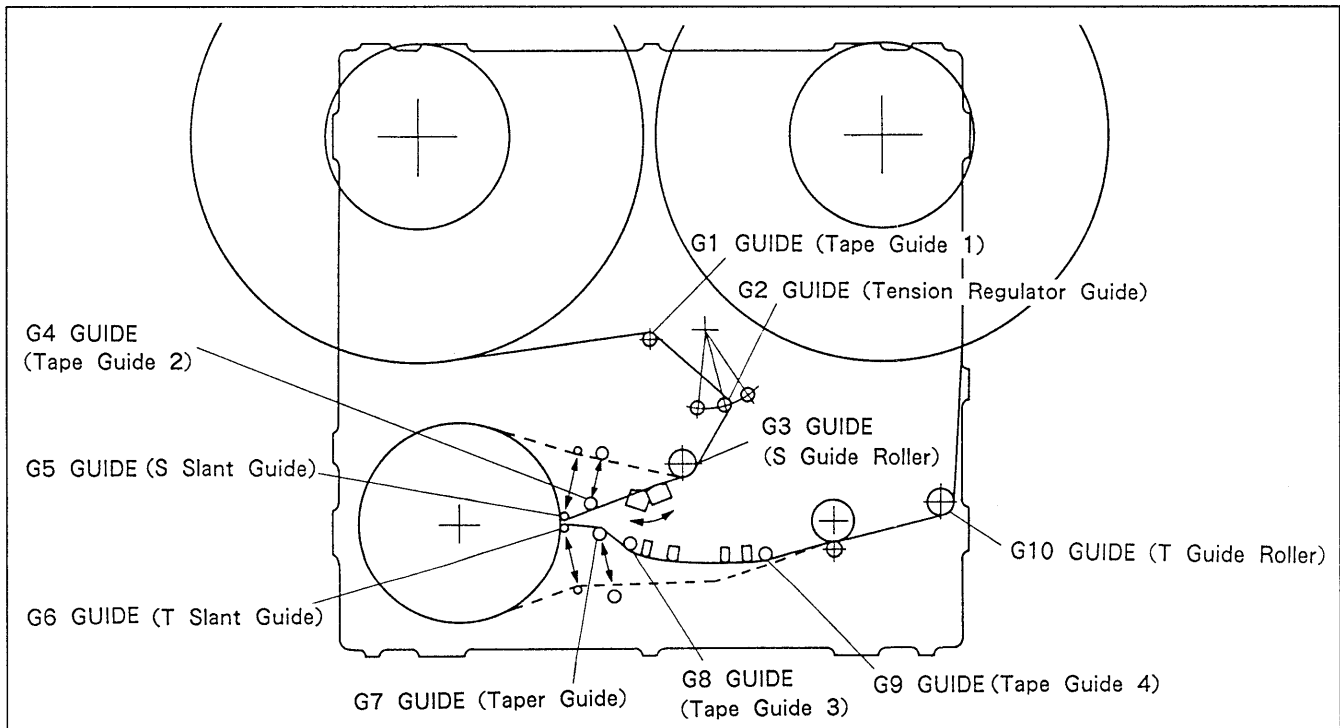


Fig. 6-13-1. Location of Tape Guides

Replacement

1. Replace the necessary parts while referring to Fig. 6-13-2.

Note 1 : Take care of the mounting direction of the spring and taper guide when replacing G7 guide (taper guide). Also, there is a stop pin for rotation of the taper guide, so be very careful to remove or to install the tape guide.

Note 2 : When replacing the bearing part of G3 and G10 guide, take care of not giving shocks to that part. When replacing, clean the bearing part with cloth (or gauze) soaked with alcohol.

2. When replacing the tape guide, clean the tape path surfaces of the tape guide and tape guide flange with cloth (or gauze) soaked with alcohol.
3. After replacement, wipe the tape path surface of the tape guide and tape guide flange with dry cloth.
4. After replacement, check the tape path according to item B of preliminary information.

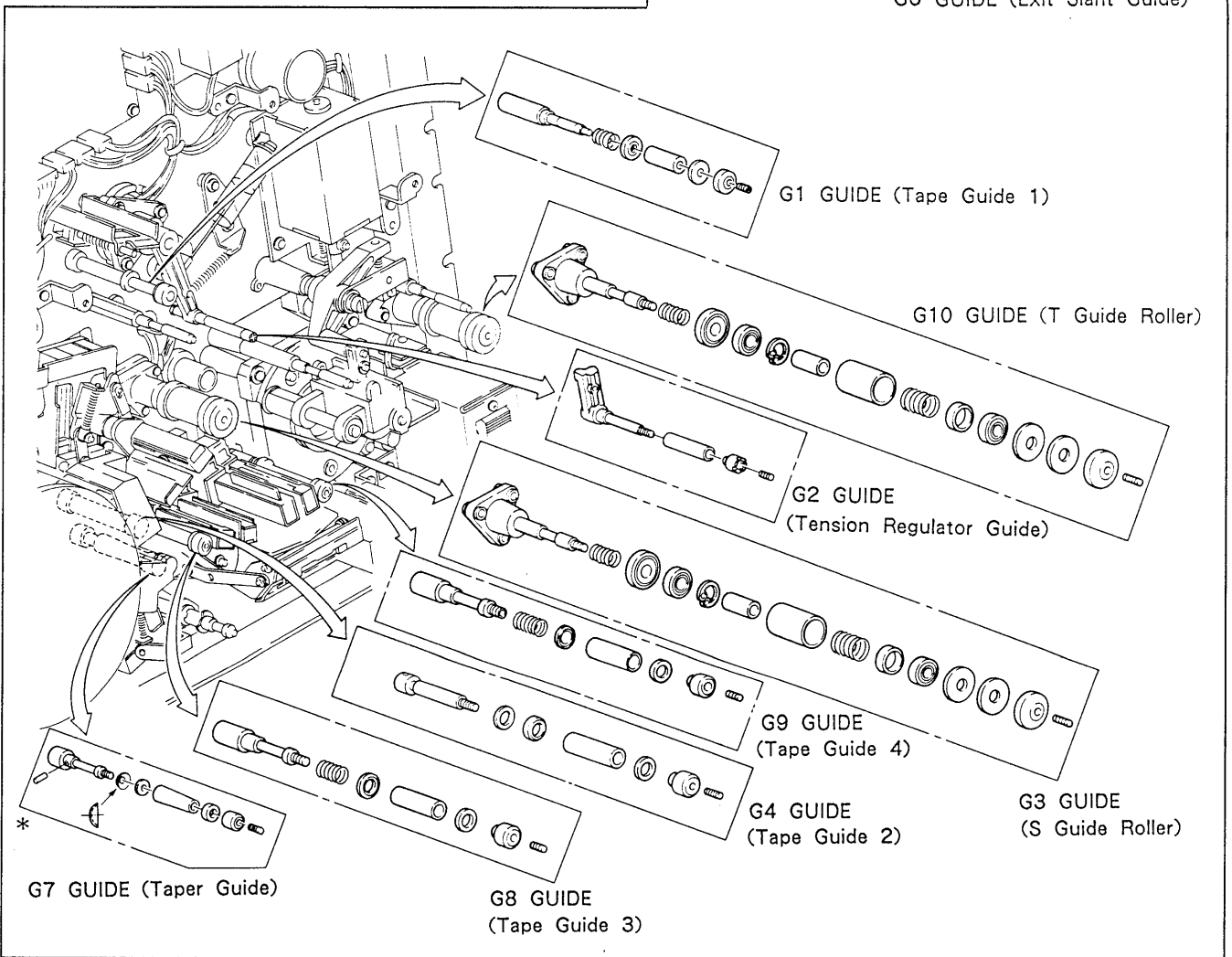
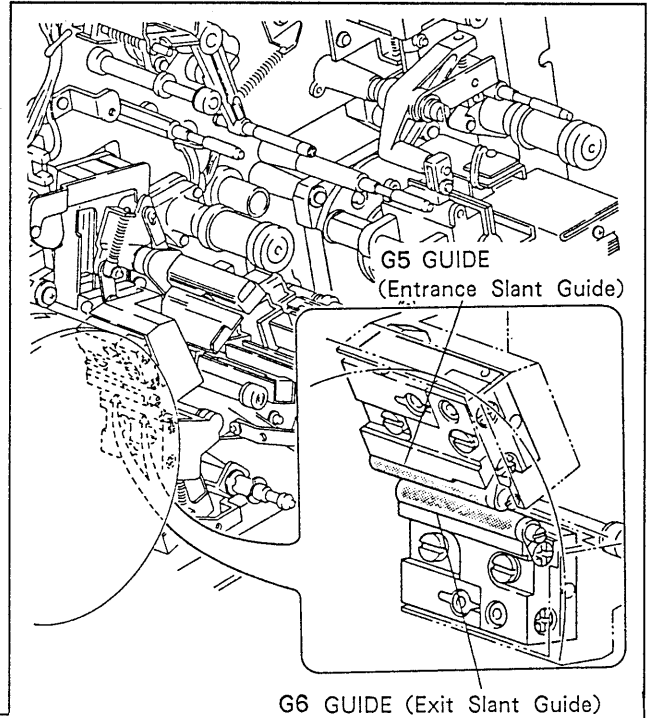
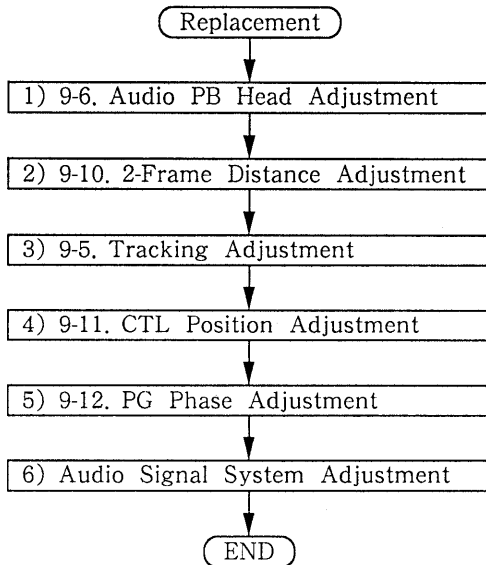


Fig. 6-13-2. Parts for Tape Guides Replacement

6-14. AUDIO PB HEAD ASSEMBLY REPLACEMENT

Preliminary Information

When the audio PB head assembly (hereafter referred to simply as "PB head") is replaced or removed, perform checks shown in the following flowchart after replacement because head azimuth, head height and head mounting position may differ from the settings prior to the replacement.



Removal

1. Open the power supply panel and remove 10 pieces of connector from the PB head harness connected to the AP-22 board, CN12, CN14, CN22, CN24, CN32, CN34, CN42, CN44, CN53, CN92.
2. Remove the PB head harness from the harness holder.

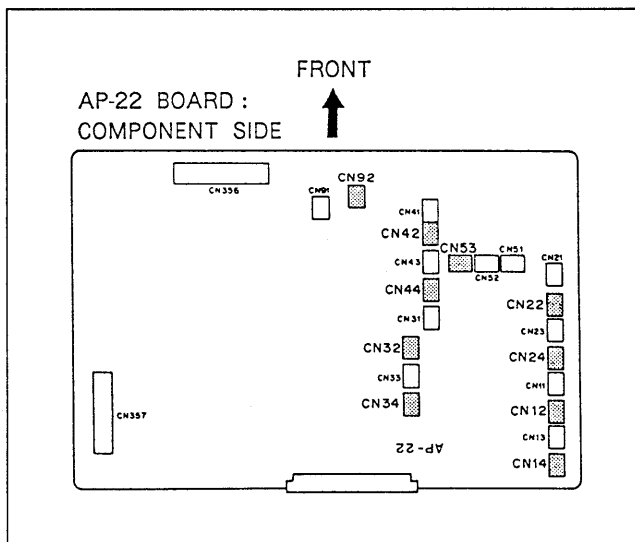


Fig. 6-14-1. PB Head Harness Removal

3. Pull out the PB head harness from the hole B shown in Fig. 6-14-2.
4. Remove the PB head assembly by removing two screws ① (including spring washers and flat washers).

Note 1 : When screw ① is removed, as both spring washer (SW3) and flat washer (W3) are removed at the same time, notice them not to be lost.

Note 2 : Do not touch the head azimuth adjustment screw. This adjustment screw is used for the tape path adjustment.

Note 3 : When the PB head harness is pulled out from the hole B shown in the figure, remove each connector in good order.

5. Remove two screws ② and remove the PB head from the head adjustment table (A). The PB head should be replaced together with the harness.

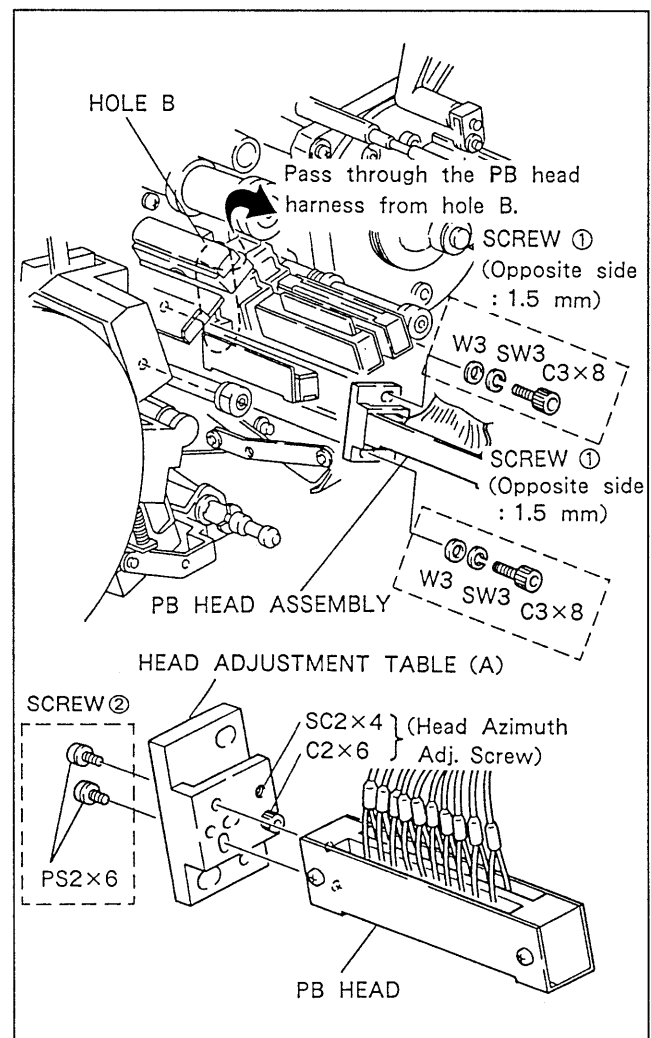


Fig. 6-14-2. PB Head Assembly Replacement

6. PARTS REPLACEMENT

[Cleaning]

- Clean the shaded area of each mounting surface shown in Fig. 6-14-3 by the cleaning cloth (or gauze) soaked with alcohol.

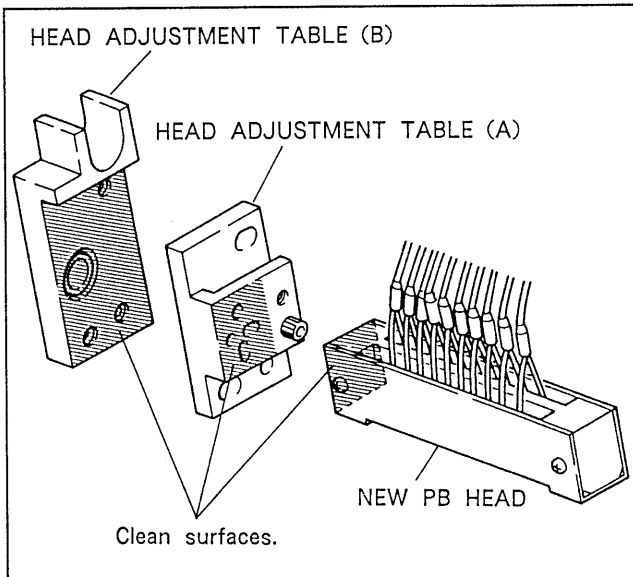


Fig. 6-14-3. Cleaning the Mounting Surface

Installation

[PB Head Mounting Position Adjustment]

- Secure the PB head temporarily onto the head adjustment table (A) with two screws ② shown in Fig. 6-14-4 (Once tightening the two screws and then loosen for 1/4 to 1/2 rotation.).
- Push the PB head to the direction of arrow and tighten two screws ② where the edge surface D of the PB head becomes visually parallel with the edge surface C of head adjustment table (A).
- Pass the PB head harness through the hole B shown in Fig. 6-14-2.

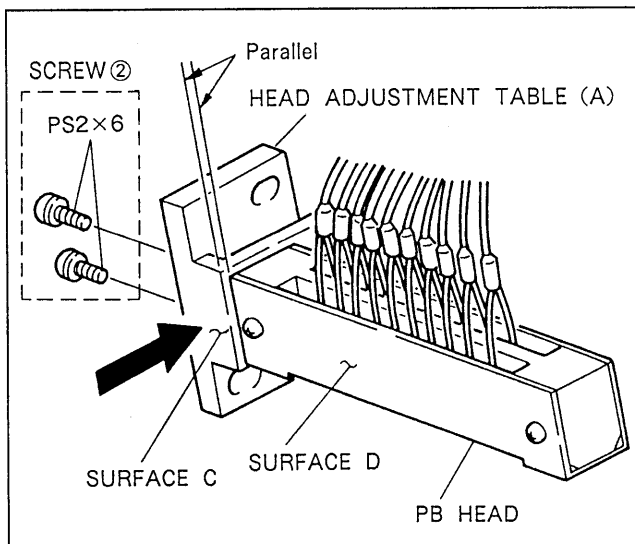


Fig. 6-14-4. PB Head Mounting Position Adjustment

[PB Head Ass'y Mounting Position Adjustment]

- Temporarily secure the PB head assembly to the head adjustment table (B) with two screws ① (including spring washer and flat washer) shown in Fig. 6-14-5.
- Press the PB head assembly against the surface E of the head adjustment table (B) and tighten two screws ① so that the surface G of the head adjustment table (A) becomes parallel with the surface F.

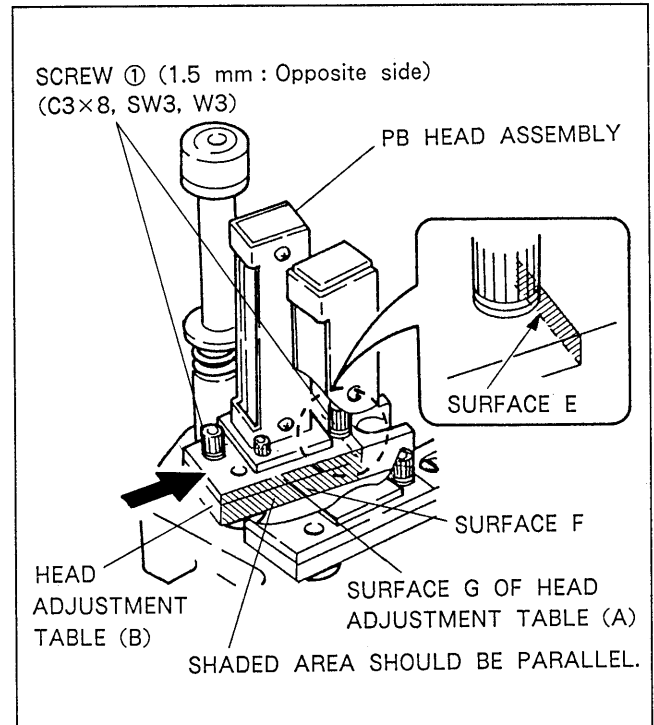


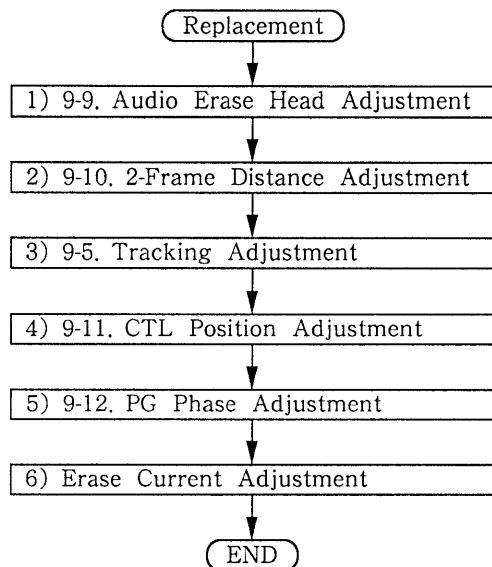
Fig. 6-14-5. PB Head Ass'y Mounting Position Adjustment

- Connect the PB head harness with the reverse order of steps 1 and 2.
- Perform checking and adjustment shown in the preliminary information.

6-15. AUDIO ERASE HEAD ASSEMBLY REPLACEMENT

Preliminary Information

When the audio erase head assembly (hereafter referred to simply as "erase head") is replaced or removed, perform checks shown in the following flowchart after replacement.



Removal

1. Open the power supply panel and remove the connector CN357 from the erase head harness connected to the AP-22 board as shown in Fig. 6-15-1.
2. Remove the erase head harness from the harness holder.

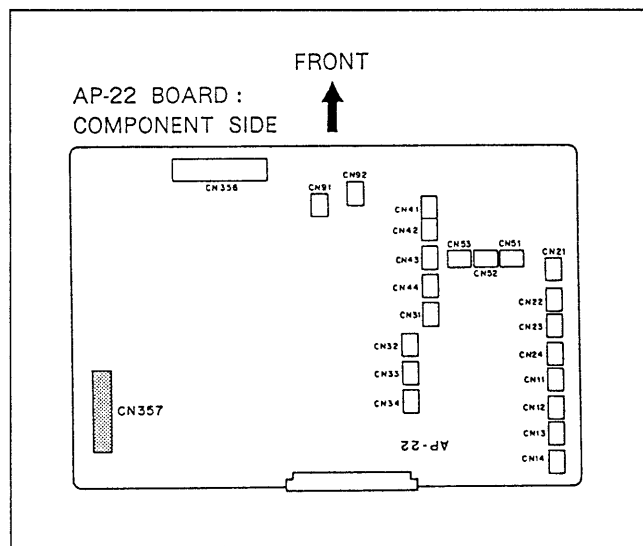


Fig. 6-15-1. Erase Head Harness Removal

3. Remove screw ① (including spring washer and flat washer) and remove the shield plate (DA) shown in Fig. 6-15-2.

Note : When removing screw ①, spring washer and flat washer come off together with screw ①, so that take care not to lose them.

4. Pass through the erase head harness from hole C.
5. Remove the erase head assembly by removing two screws ② (including spring washers and flat washers).

Note 1 : When screw ② is removed, as both spring washer (SW3) and flat washer (W3) are removed at the same time, notice them not to be lost.

Note 2 : Do not touch the head azimuth adjustment screw.

6. Remove two screws ③ and remove the erase head from the head adjustment table (A). The erase head should be replaced together with the harness.

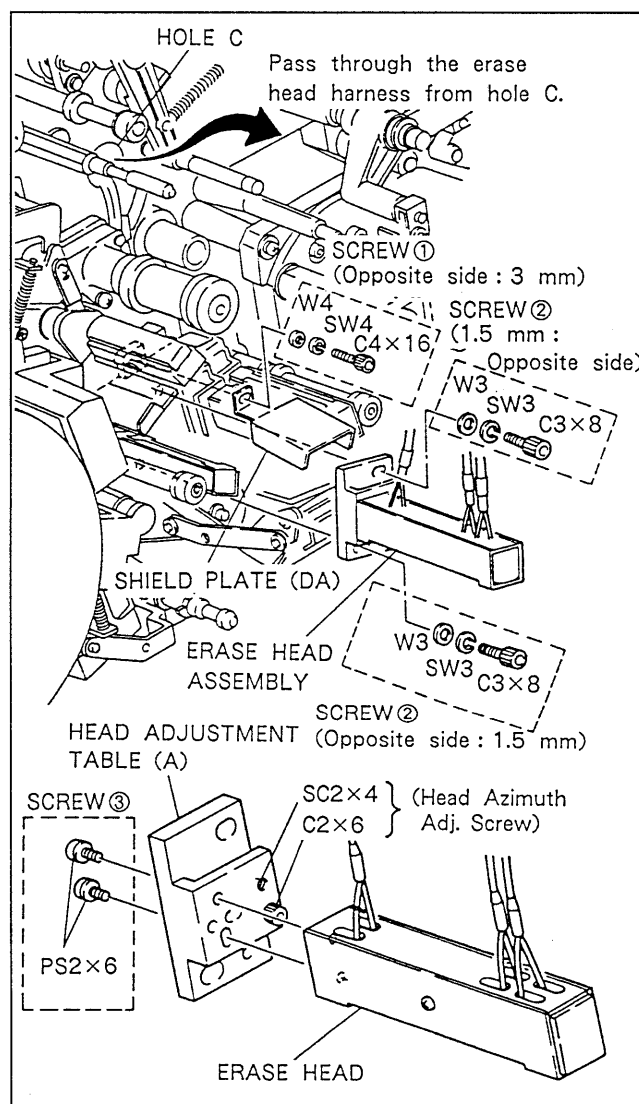


Fig. 6-15-2. Erase Head Assembly Replacement

[Cleaning]

7. Clean the shaded area of each mounting surface shown in Fig. 6-15-3 by the cleaning cloth (or gauze) soaked with alcohol.

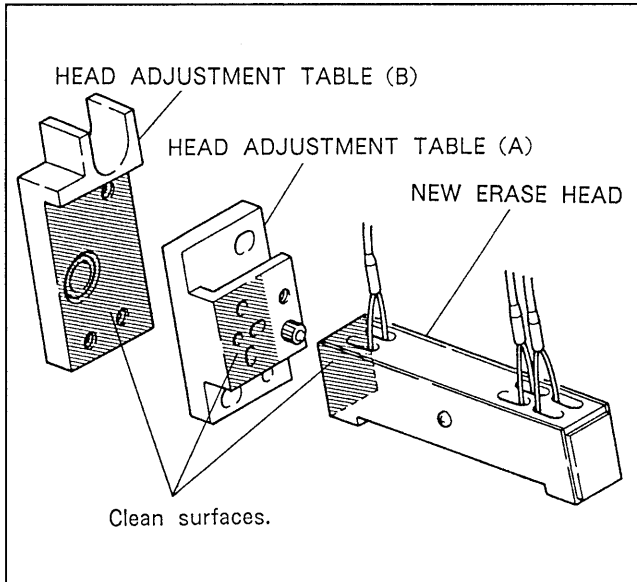


Fig. 6-15-3. Cleaning the Mounting Surface

Installation**[Erase Head Mounting Position Adjustment]**

8. Secure the erase head temporarily onto the head adjustment table (A) with two screws ② shown in Fig. 6-15-4 (Once tightening the two screws and then loosen for 1/4 to 1/2 rotation.).
9. Push the erase head to the direction of arrow and tighten two screws ② where the edge surface D of the erase head becomes visually parallel with the edge surface C of head adjustment table (A).
10. Pass the erase head harness through the hole C shown in Fig. 6-15-2.

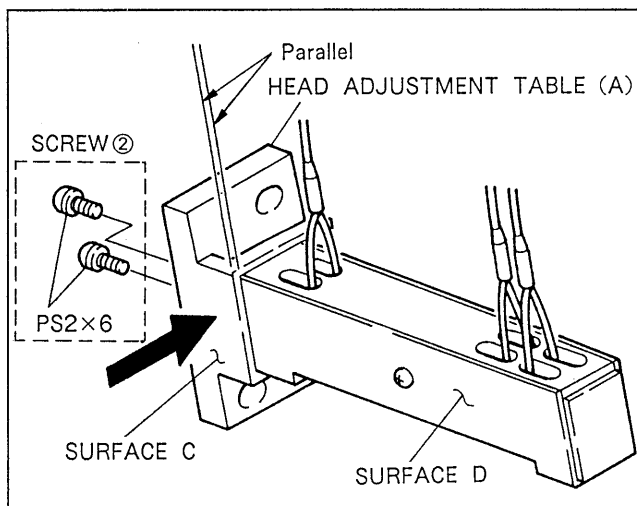


Fig. 6-15-4. Erase Head Mounting Position Adjustment

[Erase Head Ass'y Mounting Position Adjustment]

11. Temporarily secure the erase head assembly to the head adjustment table (B) with two screws ① (including spring washer and flat washer) shown in Fig. 6-15-5.
12. Press the erase head assembly against the surface E of the head adjustment table (B) and tighten two screws ① so that the surface G of the head adjustment table (A) becomes parallel with the surface F.

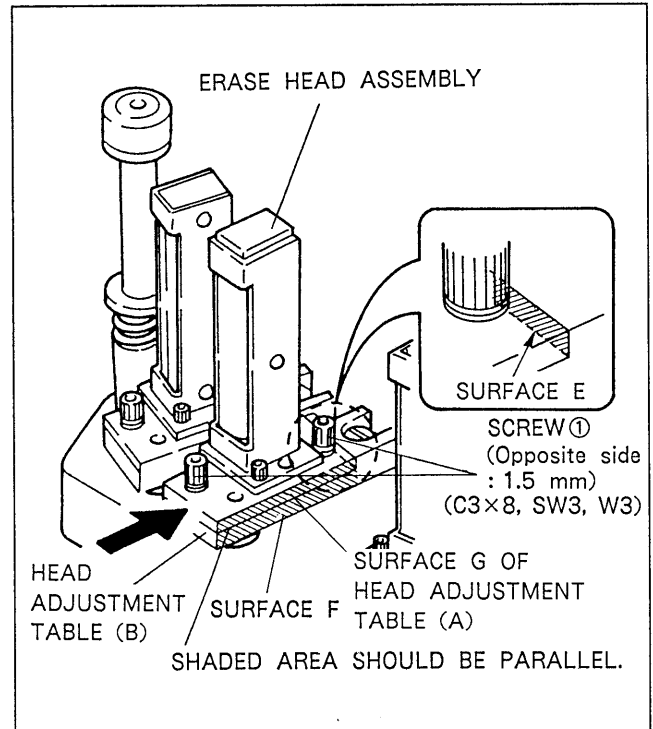


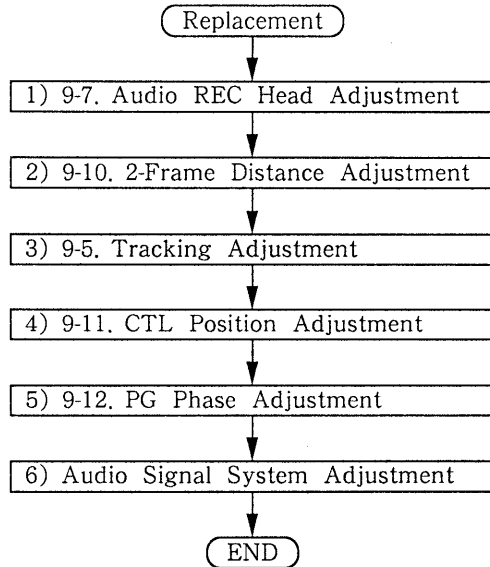
Fig. 6-15-5. Erase Head Ass'y Mounting Position Adjustment

13. Secure the shield plate (DA) with screw ① (including spring washer and flat washer) as shown in Fig. 6-15-2.
14. Connect the erase head harness with the reverse order of steps 1 and 2.
15. Perform checking and adjustment shown in the preliminary information.

6-16. AUDIO REC HEAD ASSEMBLY REPLACEMENT

Preliminary Information

When the audio REC head assembly (hereafter referred to simply as "REC head") is replaced or removed, perform checks shown in the following flowchart after replacement because head azimuth, head height and head mounting position may differ from the settings prior to the replacement.



Removal

1. Open the power supply panel and remove the connector CN356 from the REC head harness connected to the AP-22 board.
2. Remove the REC head harness from the harness holder.

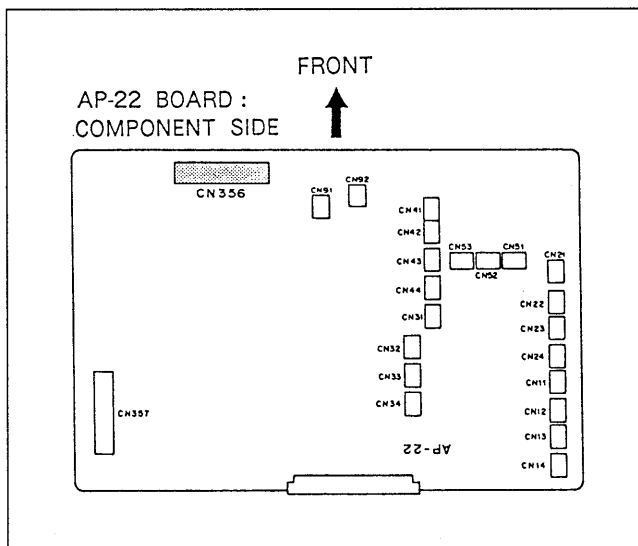


Fig. 6-16-1. REC Head Harness Removal

3. Remove screw ① (including spring washer and flat washer) and remove the shield plate (DA) shown in Fig. 6-16-2.

Note : When removing screw ①, spring washer and flat washer come off together with screw ①, so that take care not to lose them.

4. Pass through the REC head harness from hole A.
5. Remove the REC head assembly by removing two screws ② (including spring washers and flat washers).

Note 1 : When screw ② is removed, as both spring washer (SW3) and flat washer (W3) are removed at the same time, notice them not to be lost.

Note 2 : Do not touch the head azimuth adjustment screw. This adjustment screw is used for the tape path adjustment.

6. Remove two screws ③ and remove the REC head from the head adjustment table (C). The REC head should be replaced together with the harness.

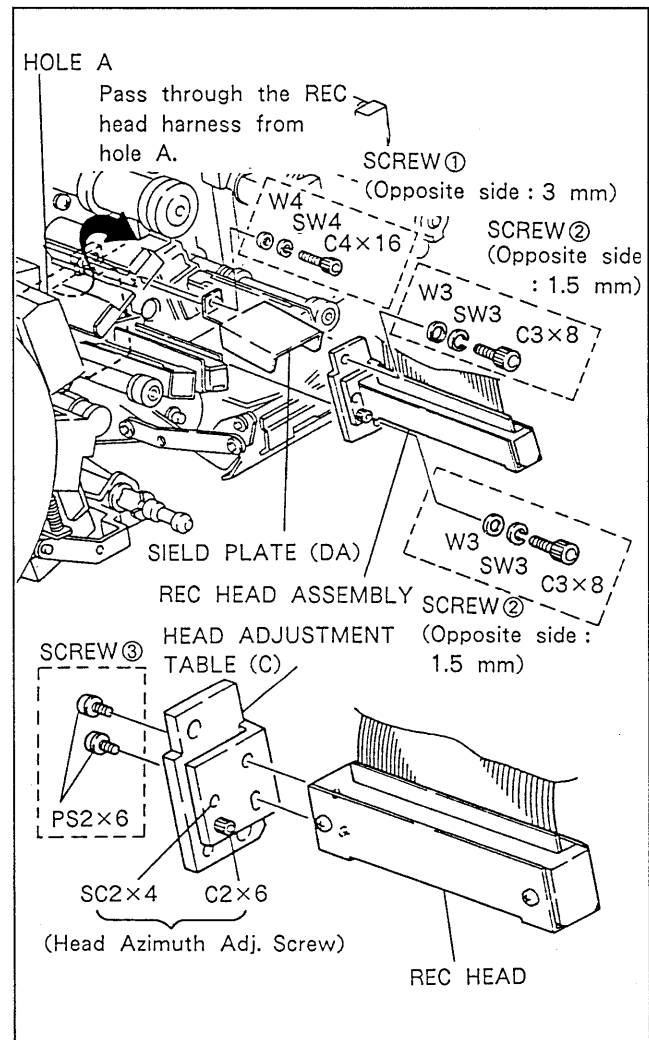


Fig. 6-16-2. REC Head Assembly Replacement

[Cleaning]

- Clean the shaded area of each mounting surface shown in Fig. 6-16-3 by the cleaning cloth (or gauze) soaked with alcohol.

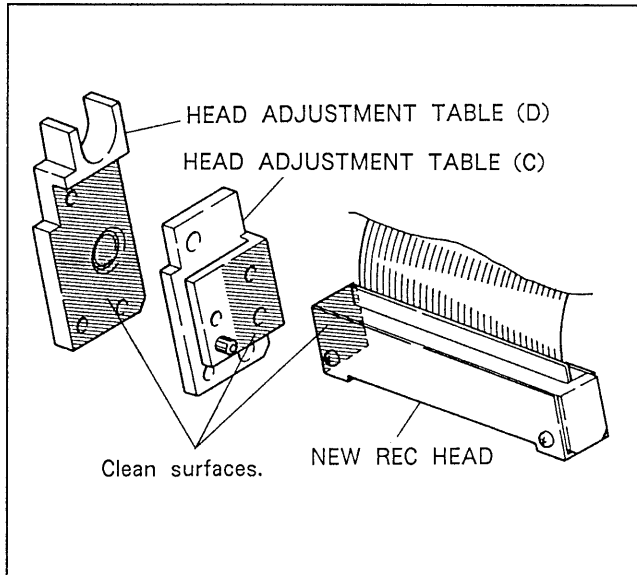


Fig. 6-16-3. Cleaning the Mounting Surface

Installation**[REC Head Mounting Position Adjustment]**

- Secure the REC head temporarily onto the head adjustment table (C) with two screws ② shown in Fig. 6-16-4 (Once tightening the two screws and then loosen for 1/4 to 1/2 rotation.).
- Push the REC head to the direction of arrow and tighten two screws ② where the edge surface B of the REC head becomes visually parallel with the edge surface A of head adjustment table (C).
- Pass the REC head harness through the hole A shown in Fig. 6-16-2.

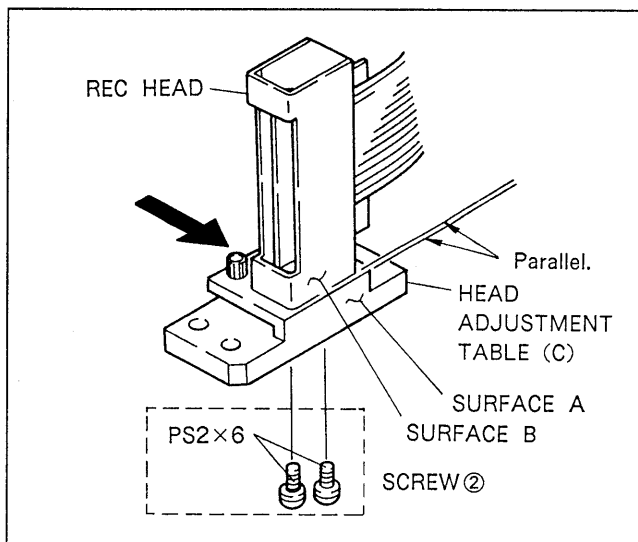


Fig. 6-16-4. REC Head Mounting Position Adjustment

[REC Head Ass'y Mounting Position Adjustment]

- Temporarily secure the REC head assembly to the head adjustment table (C) with two screws ① (including spring washer and flat washer) shown in Fig. 6-16-5.
- Press the REC head assembly against the surface E of the head adjustment table (D) and tighten two screws ① so that the surface G of the head adjustment table (C) becomes parallel with the surface F.

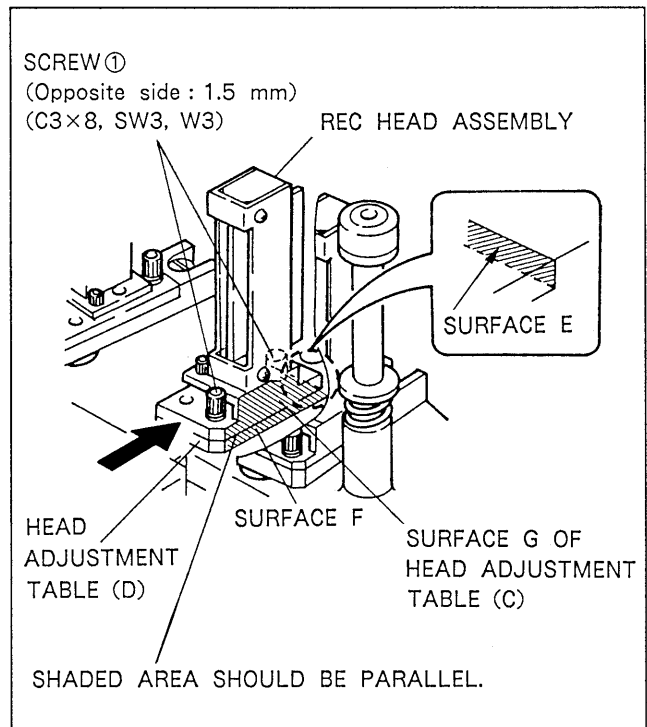


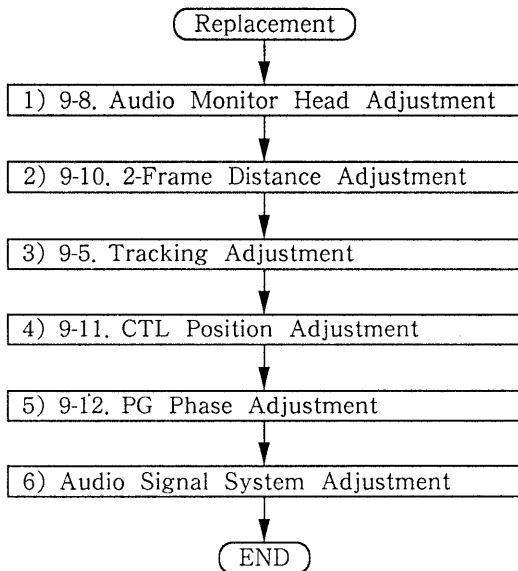
Fig. 6-16-5. REC Head Ass'y Mounting Position Adjustment

- Secure the shield plate (DA) with screw ① (including spring washer and flat washer) as shown in Fig. 6-16-2.
- Connect the REC head harness with the reverse order of steps 1 and 2.
- Perform checking and adjustment shown in the preliminary information.

6-17. AUDIO MONITOR HEAD ASSEMBLY REPLACEMENT

Preliminary Information

When the audio monitor head assembly (hereafter referred to simply as "monitor head") is replaced or removed, perform checks shown in the following flowchart after replacement because head azimuth, head height and head mounting position may differ from the settings prior to the replacement.



Removal

1. Open the power supply panel and remove 11 pieces of connector from the monitor head harness connected to the AP-22 board. CN11, CN13, CN21, CN23, CN31, CN33, CN41, CN43, CN51, CN52, CN91
2. Remove the monitor head harness from the harness holder.

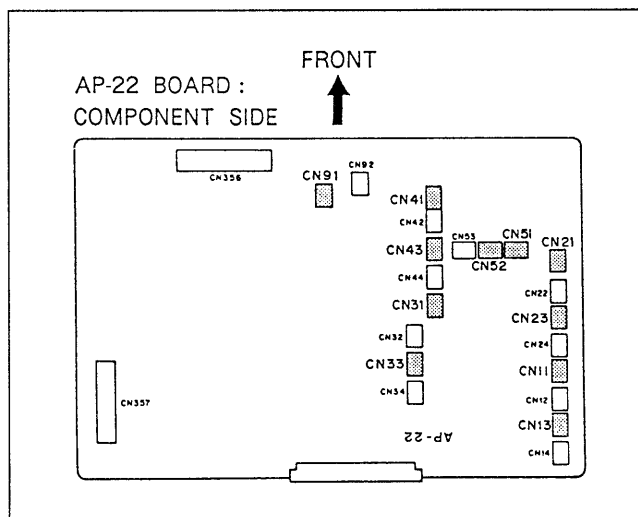


Fig. 6-17-1. Audio Monitor Head Harness Removal

3. Pull out the monitor head harness from the hole B shown in Fig. 6-17-2.
4. Remove the monitor head assembly by removing two screws ① (including spring washers and flat washers).

Note 1 : When screw ① is removed, as both spring washer (SW3) and flat washer (W3) are removed at the same time, notice them not to be lost.

Note 2 : Do not touch the head azimuth adjustment screw. This adjustment screw is used for the tape path adjustment.

5. Remove two screws ② and remove the monitor head from the head adjustment table (C). The monitor head should be replaced together with the harness.

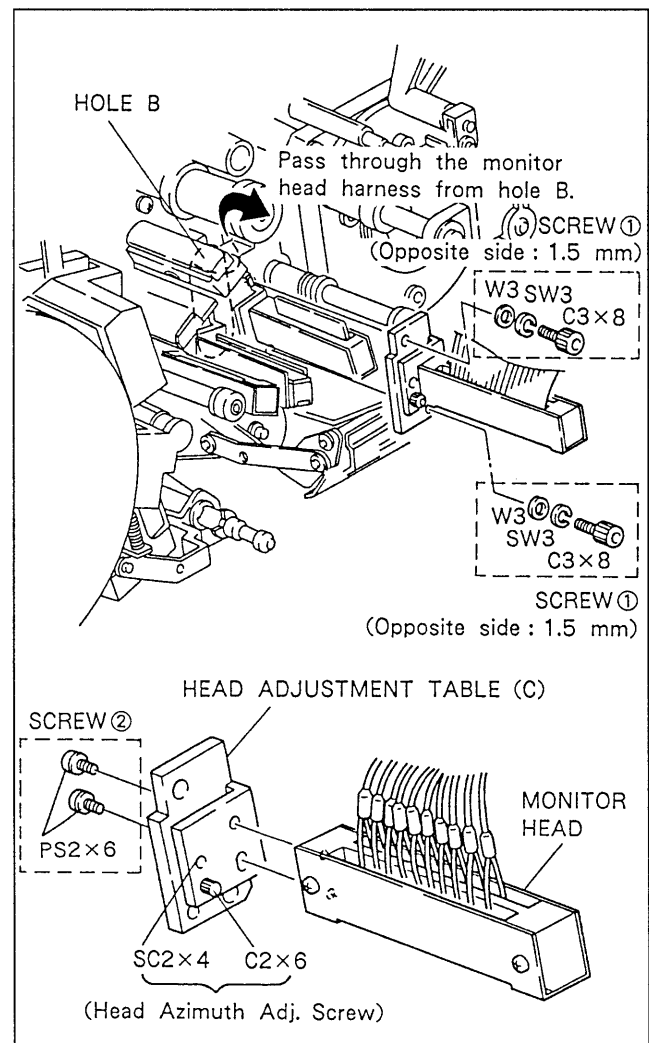


Fig. 6-17-2. Audio Monitor Head Assembly Replacement

[Cleaning]

6. Clean the shaded area of each mounting surface shown in Fig. 6-17-3 by the cleaning cloth (or gauze) soaked with alcohol.

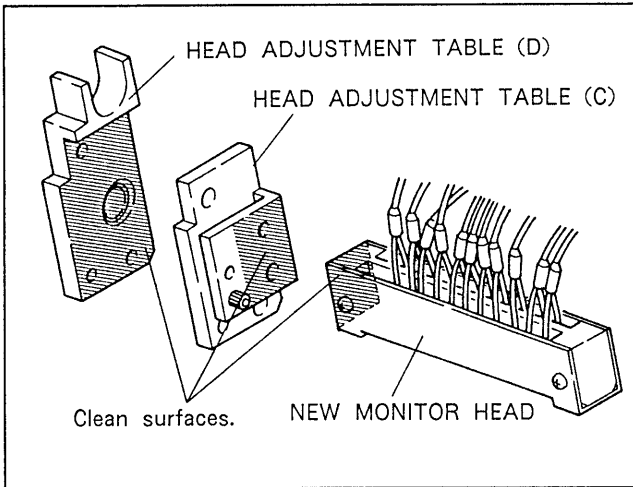


Fig. 6-17-3. Cleaning the Mounting Surface

Installation

[Monitor Head Mounting Position Adjustment]

7. Secure the monitor head temporarily onto the head adjustment table (C) with two screws ② shown in Fig. 6-17-4 (Once tightening the two screws and then loosen for 1/4 to 1/2 rotation.).
8. Push the monitor head to the direction of arrow and tighten two screws ② where the edge surface B of the monitor head becomes visually parallel with the edge surface A of head adjustment table (C).
9. Pass the monitor head harness through the hole B shown in Fig. 6-17-2.

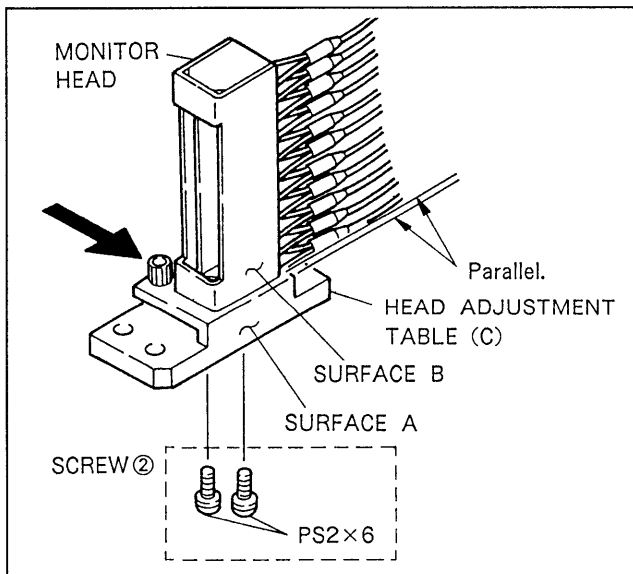


Fig. 6-17-4. Monitor Head Mounting Position Adjustment

[Monitor Head Ass'y Mounting Position Adjustment]

10. Temporarily secure the monitor head assembly to the head adjustment table (D) with two screw ① (including spring washer and flat washer) shown in Fig. 6-17-5.
11. Press the monitor head assembly against the surface E of the head adjustment table (D) and tighten two screw ① so that the surface G of the head adjustment table (C) becomes parallel with the surface F.

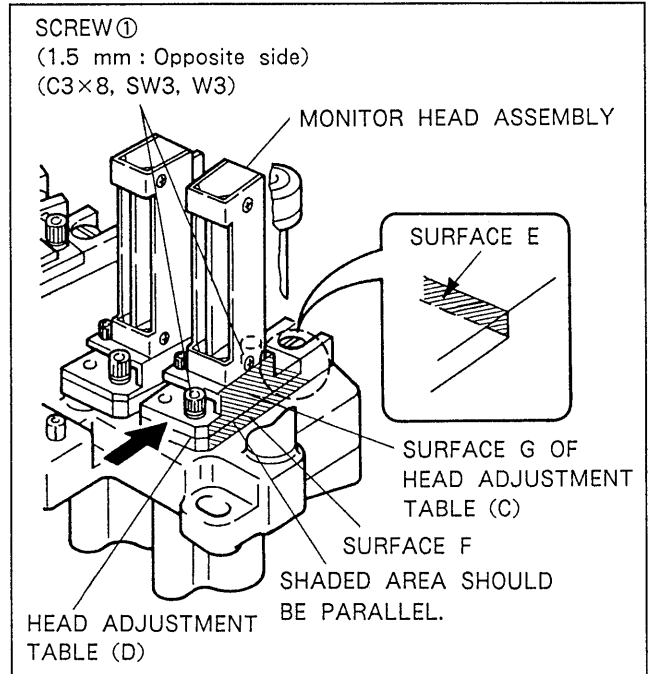


Fig. 6-17-5. Monitor Head Ass'y Mounting Position Adjustment

12. Connect the monitor head harness with the reverse order of steps 1 and 2.
13. Perform checking and adjustment shown in the preliminary information.

6-18. FULL ERASE HEAD REPLACEMENT

Preliminary Information

- A. As the full erase head has a small wrap angle against the tape, therefore, if the mounting position is inadequate erasing defect may come out. Be very careful of the mounting position when replacing.
- B. When the zenith of the full erase head against the tape is not adjusted to an optimum value, fluctuation of RF waveform may occurs. The full erase head zenith adjustment should be performed after the replacement.
- C. Prepare the following tools for replacement.
 - TC positioning tool
Sony Part No. J-6256-550-A
 - Cleaning fluid
Sony Part No. 9-919-573-00
- D. After replacement, perform checks in accordance with the following flowchart.

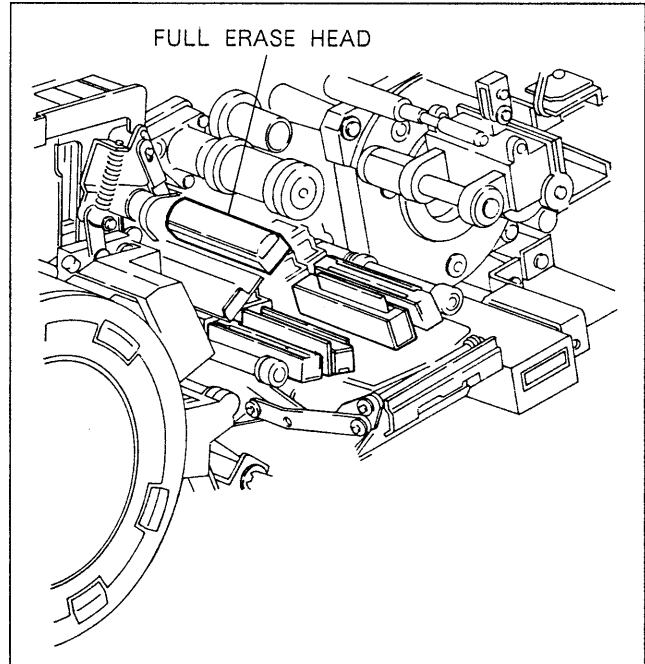
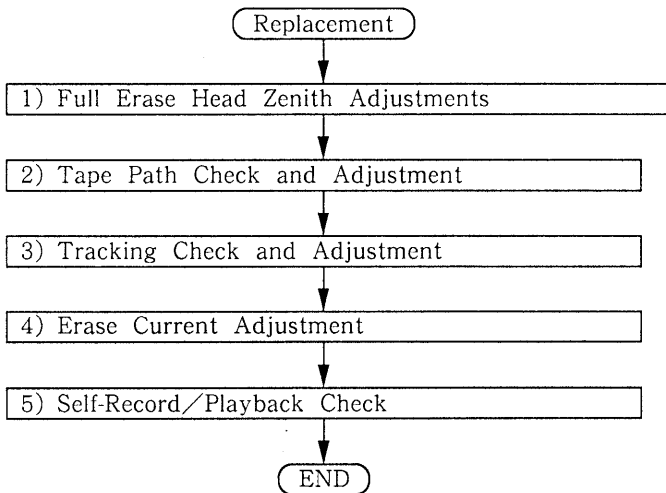


Fig. 6-18-1. Full Erase Head Assembly



Removal

1. Remove the screw ① (B3×6) and remove the air guide.
2. Remove the screw ② (C3×6: including the spring washer) and remove the FEH assembly as shown in Fig. 6-18-2.

Note 1: There is a harness on the FEH assembly. Do not stretch the harness excessively.

Note 2: When removing the screw ②, spring washer (SW3) will come off together with screw, so that take care not to lose it.

Note 3: Do not touch the full erase head zenith adjustment screw (two pieces).

3. Using the soldering iron, remove all wires from the terminals on the HD-06 board.
4. Remove the screw ③ (including the spring washer) and remove the harness holder.

Note 1: Remove the harness holder together with harnesses.

Note 2: When removing the screw ③, spring washer (SW2) will come off together with screw, so that take care not to lose it.

5. Using the soldering iron, remove the HD-06 board from the FEH assembly.
6. Remove the screw ④ (PS2.6×6) and remove the full erase head.

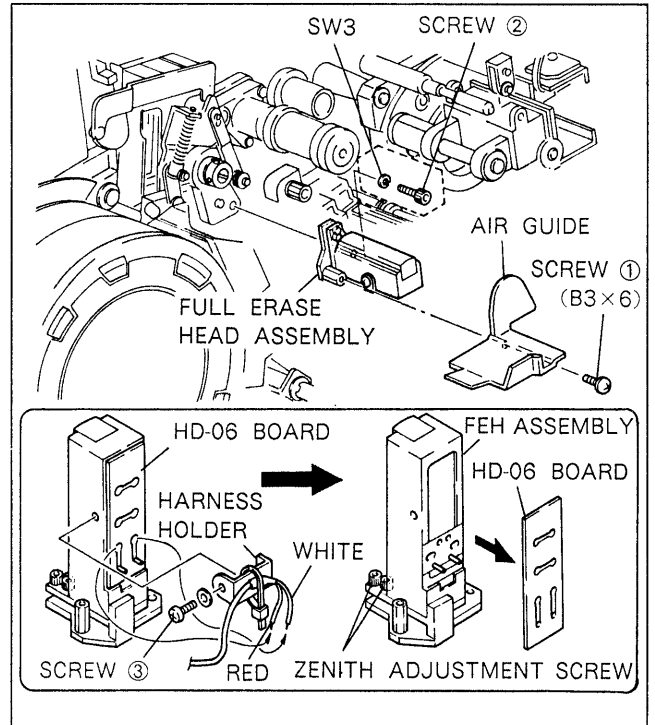


Fig. 6-18-2. Full Erase Head Assembly Removal

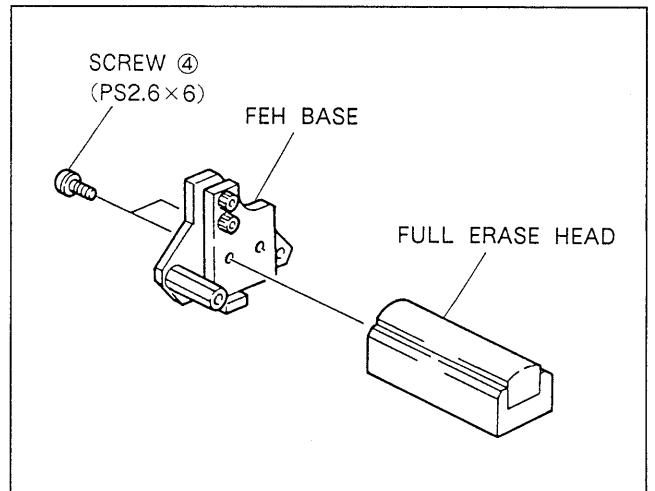


Fig. 6-18-3. Full Erase Head Removal

7. Replace the full erase head with new one then assemble the full erase head in the reverse order of steps 1 to 6.

When assembling, take care the following items.

- 1) Cleaning of Mounting Surface (See Fig. 6-18-4.)
Clean the following mounting surface (oblique lines area) with cleaning cloth (or gauze) soaked with alcohol.

- ① Mounting surface between the full erase head and FEH base
- ② Mounting surface between the FEH base and erase arm base

- 2) Mounting Position Adjustment (See Fig. 6-18-5.)
① Mounting position of full erase head and FEH base (Refer to Fig. A.)

Press the full erase head in the arrow A direction and make the full erase head contact with the guide surface of the FEH base. Fix the full erase head with two screws ④ (PS2.6×6) so that the side surface of full erase head and the surface of FEH base become in parallel (oblique lines area).

- ② Mounting position of erase arm base and FEH assembly (Refer to Fig. B.)

Fix them with the screw ② (C3×6) so that the erase arm base and the FEH assembly become in parallel (oblique lines area).

8. Perform the full erase head zenith adjustment.

Preparation before adjustment

- Use TC positioning tool

It is used for adjusting the optimum zenith of the full erase head.

Use the tool as follows :

- ① When the knob shown in Fig. 6-18-6 is turned in the arrow B direction, the positioning plate moves up and down. After moving upward or downward, the tool returns in the arrow C direction (*) automatically.
- ② When positioning to the upper side :
Use this position when installing or removing the TC positioning tool to the machine.
- ③ When positioning to the lower side :
Use this position when adjusting the zenith of the full erase head.

*When the positioning tool is moved to ② or ③, the moving amount (arrow C) of the positioning plate differs.

When ③ (lower side) is taken as a reference, the moving amount of ② (upper side) to the arrow B direction becomes about half.

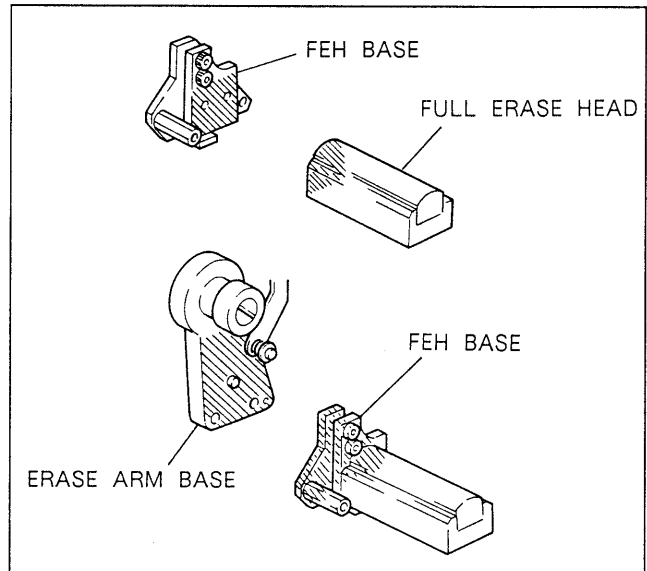


Fig. 6-18-4. Cleaning of each Mounting Surfaces

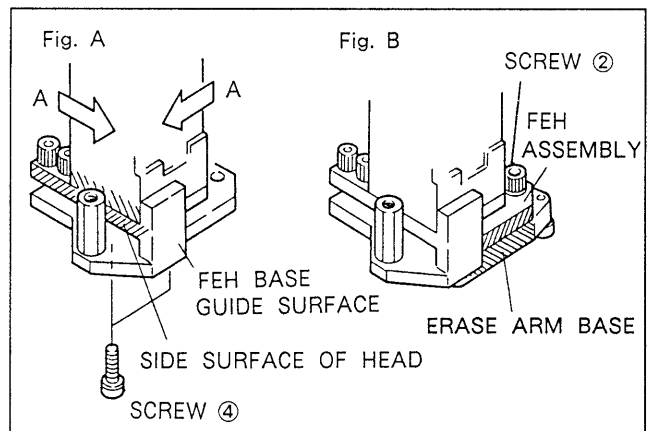


Fig. 6-18-5. Mounting Position Adjustment

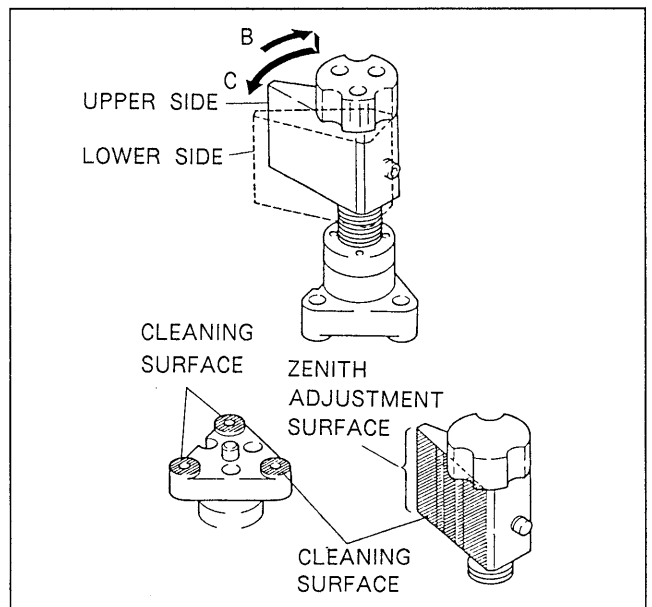


Fig. 6-18-6. Use of TC Positioning Tool

④Cleaning before installation

Clean the each mounting surface (oblique lines area) shown in the figure, before installing into the machine.

- Mounting surface to the machine
- Zenith adjusting surface of the positioning plate

⑤Notes on operation and storage

Be very careful not to damage the mounting surface to the machine and zenith adjustment surface.

- 1) Remove the three screws ⑤ (PS3×16) then remove the S guide roller assembly.

Note 1 : Put mark before removing the S guide roller assembly as shown in figure in order to install in the same condition as before.

Note 2 : There may be spacers for adjusting the slantness of the S guide roller inserted between the S guide roller assembly and the mounting surface of the mechanical base.

In this case, check and write down the position and number of the spacer when installing the S guide roller assembly in the same condition.

- 2) Open the movable guide assembly. Clean the boss surface (mounting surface of S guide roller assembly) of the mechanical base, mounting surface and zenith adjusting surface of the TC positioning tool to the machine.

- 3) Mount the TC positioning tool with three screws ⑤ (PS3×16) then close the movable guide assembly.

Use the fixing screw for the S guide roller assembly as screw ⑤.

Note : When installing the tool, check that the positioning plate is positioned upward. (Refer to "Use TC positioning tool" above.)

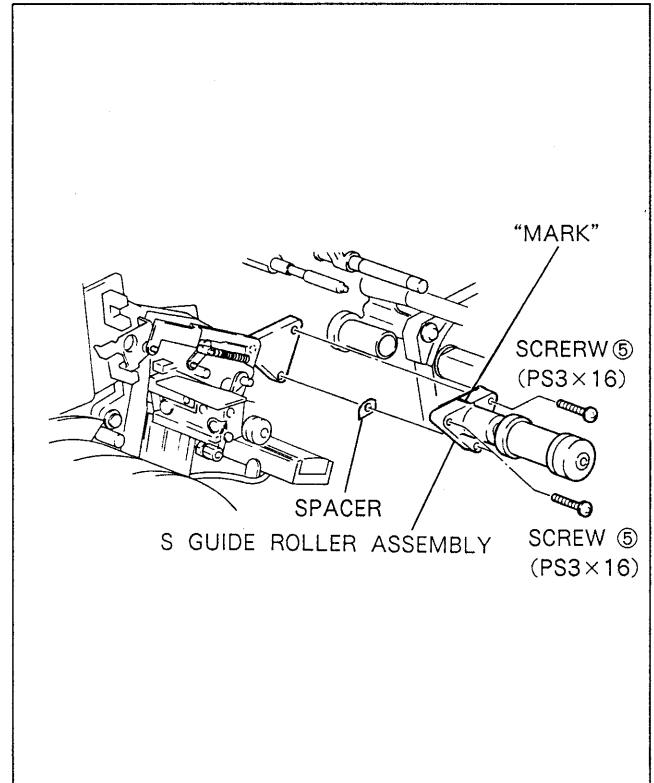


Fig. 6-18-7. S Guide Roller Ass'y Removal

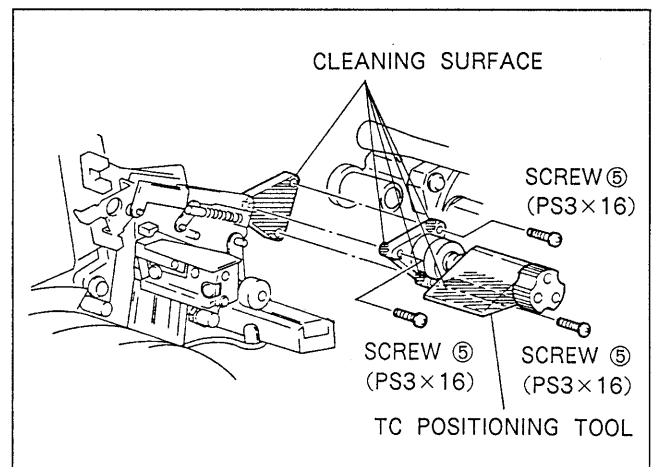


Fig. 6-18-8. TC Positioning Tool Installation

[Full Erase Head Zenith Adjustment]

4) Turn the knob of the tool in the arrow B direction and move the positioning plate to the lower side. Turn the knob in the arrow C direction slowly and stops where the positioning plate contacts with the tape path surface of the full erase head.

i) Full Erase Head Zenith Check

- ① Put a cleaning cloth underneath the full erase head.
- ② Check the clearance between the full erase head and the adjusting surface of the positioning plate. Clearance should be within the specifications.

Spec.: Upper or lower clearance of the full erase head should be within $18\ \mu\text{m}$ (thickness equal to a sheet of tape).

If the clearance is out of specification, perform the full erase head zenith adjustment.

ii) Full Erase Head Zenith Adjustment

- ① Put a cleaning cloth underneath the full erase head.
- ② Turn the full erase head zenith adjustment screws (A) and (B) of the FEH base assembly. (Opposite side: 1.5 mm)

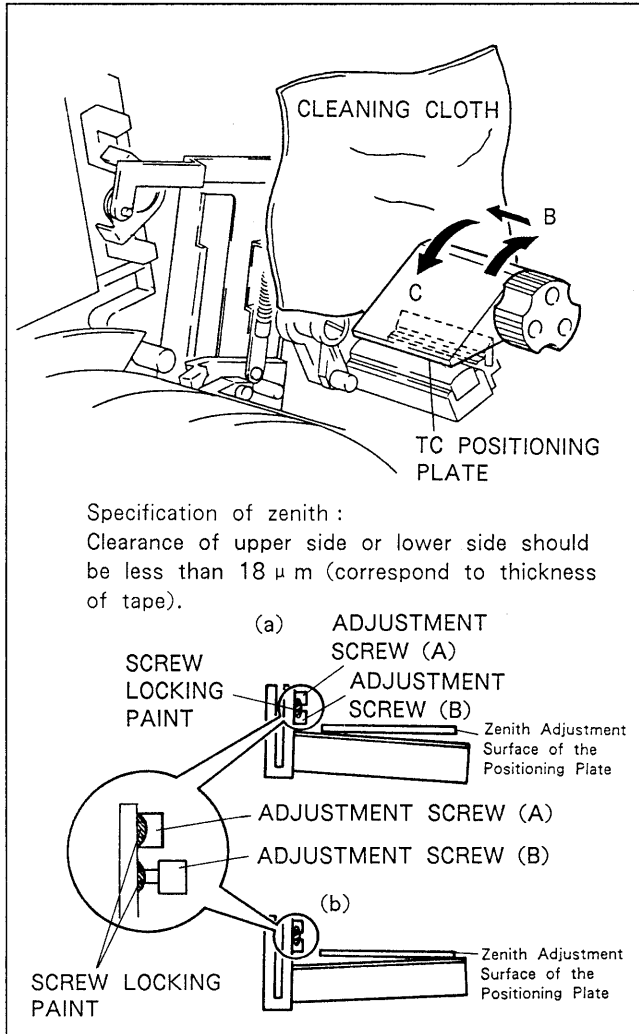
Adjustment of zenith adjustment screw

Ex (A): When there is a clearance at the upper side of the full erase head as shown in (a).

- ① Loosen the adjustment screw (B).
- ② Tighten the adjustment screw (A) then perform zenith adjustment.
- ③ Tighten the adjustment screw (B) securely.
- ④ Apply a screw locking paint a little to the position shown in figure.

Ex (B): When there is a clearance at the lower side of the full erase head as shown in (b).

- ① Loosen the adjustment screw (A).
- ② Tighten the adjustment screw (B) then perform zenith adjustment.
- ③ Tighten the adjustment screw (A) securely.
- ④ Apply a screw locking paint a little to the position shown in figure.



Specification of zenith :
Clearance of upper side or lower side should be less than $18\ \mu\text{m}$ (correspond to thickness of tape).

Fig. 6-18-9. Full Erase Head Zenith Adjustment

- iii) Move the TC positioning tool upward once.
- iv) Contact the TC positioning tool with the tape running surface of the full erase head.
- v) Check that the tape is within the specification against the zenith adjustment surface.

If not, readjust the above adjustment.

- vi) Turn the knob of the tool, and move the positioning plate upward.
- 5) Open the movable guide assembly. The movable guide opens automatically when the power is turned on.
- 6) Remove the TC positioning tool.
- 7) Install the S guide roller assembly shown in Fig. 6-18-10 in the original position taking number and position of the spacer checked in step 1) into consideration.
- 9. Mount the air guide referring to Fig. 6-18-2 in step 1.
- 10. Perform the tape path check referring to section 9-3-1.
- 11. Perform the tracking check referring to section 9-5-1.
- 12. Perform the full erase head current adjustment referring to section 11-11.
- 13. Perform the self-record/playback check referring to section 9-13.

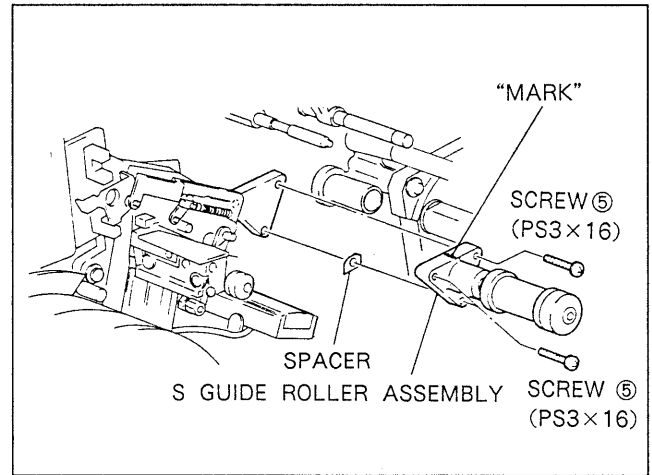


Fig. 6-18-10. S Guide Roller Installation

6-19. BLOWER REPLACEMENT

The replacement of blower is described as follows :

6-19-1. Supply Side Blower Replacement

6-19-2. Tape-up Side Blower Replacement

6-19-1. Supply Side Blower Replacement

1. Move to the rear of the VTR, loosen the four screws securing the power supply panel and open the power supply panel.
2. Disconnect connector CN103 from the CD-37 board.

3. Remove the five screws securing the CD-37 board and turn the board down to the left side.

4. Remove the four screws securing the blower, replace the blower with new one and install.

Note : Since the length of mounting screws for the CD-37 board and the blower is different, much attention should be paid when mounting.

5. Re-assemble the blower in reverse order of steps 1 through 3.

6. Load the reel, close the front cover and check that the "air threading" can be made.

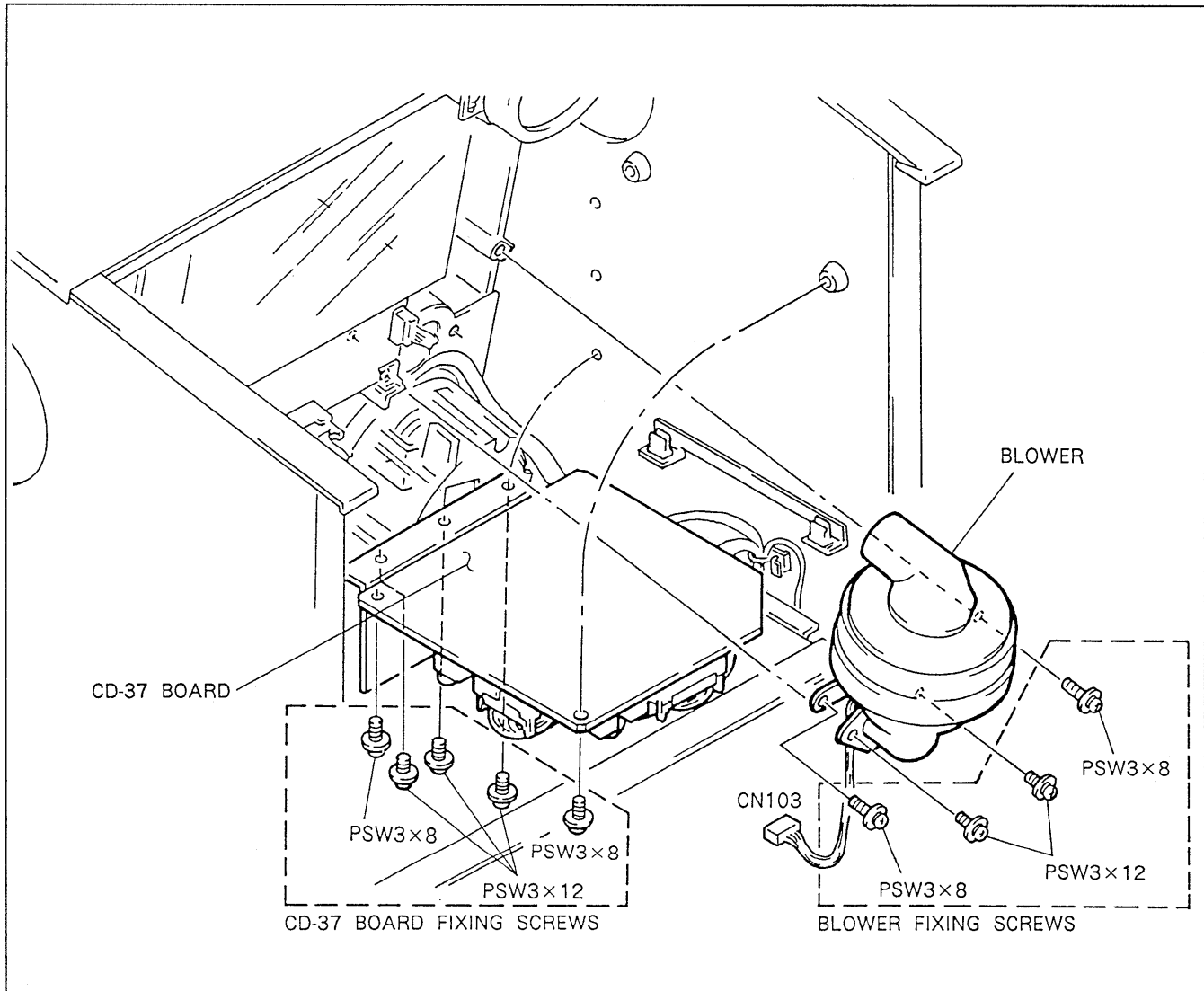


Fig. 6-19-1. Supply Side Blower Replacement

6. PARTS REPLACEMENT

6-19-2. Take-up Side Blower Replacement

1. Remove the front cover, head cover and reel panel from the front. As for removing method, refer to section 2-2.
2. Move to the rear of the VTR, loosen the four screws securing the power supply panel and open the power supply panel.
3. Remove the three mounting screws for the RM-43 board and remove the board.
4. Remove the four mounting screws for the power unit and remove the power unit.
5. Remove the CN011 from the DS-19 board on the front of the VTR.
6. Remove the four mounting screws of the blower and replace it with a new one.

Note : As the blower mounting screws are different in length, much attention should be paid when mounting.
7. Re-assemble in the reverse order of steps 1 through 5.
8. Load the reel, close the front cover and then confirm that air threading can be made.

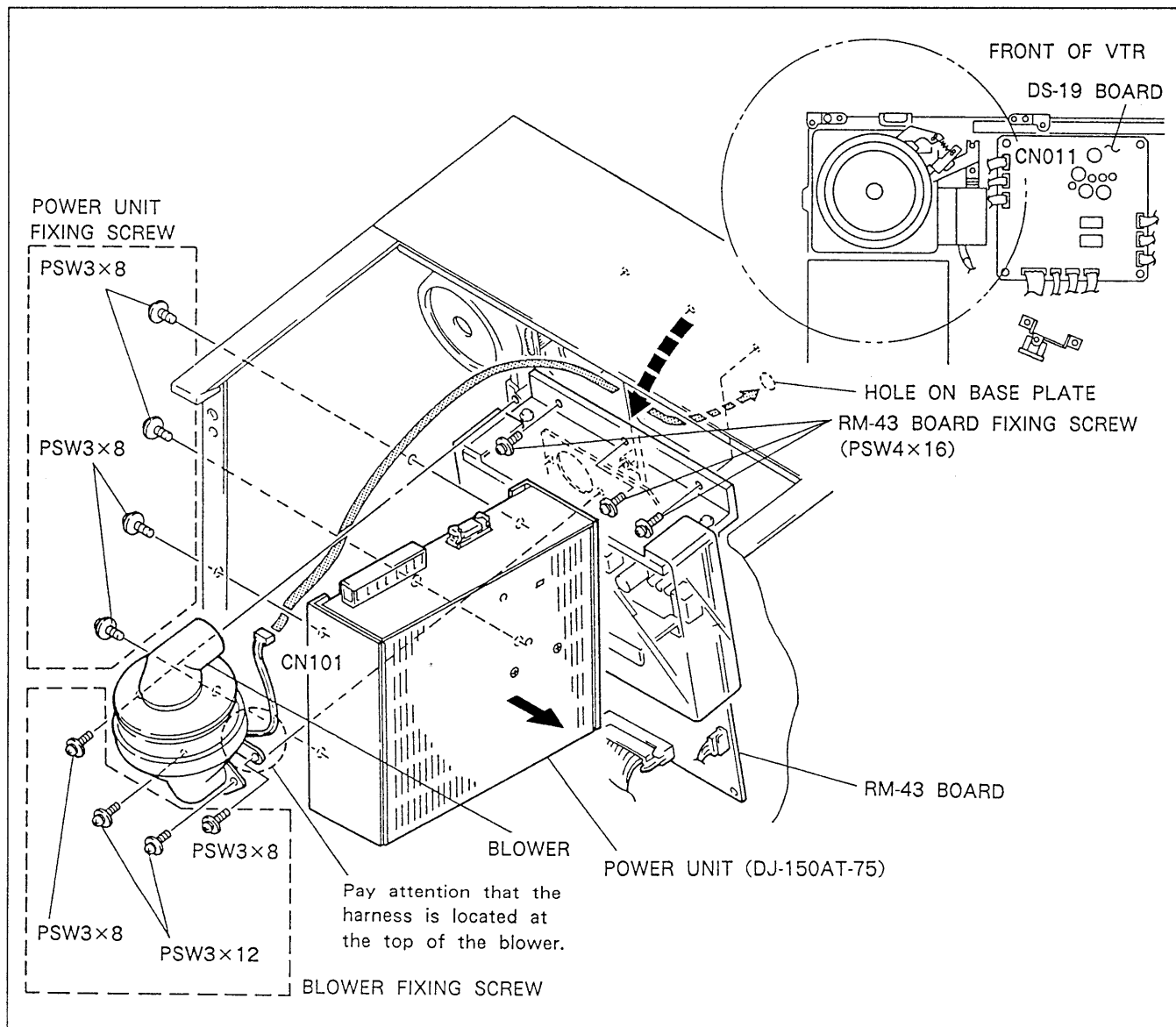
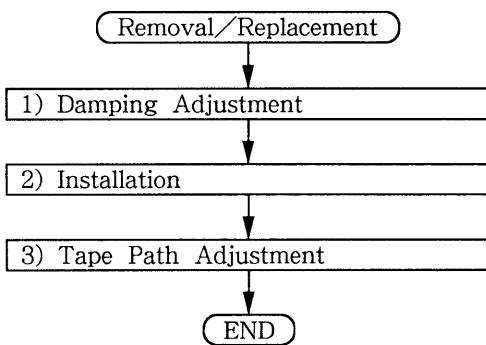


Fig. 6-19-2. Take-up Side Blower Replacement

6-20. AIR DAMPER REPLACEMENT

Preliminary Information

- A : When the air damper has been replaced or the tension arm abnormally vibrates at the transition from STOP to F.FWD or REW, be sure to perform the damping adjustment.
- B. Prepare the following tool for adjustment after the replacement :
- 90 g weight
Supplied with tension adjustment tool :
Sony Part No. J-6040-320-A
- C. Be sure to confirm the following flowchart after the replacement.



Removal

1. Remove the nut (1) shown in Fig. 6-20-1 from the tension arm assembly. (Opposite side : 5.5 mm)
2. Remove the connecting rod of the air damper in the direction of arrow A.
3. Loosen the nut (2) and remove the air damper in the direction of arrow B as shown in Fig. 6-20-2. (Opposite side : 12.5 mm)

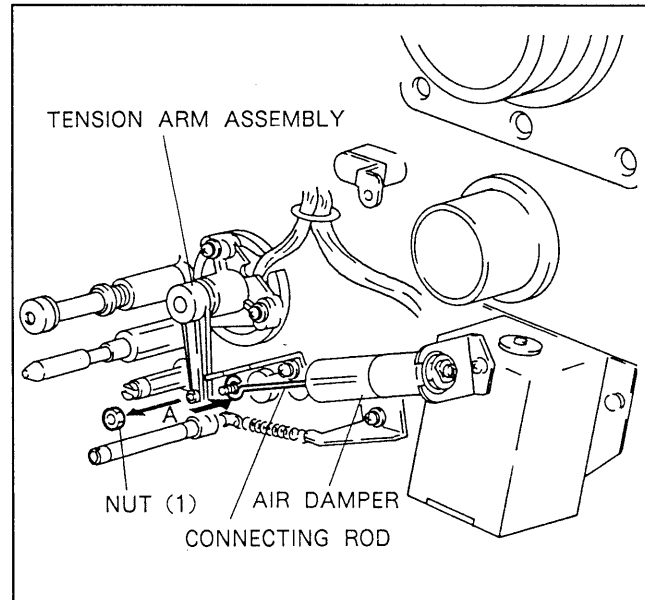


Fig. 6-20-1. Air Damper Removal (1)

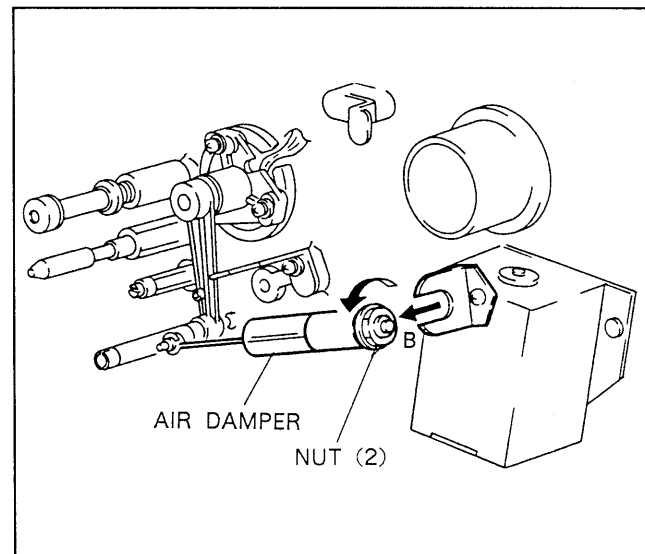


Fig. 6-20-2. Air Damper Removal (2)

4. Perform the damping adjustment.
 - 1) Hold the air damper vertically as shown in Fig. 6-20-3 and attach the 90 g weight at the tip of the air damper.
 - 2) Bring the piston into contact with upper side of the cylinder by hand. Set 90 g weight free from the hand and measure the time period until the side A of the piston just come out from the cylinder.

Spec. : 2.5 ± 0.2 sec

If it is out of specification, perform adjustment by turning the adjustment screw as follows :

- If measured time is too short, turn the adjustment screw clockwise.
- If measured time is too long, turn the adjustment screw counterclockwise.

Installation

5. Install the air damper in the reverse order of steps 1 through 3.
6. Check that there is a clearance between the piston and bottom edge of the cylinder when pushing the tension arm toward the stopper as shown in Fig. 6-20-4.
7. Perform tape path check referring to section 9-3. Also, check that there is no abnormal vibration of the tension arm at the transition from STOP to PLAY, REV, F.FWD and REW modes during the tape path check. If there is abnormal vibration, perform damping adjustment in step 4.

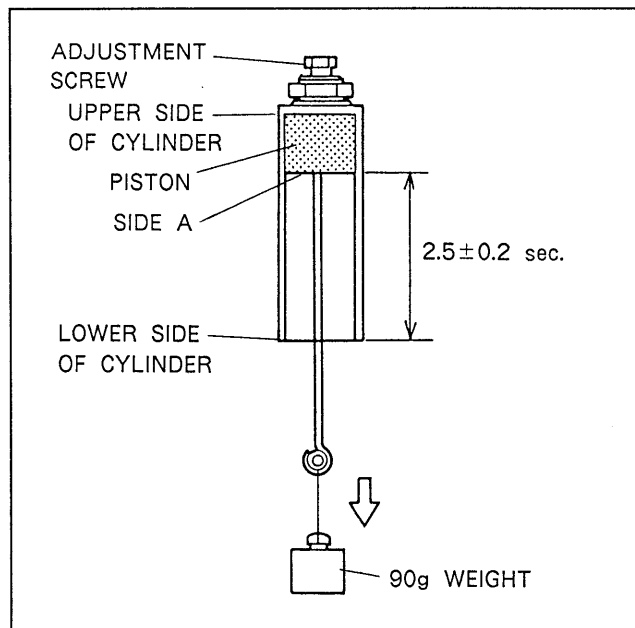


Fig. 6-20-3. Damping Adjustment

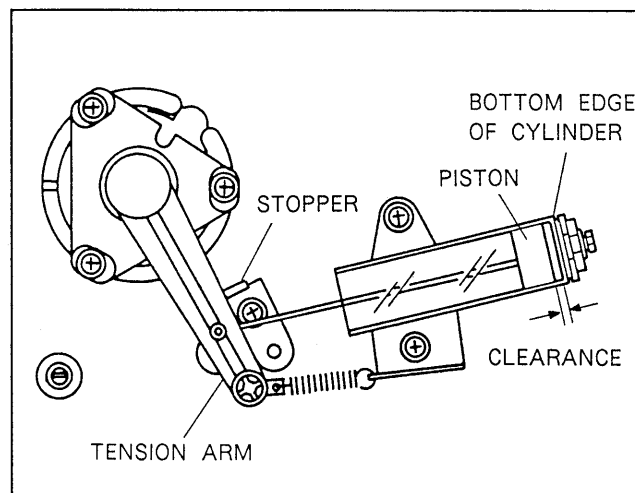


Fig. 6-20-4. Air Damper Installation



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SECTION 7

GENERAL INFORMATION FOR ALIGNMENT

7-1. INDEX OF ADJUSTMENT COMPONENTS

The following table lists the adjustment components on the circuit boards and the section number of their adjustment procedures.

AP-22 board

LV1	11-10
LV421	11-10
LV422	11-10
LV441	11-10
LV442	11-10
LV461	11-10
LV462	11-10

RV1	11-4
RV2	11-3
RV3	11-5
RV4	11-5
RV5	11-13
RV6	11-9
RV7	11-9
RV8	11-11
RV421	11-10
RV441	11-10
RV461	11-10

AU-109 board

RV101	11-7
RV102	11-7
RV201	11-7
RV202	11-7
RV301	11-7
RV302	11-7
RV401	11-7
RV402	11-7
RV501	11-7
RV502	11-7
RV601	11-7
RV602	11-7
RV701	11-7
RV702	11-7
RV801	11-7
RV802	11-7
RV901	11-6
RV902	11-12

DET-3 board

RV1	10-2
RV2	10-2

DRC-1 board

LV104	12-4
LV204	12-4
LV304	12-4
LV404	12-4
RV1	12-4
RV101	12-7
RV102	12-7
RV103	12-7
RV104	12-8
RV105	12-9
RV106	12-5
RV107	12-4
.....	12-6
RV108	12-7
RV109	12-6
RV110	12-6
RV201	12-7
RV202	12-7
RV203	12-7
RV204	12-8
RV205	12-9
RV206	12-5
RV207	12-4
.....	12-6
RV208	12-7
RV209	12-6
RV210	12-6
RV301	12-7
RV302	12-7
RV303	12-7
RV304	12-8
RV305	12-9
RV306	12-5
RV307	12-4
.....	12-6
RV308	12-7
RV309	12-6
RV310	12-6
RV401	12-7
RV402	12-7
RV403	12-7
RV404	12-8
RV405	12-9
RV406	12-5
RV407	12-4
.....	12-6
RV408	12-7
RV409	12-6
RV410	12-6

FE-05 board

CV1 12-3
 CV2 12-3
 RV1 12-3
 RV2 12-3

KC-14 board

RV101 10-1

PRD-1 board

*RV2 Mechanical center
 RV3 12-10
 RV4 12-10
 RV5 12-10
 RV6 12-10
 RV7 12-10
 RV8 12-10
 RV9 12-10
 RV10 12-10
 *RV101 C.C.W. fully
 *RV201 C.C.W. fully
 *RV301 C.C.W. fully
 *RV401 C.C.W. fully
 *RV501 C.C.W. fully
 *RV601 C.C.W. fully
 *RV701 C.C.W. fully
 *RV801 C.C.W. fully

* marked parts are for #10001 through #10199.

SP-01 board

RV171 8-2
 RV201 8-2
 RV202 8-2
 RV203 8-2

SP-02 board

RV201 8-6
 RV203 8-5
 RV204 8-5
 RV205 8-5
 RV206 8-5
 RV207 8-5
 RV208 8-5
 RV209 8-5
 RV210 8-5
 RV471 8-6
 RV671 8-5
 RV672 8-5

SP-03 board

RV201 8-3
 RV202 8-3
 RV203 8-3
 RV271 8-3
 RV571 8-3

SV-90 board

RV1 10-3
 RV2 10-3
 RV3 10-3

VR-74 board

RV1 11-8

7-2. EQUIPMENTS AND TOOLS

The following equipments and tools, other than general tools, are required for alignment. As for items 1 through 21, see section 2-7.

1. Extension Board, EX-136
Sony Part No. A-6001-007-A
2. Extension Board, EX-166
Sony Part No. A-6001-018-A
3. Alignment Tape, FR2-1
Sony Part No. 8-960-072-11
4. Alignment Tape, FR5-1
Sony Part No. 8-960-072-01
5. Tension Scale, 5 kg
Sony Part No. J-6041-640-A
6. Thickness Gauge
Sony Part No. J-6041-670-A
7. Flat Plate
Sony Part No. J-6040-160-A
8. Ball Point Hexagonal Wrench
Sony Part No. 7-721-130-51
9. Hex. Screwdriver
1.4 mm Sony Part No. 7-700-766-02
2 mm Sony Part No. 7-700-766-03
2.5 mm Sony Part No. 7-700-766-04
3 mm Sony Part No. 7-700-766-05
9. L-shaped Hex. Wrench Set
Sony Part No. J-6041-700-B
10. Tension Adjustment Tool
Sony Part No. J-6251-960-A
11. Torque-Driver
60×10⁻² N · m {6 kgf · cm}
Sony Part No. J-6252-510-A
120×10⁻² N · m {12 kgf · cm}
Sony Part No. J-6252-520-A
260×10⁻² N · m {26 kgf · cm}
Sony Part No. J-6252-530-A
12. Bit-Set of Torque-Driver
Sony Part No. J-6253-970-A
13. Dental Mirror
Sony Part No. 7-723-907-00
Dental Mirror
Aluminium Mirror
Sony Part No. J-6257-680-A
14. Audio REC Head PB Tool
Sony Part No. J-6263-310-A
15. Video Erase Extension Harness
Sony Part No. J-6266-300-A
16. Audio REC Extension Harness
Sony Part No. J-6266-030-A
17. Audio Erase Extension Harness
Sony Part No. J-6266-040-A
18. BNC-UM Cable
Sony Part No. J-6264-360-A
19. Adjustment Screwdriver
Sony Part No. 7-700-733-01
Sony Part No. 7-700-733-02
20. IC Test Clip
TC-8 Sony Part No. J-6350-280-A
TC-16 Sony Part No. J-6041-770-A
TC-20 Sony Part No. J-6041-780-A
21. Cleaning Piece
Sony Part No. 2-034-697-00
22. Oscilloscope
Frequency response : 200 MHz or more
23. Current Probe
24. Digital Voltmeter
Effective digits : more than 4-1/2 = digits
Accuracy : less than 0.02 %, ± 1 count
25. Electronic Load
Input load voltage : 5 to 100 V dc or greater
Input load current : 0 to 7 A min.
(constant current mode)
Allowable load power : 100 W min.
Equivalent product : PLZ152W
/Kikusui International
Used for section 8-5. variable voltage system adjustment.
26. DC Power Supply
Output voltage : + 5 V to + 8 V
(Current : several milliamps or below)
Used for section 8-5. variable voltage system adjustment.
27. Audio Level Meter

28. Spectrum Analyzer

Equivalent product : 141T/Hewlet Packard

Used for section 12-7. playback equalizer adjustment.
However, if a spectrum analyzer is not available,
do not perform this adjustment.

29. HD picture monitor

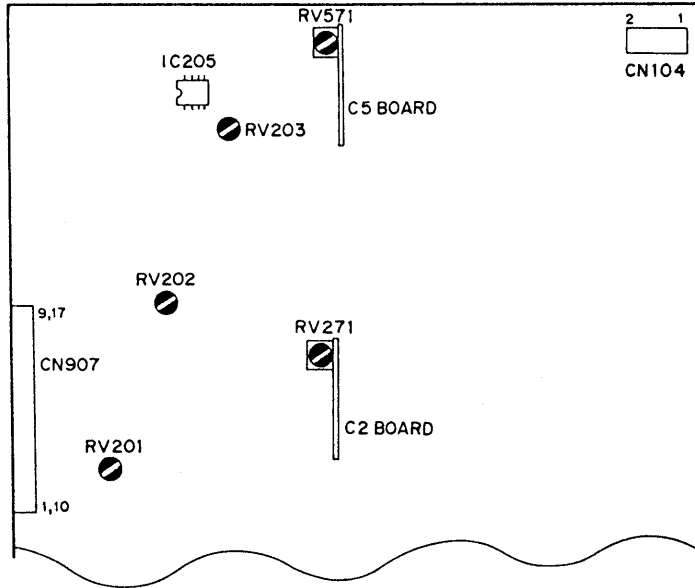
30. HD video signal generator

Generate the 1125 lines/60 Hz HD video signal
that is conformed to BTA-S001 or SMPTE240B.

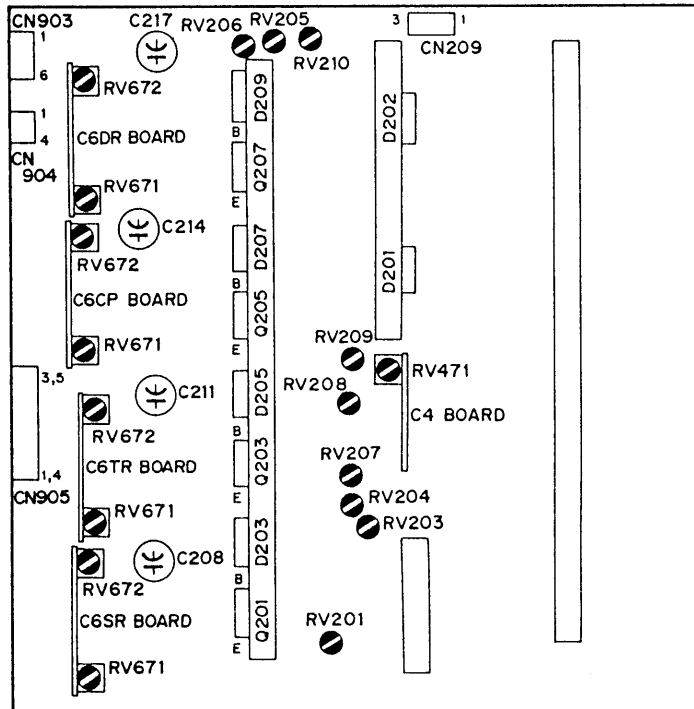


SECTION 8 POWER SUPPLY ALIGNMENT

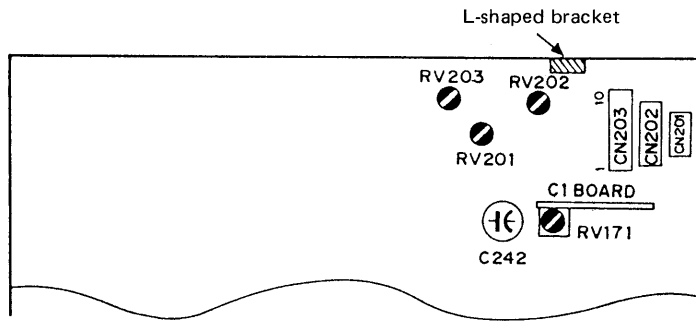
**SP-03 Board
(Component Side)**



**SP-02 Board
(Component Side)**



**SP-01 Board
(Component Side)**



[CAUTION 1]

The power supply boards contain primary side parts and high-voltage parts and so care should be taken to avoid touching them when they are "live" and receiving an electric shock. Read through "Section 2-3. Notes on Power Unit" before proceeding with the inspection and adjustment.

[CAUTION 2]

The heat sinks on the boards have a thermal capacity which is rated on the assumption that cooling will be provided by the fans. Care should thus be taken not to operate the VTR over prolonged periods of time during inspection and at other such times without fan cooling.

8-1. DIAGNOSIS

When something has gone wrong with the power supply section, visually inspect whether foreign matter has entered inside or whether any of the parts have been discolored or deformed before proceeding to check the operation of each board. An alternative method of conducting inspections is to bring your hands near the power supply section and locate any parts which have been heated up by high temperatures. Yet another method of inspection which is effective in locating trouble areas is to use a VOM (Volt/Ohm meter) to check the conductivity of the components and check the polarities of the semiconductors in accordance with the schematic diagrams with no power supplied.

Since this power unit consists of four switching regulators of the half-bridge inverter type, four switching regulators of the DC/DC converter type, and six series regulators, trouble spots can also be effectively located by comparing and contrasting the characteristics of the regulators.

Half-bridge inverter type of switching regulators

T101/SP-01 board	+ 5 V
T101/SP-02 board	PRE-REGULATOR (+ 90 V)
T101/SP-03 board	+ 13 V SOL
T105/SP-03 board	± 18 V

DC/DC converter type of switching regulators

Q201/SP-02 board	S-REEL VH
Q203/SP-02 board	T-REEL VH
Q205/SP-02 board	CAPSTAN VH
Q207/SP-02 board	DRUM VH (Not used)

Series regulators

Q202/SP-01 board	+ 17 V
Q209/SP-01 board	- 5 V
Q209/SP-02 board	F + 17 V
Q201/SP-03 board	+ 12 V
Q204/SP-03 board	- 12 V
IC206/SP-03 board	+ 12 V FAN/+ 12 V CON

A great deal can be accurately guessed about the trouble from the nature of trouble itself. Reference should be made to the flow chart below.

When the supply power output has been stopped, set the power switch to OFF, wait for at least 30 seconds (or at least 2 minutes with a 220/240 V AC power line voltage), check the situation and then turn it back to ON again.

(1) Is the AC power line breaker ON?

The AC power breaker will be tripped if the AC power supply capacity is inadequate.

YES → NO
Provide a connection to an AC power supply with a higher capacity.

(2) Is the AC input voltage adequate?

If the VTR is set to the F. FWD or REW mode when the AC line impedance is high or when equipment with a high power consumption is connected to the same AC line, the AC voltage supplied to the VTR may drop and the VTR may stop operating or the VTR's input breaker (AC-92 board) may be tripped.

YES → NO
Check whether the supply/take-up reel motor drive circuit/RM-43 board is overloaded.
If the input breaker CB1/AC-92 board is OFF, set it back to ON.

(3) Has the OVERHEAT alarm been given?

When it is no longer possible to cool the power unit or when an abnormal load is kept applied to +5 V/+18 V/-18 V/+13 V SOL system, the supply power output will shut down in order to protect the power circuitry from overheating. In cases like this, the OVERHEAT alarm will appear on the control panel and the VTR will then stop before the power output shuts down. Check the situation immediately prior to the power output shutdown and then switch the power back on.

NO → YES
Check whether the trouble lies in the fans.
Check which of the +5 V/+18 V/-18 V/+13 V SOL systems has been heated up to a high temperature and inspect the load of that system.

(4) Has the rush current limiting relay been activated?

Relay RY101/SP-01 board inside the power unit is activated immediately after the power has been switched on. If you listen at the rear panel of the VTR, you can check that the relay is activated by the sound it makes when the power switch is set to ON. If the relay is activated, the rectifier section, starter section and +5 V switching regulator will be activated.

YES → NO
Inspect the rectifier section (D101/SP-01 surrounding parts).
Inspect the starter section (IC102/SP-01 surrounding parts).
Inspect the +5 V switching regulator (T101/SP-01 surrounding parts).

(5) Does the power output stop several seconds after the power has been switched on?

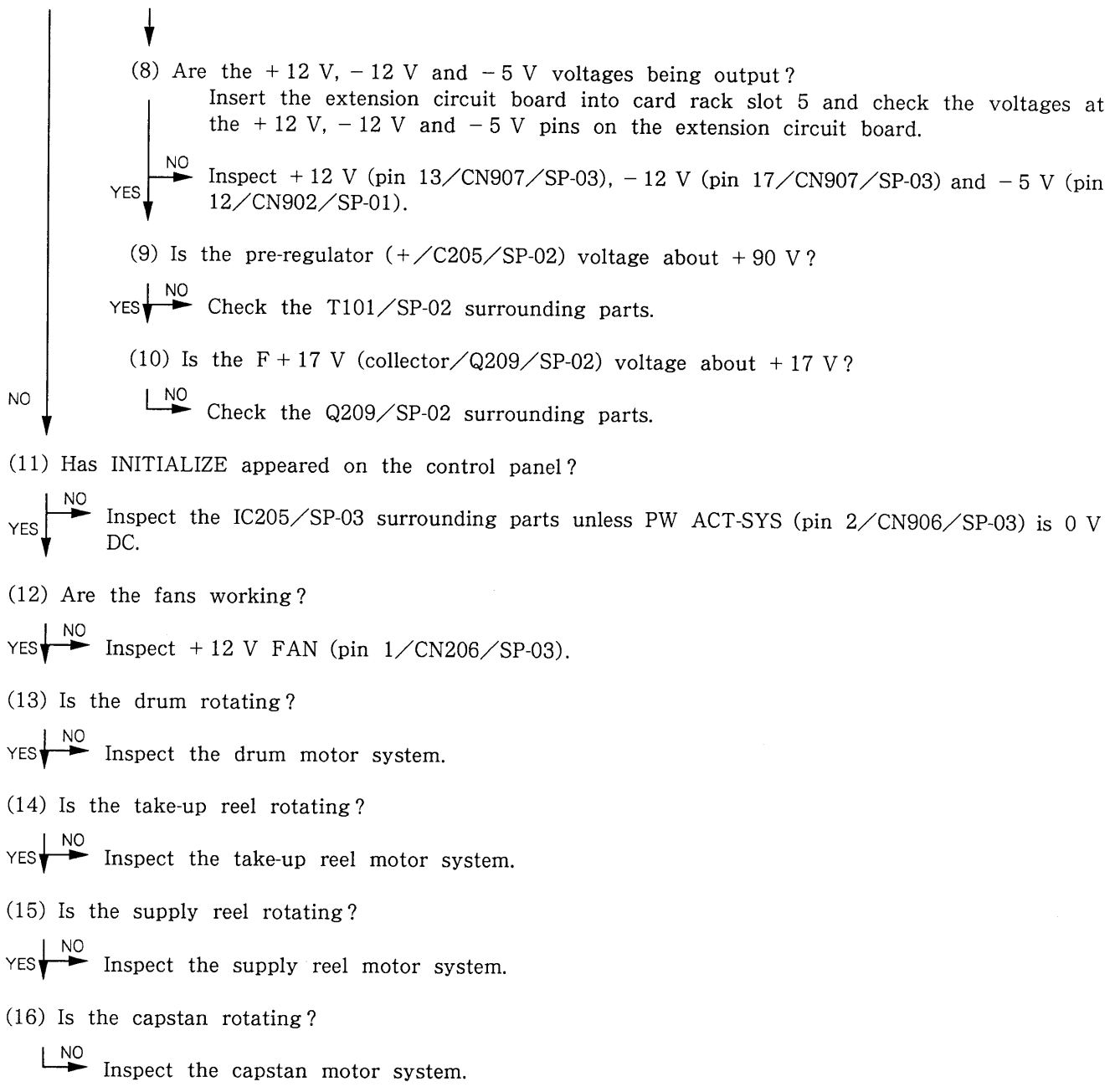
Note: Set the power switch to OFF, wait for at least 30 seconds (or at least 2 minutes with a 220/240 V AC power line voltage), and then turn it back to ON again.

NO → YES
(6) Does the LED 1, 2 or 3 light, when the REMOTE/LOCAL switch is set to REMOTE?

YES → NO
Inspect +18 V (pin 4/CN907/SP-03), -18 V (pin 16/CN907/SP-03) and +17 V (pin 2/CN207/SP-03).

(7) Are the fans working?

YES → NO
Inspect +13 V SOL (pin 12/CN907/SP-03).



8-2. +17 V/+5 V/ -5 V ADJUSTMENTS

[Preparations]

Refer to Section 2-3-6 and take out the SP-01 board from the power unit. Connect all the connectors on the board. Insert the extension circuit board into card rack slot 5. Switch on the power and set the VTR to the stop (STANDBY OFF) mode.

[Adjustments]

Adjustment item	Measuring point Cold pin in parentheses	Specifications	Adjustment
+ 17 V	Pin2/CN203/SP-01 board (L-shaped bracket nearby CN203)	+ 17.0 ± 0.1 V dc	⊗RV201/SP-01 board
+ 5 V	+ 5 V pin/extension circuit board/slot 5 If the adjustment cannot be made by ⊗RV202, first and then use ⊗RV202 for the fine adjustment.	+ 5.00 ± 0.05 V dc	⊗RV202/SP-01 board (⊗RV171/C1 board/SP-01 board)
- 5 V	- 5 V pin/extension circuit board/slot 5	- 5.00 ± 0.02 V dc	⊗RV203/SP-01 board

After the adjustments switch off the power and return the SP-01 board to the inside of the power unit.

8-3. +13 V SOL/+12 V/ -12 V/+18 V ADJUSTMENTS

[Preparations]

Refer to Section 2-3-6 and take out the SP-03 board from the power unit. Connect all the connectors on the board. Insert the extension circuit board into card rack slot 5. Switch on the power and set the VTR to the stop (STANDBY OFF) mode.

[Adjustments]

Adjustment item	Measuring point Cold pin in parentheses	Specifications	Adjustment
+ 13 V SOL	Pin 12/CN907/SP-03 board (Pin 3/CN907)	+ 13.6 ± 0.1 V dc	●RV271/C2 board/SP-03 board
+ 12 V	+ 12 V (+ 18 V) pin/extension circuit board/slot 5	+ 12.00 ± 0.02 V dc	●RV201/SP-03 board
- 12 V	- 12 V (- 18 V) pin/extension circuit board/slot 5	- 12.00 ± 0.02 V dc	●RV202/SP-03 board
+ 18 V	1a/CN-B/extension circuit board/slot 5	+ 19.0 ± 0.2 V dc	●RV571/C5 board/SP-03 board

Leave the SP-03 board on top of the power unit as it is and proceed with next adjustment.

8-4. PW ACT ADJUSTMENT

[Preparations]

Same as for previous section.

[Adjustments]

Measure the DC voltage at pin 1 (pin 2 = cold) /CN104/SP-03 board. This is now taken to be V_B .
[CAUTION] V_B is the primary side voltage. Proceed cautiously so as to avoid electric shocks.

Adjust the DC voltage at pin 5 (pin 4 = cold) /IC205/SP-03 board as follows :

$$\text{Spec : } \frac{2.5}{90} \times V_B \quad \bullet \text{RV203/SP-03 board}$$

(Note) V_B depends on the AC power line voltage. When the AC power line voltage is 100 V ac, V_B will be approximately 100 V dc.

After the adjustment switch off the power and return the SP-03 board to the inside of the power unit.

8-5. VARIABLE VOLTAGE SYSTEM ADJUSTMENTS

The following 4 systems are included in the variable voltage system :

S-REEL VH
T-REEL VH
CAPSTAN VH
DRUM VH (Not used)

Proceed with the following 4 adjustments for each of these four systems.

Output current limiting adjustment
Output power limiting adjustment (with maximum voltage)
Output power limiting adjustment (with minimum voltage)
Output voltage adjustment

The following equipments are required for these adjustments.

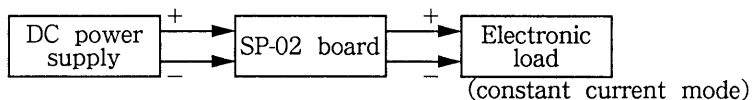
[CAUTION] Do not attempt to undertake these adjustments if this equipment is not available.

Electronic load	Input load voltage :	5 to 100 V dc or greater
	Input load current :	0 to 7 A min.(constant current mode)
	Allowable load power :	100 W min.
	Equivalent product :	PLZ152W by Kikusui International
DC power supply	Output voltage :	+ 5 V to + 8 V (Current : several milliamps or below)
DC voltmeter		
Oscilloscope		

[Preparations]

Refer to Section 2-3-6 and take out the SP-02 board from the power unit. Leave connectors CN903, 904 and 905, which connect the SP-02 board with the VTR, disconnected from the SP-02 board. Connect all the other connectors.

Connect the DC power supply and electronic load to the SP-02 board. Use the electronic load in the constant current mode.



Refer to step (1) and following for the settings of the DC power supply and electronic load and for the destinations of the connections on the SP-02 board.

[CAUTION] When the DC power supply and electronic load are connected, set the power of the equipment ON and OFF in accordance with the following sequence.

ON : VTR → DC power supply → Electronic load
OFF : VTR → DC power supply → Electronic load

Switch off the power here as quickly as possible.

(1) S-REEL VH adjustments

Connect the DC power supply and electronic load as follows.

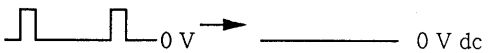
DC power supply (+) → Pin 5/CN903/SP-02 board

DC power supply (-) → Pin 6/CN903/SP-02 board

Electronic load (+) → Pin 4/CN905/SP-02 board

Electronic load (-) → Pin 1/CN905/SP-02 board

Following the table below, set the output voltage of the DC power supply and the load current of the electronic load, and proceed to adjust.

Adjustment item	DC power supply	Electronic load (constant current)	Measuring point (SP-02 board) Cold pin in parentheses	Specifications/adjustment (SP-02 board)
Output current limiting	+ 8.00 ± 0.05 V	5.0 A	Cathode/D203 (Heat sink for D203)	Turn ⒶRV203 counterclockwise, then rotate it slowly clockwise and stop at point where pulses vanish. Take care not to rotate ⒶRV203 too far. 
Output power limiting (with max. voltage)	+ 8.00 ± 0.05 V	1.1 A	Pin 4/CN905 (Pin 1/CN905)	+ 78.5 ± 0.5 V dc ⒶRV671/C6SR board/SP-02 board
Output power limiting (with min. voltage)	+ 8.00 ± 0.05 V	4.4 A	Pin 4/CN905 (Pin 1/CN905)	+ 20.0 ± 0.2 V dc ⒶRV207
Output voltage	+ 5.00 ± 0.01 V	1.6 A	Pin 4/CN905 (Pin 1/CN905)	+ 49.5 ± 0.2 V dc ⒶRV672/C6SR board/SP-02 board

8. POWER SUPPLY ALIGNMENT

(2) T-REEL VH adjustments

Connect the DC power supply and electronic load as follows.

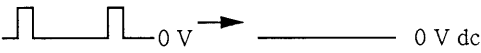
DC power supply (+) → Pin 4/CN903/SP-02 board

DC power supply (-) → Pin 6/CN903/SP-02 board

Electronic load (+) → Pin 5/CN905/SP-02 board

Electronic load (-) → Pin 3/CN905/SP-02 board

Following the table below, set the output voltage of the DC power supply and the load current of the electronic load, and proceed to adjust.

Adjustment Item	DC power supply	Electronic load (constant current)	Measuring point (SP-02 board) Cold pin in parentheses	Specifications/adjustment (SP-02 board)
Output current limiting	+ 8.00 ± 0.05 V	5.0 A	Cathode/D205 (Heat sink for D205)	Turn ⒶRV204 counterclockwise, then rotate it slowly clockwise and stop at point where pulses vanish. Take care not to rotate ⒶRV204 too far. 
Output power limiting (with max. voltage)	+ 8.00 ± 0.05 V	1.1 A	Pin 5/CN905 (Pin 3/CN905)	+ 78.5 ± 0.5 V dc ⒶRV671/C6TR board/SP-02 board
Output power limiting (with min. voltage)	+ 8.00 ± 0.05 V	4.4 A	Pin 5/CN905 (Pin 3/CN905)	+ 20.0 ± 0.2 V dc ⒶRV208
Output voltage	+ 5.00 ± 0.01 V	1.6 A	Pin 5/CN905 (Pin 3/CN905)	+ 49.5 ± 0.2 V dc ⒶRV672/C6TR board/SP-02 board

(3) CAPSTAN VH adjustmets

Connect the DC power supply and electronic load as follows.

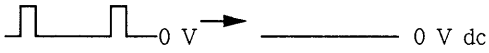
DC power supply (+) → Pin 3/CN903/SP-02 board

DC power supply (-) → Pin 6/CN903/SP-02 board

Electronic load (+) → Pin 4/CN904/SP-02 board

Electronic load (-) → Pin 2/CN904/SP-02 board

Following the table below, set the output voltage of the DC power supply and the load current of the electronic load, and proceed to adjust.

Adjustment item	DC power supply	Electronic load (constant current)	Measuring point (SP-02 board) Cold pin in parentheses	Specifications/adjustment (SP-02 board)
Output current limiting	+ 8.00 ± 0.05 V	3.5 A	Cathode/D207 (Heat sink for D207)	Turn ●RV206 counterclockwise, then rotate it slowly clockwise and stop at point where pulses vanish. Take care not to rotate ●RV206 too far. 
Output power limiting (with max. voltage)	+ 8.00 ± 0.05 V	0.55 A	Pin 4/CN904 (Pin 2/CN904)	+ 39.5 ± 0.2 V dc ●RV671/C6CP board/SP-02 board
Output power limiting (with min. voltage)	+ 8.00 ± 0.05 V	2.2 A	Pin 4/CN904 (Pin 2/CN904)	+ 10.0 ± 0.1 V dc ●RV209
Output voltage	+ 5.00 ± 0.01 V	0.8 A	Pin 4/CN904 (Pin 2/CN904)	+ 24.75 ± 0.1 V dc ●RV672/C6CP board/SP-02 board

(After adjustment, the power supply will stop automatically.)

8-6. F+17 V/PRE-REGULATOR ADJUSTMENTS

[Preparations]

Take out the SP-02 board from the power unit and connect all the connectors on the board. Switch on the power and set the VTR to the stop (STANDBY OFF) mode.

[Adjustments]

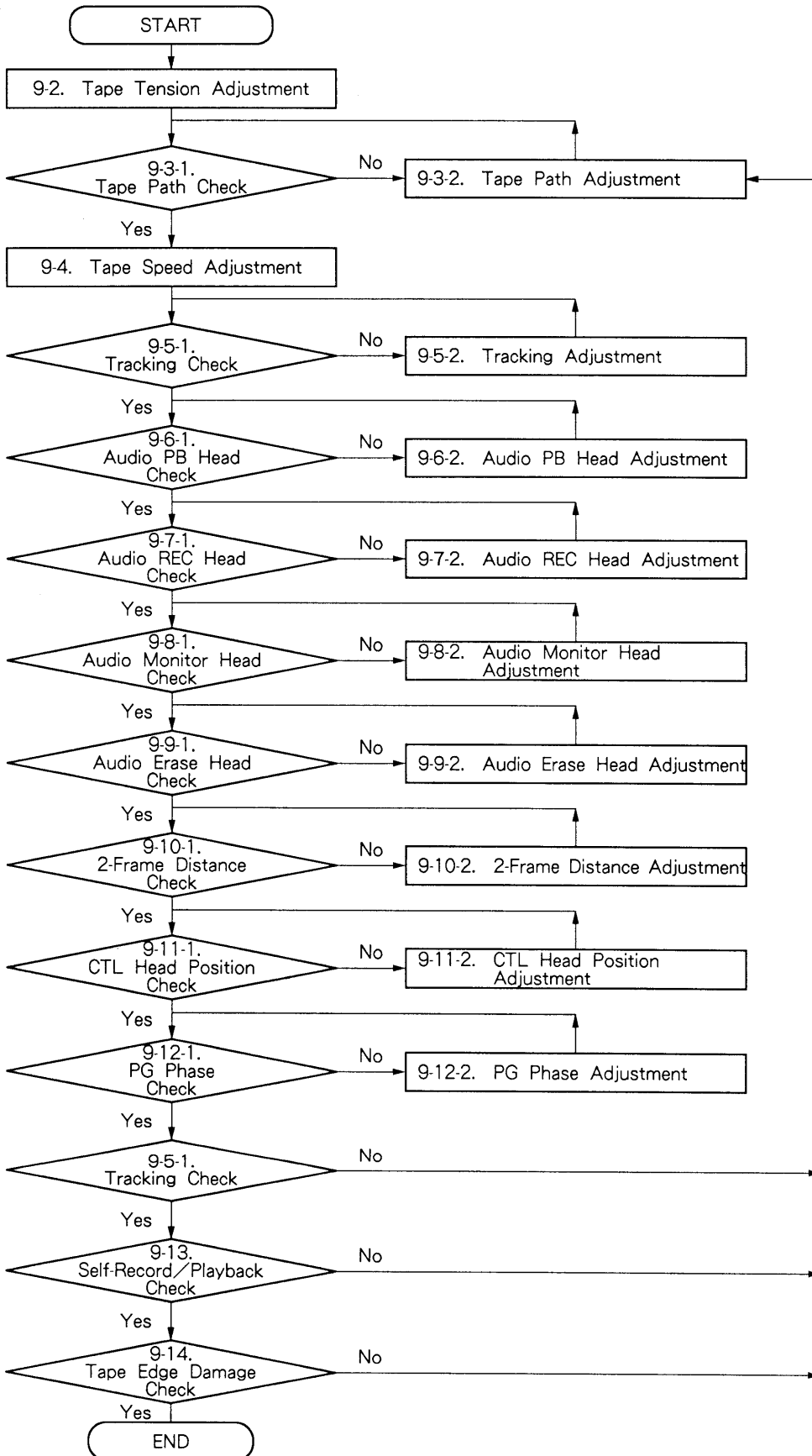
Adjustment item	Measuring point Cold pin in parentheses	Specifications	Adjustment
F + 17 V	Collector/Q209/SP-02 board (Heat sink for Q209)	+ 17.1 ± 0.1 V dc	●RV201/SP-02 board
PRE REG	Pin 1/CN209/SP-02 board (Heat sink for D201 & D202)	+ 93.5 ± 0.5 V dc	●RV471/C4 board/SP-02 board Turn ●RV471 counterclockwise, then rotate it clockwise.

After the adjustments switch off the power and return the SP-02 board to the inside of the power unit.



SECTION 9 TAPE PATH SYSTEM ALIGNMENT

9-1. ADJUSTMENT FLOWCHART



9-2. TAPE TENSION ADJUSTMENT

Preliminary Information

- A. Perform this adjustment when replacing the tension arm assembly or the components of the tension arm assembly.
- B. Prepare the following tools:
- Tension adjustment tool
Sony Part No. J-6251-960-A
 - Extension board EX-136
Sony Part No. A-6001-007-A
 - Digital voltmeter

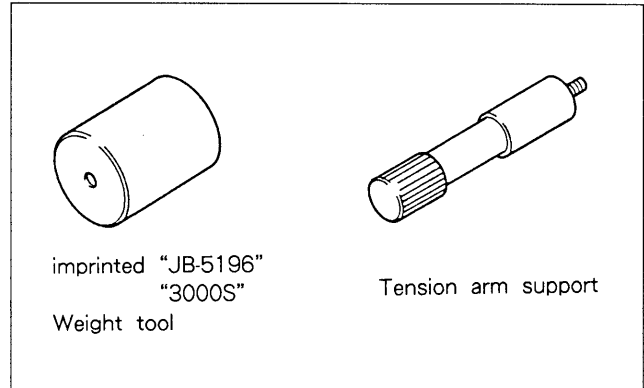
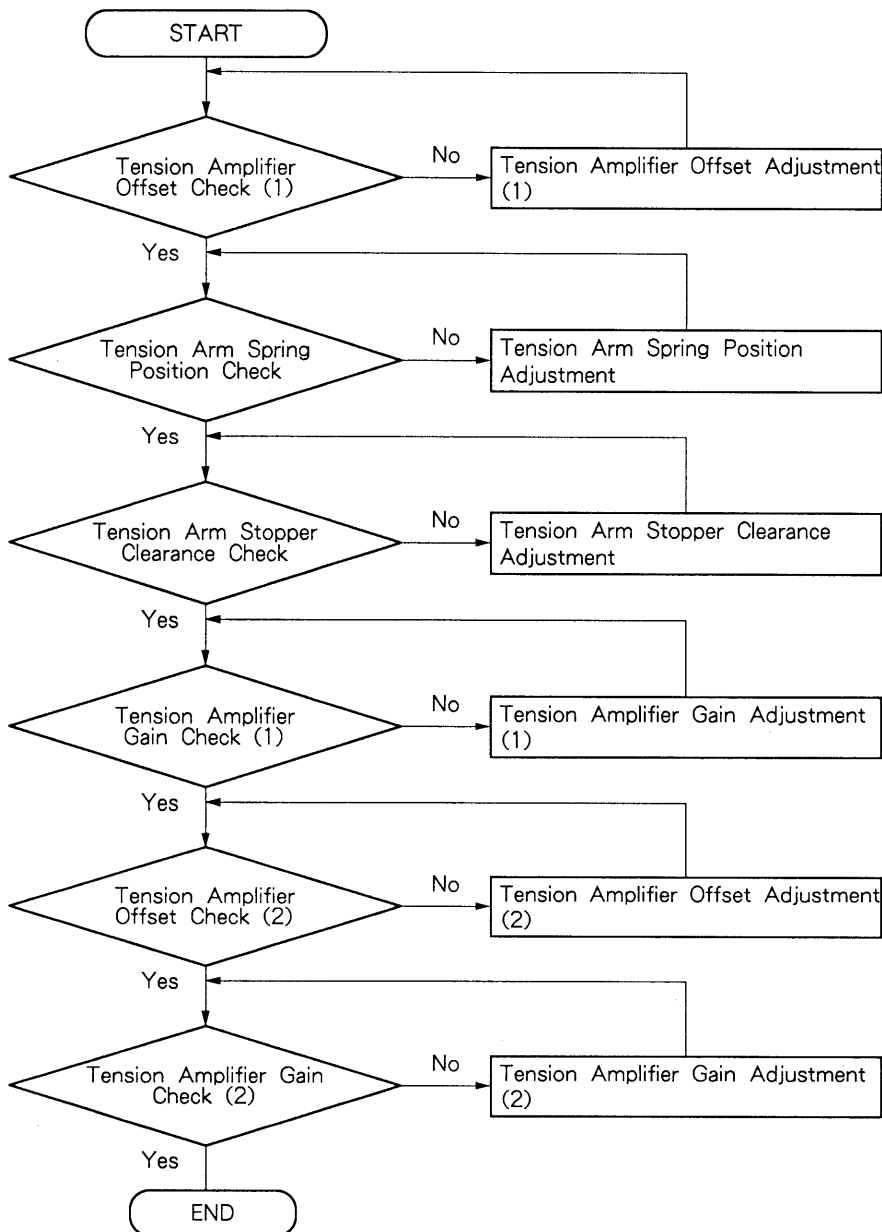


Fig. 9-2-1. Tension Adjustment Tool

C. Adjustment Flowchart



Tape Tension Adjustment

1. Remove the air damper from the tension arm assembly as follows.

- (1) Remove the nut (1) from the tension arm assembly as shown in Fig. 9-2-2.
- (2) Remove the connecting rod of the air damper in the arrow A direction.

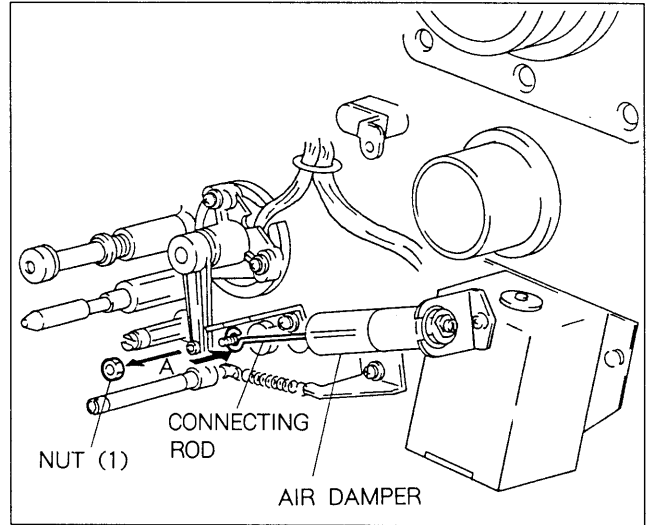


Fig. 9-2-2. Air Damper Replacement (1)

(3) Loosen the nut (2) and remove the air damper in the arrow B direction as shown in Fig. 9-2-3.

Note: Do not turn the screw C.

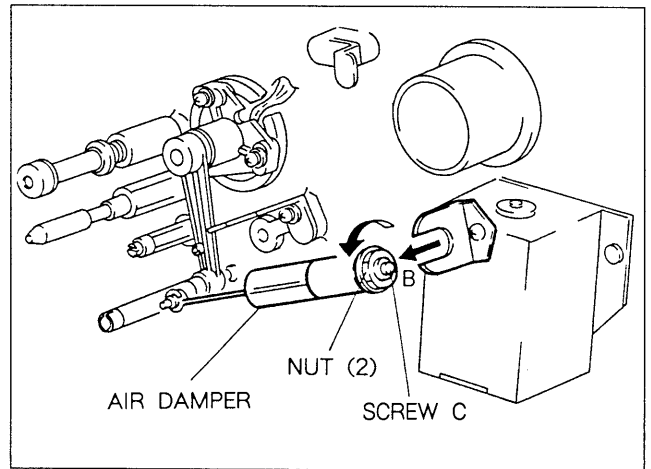


Fig. 9-2-3. Air Damper Replacement (2)

2. Take out the SV-90 board from the machine and insert the SV-90 board again through the extension board (EX-136) as shown in Fig. 9-2-4.

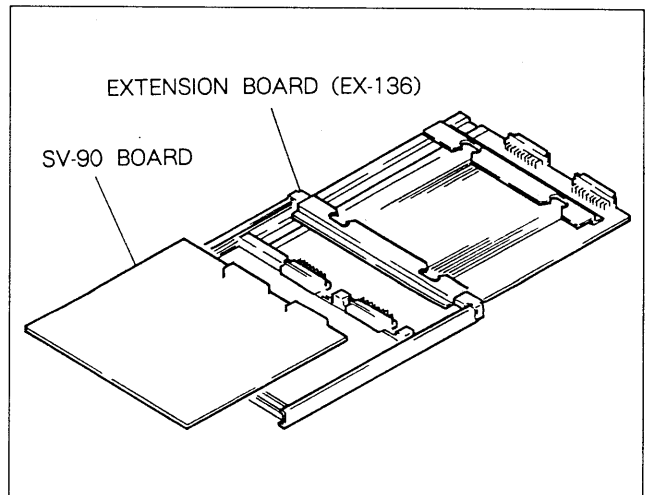
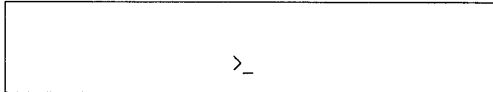


Fig. 9-2-4. Insertion of Extension Board

3. Tension Amplifier Offset Check (1)
 - (1) While pressing the tension arm in the arrow D direction with finger, fix the tension arm supporting tool as shown in Fig. 9-2-5.
 - (2) Connect digital voltmeter to TP22 and E3 (GND) on the SV-90 board as shown in Fig. 9-2-6 and turn the power ON.
 - (3) While pressing the SW2 on the SY-103 board, press **[0]** of the 21-key section. (Or referring to section 3-3, set the TTP ADJ menu.) With above operations, the following message will be appeared on the control panel display.



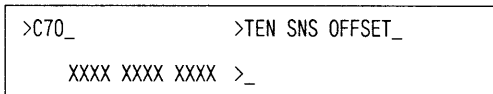
- (4) Check that the voltage at TP22 on the SV-90 board is within the specification.

Specification: 0 ± 0.02 V dc

When the voltage is met, remove the tension arm supporting tool then perform adjustment in step 5 and latter.

When the voltage is out of specification, perform step 4. Tension Amplifier Offset Adjustment (1).

4. Tension Amplifier Offset Adjustment (1)
 - (1) To set the TEN SNS OFFSET menu, press **[C]**, **[7]**, **[0]** and **[SET]** in sequence on the 21-key section.



When performing the TP22 voltage adjustment, press **[7]**, **[8]**, **[9]** or **[IN]** while pressing blue **[OUT]** of the 21-key section.

Function of each key

- [7]** key: Press when adjusting the voltage to “- -” direction.
- [8]** key: Press when adjusting the voltage to “-” direction.
- [9]** key: Press when adjusting the voltage to “+” direction.
- [IN]** key: Press when adjusting the voltage to “++” direction.

- (2) Remove the tension arm supporting tool.

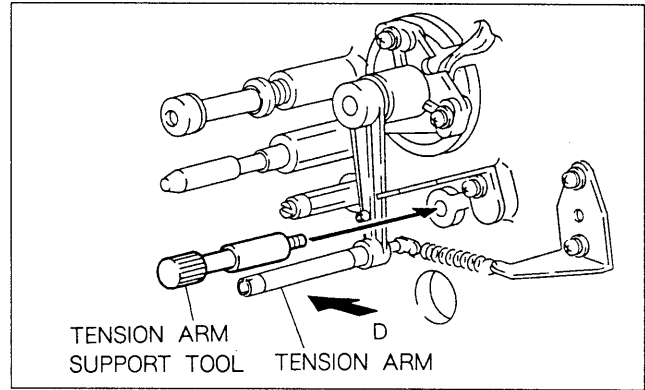


Fig. 9-2-5. Installation of Tension Arm Support Tool

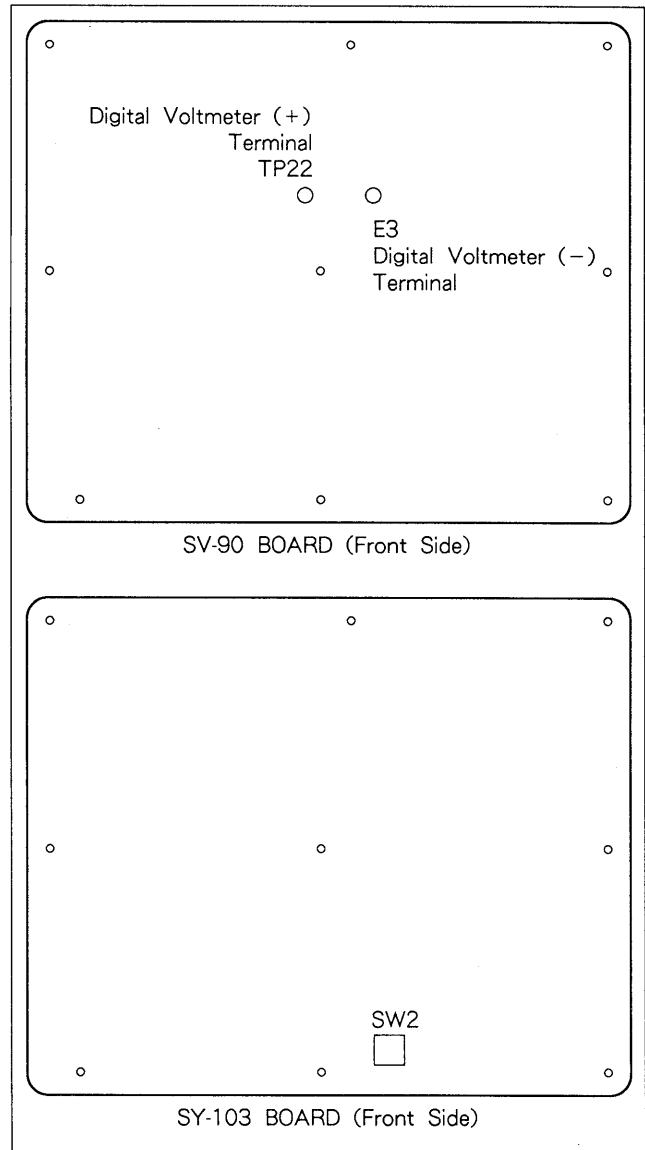


Fig. 9-2-6. Connection of Digital Voltmeter

5. Tension Arm Spring Position Check

- (1) Clean the mounting hole of the weight tool shown in Fig. 9-2-8 with cleaning piece.
- (2) Fix the weight tool to the tension regulator guide with care not to scratch the guide section.
- (3) Move the weight lightly right and left and stop it. Check that the voltage at TP22 on the SV-90 board is within the specification.

Specification: 0.538 ± 0.01 V dc

If the voltage is within the specification, remove the weight tool and perform step 7 and latter.

If the voltage is out of the specification, perform step 6. Tension Arm Spring Position Adjustment.

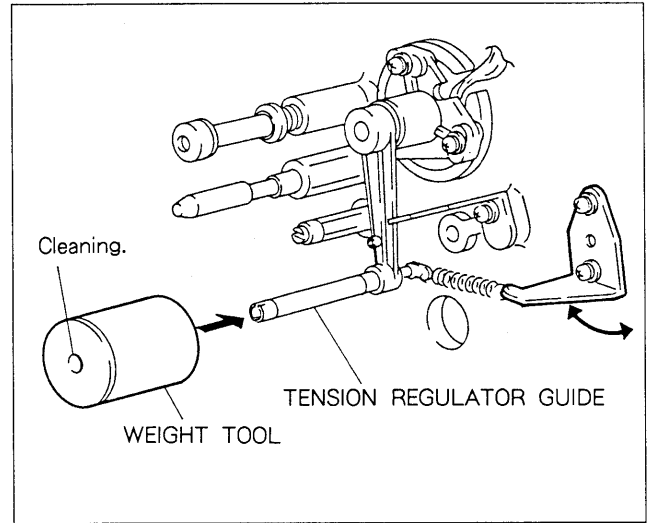


Fig. 9-2-7. Tension Arm Spring Position Check

6. Tension Arm Spring Position Adjustment

- (1) Loosen the two screws (1) until the spring holder shown in Fig. 9-2-8 can be moved lightly.
- (2) Insert the tip of the phillips screwdriver into the adjustment hole of the spring holder, move the screwdriver right and left and adjust the position so that the voltage at TP22 on the SV-90 board meet the specification.
- (3) Carefully tighten the two screws (1) securely without changing the position of the spring holder.
- (4) Check the voltage at TP22 on the SV-90 board again so that it is within the specification.
- (5) Carefully remove the weight tool without scratching the guide.

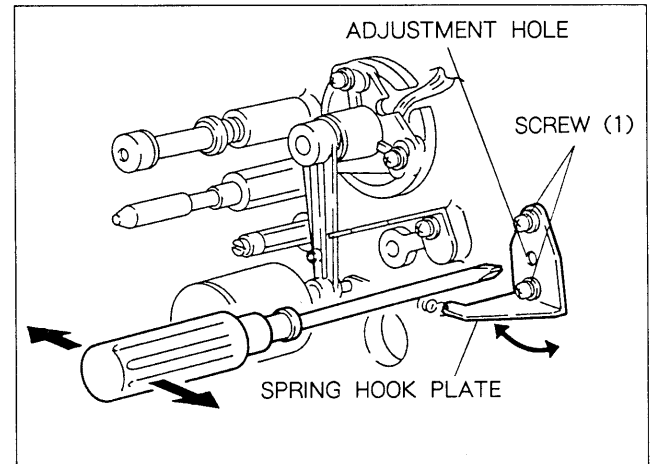


Fig. 9-2-8. Tension Arm Spring Position Adjustment

7. Tension Arm Stopper Clearance Check

Measure the clearance between stopper and tension arm with thickness gauge shown in Fig. 9-2-9 whether it is met the specification.

Specification: 0.3 to 0.7 mm

When the clearance is within the specification, perform step 9 and latter. If it is out of the specification, perform step 8. Tension Arm Stopper Clearance Adjustment.

8. Tension Arm Stopper Clearance Adjustment

To move the position of the stopper, loosen the screw (2) and adjust the clearance so that it is within above specification.

9. Tension Amplifier Gain Check (1)

Under the condition that tension arm is free, check the voltage at TP22 on the SV-90 board so that it is within the following specification.

Specification: 2.0 ± 0.1 V dc

When the voltage is within the specification, perform step 11 and latter.

If it is out of the specification, perform step 10. Tension Amplifier Gain Adjustment (1).

10. Tension Amplifier Gain Adjustment (1)

To set the TEN SNS GAIN menu, press [C], [7], [1] and [SET] in sequence on the 21-key section.

>C71_	>TEN SNS GAIN_
XXXX XXXX XXXX	>_

When performing the TP22/SV-90 voltage adjustment, press [7], [8], [9] or [IN] while pressing blue [OUT] on the 21-key section.

Function of each key

[7] key: Press when adjusting the voltage to “-” direction.

[8] key: Press when adjusting the voltage to “-” direction.

[9] key: Press when adjusting the voltage to “+” direction.

[IN] key: Press when adjusting the voltage to “++” direction.

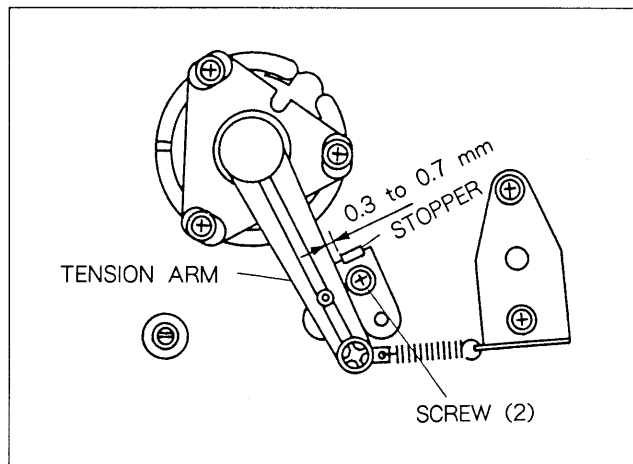


Fig. 9-2-9. Tension Arm Stopper Clearance Check

11. Tension Amplifier Offset Check (2)

- (1) Clean the mounting hole of the weight tool shown in Fig. 9-2-10 with cleaning piece.
- (2) Fix the weight tool to the tension regulator guide with care not to scratch the guide section.
- (3) Move the weight lightly right and left and stop it. Check that the voltage at TP22 on the SV-90 board is within the specification.

Specification: 0.538 ± 0.02 V dc

If the voltage is adjusted within the specification, remove the weight tool and perform step 13 and latter.

If the voltage is out of the specification, perform step 12. Tension Amplifier Offset Adjustment (2).

12. Tension Amplifier Offset Adjustment (2)

To set the TEN SNS OFFSET menu, press **[C]**, **[7]**, **[0]** and **[SET]** in sequence on the 21-key section.

```
>C70_          >TEN SNS OFFSET_  
XXXX XXXX XXXX >_
```

When performing the TP22/SV-90 voltage adjustment, press **[7]**, **[8]**, **[9]** or **[IN]** while pressing blue **[OUT]** on the 21-key section.

Function of each key

- [7]** key: Press when adjusting the voltage to “- -” direction.
- [8]** key: Press when adjusting the voltage to “-” direction.
- [9]** key: Press when adjusting the voltage to “+” direction.
- [IN]** key: Press when adjusting the voltage to “++” direction.

13. Tension Amplifier Gain Check (2)

While pressing the tension arm against the stopper with finger, check the voltage at TP22 on the SV-90 board so that it is within the following specification.

Specification: -2.0 V dc or less

When the voltage is within the specification, perform step 15 and latter.

If it is out of the specification, perform step 14. Tension Amplifier Gain Adjustment (2).

14. Tension Amplifier Gain Adjustment (2)

Release finger from the tension arm. Perform step 10 so that adjust the voltage at TP22 on the SV-90 board for 2.04 to 2.05 V dc. After adjustment, perform step 13 again.

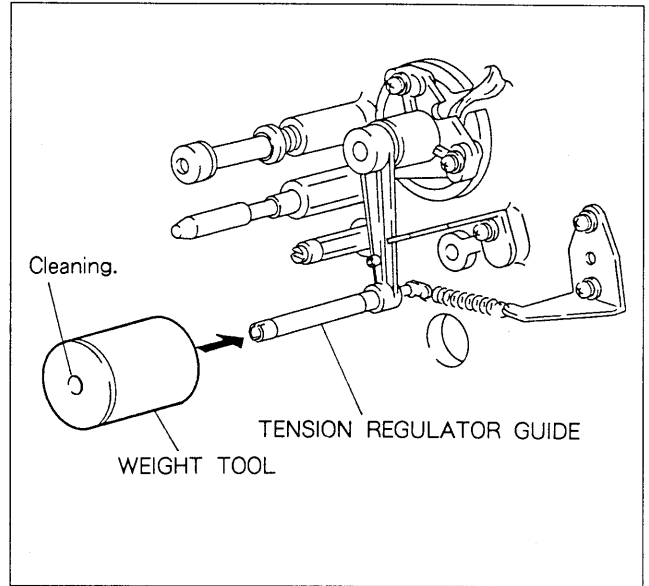


Fig. 9-2-10. Tension Amplifier Offset Check (2)

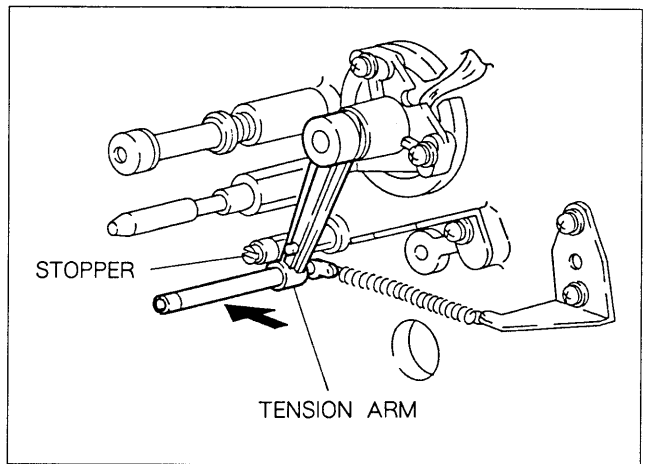


Fig. 9-2-11. Tension Amplifier Gain Check (2)

15. Writing of Non-Volatile RAM

Perform the following operation in order to write the above adjusted value into the non-volatile RAM.

- (1) Press **[C]**, **[T]**, **[F]** and **[SET]** in sequence while pressing blue **[OUT]** on the 21-key section. The following message is appeared on the control panel display.

```
>TEN SNS XXXX _ >NVW_  
XXXX XXXX XXXX >_
```

- (2) Keep pressing **[+]** key on the 21-key section until the message "PUSH NVWR SW_" appears on the control panel display.

```
>XXXX XX-XX >XXXX XX-XX  
XXXX XXXX XXXX >PUSH NVWR SW_
```

- (3) Press NVWR switch on the SV-90 board. The message "READY" appears on the control panel display.

```
>PUSH NVWR SW_ >READY_  
XXXX XXXX XXXX >_
```

- (4) Press **[C]**, **[O]** and **[SET]** in sequence on the 21-key section. The message "TEST MODE OFF" appears on the control panel display.

```
>CO_ >TEST MODE OFF_  
>_
```

- (5) Press **[SET]** while pressing blue **[OUT]** on the 21-key section to set the machine into the normal operating mode.

16. Turn OFF the power.

17. Remove the SV-90 board and extension board from the machine, then reinstall the SV-90 board.

18. Attach the air damper in the reverse order of step 1. After the completion, move the tension arm lightly right and left with finger, and check that the air damper can be moved smoothly.

Note: Be sure not to turn the screw C when attaching the air damper. If the screw C has been turned, refer to section 6-21. Replacement of Air Damper.

19. Clean the guides that touched at the adjustment with cleaning piece moistened with alcohol. After cleaning, wipe with dry cloth.

9-3. TAPE PATH ADJUSTMENT

Preliminary Information

- A. Check that the tape does not touch the reel flange too firmly and there is no abnormal tape curling near each guide when the tape runs in the REC, F.FWD, VAR-1 and REW modes.
- B. When the height of the guides has been adjusted, first tighten the setscrews and check the tape path again.
- C. Use a tape which is free from wrinkles and no damage on both edges, and whose reel flanges are characterized by minimum eccentricity.
- D. Before running the tape, clean the tape running surface of each guide.

9-3-1. Tape Path Check

1. Thread the tape correctly onto the reel table.
2. Put the machine into the REC mode and check the tape path of the following guides:
 - Supply reel:
The tape should barely touch the upper and lower flanges while it is running.
 - Guide post 1:
The tape should make contact with the upper flange of the guide with little curl when the upper winding tape is used, or the tape make contact with the lower flange of the guide with little curl when the lower winding tape is used.
 - Tension regulator guide:
Be sure to apply uniform tape tension to the tape running surface of the guide.
 - S guide roller:
The tape curls a little at the upper flange.
 - Guide post 2:
The tape should make contact with the upper flange of the guide but should barely curl at all. Be sure not to curl the tape at the lower flange.
 - Entrance and exit slant guides:
Be sure not to touch the tape to the guide flanges.

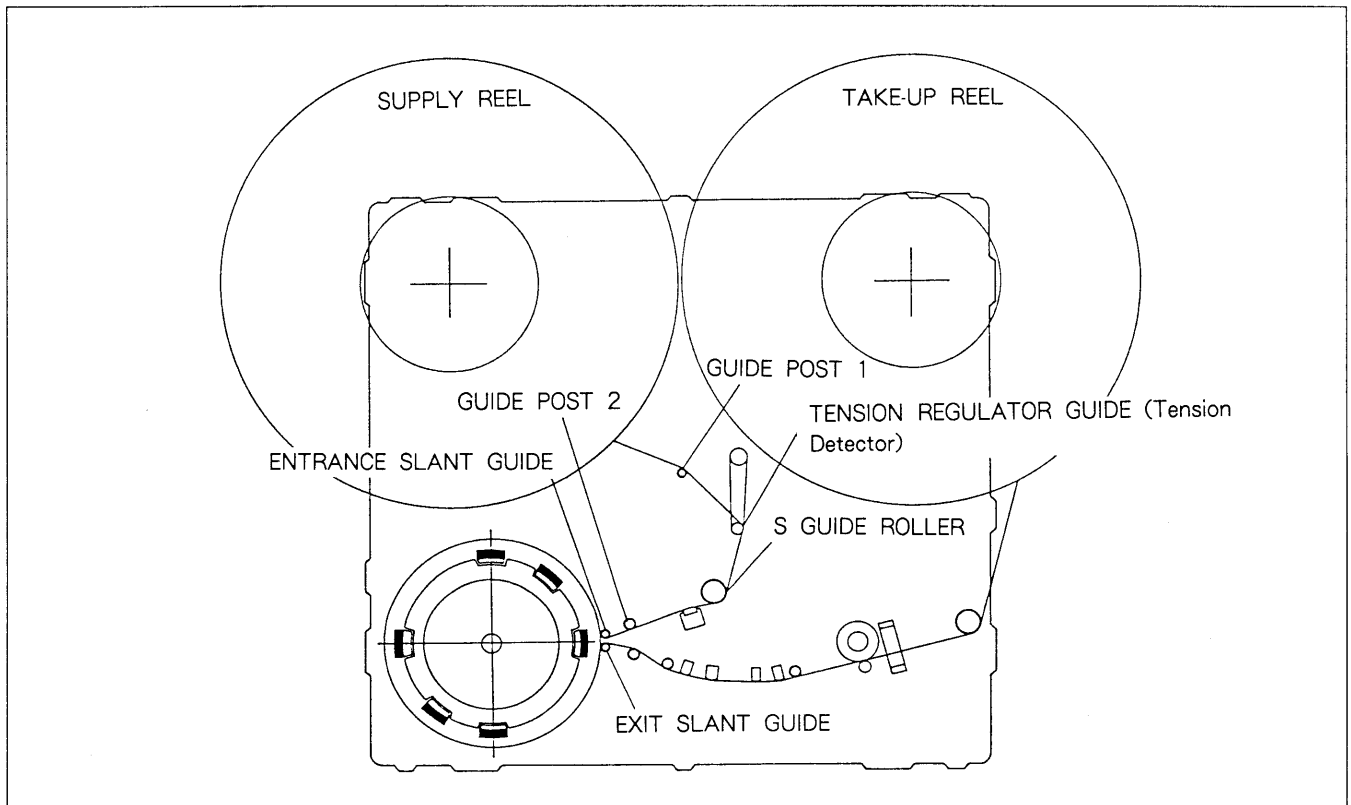


Fig. 9-3-1. Tape Path Check (1)

- Taper guide:
The tape should make contact with the upper flange of the guide but should barely curl at all.
- Guide post 3:
The tape should make contact with the upper flange of the guide but should barely curl at all.
- Guide post 4:
The tape does not make contact with upper and lower flanges of the guide. Or the tape make contact with the upper flange but should barely curl at all.
- T guide roller:
The tape should make contact with upper and lower flanges of the guide but should barely curl at all. Or the tape does not contact with the both flanges.
- Take-up reel:
The tape should barely touch the flange while it is running.

Note: When excessive curl appears at the upper flange of the guide post 2, taper guide or guide post 3, pay attention not to damage the tape edge.

3. If tape path is out of the above conditions, perform the height adjustment of each guide in accordance with the procedures in step 9-3-2.

Note: In order to memorize the present condition, be sure to put a mark on each guide when performing the guide adjustment.

4. Check that the tape is not curling abnormally in VAR-1, FF and REW modes.

Note: When excessive curl appears at the upper flange of the guide post 2, taper guide or guide post 3 in FF and REW modes, pay attention not to damage the tape edge.

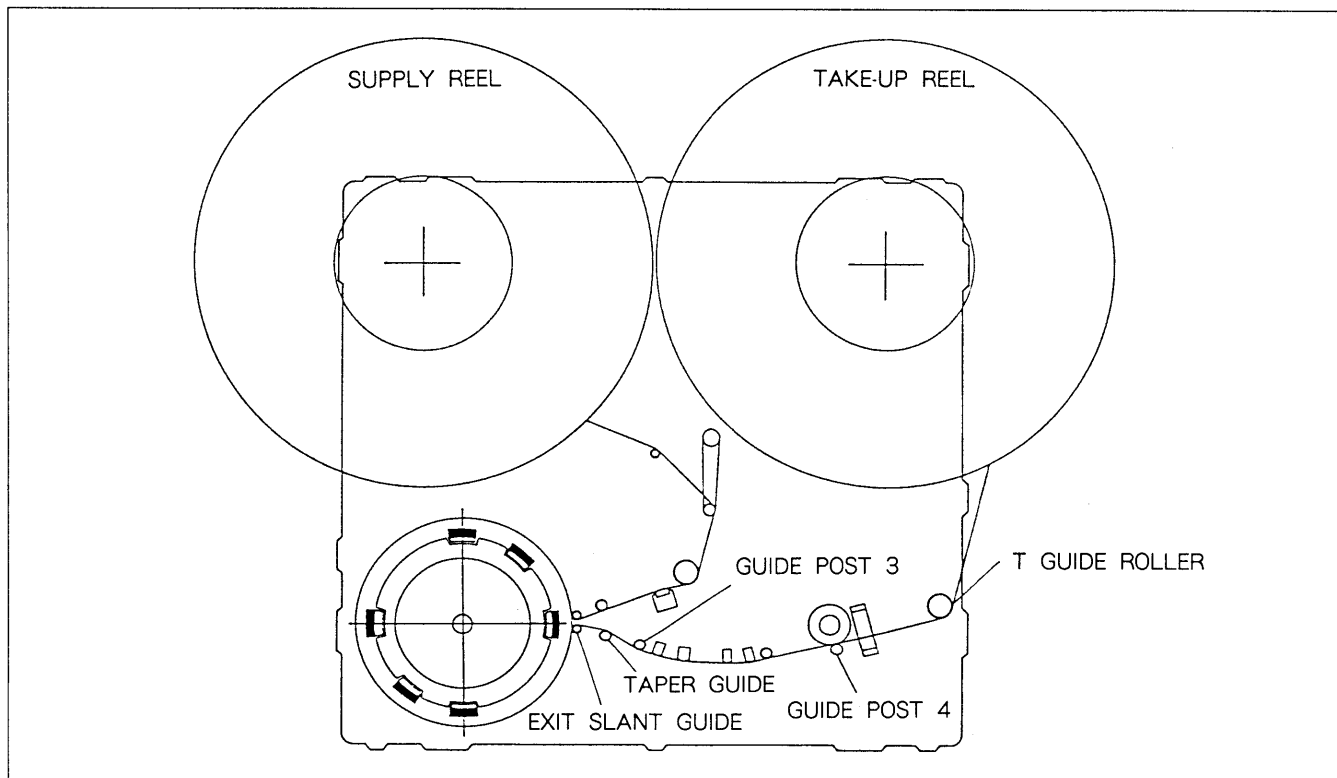


Fig. 9-3-2. Tape Path Check (2)

9-3-2. Tape Path Adjustment

Preliminary Information

- The standard of reel and guide heights are shown in Fig. 9-3-3. When a component has been replaced, mount the component in reference to the value shown below. For more details, refer to height adjustment of each guide.
- Before running the tape, clean the tape running surface of each guide.

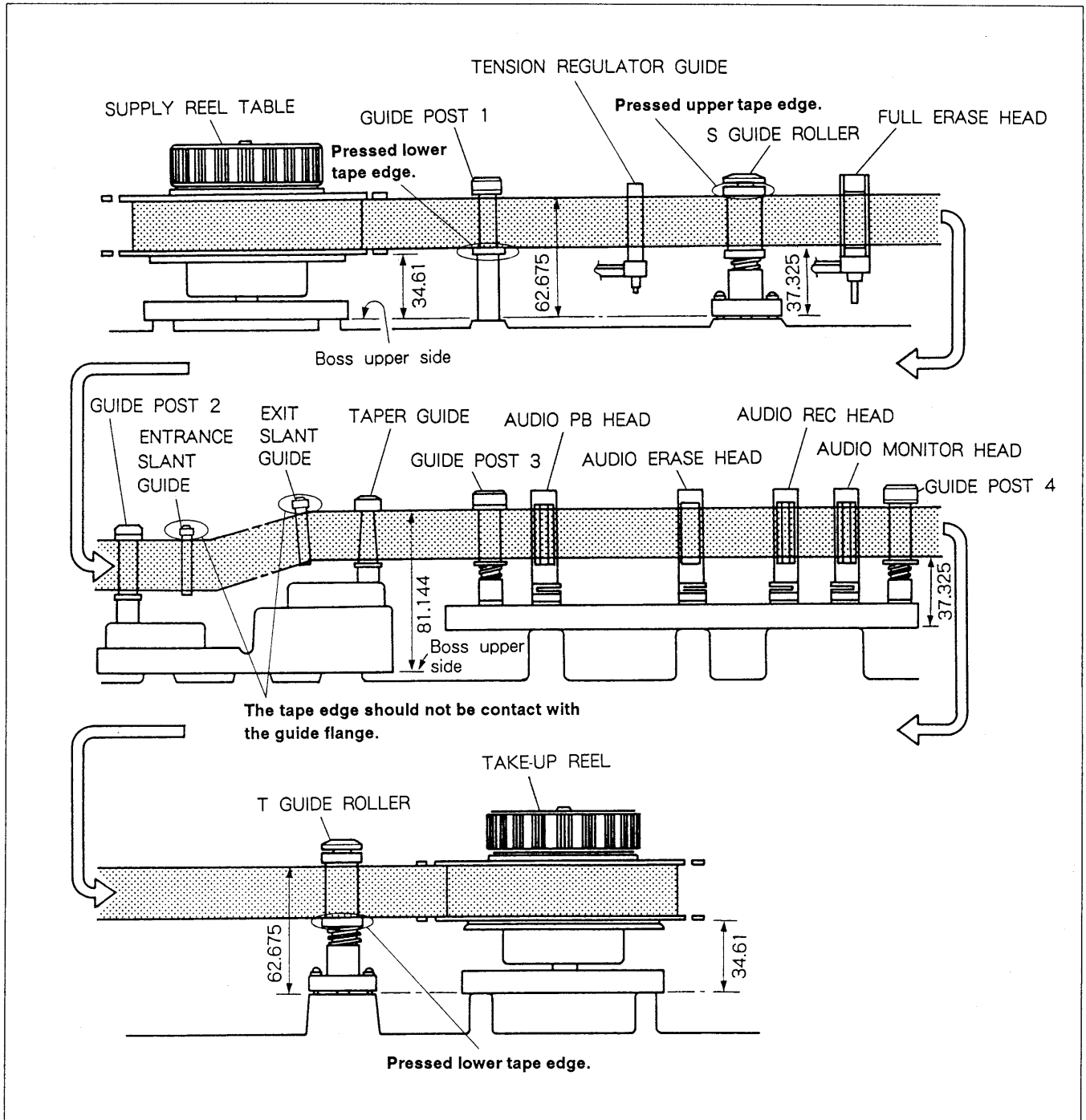


Fig. 9-3-3. Height of Each Guide

1. **Supply and Take-up Reel Tables Height Adjustment**
 When performing an ordinary tape path adjustment, it is not necessary to perform this adjustment. If the tape edge touches the reel flange extremely, check the height of each reel table referring to section 6-6-1. Supply Reel Motor Assembly Replacement and section 6-6-2. Take-up Reel Motor Assembly Replacement, then perform adjustment if necessary. If tape curl still appears, perform as follows.
 - Is tape threaded around the reel table correctly?
 - Is shape of the tape's reel flange normal?
 - Is there any abnormal noise generated from the reel motor?
 - Is there any eccentricity of the reel table?

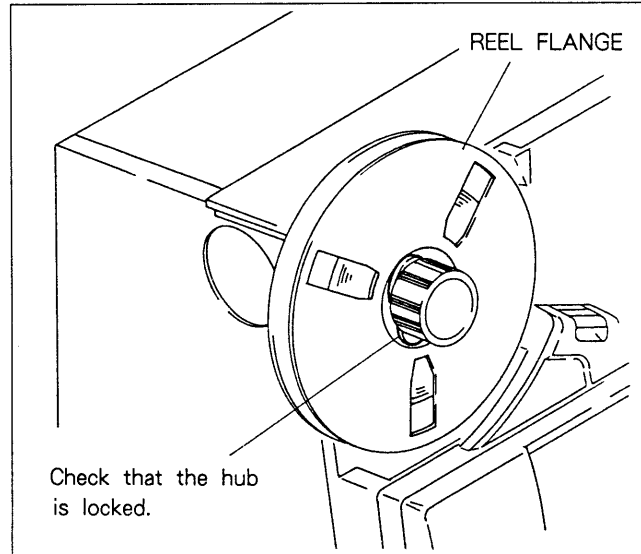


Fig. 9-3-4. S/T Reel Tables Height Adjustmet

2. **Guide Post 1 Height Adjustment (See Fig. 9-3-5.)**
 Before replacing the guide post, perform height adjustment referring to Fig. 9-3-3.

- (1) Loosen the setscrew. (Opposite side: 1.5 mm)
- (2) Put the machine into the recording mode.
- (3) Turn the cap right and left and adjust so that the tape will make light contact with the upper flange with little curl when the upper winding tape is used, or the tape will make light contact with the lower flange with little curl when the lower winding tape is used.

Also, check that the tape is not curling abnormally in order modes.

- (4) Hold the cap and tighten the setscrew with taking care that the tape path does not change. (Tightening torque: $80 \times 10^{-2} \text{ N}\cdot\text{m}$ {8 kgf·cm})
- (5) Check the tape path again.

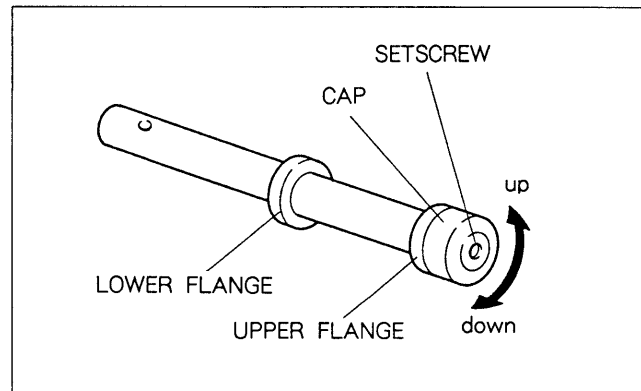


Fig. 9-3-5. Guide Post 1 Height Adjustment

3. **S Guide Roller Height Adjustment (See Fig. 9-3-6.)**
 Adjust the height of the S reel table and guide post 1 so that the tape will touch the GR upper flange with little curl in the recording mode. Final adjustment of this guide will be carried out in section 9-5. Tracking Adjustment.

When performing the tracking adjustment, adjust the height in the following procedures.

- (1) Loosen the setscrew. (Opposite side: 1.5 mm)
- (2) Put the machine into the recording mode.
- (3) Turn the GR flange right and left and adjust the height of the guide flange.
- (4) Hold the GR flange and tighten the setscrew with taking care that the tape path does not change. (Tightening torque: $80 \times 10^{-2} \text{ N}\cdot\text{m}$ {8 kgf·cm})

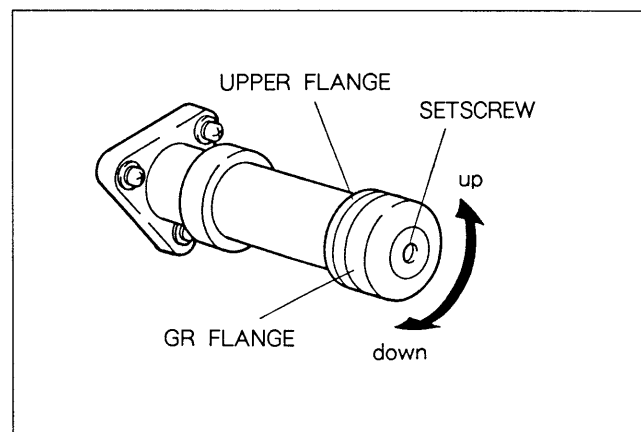


Fig. 9-3-6. S Guide Roller Height Adjustment

4. Guide Post 2 Height Adjustment (See Fig. 9-3-7.)
Final adjustment of this guide will be carried out in section 9-5. Tracking Adjustment. When performing the tracking adjustment, adjust the height in the following procedures.

- (1) Loosen the setscrew. (Opposite side: 1.5 mm)
- (2) Put the machine into the recording mode.
- (3) Turn the cap right and left and adjust the height.
- (4) Hold the cap and tighten the setscrew with taking care that the tape path does not change.
(Tightening torque: $80 \times 10^{-2} \text{ N}\cdot\text{m}$ {8 kgf·cm})

5. Entrance and Exit Slant Guides Height Adjustment
When performing an ordinary tape path adjustment, it is not necessary to perform this adjustment. Final adjustment of this guide will be carried out in section 9-5.

6. Taper Guide and Guide Post 3 Height Adjustment (See Fig. 9-3-8.)

This adjustment is not necessary when tape does not curl at the upper flange. Final adjustment will be carried out in section 9-5.

When performing the tracking adjustment, adjust the height in the following procedures.

- (1) Loosen the setscrew. (Opposite side: 1.5 mm)
- (2) Put the machine into the recording mode.
- (3) Turn the cap right and left and adjust the height.
- (4) Hold the cap and tighten the setscrew with taking care that the tape path does not change.
(Tightening torque: $80 \times 10^{-2} \text{ N}\cdot\text{m}$ {8 kgf·cm})

7. Guide Post 4 Height Adjustment (See Fig. 9-3-9.)

- (1) Loosen the setscrew. (Opposite side: 1.5 mm)
- (2) Put the machine into the recording mode.
- (3) Adjust the height by turning the cap right and left so that the tape touches to the upper flange without tape curl or the tape does not touch to the both flanges at all.
- (4) Hold the cap and tighten the setscrew with taking care that the tape path does not change.
(Tightening torque: $80 \times 10^{-2} \text{ N}\cdot\text{m}$ {8 kgf·cm})
- (5) Check the tape path again.

8. T Guide Roller Height Adjustment (See Fig. 9-3-10.)

Before replacing the T guide roller assembly, perform height adjustment referring to Fig. 9-3-3.

- (1) Loosen the setscrew. (Opposite side: 1.5 mm)
- (2) Put the machine into the recording mode.
- (3) Adjust the height by turning the GR flange right and left so that the tape touches to the lower flange without tape curl or the tape does not touch to the both flanges at all.
- (4) Hold the GR flange and tighten the setscrew with taking care that the tape path does not change.
(Tightening torque: $80 \times 10^{-2} \text{ N}\cdot\text{m}$ {8 kgf·cm})
- (5) Check the tape path again.

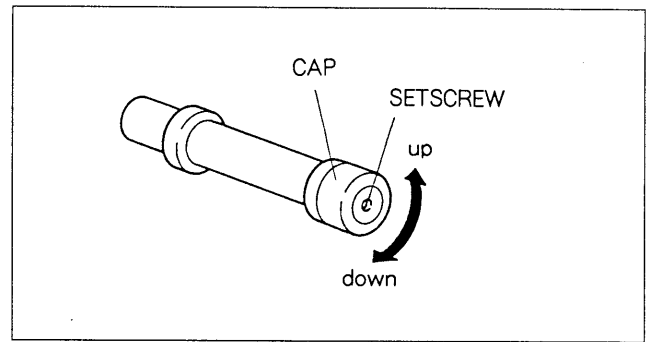


Fig. 9-3-7. Guide Post 2 Height Adjustment

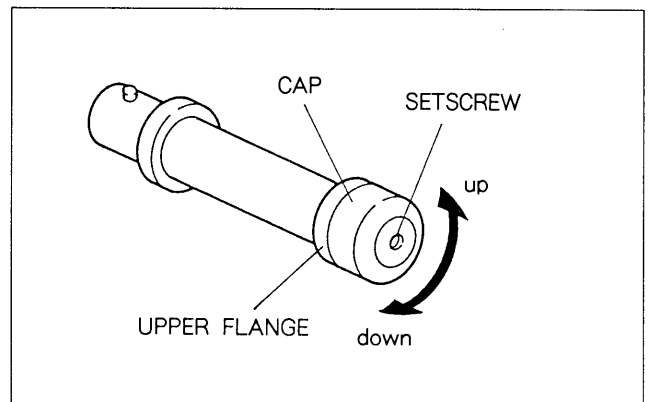


Fig. 9-3-8. Taper Guide and Guide Post 3 Height Adjustment

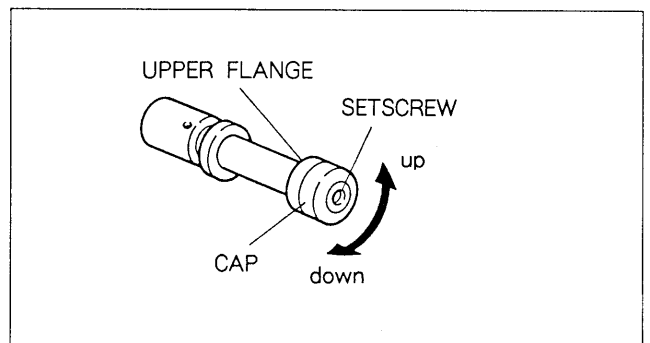


Fig. 9-3-9. Guide Post 4 Height Adjustment

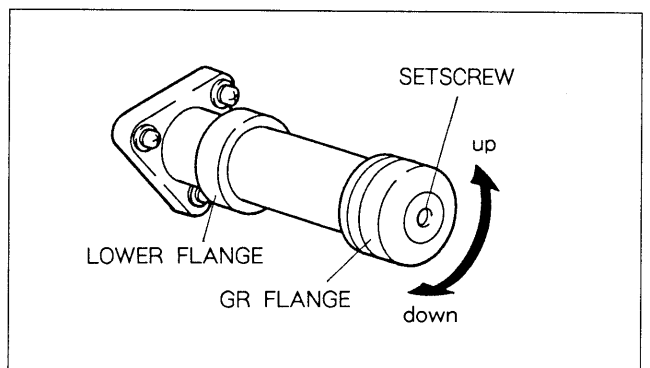
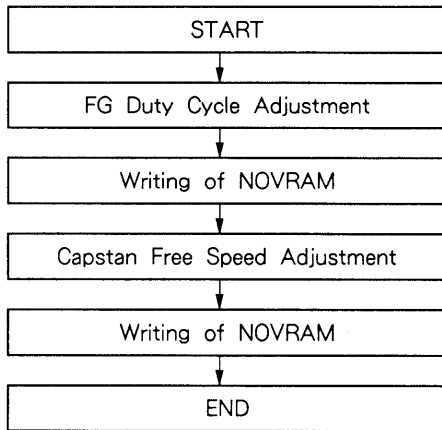


Fig. 9-3-10. T Guide Roller Height Adjustment

9-4. TAPE SPEED ADJUSTMENT

Preliminary Information

- A. The tape speed can be adjusted by adjusting the capstan lock time within the specification.
- B. This adjustment is required only when the capstan motor has been replaced.
- C. This adjustment is necessary to set the constant of the servo system in order to equal the capstan motor's FG pulse frequency to the reference frequency.
- D. Adjustment Flowchart



1. FG Duty Cycle Adjustment

- (1) To set TTP ADJ menu, press **[0]** on the 21-key section while pressing SW2 on the SY-103 board.

```

    >_
  
```

- (2) To set CAP FG ADJ menu, press **[F]**, **[8]** and **[SET]** in sequence on the 21-key section.

```

    >F8 CFG ADJ _
    D5 D5 XXXX XXXX >_
  
```

Spec. : $D5 \pm 2$ (D3 to D7)

The capstan motor starts to rotate automatically.

- (3) To adjust the FG duty cycle, press blue **[IN]** while pressing blue **[OUT]** on the 21-key section.

Spec. of FG duty cycle: $D5 \pm 2$ HEX (D3 to D7)

- (4) Press **[F]**, **[3]** and **[SET]** in sequence on the 21-key section. The rotation of the capstan motor stops automatically.

```

    >F8 CFG ADJ _      >F3 STOP_
    XXXX XXXX XXXX >_
  
```

2. Writing of Non-Volatile RAM

- (1) Perform the following operation in order to write the above adjusted value into the non-volatile RAM. Press **[C]**, **[T]**, **[F]** and **[SET]** in sequence while pressing blue **[OUT]** on the 21-key section. The following message is appeared on the control panel display.

```
>F3 STOP_      >NVW_
  XXXX XXXXXXXX > XXXX XX-XX
```

- (2) Keep pressing **[+]** key on the 21-key section until the message "PUSH NVWR SW" appears on the control panel display.

```
>XXXX XX-XX      >XXXX XX-XX
  XXXX XXXX XXXX >PUSH NVWR SW_
```

- (3) Press NVWR switch on the SV-90 board. The message "READY" appears on the control panel display.

```
>PUSH NVWR SW_  >READY_
  XXXX XXXX XXXX >_
```

- (4) Press **[C]**, **[0]** and **[SET]** in sequence on the 21-key section. The message "TEST MODE OFF" appears on the control panel display.

```
>CO_            >TEST MODE OFF_
                >_
```

- (5) Press **[SET]** while pressing blue **[OUT]** on the 21-key section to set the machine into the normal operating mode.

3. Capstan Free Speed Adjustment

- (1) Thread the blank tape and set the machine into the PLAY mode.
 (2) To set TTP ADJ menu, press **[0]** on the 21-key section while pressing SW2 on the SY-103 board.

```
>_
```

- (3) To set CAP SPEED ADJ menu, press **[C]**, **[C]**, **[0]** and **[SET]** in sequence on the 21-key section.

```
>CCO_           >CAP SPEED ADJ _
  OFA0 XXXX XXXX >_
```

└───┬───> Spec. : OFA0±A (OF96 to OFAA)

- (4) To adjust the capstan free speed, press blue **[IN]** while pressing blue **[OUT]** on the 21-key section.

Spec. of capstan free speed:

OFA0 ± A (OF96 to OFAA)

4. Writing of Non-Volatile RAM

- (1) Perform the following operation in order to write the above adjusted value into the non-volatile RAM. Press **[C]**, **[T]**, **[F]** and **[SET]** in sequence while pressing blue **[OUT]** on the 21-key section. The following message is appeared on the control panel display.

```
>CAP SPEED ADJ_ >NVW_
  XXXX XXXX XXXX >_
```

- (2) Keep pressing **[+]** key on the 21-key section until the message "PUSH NVWR SW" appears on the control panel display.

```
>XXXX XX-XX      >XXXX XX-XX
  XXXX XXXX XXXX >PUSH NVWR SW_
```

- (3) Press NVWR switch on the SV-90 board. The message "READY" appears on the control panel display.

```
>PUSH NVWR SW_  >READY_
  XXXX XXXX XXXX >_
```

- (4) Press **[C]**, **[0]** and **[SET]** in sequence on the 21-key section. The message "TEST MODE OFF" appears on the control panel display.

```
>CO_            >TEST MODE OFF_
                >_
```

- (5) Press **[SET]** while pressing blue **[OUT]** on the 21-key section to set the machine into the normal operating mode.

9-5. TRACKING ADJUSTMENT

9-5-1. Tracking Check

Preliminary Information

A. When the upper drum has been replaced, warm up the machine in the playback or recording mode for about 20 minutes in order to obtain a good head-to-tape contact before performing the tracking check.

B. Prepare the following tools for this adjustment.

- Alignment tape FR2-1
Sony Part No. 8-960-072-11
- Alignment tape FR2-2
Sony Part No. 8-960-072-12
(After the TC 10:30:00 Portion of the FR2-2, the narrow range recording is carried out, so the height adjustment of the PB and monitor head can be made accurately.)
- BNC-UM cable
Sony Part No. J-6264-360-A

1. Connect BNC connector side of the BNC-UM cable to an oscilloscope.
(Trigger: TP2/SV-90 board/slot No.1)
2. Connect UN connector side of the BNC-UM cable to CH-1 terminal of the DRC-1 board (slot No.5).
3. Thread an alignment tape and play back the CH-1 recorded portion
(TC 00:00:00 to 05:00:00 for the FR2-1, TC 00:00:00 to 10:00:00 for the FR2-2).
4. Turn the TRACKING control and adjust the RF amplitude for maximum.
5. Check that the RF waveform is within the specifications shown in Fig. 9-5-2.
6. (Play back after the TC 05:30:00 Portion of the FR2-1, and after the TC 10:30:00 Portion of the FR2-2.) Check that the RF waveforms of CH-2 through CH-8 (DRC-1 board/slot No.4) in sequence so that they meet the specifications.
If not, perform adjustment in section 9-5-2. Tracking Adjustment.

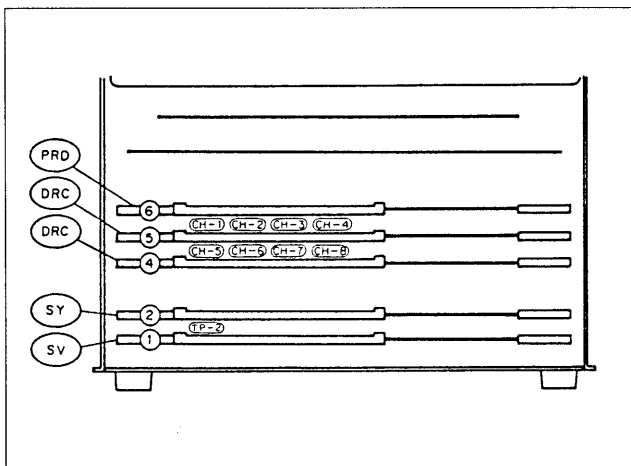


Fig. 9-5-1. DRC-1 and SV-90 Boards

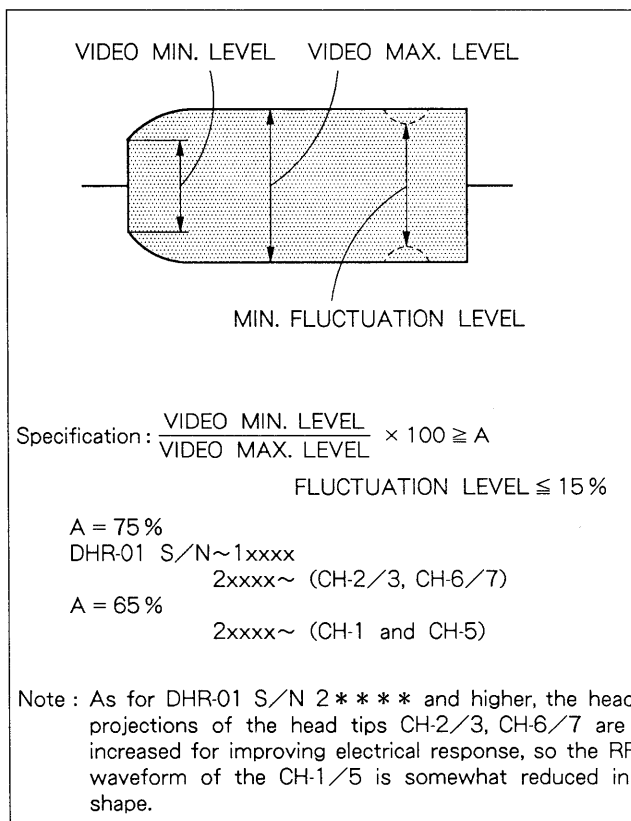


Fig. 9-5-2. PB RF Waveform of an Alignment Tape

9-5-2. Tracking Adjustment

Preliminary Information

- A. The purpose of this adjustment is to maintain the tape interchangeability by adjusting the head-to-tape contact and head trace onto the recorded track correctly using an alignment tape.
- B. Adjustment Points
- Perform this adjustment with the height adjustment of the following guides.
Entrance side: S guide roller and guide post 2
Exit side: Taper guide and guide post 3
 - Be sure to adjust the RF waveform at the entrance side first, then proceed to adjust at the exit side.
 - When handling the tape, be sure to touch the back-coated surface, not to touch the magnetized surface.
 - Do not perform the entrance or the exit slant guide adjustment unnecessarily.
- C. If the tracking cannot be correctly adjusted due to wear of the entrance slant guide, exit slant guide or tape lead surface of the head drum assembly, replace the parts in accordance with section 6.
- D. Adjustment Flowchart
- The major items for the tracking adjustment are shown in the following flowchart.
 - Numbers inside the flowchart are corresponded to the adjustment procedures.

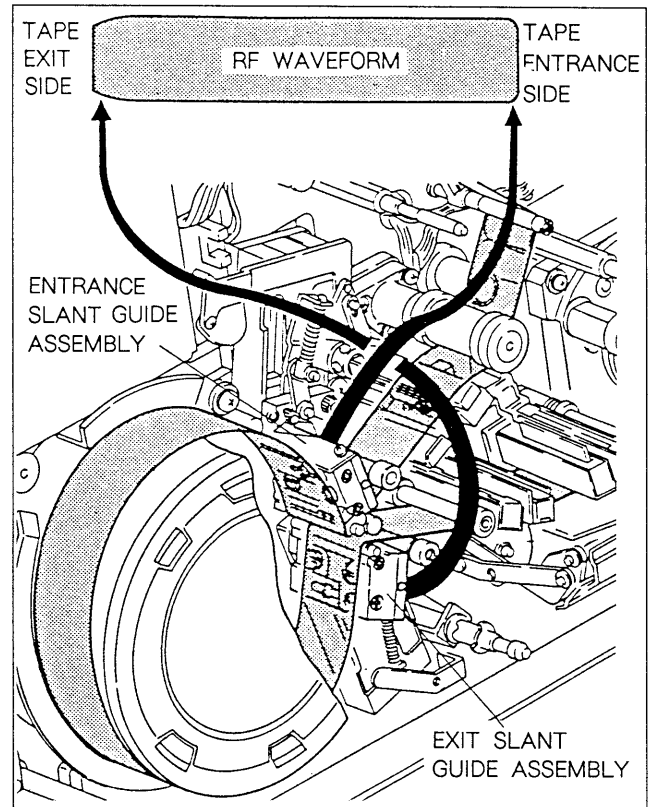
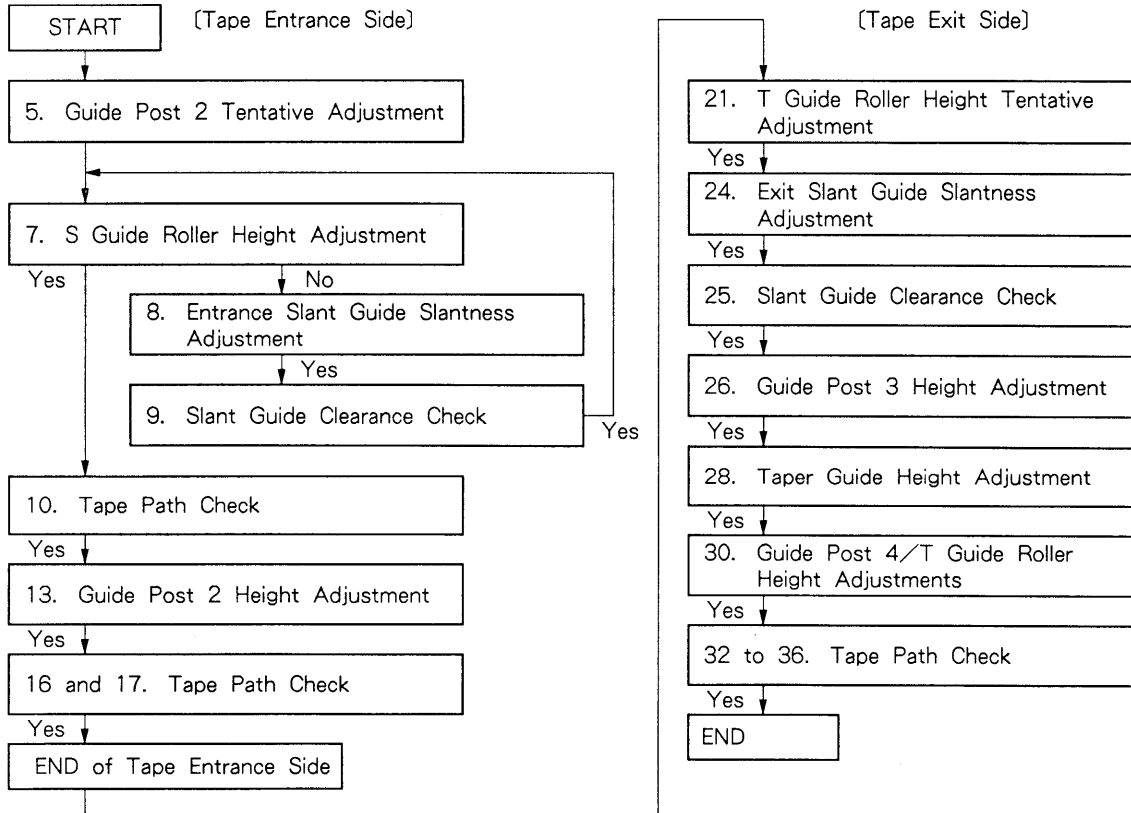


Fig. 9-5-3. Tracking Adjustment



[Tape Entrance Side Adjustment]

1. Connect BNC connector side of the BNC-UM cable to an oscilloscope.

Trigger: TP2/SV-90 board (slot No.1)

2. Connect UN connector side of the BNC-UM cable to CH-1 terminal of the DRC-1 board (slot No.5).
3. Loosen the setscrews for the following guides:
 - S guide roller (opposite side: 1.5 mm)
 - Guide post 2 (opposite side: 1.5 mm)
4. Thread an alignment tape and play back the CH-1 recorded portion
(TC 00:00:00 to 05:00:00 for the FR2-1, TC 00:00:00 to 10:00:00 for the FR2-2).
5. Adjust the guide post 2 with following procedures in order to set free from the limitation.
 - (1) Loosen the setscrew. (Opposite side: 1.5 mm)
 - (2) Turn the cap in the clockwise direction in order to appear the tape curl once, then turn it in the counterclockwise direction until there is no tape curl.
 - (3) Turn the cap in the counterclockwise direction about 10 degrees.
6. Turn the TRACKING control counterclockwise and stops where the RF amplitude is 80 % from its maximum level.

7. Adjust the S guide roller shown in Fig. 9-5-4 so that the RF waveform shown in Fig. 9-5-5 of tape entrance side is flat. When adjusting the S guide roller, at this time, tape curl may appear at the guide post 2, therefore, perform adjustment while observing the guide post 2 is set free from the limitation.

Also, be sure to check the tape curl at the guide post 1.

- (1) Loosen the setscrew. (Opposite side: 1.5 mm)
- (2) Adjust the height of the guide roller by turning the GR flange clockwise or counterclockwise.

Note: Be sure not to curl at the lower flange of the S guide roller but there is little curl at the upper flange.

If it is impossible to adjust for flat as shown in example 1 with S guide roller, adjust the slantness of the entrance slant guide.

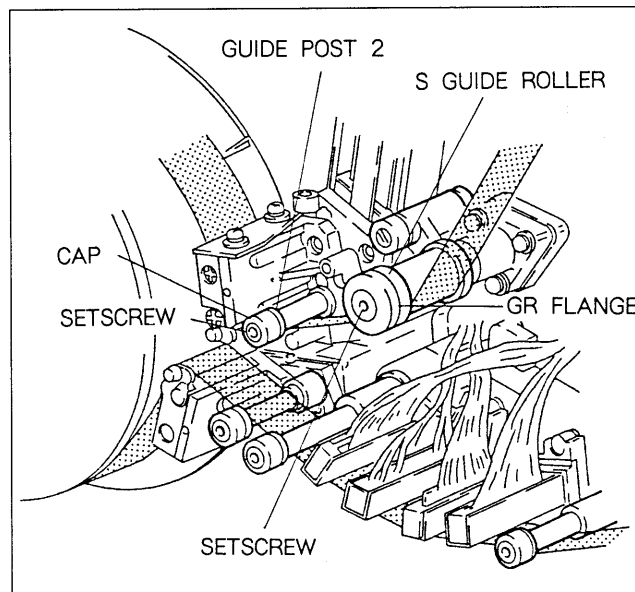


Fig. 9-5-4. Guide Post 2 and S Guide Roller

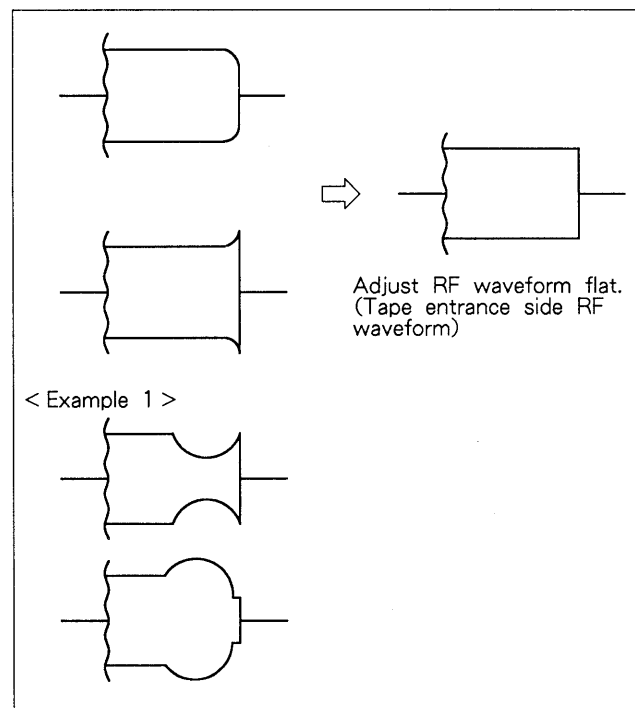


Fig. 9-5-5. Tape Entrance Side RF Waveform

8. Entrance Slant Guide Slantness Adjustment
- (1) Loosen the entrance slant guide locking screw (opposite side: 2.5 mm) shown in Fig. 9-5-6.
 - (2) Press the top or bottom edge of the tape from the back-coated surface while it is running, and find the RF waveform where it becomes flat as shown in Fig. 9-5-5.
 - (3) Perform adjustment by turning the slant adjustment screw of the entrance slant guide as follows:
 - If the RF waveform becomes good by pressing the top edge of the tape (opposite of example 1), turn the slant adjustment screw clockwise.
 - If the RF waveform becomes good by pressing the bottom edge of the tape (same as example 1), turn the adjustment screw counterclockwise.

Note: Please note the followings when performing the adjustment.

- (A) Do not turn the slant adjustment screw more than ± 45 degrees against the position where adjusted before.
- (B) When finishing the adjustment, be sure not to stop the slant adjustment screw at the backlash position, but turn it counterclockwise.

When performing the adjustment by turning the slant adjustment screw clockwise, turn it about three turns over the adjustment point then turn it back in the counterclockwise direction in order to eliminate the backlash.

- (4) Tighten the entrance slant guide locking screw.

9. Slant Guide Clearance Check

This check is necessary only when the entrance slant guide has been adjusted.

Close the slant guide assembly by inserting the flat blade screwdriver into the cut-out portion of the drive lever as shown in Fig. 9-5-17.

• Entrance Guide Clearance Check

Check that the clearances C and D are within the specifications in step 11 of section 6-5-1. If not, readjust step 11 of section 6-5-1.

Note 1: Take extreme care not to give shocks to the rotary head when inserting the thickness gauge.

Note 2: When performing the clearance check, insert the thickness gauge into the side of the upper drum where no head tips.

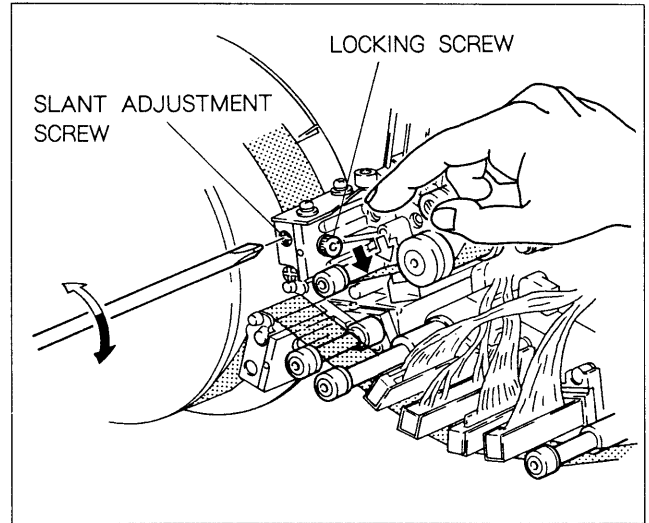


Fig. 9-5-6. Entrance Slant Guide Slantness Adjustment

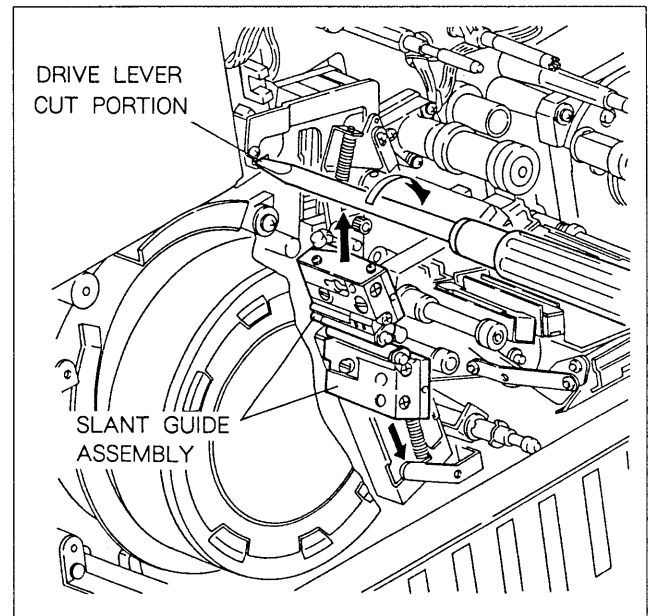


Fig. 9-5-7. Slant Guide Clearance Check

10. Check that the tape path of each guide shown in Fig. 9-5-8 are within the specifications.

Note: If there is excessive tape curl or no curl at the upper flange of the S guide roller at all, perform the entrance slant guide slantness adjustment referring to step 8.

- When there is excessive tape curl, turn the slant adjustment screw clockwise.
- When there is no tape curl at all, turn the slant adjustment screw counterclockwise. However, it is OK that the RF fluctuation is within the specification in the self-recording/playback mode.

11. Turn the TRACKING control and check that the RF waveform of the tape entrance side changes evenly. If not, readjust from step 7.
12. Tighten the S guide roller setscrew (opposite side: 1.5 mm) with taking care that the tape path does not change.
13. Perform the height adjustment of the guide post 2 as follows.
- (1) Turn the cap of the guide post 2 in the clockwise direction in order to appear the curl once. Then, turn the cap in the counterclockwise direction and stops where the upper flange touches to the tape edge.
 - (2) Tighten the guide post 2 setscrew (opposite side: 1.5 mm) with taking care that the tape path does not change.
14. Check the tape curls at the S guide roller and the guide post 2.
15. Turn the TRACKING control and check that the RF waveform changes evenly.
16. Check that the tape path of all guides shown in Fig. 9-5-9 are within the specifications in PLAY, VAR-1, FF and REW modes respectively.

After the completion of tape path, check that no white powder on the full erase head and the tape's upper edge contacting surface of the capstan shaft.

If there is a powder, check the upper flange of each guide, find the guide which in contact with the tape edge excessively, and perform adjustment from step 7. (Refer to section 9-14. Tape Edge Damage Check.)

SUPPLY REEL	Tape should not make contact with reel flange.
GUIDE POST 1	A little curl at upper (or lower) flange allowed when upper (or lower) winding tape is used.
S GUIDE ROLLER	A little curl at upper flange allowed but never curl at lower flange.
GUIDE POST 2	Tape should make contact with upper flange with little curl but never curl at lower flange.
ENTRANCE SLANT GUIDE	Tape should not make contact with guide flange.

Fig. 9-5-8. Specification of Each Guide during Tape Running

SUPPLY REEL	Tape should not make contact with reel flange.
GUIDE POST 1	A little curl at upper (or lower) flange allowed when upper (or lower) winding tape is used.
S GUIDE ROLLER	A little curl at upper flange allowed. (Never curl other than PLAY mode or a little curl at the lower flange allowed if it is within specification.)
GUIDE POST 2	There is almost no tape curl.
ENTRANCE SLANT GUIDE	Tape should not make contact with flange.

Fig. 9-5-9. Specification of Each Guide during Tape Running

17. Check that the tape path of all guides shown in Fig. 9-5-10 are within the specifications in VAR -2/30 mode.

Note: Proceed to step 18 when there is excessive tape curl which the tape edge may be folded, at the S guide roller.

SUPPLY REEL	Tape should not make contact with reel flange.
GUIDE POST 1	A little curl at upper (or lower) flange allowed when upper (or lower) winding tape is used.
S GUIDE ROLLER	A little curl at upper flange without folding the tape edge allowed.
GUIDE POST 2	A little curl at upper flange allowed.
ENTRANCE SLANT GUIDE	Tape should not make contact with flange.

Fig. 9-5-10. Specification of Each Guide during Tape Running

18. S Guide Roller Slantness Adjustment

While pushing the tip of the S guide roller shown in Fig. 9-5-11, find the direction whose tape curl decreases.

In case when the tape curl is decreased by pushing the tip in the arrow direction, insert the spacer into portion C (up to 20 μm).

Note 1: Since spacer adjustment has already been completed from 0 through 40 μm, do not lose the installed spacer when adding the new spacer. Also, do not change the inserting direction.

Note 2: If it is necessary to insert the spacer more than 20 μm in thickness, perform the entrance slant guide adjustment referring to step 8. When adjusting, turn the adjustment screw clockwise.

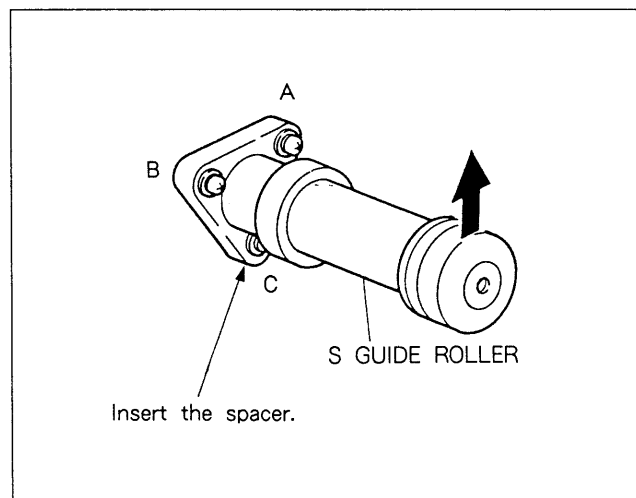


Fig. 9-5-11. S Guide Roller Slantness Adjustment

[Tape Exit Side Adjustment]

19. Loosen the following setscrews for each guide:

- Taper guide (Opposite side: 1.5 mm)
- Guide post 3 (Opposite side: 1.5 mm)
- Guide post 4 (Opposite side: 1.5 mm)
- T guide roller (Opposite side: 1.5 mm)

20. Thread an alignment tape and play back the CH-1 recorded portion (TC 00:00:00 to 05:00:00 for the FR2-1, TC 00:00:00 to 10:00:00 for the FR2-2). Set the following guides free from the limitation.

- Taper guide:
Turn approx. 90 degree counterclockwise.
- Guide post 3:
Turn the guide clockwise to appear the tape curl once, turn it back gradually counterclockwise and stops where about 10 degrees later from the curl just disappeared.
- Guide post 4:
Turn the guide clockwise to appear the tape curl once, turn it back gradually counterclockwise and stops where about 10 degrees later from the curl just disappeared.

Note: Be sure to adjust the taper guide, guide post 3 and guide post 4 in this order. After the completion of guide post 4 adjustment, check the taper guide and guide post 3.

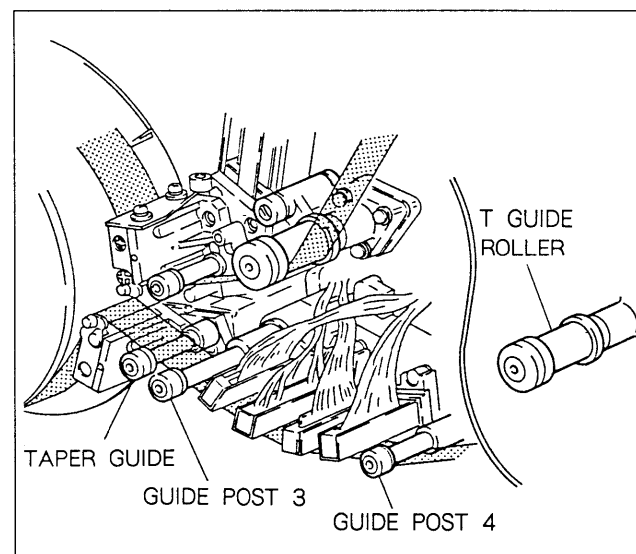


Fig. 9-5-12. Taper Guide, Guide Post 3, Guide Post 4 and T Guide Roller

21. Adjust the height of the T guide roller for no tape curl at the upper and lower portions of the flange.
22. Check the tape running position of the T reel and adjust it so that the tape does not contact with the reel flange. (Be sure to use the empty reel with minimum fluctuation.)
23. Turn the TRACKING control counterclockwise and stops where the RF amplitude is 80 % from its maximum level.

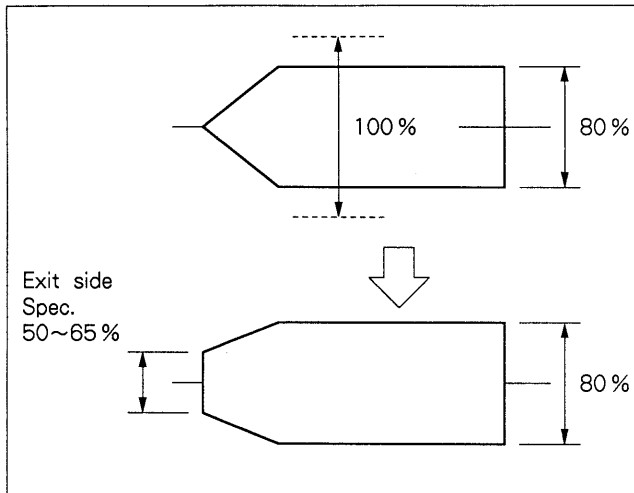


Fig. 9-5-13. Tape Exit Side RF Waveform (1)

24. Exit Slant Guide Slantness Adjustment

- (1) Loosen the exit slant guide locking screw (opposite side: 2.5 mm) as shown in Fig. 9-5-14.
- (2) Press the top or bottom edge (between exit slant guide and taper guide) of the tape from the back-coated surface with toothpick while it is running, and find the RF waveform where it becomes good.
- (3) Perform adjustment by turning the slant adjustment screw of the exit slant guide until the RF waveform meets the specification shown in Fig. 9-5-15.
 - If the RF waveform becomes good by pressing the top edge of the tape: Turn the slant adjustment screw clockwise.
 - If the RF waveform becomes good by pressing the bottom edge of the tape: Turn the adjustment screw counterclockwise.

Note: Please note the followings when performing the adjustment.

- (A) Do not turn the slant adjustment screw more than ± 45 degrees against the position where adjusted before.
- (B) When finishing the adjustment, be sure not to stop the slant adjustment screw at the backlash position, but turn it clockwise.
When performing the adjustment by turning the slant adjustment screw counterclockwise, turn it about three turns over the adjustment point then turn it back in the clockwise direction in order to eliminate the backlash.

When performing this adjustment, be sure to stop the drum rotation.

- (4) Tighten the exit slant guide locking screw.

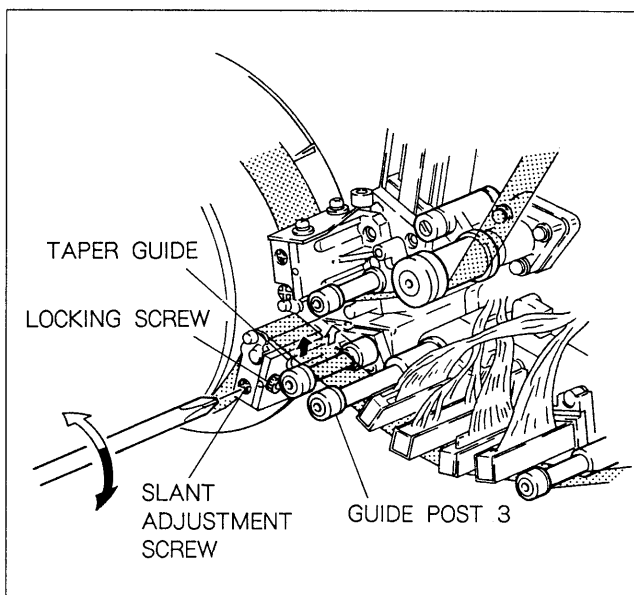


Fig. 9-5-14. Exit Slant Guide Slantness Adjustment

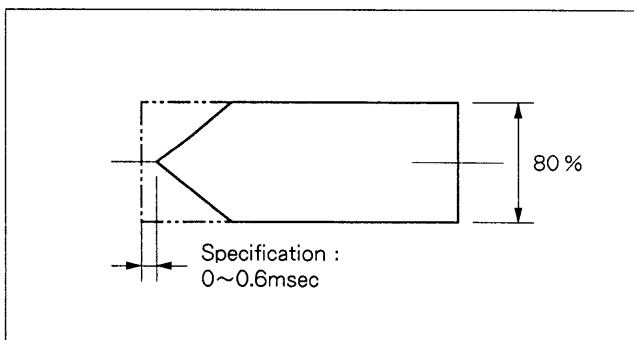


Fig. 9-5-15. Tape Exit Side RF Waveform (3)

25. Slant Guide Clearance Check

This check is necessary only when the exit slant guide has been adjusted.

Close the slant guide assembly by inserting the flat blade screwdriver into the cut-out portion of the drive lever as shown in Fig. 9-5-16.

- Exit Guide Clearance Check

Check that the clearances C and D are within the specifications in step 10 of section 6-5-2.

If not, readjust step 10 of section 6-5-2.

Note 1: Take extreme care not to give shocks to the rotary head when inserting the thickness gauge.

Note 2: When performing the clearance check, insert the thickness gauge into the side of the upper drum where no head tips.

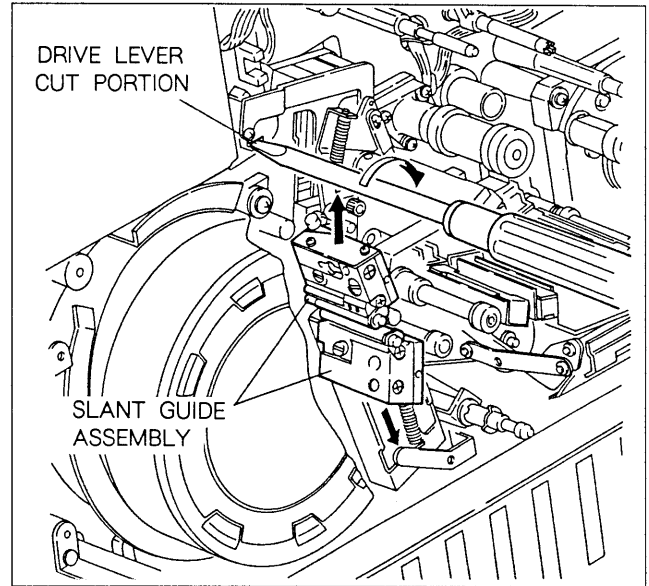


Fig. 9-5-16. Slant Guide Clearance Check

26. Turn the cap of the guide post 3 in the clockwise direction and adjust it so that the RF waveform shown in Fig. 9-5-13 of the tape exit side meets the specification.

At this time, tape path of the guide post 4 and the T guide roller may change, therefore check them and perform adjustment if necessary.

If there is tape curl due to a big change in tape path around guide post 4 and T guide roller, perform adjustment hastily in order to prevent an alignment tape from damage.

- Guide post 4: no limitation
- T guide roller: no curl at upper and lower flanges
- T reel: tape does not contact with the flange

27. Tighten the guide post 3 setscrew with taking care that the tape path does not change.

28. Turn the cap of the taper guide in the clockwise direction and tighten it so that the RF waveform of the tape exit side shown in Fig. 9-5-17 becomes flat.

Note 1: The RF waveform shown in Fig. (b) appears when the tape is extremely pushed by the taper guide causing tape damage. Be sure to meet the specification in Fig. (a).

Note 2: If there is an excessive inversion as shown in Fig. (c), perform again the slantness adjustment of the exit slant guide.

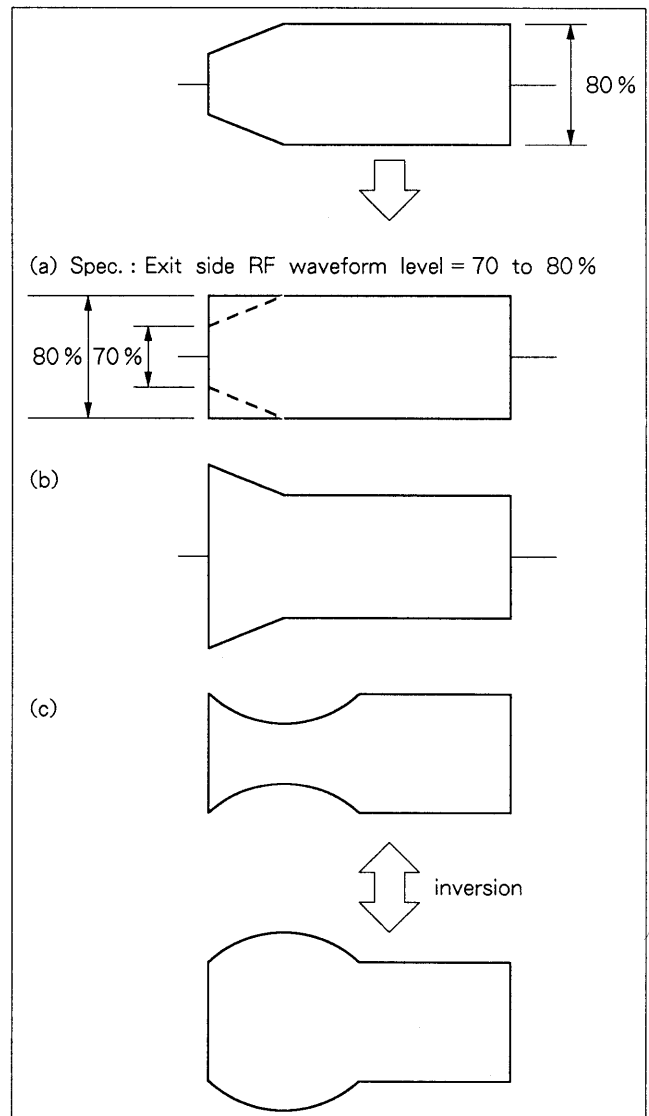


Fig. 9-5-17. Tape Exit Side RF Waveform (2)

29. Turn the TRACKING control and check that the RF waveform changes evenly.

30. Adjust the height of each guide so that the tape path of guide post 4 and T guide roller are within the specifications shown in Fig. 9-5-18.

31. Check that the taper guide and guide post 3 are limited by their upper flange and there are no tape curls. (See Fig. 9-15-19.)

If there are excessive tape curls, perform the following adjustment.

- If there is excessive tape curl at the guide post 3, adjust the RF waveform for 50 % with guide post 3 referring to step 24, then readjust from step 25.
- If there is excessive tape curl at the taper guide, adjust the RF waveform for 65 % with guide post 3 referring to step 24, then readjust from step 25.

32. Check that the tape path of all guides shown in Fig. 9-5-19 are within the specifications in VAR-1 mode.

33. Check that the tape path of all guides shown in Fig. 9-5-20 are within the specifications in VAR-7/30 mode.

34. Play back after the 05:30:00 Portion of the FR2-1, or after the 10:30:00 Portion of the FR2-2 with VAR-7/30 mode and check so that there is no improper RF waveform due to lack of head-to-tape contact as shown in Fig. 9-5-21.

35. Check that the tape path of all guides shown in Fig. 9-5-20 are within the specifications in VAR \pm 2/30 mode.

GUIDE POST 4	Tape should not make contact with upper and lower flanges or make contact with upper flange with little curl.
T GUIDE ROLLER	The tape should not curl at all.
TAKE-UP REEL	Tape should not make contact with upper and lower flanges. (Due to winding of tape.)

Fig. 9-5-18. Specification of Each Guide during Tape Running (Normal PB)

TAPER GUIDE GUIDE POST 3	Tape should make contact with upper flange with little curl.
GUIDE POST 4 T GUIDE ROLLER	A little curl allowed.
TAKE-UP REEL	Tape should not make contact with the flange.

Fig. 9-5-19. Specification of Each Guide during Tape Running (VAR-1)

TAPER GUIDE GUIDE POST 3	Tape should make contact with upper flange with little curl.
GUIDE POST 4 T GUIDE ROLLER	There is a little curl but tape does not fold, is allowed.
TAKE-UP REEL	Tape should not contact with the flange.

Fig. 9-5-20. Specification of Each Guide during Tape Running (VAR-7/30, \pm 2/30)

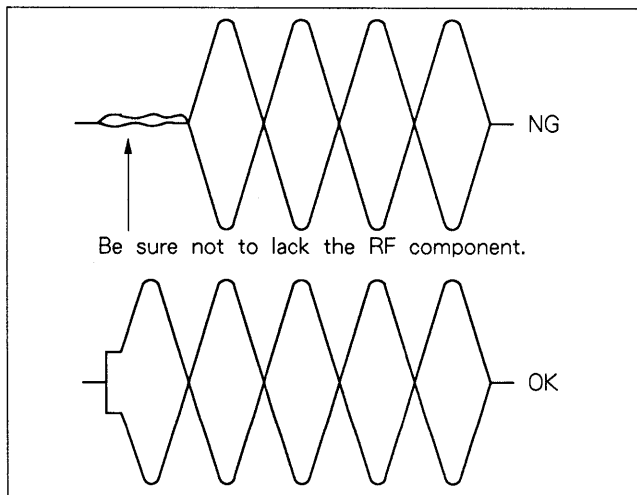


Fig. 9-5-21. PB RF Waveform of an Alignment Tape

36. Check that the tape path of all guides shown in Fig. 9-5-22 are within the specifications in SHTTLE ± 4 and ± 8 modes.

37. Check that the tape path of all guides shown in Fig. 9-5-22 are within the specifications in FF and REW modes respectively.

After the completion of tape path, check that no white powder on the full erase head and the tape's upper edge contacting surface of the capstan shaft. If there is a powder, check the upper flange of each guide, find the guide which in contact with the tape edge excessively, and perform adjustment from step 24.

Note: If there is excessive tape curl at the guide post 4 and T guide roller, perform the following adjustment.

- Guide post 4:
Adjust the height of the T guide roller in PLAY mode with no tape curl at the T guide roller.
- T guide roller:
Proceed to step 38 when there is excessive tape curl which the tape edge may be folded.

38. T Guide Roller Slantness Adjustment

While pushing the tip of the T guide roller shown in Fig. 9-5-23, find the direction whose tape curl decreases. In case when the tape curl is decreased by pushing the tip in the arrow direction, insert the spacer into portion C (up to 20 μm).

Note 1: Since spacer adjustment has already been completed from 0 through 40 μm , do not lose the installed spacer when adding the new spacer.

TAPER GUIDE GUIDE POST 3 GUIDE POST 4	Tape should make contact with upper flange with little curl.
T GUIDE ROLLER	A little curl allowed.
TAKE-UP REEL	Tape should not make contact with the flange.

Fig. 9-5-22. Specification of Each Guide during Tape Running (Shuttle ± 4 , ± 8 , ± 15 (FF, REW))

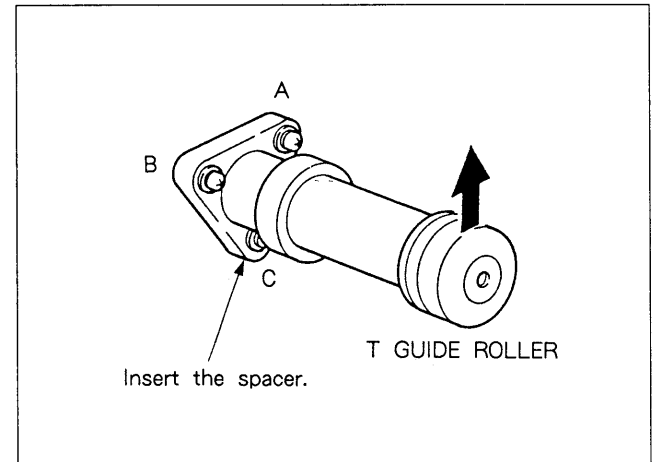


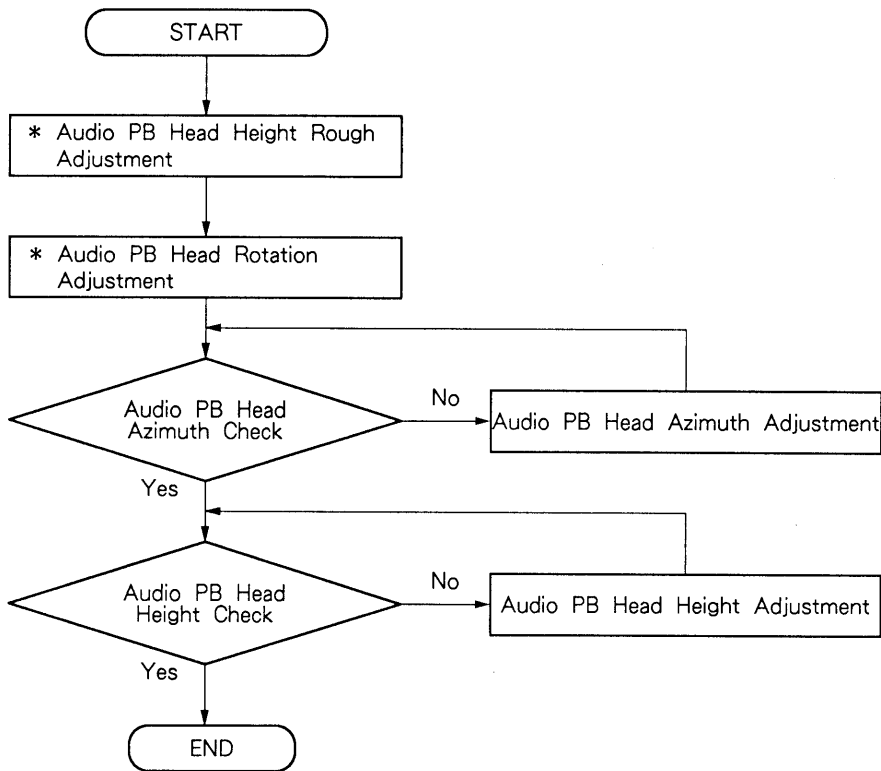
Fig. 9-5-23. T Guide Roller Slantness Adjustment

9-6. AUDIO PB HEAD CHECK AND ADJUSTMENT

Preliminary Information

- A. When the audio PB head has been replaced or the guides on the tape path have been adjusted, be sure to check the audio PB head.
- B. Prepare the following tools for this check and adjustment:
- Alignment tape FR2-1
Sony Part No. 8-960-072-11
 - Extension board EX-136
Sony Part No. A-6001-007-A

C. Adjustment Flowchart



* : This adjustment is required only when the audio PB head has been replaced.

9-6-1. Audio PB Head Check

1. Pull the AU-109 board out from the machine and insert it via the extension board (EX-136).
(Refer to "Level Control Panel and AU-109 Board Removal" in section 2-2.)
2. Connect CH-1 and CH-2 of oscilloscope to TP104 (DA.CH-1) and TP804 (DA.CH-8) on the AU-109 board respectively.

Trigger: CH-1 or CH-2

3. Perform step 2 "Audio PB Head Height Rough Adjustment and Rotation Adjustment" in section 9-6-2 only when the PB head has been replaced.

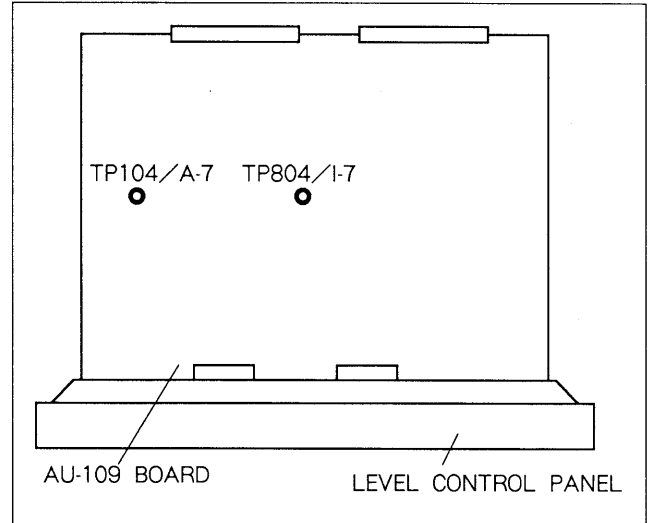


Fig. 9-6-1. AU-109 Board

4. Audio PB Head Azimuth Check
 - (1) Thread an alignment tape and play it back.
(Any Portion for the FR2-1, TC 00:00:00 to 10:00:00 for the FR2-2)
 - (2) Set the time base of oscilloscope to 1 μ secs.
 - (3) Check that the phase difference between CH-1 and CH-2 is within the specification shown in Fig. 9-6-2. If not, perform step 3 "Audio PB Head Azimuth Adjustment" in section 9-6-2.

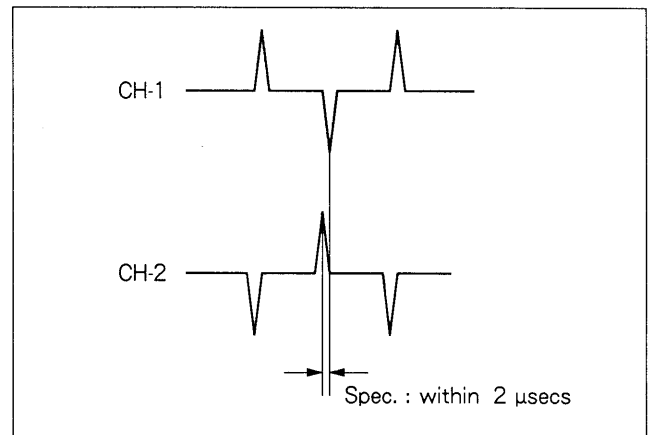


Fig. 9-6-2. Audio PB Head Azimuth Check

5. Audio PB Head Height Check
 - (1) Thread an alignment tape and play it back.
(Any Portion for the FR2-1, TC 10:30:00 for the FR2-2)
 - (2) Set the time base of oscilloscope to 500 μ secs.
 - (3) Push up or down the tape against the PB head during playback as shown in Fig. 9-6-3. Check that the CH-1 output is decreasing from the maximum level when the tape has been pushed both upward and downward.
If the CH-1 output is increasing, perform step 4 "Audio PB Head Height Adjustment" in section 9-6-2.

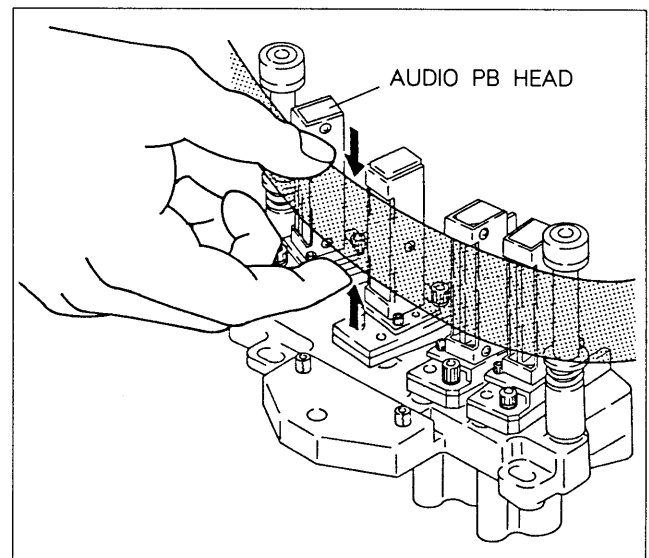


Fig. 9-6-3. Audio PB Head Height Check

6. Disconnect oscilloscope.
7. Remove the AU-109 and extension boards then reinstall the AU-109 board directly into the machine.

9-6-2. Audio PB Head Adjustment

1. Insert the AU-109 board into the machine via the extension board (EX-136) and connect oscilloscope. (Refer to steps 1 and 2 of section 9-6-1.)

2. Audio PB Head Height Rough Adjustment and Rotation Adjustment
Perform this adjustment only when the PB head has been replaced.

(1) Thread an alignment tape and play it back.
(Any Portion for the FR2-1, after TC 10:30:00 for the FR2-2)

(2) Loosen the height fixing screw shown in Fig. 9-6-4.

(3) Turn the height adjustment screw in the counterclockwise direction so that the CH-2 (DA. CH-8) output is zero. Turn the height adjustment screw gradually in the clockwise direction until the CH-1 (DA. CH-1) output becomes the maximum, and check the maximum output range.

(4) Set the height adjustment screw in the middle of the maximum output range.

Note: Be sure to finish the adjustment by turning the height adjustment screw in the clockwise direction.

(5) Turn the PB head rotation adjustment dowel shown in Fig. 9-6-5 right and left so that check the maximum range of CH-1 (DA. CH-1) output.

Note: Be sure to turn the adjustment dowel within ± 90 degrees.

(6) Set the adjustment dowel in the middle of the maximum output range.

(7) Tighten the height fixing screw.

(Tightening torque: 140×10^{-2} N·m {14 kgf·cm} to 180×10^{-2} N·m {18 kgf·cm})

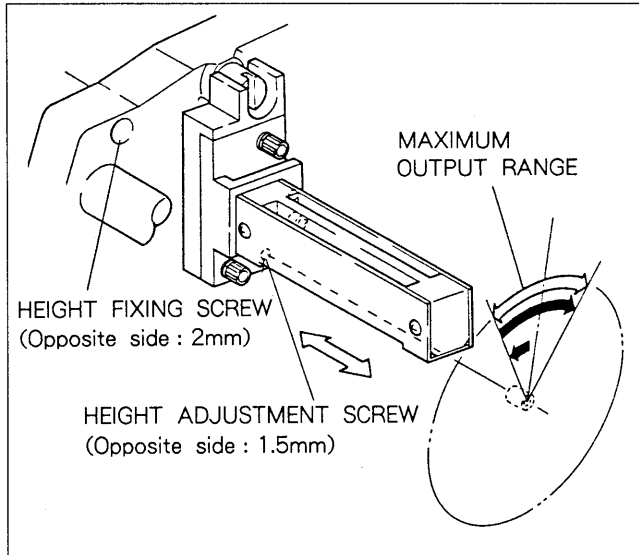


Fig. 9-6-4. Audio PB Head Height Adjustment

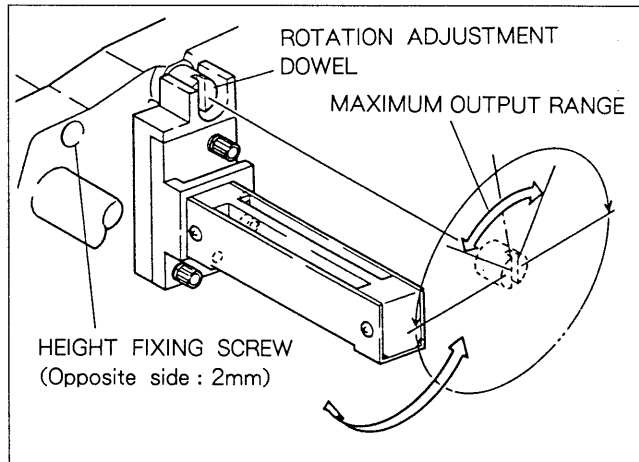


Fig. 9-6-5. Audio PB Head Rotation Adjustment

3. Audio PB Head Azimuth Adjustment

- (1) Thread an alignment tape and play it back.
(Any Portion for the FR2-1, TC 00:00:00 to 10:00:00 for the FR2-2)
- (2) Push the top of the PB head right and left with finger lightly and find the direction whose phase difference, CH-1 (DA. CH-1) and CH-2 (DA. CH-8), conforms to the specification in Fig. 9-6-6.
- (3) Turn and adjust the azimuth adjustment screws (A) and (B) as follows until the phase difference conforms to the specification.

Note: Be sure to finish the adjustment by turning the azimuth adjustment screw in the clockwise direction.

- When the phase difference conforms to the specification by pushing the PB head left, turn and adjust the azimuth adjustment screw (A) in the counterclockwise direction and the azimuth adjustment screw (B) in the clockwise direction.
- When the phase difference conforms to the specification by pushing the PB head right, turn and adjust the azimuth adjustment screw (B) in the counterclockwise direction and the azimuth adjustment screw (A) in the clockwise direction.
(Tightening torque: $10 \times 10^{-2} \text{ N}\cdot\text{m}$ {1 kgf·cm})

Note 1: Be sure to tighten the azimuth adjustment screws (A) and (B) evenly with specified torque. If not, zenith increases and the tape path may be unstable.

Note 2: When the adjustment does not conform to the specification with a specified tightening torque $10 \times 10^{-2} \text{ N}\cdot\text{m}$ {1 kgf·cm}, loosen the azimuth adjustment screws (A) and (B) for 1/4 to 1/2 turn, tighten them gradually and alternately in the clockwise direction in consideration of phase change due to tightening, then lock them with a torque of $10 \times 10^{-2} \text{ N}\cdot\text{m}$ {1 kgf·cm}.

- (4) After adjustment, apply a coat of paint at the head of the azimuth adjustment screw (A).

4. Audio PB Head Height Adjustment

- (1) Thread an alignment tape and play it back.
(Any Portion for the FR2-1, after TC 10:30:00 for the FR2-2)
- (2) Loosen the height fixing screw shown in Fig. 9-6-7.
- (3) Turn the height adjustment screw right and left and check the maximum output range of the CH-1 (DA. CH-1).
- (4) Set the height adjustment screw in the middle of the maximum output range.

Note: Be sure to finish the adjustment by turning the height adjustment screw in the clockwise direction.

- (5) Tighten the height fixing screw with taking care that the CH-1 (DA. CH-1) waveform does not change.
(Tightening torque: $140 \times 10^{-2} \text{ N}\cdot\text{m}$ {14 kgf·cm} to $180 \times 10^{-2} \text{ N}\cdot\text{m}$ {18 kgf·cm})

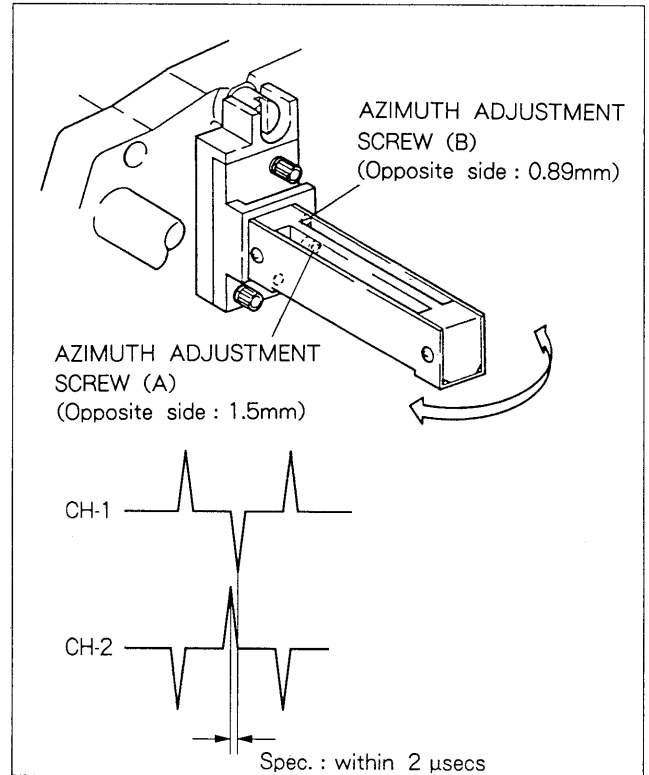


Fig. 9-6-6. Audio PB Head Azimuth Adjustment

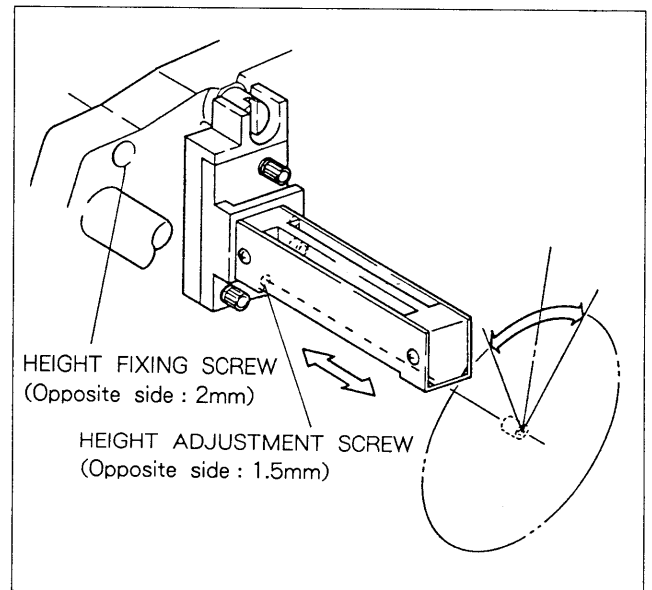
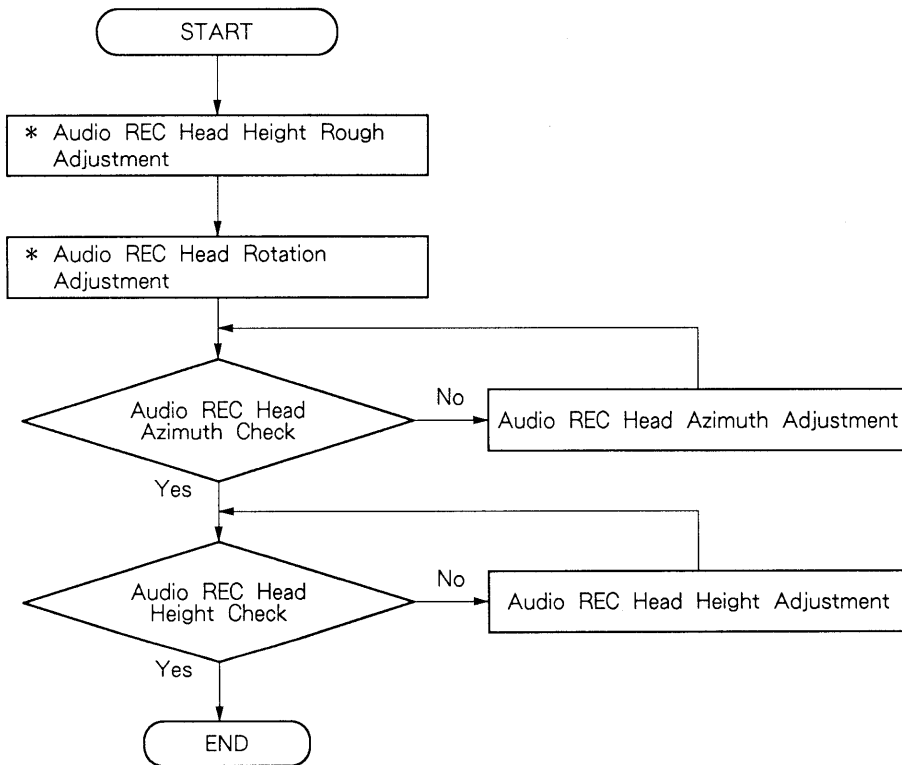


Fig. 9-6-7. Audio PB Head Height Adjustment

9-7. AUDIO REC HEAD CHECK AND ADJUSTMENT

Preliminary Information

- A. When the audio REC head has been replaced or the guides on the tape path have been adjusted, be sure to check the audio REC head.
- B. Prepare the following tools for this check and adjustment:
- Alignment tape FR2-1
Sony Part No. 8-960-072-11
 - Alignment tape FR2-2
Sony Part No. 8-960-072-12
(After the TC 05:30:00 portion of the FR2-2, for the narrow trace recoding, the height adjustment of the PB and monitor head can be made accurately.)
 - Extension board EX-136
Sony Part No. A-6001-007-A
 - Audio REC head playback tool JB-6631
Sony Part No. J-6266-310-A
- C. Adjustment Flowchart



* : This adjustment is required only when the audio REC head has been replaced.

9-7-1. Audio REC Head Check

1. Pull the AU-109 board out from the machine and insert it via the extension board (EX-136). (Refer to "Level Control Panel and AU-109 Board Removal" in section 2-2.)
2. Connect CH-1 and CH-2 of oscilloscope to TP104 (DA.CH-1) and TP804 (DA.CH-8) on the AU-109 board respectively.

Trlgger: CH-1 or CH-2

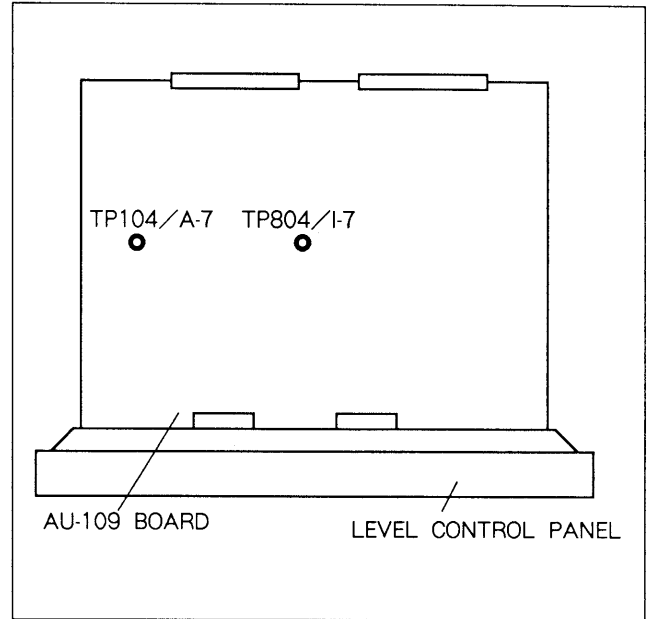


Fig. 9-7-1. AU-109 Board

3. Connect the audio REC head playback tool as follows:
 - (1) Open the power panel and disconnect the harnesses CN14, CN42 and CN356 from the AP-22 board. (Refer to "Opening of the Rear Panel and Connector Panel" in section 2-2.)
 - (2) Connect the audio REC head playback tool to the AP-22 board as shown in Fig. 9-7-2.
4. Perform section 9-7-2. Audio REC Head Height Rough Adjustment and Rotation Adjustment only when the REC head has been replaced.

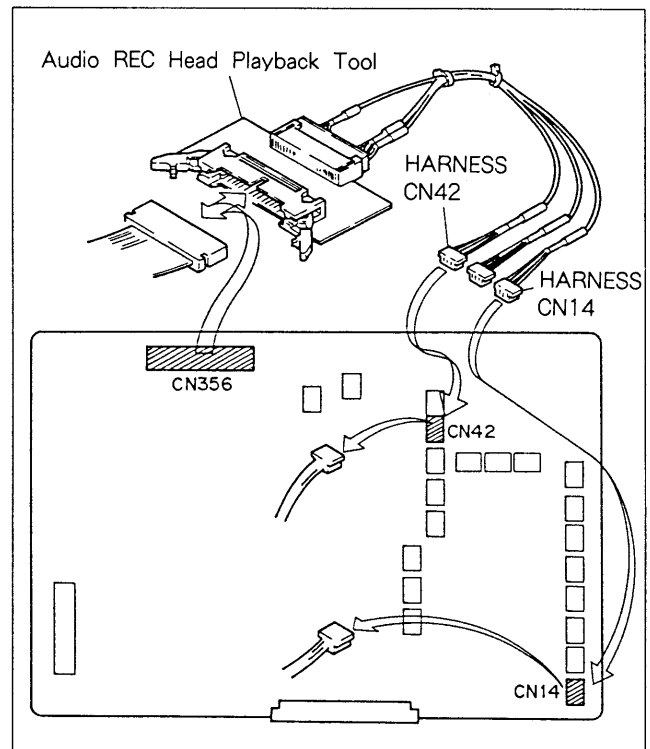


Fig. 9-7-2. Connection of Audio REC Head Playback Tool

5. Audio REC Head Azimuth Check

- (1) Thread an alignment tape FR2-1 and play it back.
- (2) Set the time base of oscilloscope to 1 μ secs.
- (3) Check that the phase difference between CH-1 (DA. CH-1) and CH-2 (DA. CH-8) is within the specification shown in Fig. 9-7-3.
If not, perform step 4 "Audio REC Head Azimuth Adjustment" in section 9-7-2.

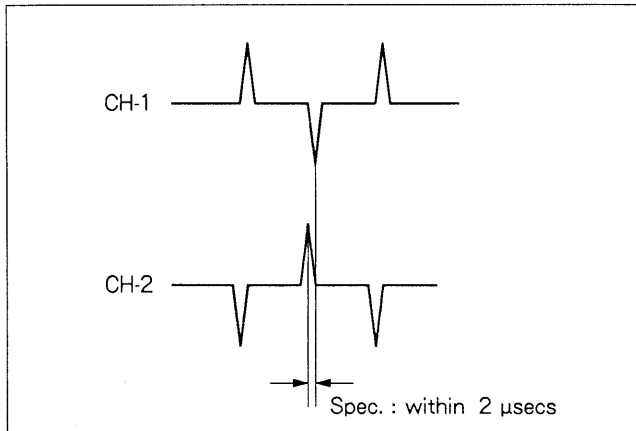


Fig. 9-7-3. Audio REC Head Azimuth Check

6. Audio REC Head Height Check

- (1) Thread an alignment tape and play it back.
(Any Portion for the FR2-1, TC 00:00:00 to 10:00:00 for the FR2-2)
- (2) Set the time base of oscilloscope to 500 μ secs.
- (3) Push up or down the tape against the REC head during playback as shown in Fig. 9-7-4. Check that the CH-1 (DA. CH-1) output is decreasing from the maximum level when the tape has been pushed both upward and downward.
If the CH-1 output is increasing, perform step 5 "Audio REC Head Height Adjustment" in section 9-7-2.

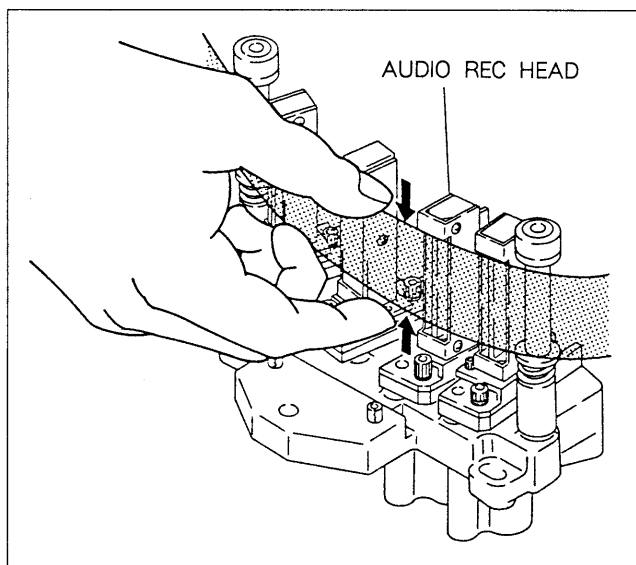


Fig. 9-7-4. Audio REC Head Height Check

- 7. Remove the audio REC head playback tool and connect the harnesses CN14, CN42 and CN356 to the AP-22 board.
- 8. Disconnect oscilloscope.
- 9. Remove the AU-109 and extension boards then reinstall the AU-109 board directly into the machine.

9-7-2. Audio REC Head Adjustment

1. Insert the AU-109 board into the machine via the extension board (EX-136) and connect oscilloscope. (Refer to steps 1 and 2 of section 9-7-1.)
2. Connect the audio REC head playback tool. (Refer to step 3 of section 9-7-1.)
3. Audio REC Head Height Rough Adjustment and Rotation Adjustment
Perform this adjustment only when the REC head has been replaced.

- (1) Thread an alignment tape and play it back.
(Any Portion for the FR2-1, TC 00:00:00 to 10:00:00 for the FR2-2)
- (2) Loosen the height fixing screw shown in Fig. 9-7-5.
- (3) Turn the height adjustment screw in the counterclockwise direction so that the CH-2 (DA. CH-8) output is zero. Turn the height adjustment screw gradually in the clockwise direction until the CH-1 (DA. CH-1) output becomes the maximum, and check the maximum output range.
- (4) Set the height adjustment screw in the middle of the maximum output range.

Note: Be sure to finish the adjustment by turning the height adjustment screw in the clockwise direction.

- (5) Turn the REC head rotation adjustment dowel shown in Fig. 9-7-6 right and left so that check the maximum range of CH-1 (DA. CH-1) output.

Note: Be sure to turn the adjustment dowel within ± 90 degrees.

- (6) Set the adjustment dowel in the middle of the maximum output range.
- (7) Tighten the height fixing screw.
(Tightening torque: 140×10^{-2} N•m {14 kgf•cm} to 180×10^{-2} N•m {18 kgf•cm})

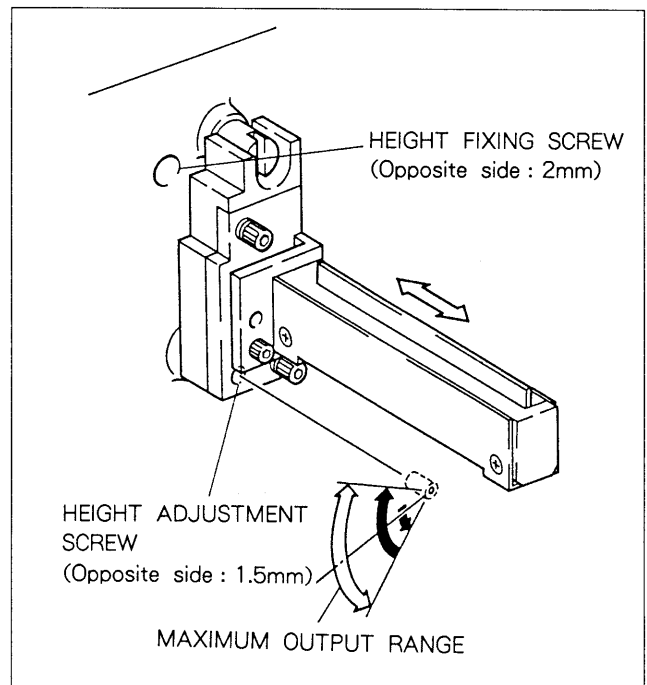


Fig. 9-7-5. Audio REC Head Height Rough Adjustment

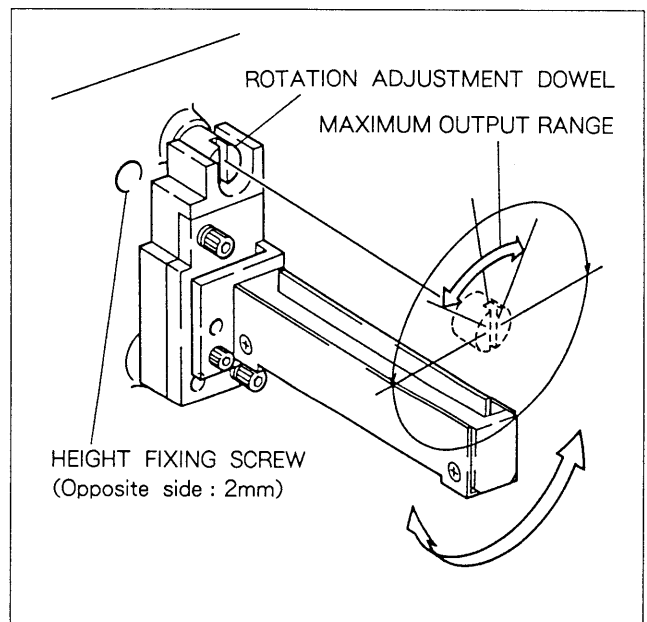


Fig. 9-7-6. Audio REC Head Rotation Adjustment

4. Audio REC Head Azimuth Adjustment

- (1) Thread an alignment tape and play it back.
(Any Portion for the FR2-1, TC 00:00:00 to 10:00:00 for the FR2-2)
- (2) Push the top of the REC head right and left with finger lightly and find the direction whose phase difference, CH-1 (DA. CH-1) and CH-2 (DA. CH-8), conforms to the specification in Fig. 9-7-7.
- (3) Turn and adjust the azimuth adjustment screws (A) and (B) as follows until the phase difference conforms to the specification.

Note: Be sure to finish the adjustment by turning the height adjustment screw in the clockwise direction.

- When the phase difference conforms to the specification by pushing the REC head left, turn and adjust the azimuth adjustment screw (B) in the counterclockwise direction and the azimuth adjustment screw (A) in the clockwise direction.
- When the phase difference conforms to the specification by pushing the REC head right, turn and adjust the azimuth adjustment screw (A) in the counterclockwise direction and the azimuth adjustment screw (B) in the clockwise direction.

(Tightening torque: $10 \times 10^{-2} \text{ N}\cdot\text{m}$ {1 kgf·cm})

Note 1: Be sure to tighten the azimuth adjustment screws (A) and (B) evenly with specified torque. If not, zenith increases and the tape path may be unstable.

Note 2: When the adjustment does not conform to the specification with a specified tightening torque $10 \times 10^{-2} \text{ N}\cdot\text{m}$ {1 kgf·cm}, loosen the azimuth adjustment screws (A) and (B) for 1/4 to 1/2 turn, tighten them gradually and alternately in the clockwise direction in consideration of phase change due to tightening, then lock them with a torque of $10 \times 10^{-2} \text{ N}\cdot\text{m}$ {1 kgf·cm}.

- (4) After adjustment, apply a coat of paint at the head of the azimuth adjustment screw (A).

5. Audio REC Head Height Adjustment

- (1) Thread an alignment tape and play it back.
(Any Portion for the FR2-1, after TC 00:00:00 to 10:00:00 for the FR2-2)
- (2) Loosen the height fixing screw shown in Fig. 9-7-8.
- (3) Turn the height adjustment screw right and left and adjust the output level for maximum.

Note: Be sure to finish the adjustment by turning the height adjustment screw in the clockwise direction.

- (4) Tighten the height fixing screw with taking care that the CH-1 (DA. CH-1) waveform does not change.
(Tightening torque: $140 \times 10^{-2} \text{ N}\cdot\text{m}$ {14 kgf·cm} to $180 \times 10^{-2} \text{ N}\cdot\text{m}$ {18 kgf·cm})

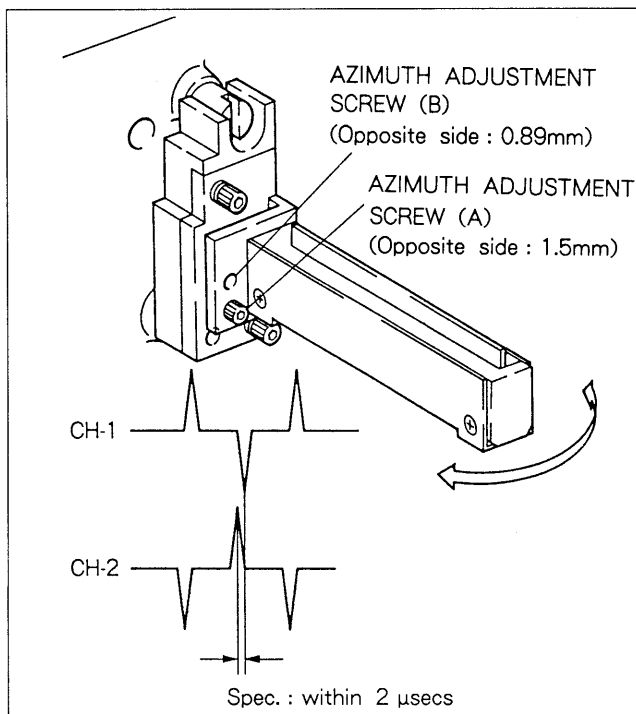


Fig. 9-7-7. Audio REC Head Azimuth Adjustment

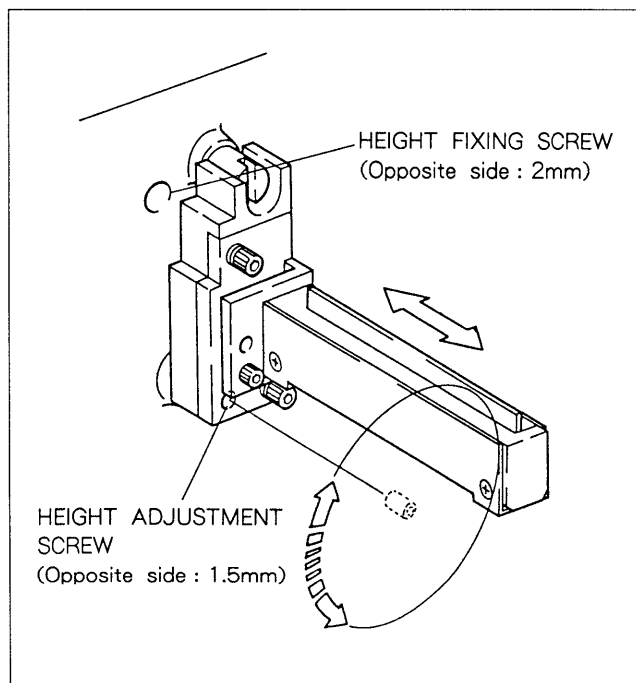


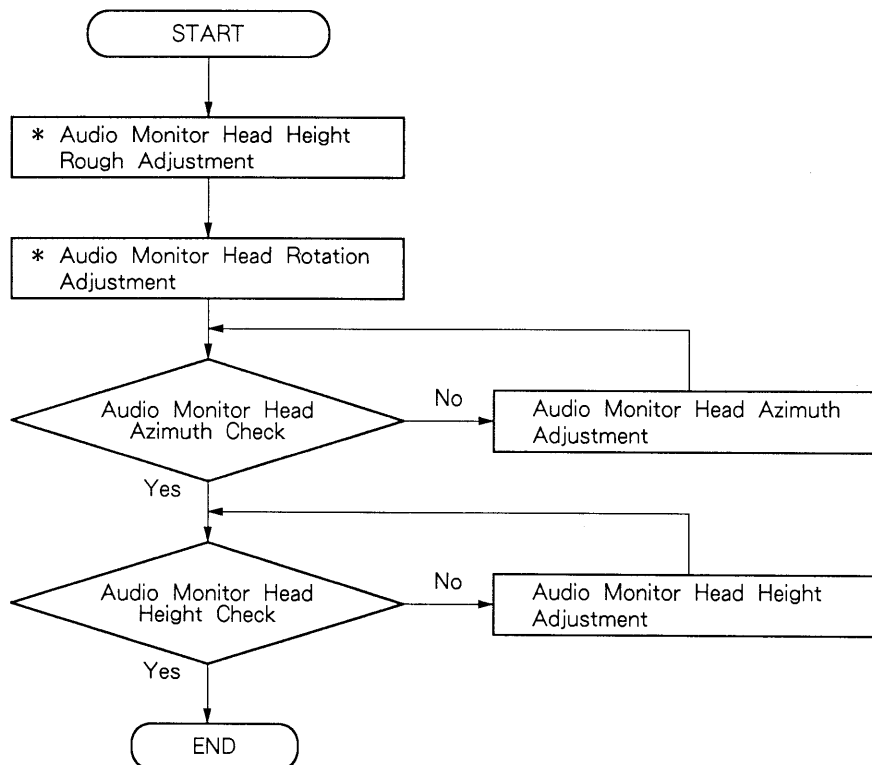
Fig. 9-7-8. Audio REC Head Height Adjustment

9-8. AUDIO MONITOR HEAD CHECK AND ADJUSTMENT

Preliminary Information

- A. When the audio monitor head has been replaced or the guides on the tape path have been adjusted, be sure to check the audio monitor head.
- B. Prepare the following tools for this check and adjustment:
- Alignment tape FR2-1
Sony Part No. 8-960-072-11
 - Alignment tape FR2-2
Sony Part No. 8-960-072-12
(After the TC 05:30:00 portion of the FR2-2, for the narrow trace recoding, the height adjustment of the PB and monitor head can be made accurately.)
 - Extension board EX-136
Sony Part No. A-6001-007-A

C. Adjustment Flowchart



* : This adjustment is required only when the audio monitor head has been replaced.

9-8-1. Audio Monitor Head Check

1. Pull the AU-109 board out from the machine and insert it via the extension board (EX-136).
(Refer to "Level Control Panel and AU-109 Board Removal" in section 2-2.)
2. Connect CH-1 and CH-2 of oscilloscope to TP105 (DA.CH-1) and TP805 (DA.CH-8) on the AU-109 board respectively.

Trigger: CH-1 or CH-2

3. Perform step 2 "Audio Monitor Head Height Rough Adjustment and Rotation Adjustment" in section 9-8-2 only when the monitor head has been replaced.

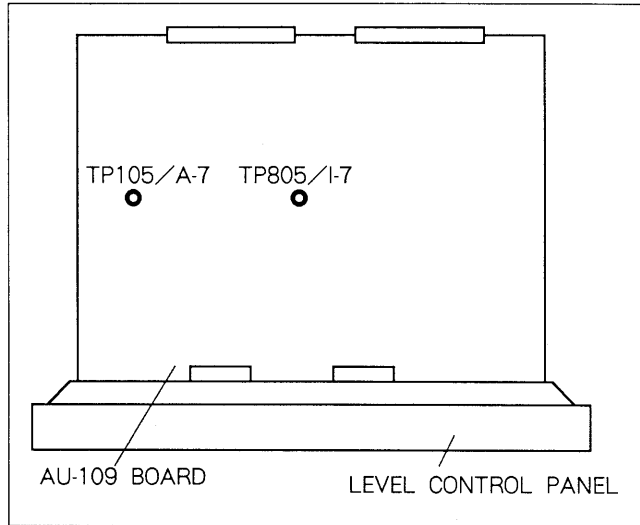


Fig. 9-8-1. AU-109 Board

4. Audio Monitor Head Azimuth Check
 - (1) Thread an alignment tape and play it back.
(Any Portion for the FR2-1, TC 00:00:00 to 10:00:00 for the FR2-2)
 - (2) Set the time base of oscilloscope to 1 μ secs.
 - (3) Check that the phase difference between CH-1 and CH-2 is within the specification shown in Fig. 9-8-2. If not, perform step 3 "Audio Monitor Head Azimuth Adjustment" in section 9-8-2.

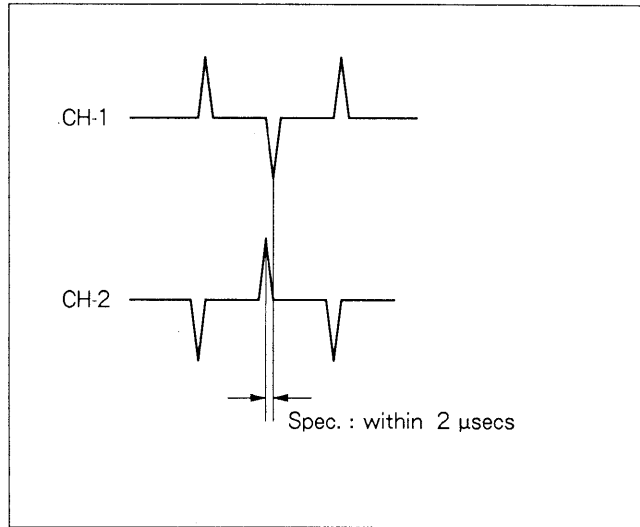


Fig. 9-8-2. Audio Monitor Head Azimuth Check

5. Audio Monitor Head Height Check
 - (1) Thread an alignment tape and play it back.
(Any Portion for the FR2-1, after TC 10:30:00 for the FR2-2)
 - (2) Set the time base of oscilloscope to 500 μ secs.
 - (3) Push up or down the tape against the monitor head during playback as shown in Fig. 9-8-3. Check that the CH-1 output is decreasing from the maximum level when the tape has been pushed both upward and downward.
If the CH-1 output is increasing, perform step 4 "Audio Monitor Head Height Adjustment" in section 9-8-2.
6. Disconnect oscilloscope.
7. Remove the AU-109 and extension boards then reinstall the AU-109 board directly into the machine.

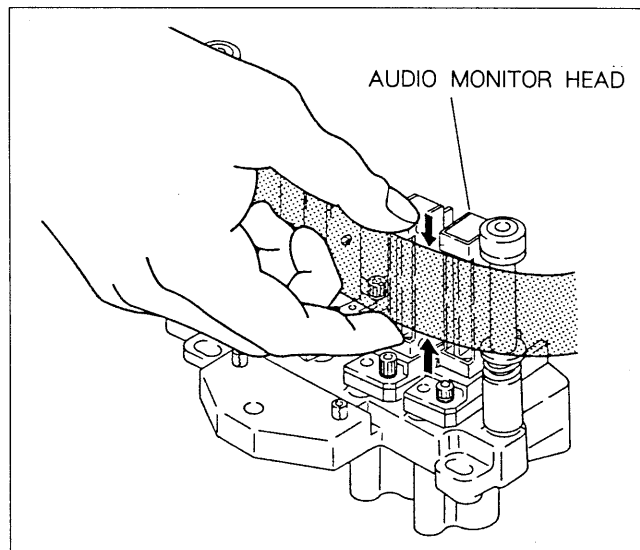


Fig. 9-8-3. Audio Monitor Head Height Check

9-8-2. Audio Monitor Head Adjustment

1. Insert the AU-109 board into the machine via the extension board (EX-136) and connect oscilloscope. (Refer to steps 1 and 2 of section 9-8-1.)
2. Audio Monitor Head Height Rough Adjustment and Rotation Adjustment
Perform this adjustment only when the monitor head has been replaced.
 - (1) Thread an alignment tape and play it back. (Any Portion for the FR2-1, after TC 10:30:00 for the FR2-2)
 - (2) Loosen the height fixing screw shown in Fig. 9-8-4.
 - (3) Turn the height adjustment screw in the counterclockwise direction so that the CH-2 (DA. CH-8) output is zero. Turn the height adjustment screw gradually in the clockwise direction until the CH-1 (DA. CH-1) output becomes the maximum, and check the maximum output range.
 - (4) Set the height adjustment screw in the middle of the CH-1's maximum output range.
Note: Be sure to finish the adjustment by turning the height adjustment screw in the clockwise direction.
 - (5) Turn the monitor head rotation adjustment dowel shown in Fig. 9-8-5 right and left so that check the maximum range of CH-1 (DA. CH-1) output.
Note: Be sure to turn the adjustment dowel within ± 90 degrees.
 - (6) Set the adjustment dowel in the middle of the maximum output range.
 - (7) Tighten the height fixing screw. (Tightening torque: $140 \times 10^{-2} \text{ N}\cdot\text{m}$ {14 kgf·cm} to $180 \times 10^{-2} \text{ N}\cdot\text{m}$ {18 kgf·cm})

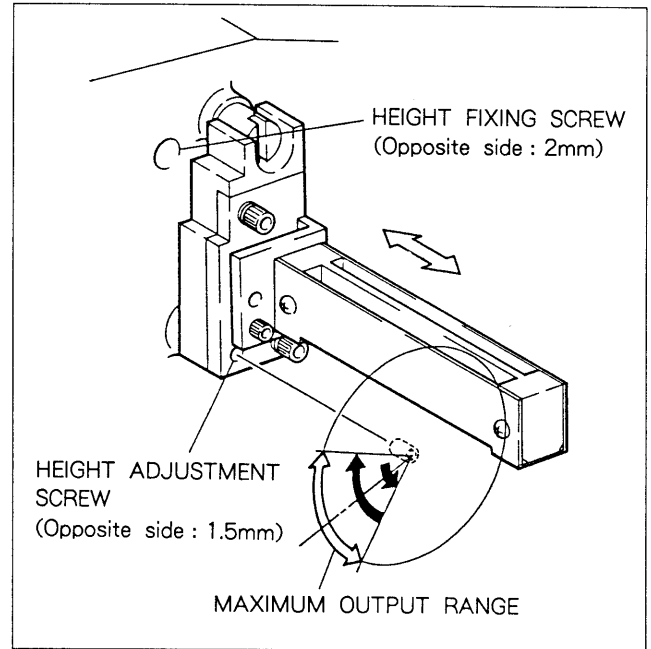


Fig. 9-8-4. Audio Monitor Head Height Rough Adjustment

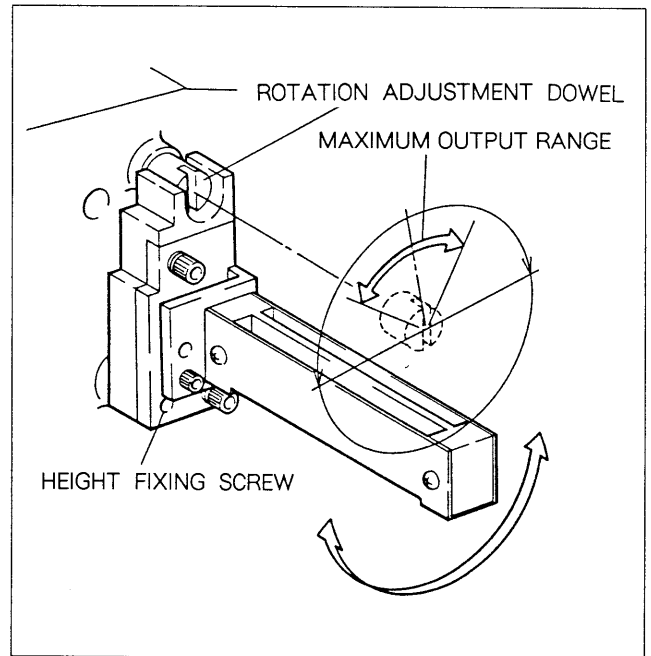


Fig. 9-8-5. Audio Monitor Head Rotation Adjustment

3. Audio Monitor Head Azimuth Adjustment

- (1) Thread an alignment tape and play it back.
(Any Portion for the FR2-1, TC 00:00:00 to 10:00:00 for the FR2-2)
- (2) Push the top of the monitor head right and left with finger lightly and find the direction whose phase difference, CH-1 (DA. CH-1) and CH-2 (DA. CH-8), conforms to the specification in Fig. 9-8-6.
- (3) Turn and adjust the azimuth adjustment screws (A) and (B) as follows until the phase difference conforms to the specification.

Note: Be sure to finish the adjustment by turning the height adjustment screw in the clockwise direction.

- When the phase difference conforms to the specification by pushing the monitor head left, turn and adjust the azimuth adjustment screw (B) in the counterclockwise direction and the azimuth adjustment screw (A) in the clockwise direction.
- When the phase difference conforms to the specification by pushing the monitor head right, turn and adjust the azimuth adjustment screw (A) in the counterclockwise direction and the azimuth adjustment screw (B) in the clockwise direction.

(Tightening torque: $10 \times 10^{-2} \text{ N}\cdot\text{m}$ {1 kgf·cm})

Note 1: Be sure to tighten the azimuth adjustment screws (A) and (B) evenly with specified torque. If not, zenith increases and the tape path may be unstable.

Note 2: When the adjustment does not conform to the specification with a specified tightening torque $10 \times 10^{-2} \text{ N}\cdot\text{m}$ {1 kgf·cm}, loosen the azimuth adjustment screws (A) and (B) for 1/4 to 1/2 turn, tighten them gradually and alternately in the clockwise direction in consideration of phase change due to tightening, then lock them with a torque of $10 \times 10^{-2} \text{ N}\cdot\text{m}$ {1 kgf·cm}.

- (4) After adjustment, apply a coat of paint at the head of the azimuth adjustment screw (A).

4. Audio Monitor Head Height Adjustment

- (1) Thread an alignment tape and play it back.
(Any Portion for the FR2-1, after TC 10:30:00 for the FR2-2)
- (2) Loosen the height fixing screw (opposite side: 2 mm) shown in Fig. 9-8-7.

- (3) Turn the height adjustment screw right and left and check the maximum output range of the CH-1 (DA. CH-1).

- (4) Set the height adjustment screw in the middle of the maximum output range.

Note: Be sure to finish the adjustment by turning the height adjustment screw in the clockwise direction.

- (5) Tighten the height fixing screw with taking care that the CH-1 (DA. CH-1) waveform does not change.
(Tightening torque: $140 \times 10^{-2} \text{ N}\cdot\text{m}$ {14 kgf·cm} to $180 \times 10^{-2} \text{ N}\cdot\text{m}$ {18 kgf·cm})

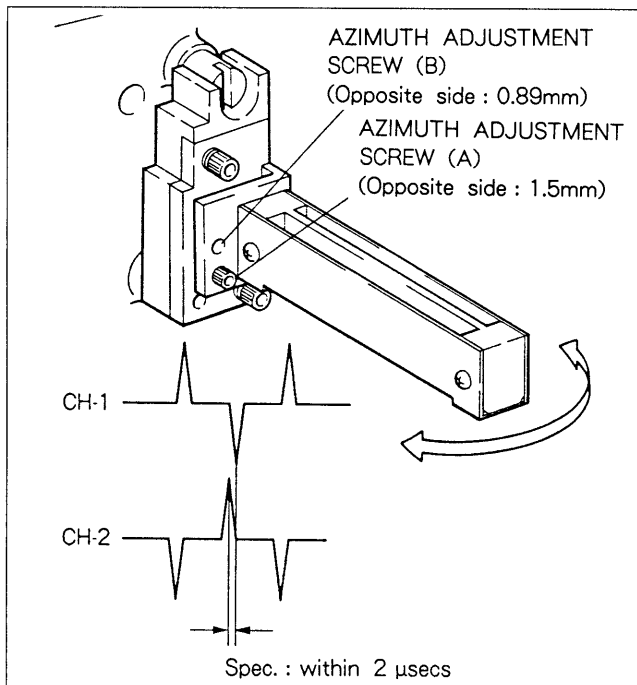


Fig. 9-8-6. Audio Monitor Head Azimuth Adjustment

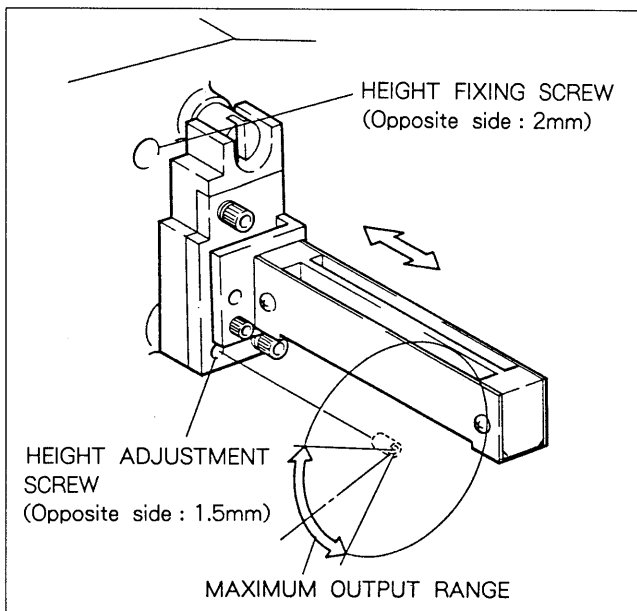


Fig. 9-8-7. Audio Monitor Head Height Adjustment

9-9. AUDIO ERASE HEAD CHECK AND ADJUSTMENT

Preliminary Information

- A. When the audio erase head has been replaced or the height of each guide have been adjusted, be sure to check the audio erase head.
- B. Only the height adjustment will be required for the audio erase head. (It is not necessary to perform the azimuth adjustment.)

9-9-1. Audio Erase Head Check

1. Record 1 kHz signal on the Cue track.
2. Rewind the portion recorded in step 1, then record no signal.
3. Connect the headphones, rewind the tape and play back the portion recorded in step 2.
Check that the 1 kHz signal cannot be heard when the monitor/headphones control is set to the maximum position. If heard, perform the adjustment of section 9-9-2. Audio Erase Head Adjustment.

9-9-2. Audio Erase Head Adjustment

1. Loosen the height fixing screw shown in Fig. 9-9-1.
2. Turn the height adjustment screw and adjust the head height. As for height of the head, refer to Fig. 9-9-2.
3. Tighten the height fixing screw.
(Tightening torque: $140 \times 10^{-2} \text{ N}\cdot\text{m}$ {14 kgf·cm} to $180 \times 10^{-2} \text{ N}\cdot\text{m}$ {18 kgf·cm})
4. Perform section 9-9-1. Audio Erase Head Check again.

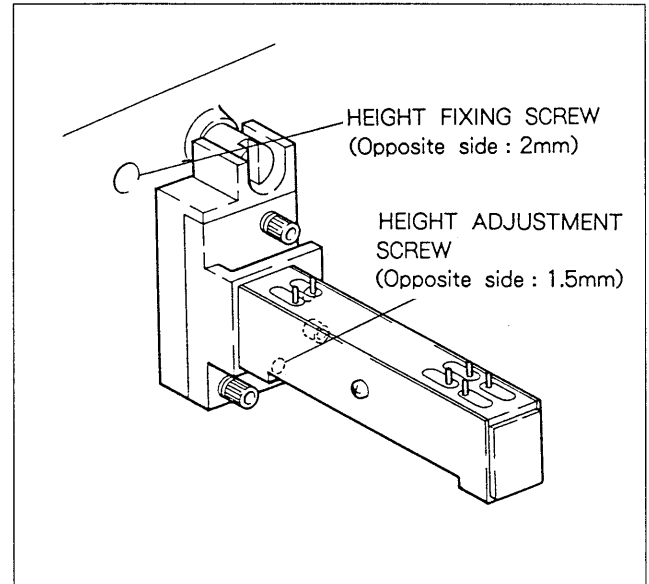


Fig. 9-9-1. Audio Erase Head Height Adjustment (1)

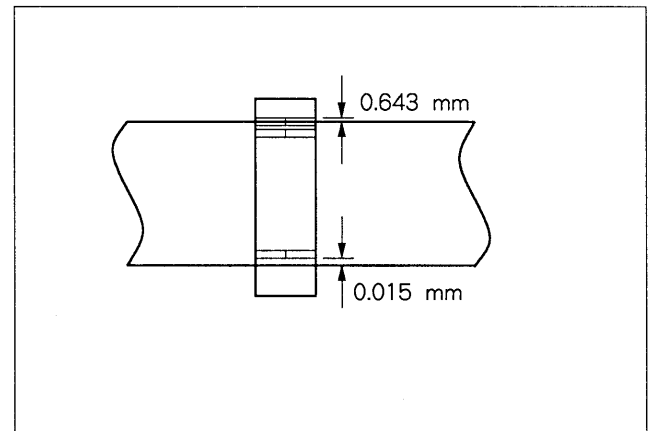


Fig. 9-9-2. Audio Erase Head Height Adjustment (2)

9-10. 2-FRAME DISTANCE CHECK AND ADJUSTMENT

Preliminary Information

The location of the audio PB head is advanced for two frames (approximately 54 mm) against the audio REC head. If the distance is incorrect, error rate will degrade or discrepancy of the video head trace on track will happen.

By adjusting the phase of the playback CTL pulses output from both heads, the two-frame distance can be precisely adjusted.

When playing back the tape with different tape speed, the phase difference of the CTL playback pulses that are output from both heads can be automatically measured and compensated.

9-10-1. 2-Frame Distance Check

1. Open the rear (power) panel and connect CH-1 and CH-2 of oscilloscope to TP2 (PB CTL) and TP5 (REC HEAD PB CTL) on the AP-22 board respectively. (Refer to section 2-2. Opening of the Rear Panel and Connector Panel.)

2. Set the TRACKING control to FIX position.

3. Thread the blank tape. Forward the tape more than 30 seconds (actual time) with FF mode, then make recording about 5 minutes. Play back the recorded portion and check that the phase difference between CH-1 and CH-2 is within the specification shown in Fig. 9-10-2.

Note: The SG signal (color bar or composite) of the HDDP-1000 can be used as input signal source.

If the phase difference is out of specification, perform section 9-10-2. 2-Frame Distance Adjustment.

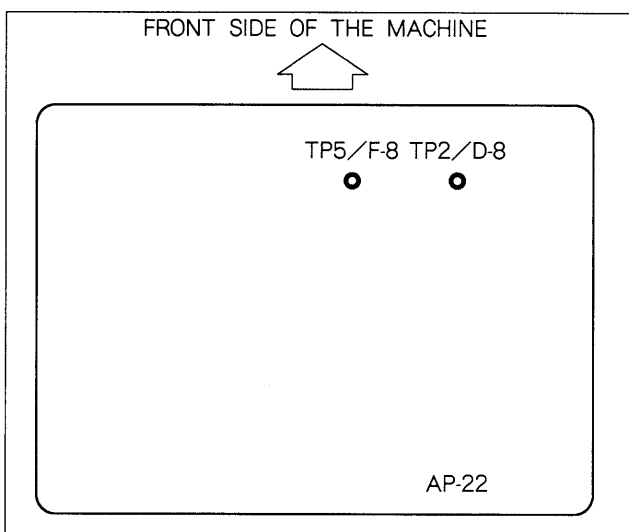


Fig. 9-10-1. AP-22 Board

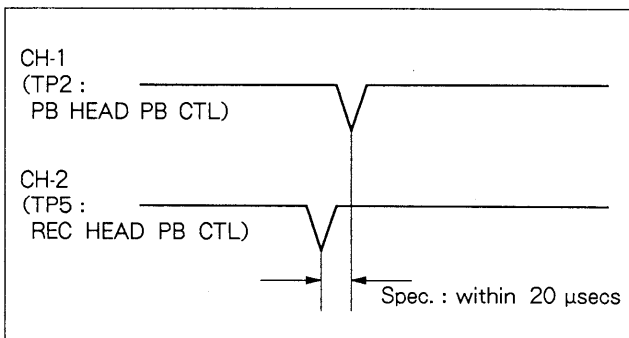


Fig. 9-10-2. 2-Frame Distance Check

9-10-2. 2-Frame Distance Adjustment

1. Connect oscilloscope probe to the AP-22 board and make short recording then play it back. (Refer to sections 9-10-1.)
2. Loosen the two screws (1) that tighten the PB head base for half or one turn as shown in Fig. 9-10-3.
3. While pushing the audio PB head in the arrow A direction, move it right and left and adjust so that it is within the specification shown in Fig. 9-10-2.

Note: If 2-frame distance can not be adjusted by the audio PB head, move the audio REC head slightly in the opposite direction in the same manner as audio PB head, then perform adjustment again.

When the capstan motor or the pinch roller is defective, tape speed changes extremely and phase also shifts extremely. If there is a big phase shift, check the tape speed and replace the defective part.

4. While pushing the audio PB head in the arrow A direction, tighten the two screws (1) alternately. (Tightening torque: 120×10^{-2} N·m {12 kgf·cm})
5. After tightening the two screws (1), check the phase difference so that it is within the specification. If not, readjust from step 2.

When the audio REC head has been replaced, play back an alignment tape FR2-1, move the audio REC head in the order of steps 2 to 4 until meet the specification. After adjustment, perform section 9-10-1. 2-Frame Distance Check.

If it is out of specification, perform above adjustment. There is little probability to perform section 9-11. CTL Position Adjustment by performing this adjustment when the audio REC head has been replaced.

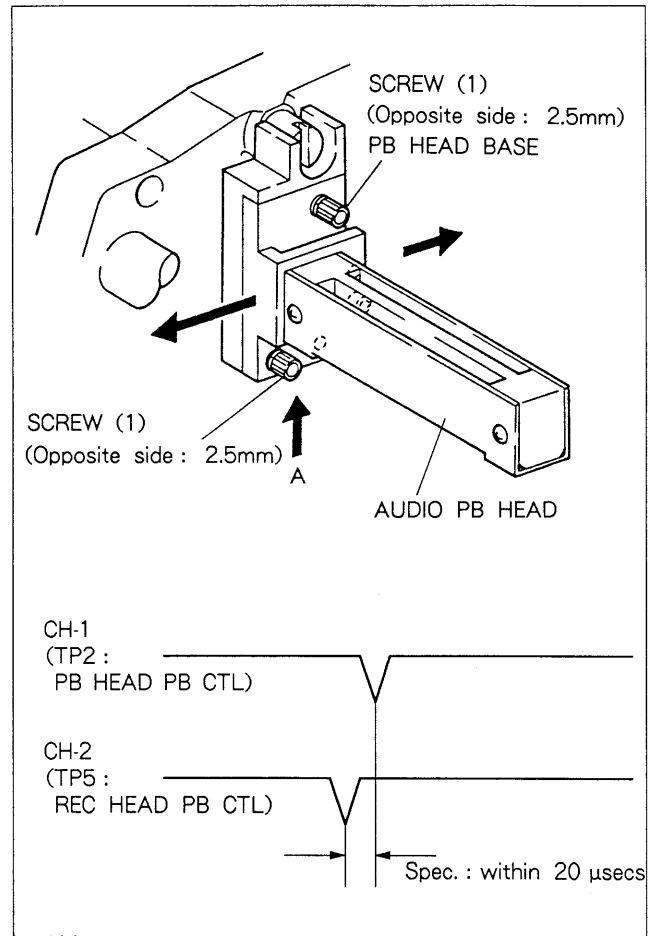


Fig. 9-10-3. 2-Frame Distance Adjustment

9-11. CTL HEAD POSITION CHECK AND ADJUSTMENT

Preliminary Information

- A. Purpose of this adjustment is to maintain tape compatibility by aligning the distance between the CTL head and the rotary (REC CH-1) head in the longitudinal direction with respect to the recorded pattern on the alignment tape.
- B. Since the PG phase varies when the CTL head is moved, the PG phase must always be adjusted after the CTL head position has been adjusted.
- C. When performing this adjustment, be sure to use the video REC head playback tool designated in item D.
- D. Prepare the following tools for this check and adjustment.
 - Alignment tape FR2-1
Sony Part No. 8-960-072-11
 - Video REC head playback tool UDR-J1
Sony Part No. J-6265-780-A
 - BNC-UM cable
Sony Part No. J-6264-360-A

9-11-1. CTL Head Position Check

1. Install the video REC head playback tool as follows:
 - (1) Remove the three B2.6×6 screws (1) then remove the drum lid as shown in Fig. 9-11-1.
 - (2) Remove the four B2.6×6 screws (2) then remove the UDR-1 board as shown in Fig. 9-11-1.
 - (3) Install the video REC head playback tool (UDR-J1) with four screws (2) as shown in Fig. 9-11-2.
(Tightening torque: 60×10^{-2} N·m {6 kgf·cm})
 - (4) Fix the drum lid with three screws (1).
(Tightening torque: 45×10^{-2} N·m {4.5 kgf·cm})
2. Connect CH-1 of oscilloscope to CH-1 (RF MONITOR) on the DRC-1 board with BNC-UM cable.
(Trigger terminal: TP2/SV-90 board)
3. Thread an alignment tape and play back the CH-1 recorded portion (TC 00:00:00 to 05:00:00 for the FR2-1, TC 00:00:00 to 10:00:00 for the FR2-2).
4. Pull and turn the TRACKING control right and left, and adjust the RF amplitude for maximum. Push (FIX) the TRACKING control and check that the RF amplitude does not change.
If the RF amplitude changes, perform section 9-11-2. CTL Head Position Adjustment.
5. Remove the video REC head playback tool in the reverse order of step 1, then assemble the components removed.

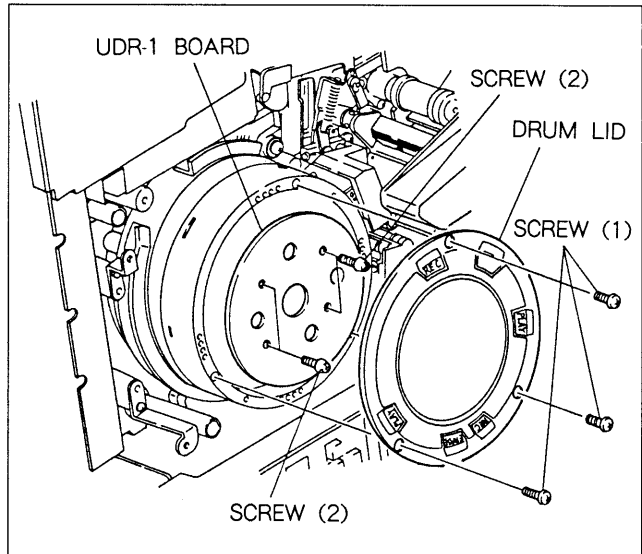


Fig. 9-11-1. Video REC Head Playback Tool Installation (1)

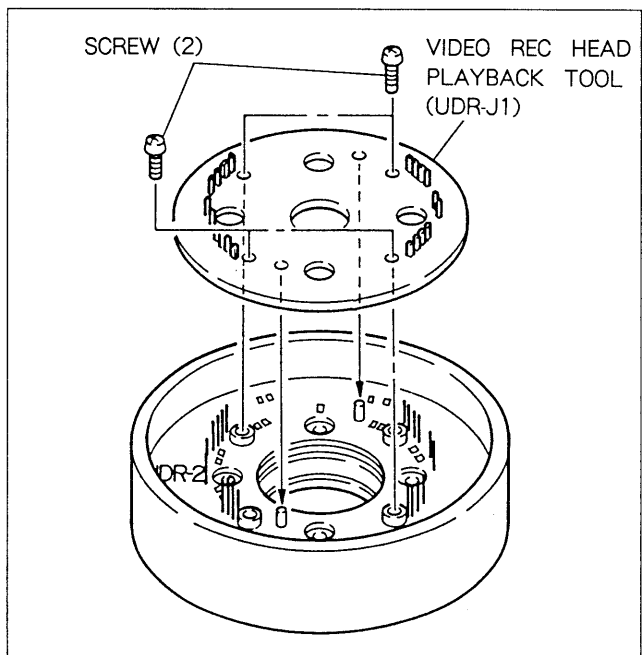


Fig. 9-11-2. Video REC Head Playback Tool Installation (2)

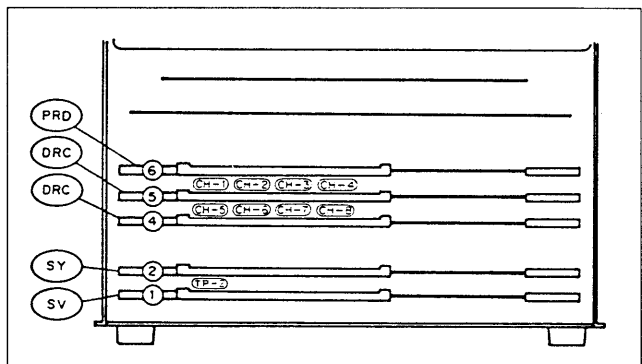


Fig. 9-11-3. BNC-UM Cable Connection

9-11-2. CTL Head Position Adjustment

1. Install the video REC head playback tool. (Refer to step 1 of section 9-11-1.)
2. Connect oscilloscope and play back an alignment tape FR2-1. (Refer to steps 2 and 3 of section 9-11-1.)
3. Check that the TRACKING control has been pushed in the (FIX) position.
4. Loosen the three screws (3) shown in Fig. 9-11-4 for one-fourth to one-half turn.
5. Insert the hexagonal screwdriver (opposite side: 3 mm) into the hole A of the stationary head base. While pushing the stationary head base in the arrow B direction, turn the hexagonal screwdriver right and left and adjust so that the RF amplitude is maximum.
6. Pull and turn the TRACKING control right and left, and adjust the RF amplitude for maximum. Push (FIX position) the TRACKING control and check that the RF amplitude does not change.
7. Tighten the three screws (3) in order of ①, ② and ③, then check step 6 again.
(Tightening torque: $200 \times 10^{-2} \text{ N}\cdot\text{m}$ {20 kgf·cm})

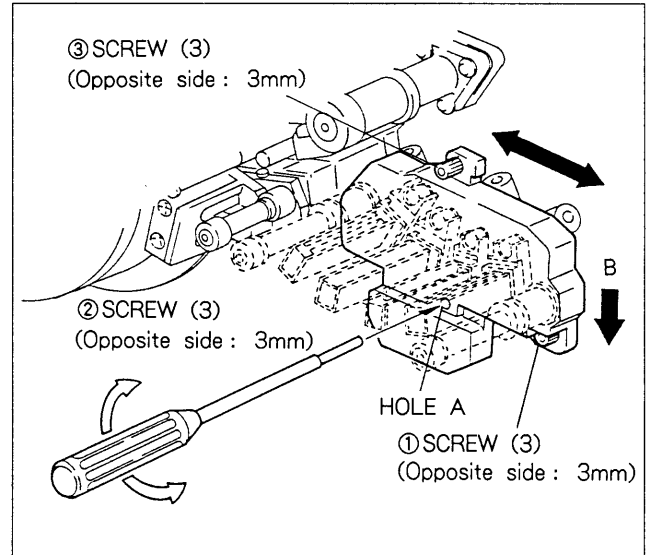


Fig. 9-11-4. CTL Head position Adjustment

9-12. PG PHASE CHECK AND ADJUSTMENT

Preliminary Information

- A. Purpose of this adjustment is to maintain tape compatibility by adjusting the phase of the video head in the track direction with respect to the recorded pattern of the alignment tape.
- B. This adjustment must be performed when the CTL head has been moved.
- C. Prepare the following tools for this adjustment.
- Alignment tape FR2-1
Sony Part No. 8-960-072-11
 - Alignment tape FR2-2
Sony Part No. 8-960-072-12
(After the TC 05:30:00 portion of the FR2-2, for the narrow trace reencoding, the height adjustment of the PB and monitor head can be made accurately.)
 - BNC-UM cable
Sony Part No. J-6264-360-A

9-12-1. PG Phase Check

1. Connect CH-2 of an oscilloscope to CH-1 (RF MONITOR) on the DRC-1 board with BNC-UM cable.

CH-1 trigger: TP2 (REF2)/SV-90 board

- Be sure to use an oscilloscope with READ OUT function.
2. Thread an alignment tape and play back the CH-1 recorded portion (TC 00:00:00 to 05:00:00 for the FR2-1, TC 00:00:00 to 10:00:00 for the FR2-2).
Note: Since alignment tape FR2-1 guarantees the specification value only from "TC 00:00:00" to "TC 05:00:00", be sure not to use the other portion of an alignment tape.
 3. With delay mode, set the time base of an oscilloscope to 20 μ sec and read out the time difference between CH-1 and CH-2.
Observe the phase difference between CH-1 and CH-2, and check so that it is within the specifications in Fig. 9-12-2.
If it is out of specification, perform section 9-12-2. PG Phase Adjustment.

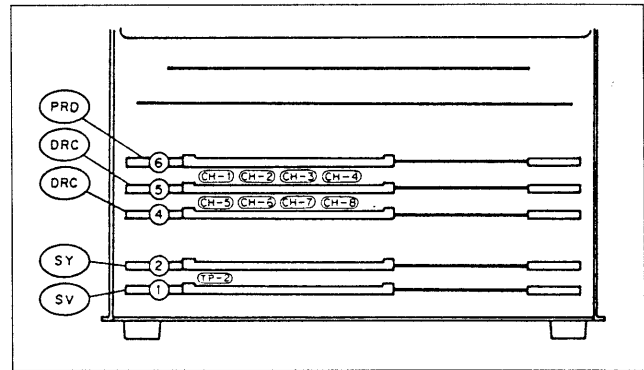


Fig. 9-12-1. BNC-UM Cable Connection

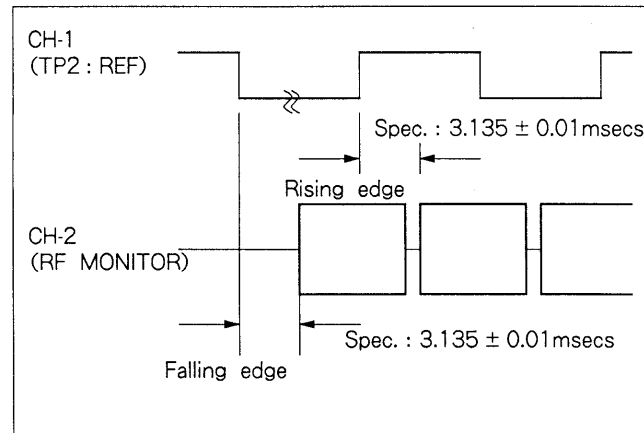


Fig. 9-12-2. PG Phase Check

9-12-2. PG Phase Adjustment

1. Press **[0]** on the 21-key section while pressing SW2 on the SY-103 board. (Alternatively, set the TTP ADJ menu referring to section 3-3.) The following message is displayed on the control panel display.

```
>_
```

2. To set PG ADJ menu, press **[C]**, **[9]**, **[0]** and **[SET]** in sequence on the 21-key section.

```
>C90_          >PG ADJ_
XXXX XXXX XXXX >_
```

Adjust the phase difference between CH-1 (rising or falling edge of REF 2) and CH-2 (entrance side of RF waveform) by pressing **[7]**, **[8]**, **[9]** or **[IN]** while pressing blue **[OUT]** on the 21-key section.

Function of each key

- [7]** key: Press when decreasing a large amount of phase difference.
- [8]** key: Press when decreasing a small amount of phase difference.
- [9]** key: Press when increasing a small amount of phase difference.
- [IN]** key: Press when increasing a large amount of phase difference.

3. Writing of Non-Volatile RAM

Perform the following operation in order to write the adjusted value into the non-volatile RAM. At this time, stop the drum rotation.

- (1) Press **[C]**, **[T]**, **[F]** and **[SET]** in sequence while pressing blue **[OUT]** on the 21-key section.

```
>PG ADJ_          >NVW_
XXXX XXXX XXXX >XXXX
```

- (2) Keep pressing **[+]** key on the 21-key section until the message "PUSH NVWR SW_" appears on the control panel display.

```
>XXXX XX-XX      >XXXX XX-XX
XXXX XXXX XXXX >PUSH NVWR SW_
```

- (3) Press NVWR (S2) switch on the SV-90 board. The message "READY" appears on the control panel display.

```
>PUSH NVWR SW_   >READY_
XXXX XXXX XXXX >_
```

- (4) Press **[C]**, **[0]** and **[SET]** in sequence on the 21-key section. The message "TEST MODE OFF" appears on the control panel display.

```
>C0_             >TEST MODE OFF_
>_
```

- (5) Press **[SET]** while pressing the blue **[OUT]** on the 21-key section to set the machine into the normal operating mode.

9-13. SELF-RECORD/PLAYBACK WAVEFORM CHECK

Preliminary Information

- A. The contacting condition of rotary head and tape can be checked by observing the self-record/playback RF waveform.
- B. Prepare the following tools for this check.
- BNC-UM cable
 - Blank tape

Sony Part No. J-6264-360-A

Type: HD-1D-63 (for 63 minutes)

1. Connect oscilloscope to CH-1 (RF MONITOR) on the DRC-1 board with BNC-UM cable.
(Trigger: TP2 (REF2)/SV-90 board)
2. Thread a blank tape and make a short recording.
Note: The SG signal (color bar or composite) of the HDDP-1000 can be used as Input signal source.
3. Play back the recorded portion and check that the RF waveform is within the specification shown in Fig. 9-13-2.
4. Check the RF waveforms of CH-2 through CH-8 (DRC-1 board/slot No. 4) in sequence and check so that all channels are within the specification.
If not, perform section 9-5-2. Tracking Adjustment.
When performing the tracking adjustment, the alignment tape's playback waveform and the self-record/playback waveform should be met the specification at the same time.

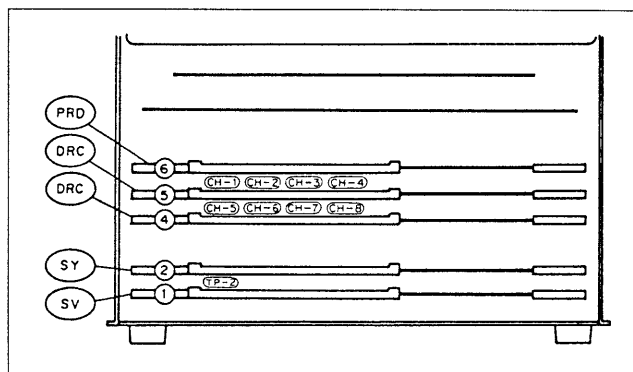


Fig. 9-13-1. BNC-UM Cable Connection

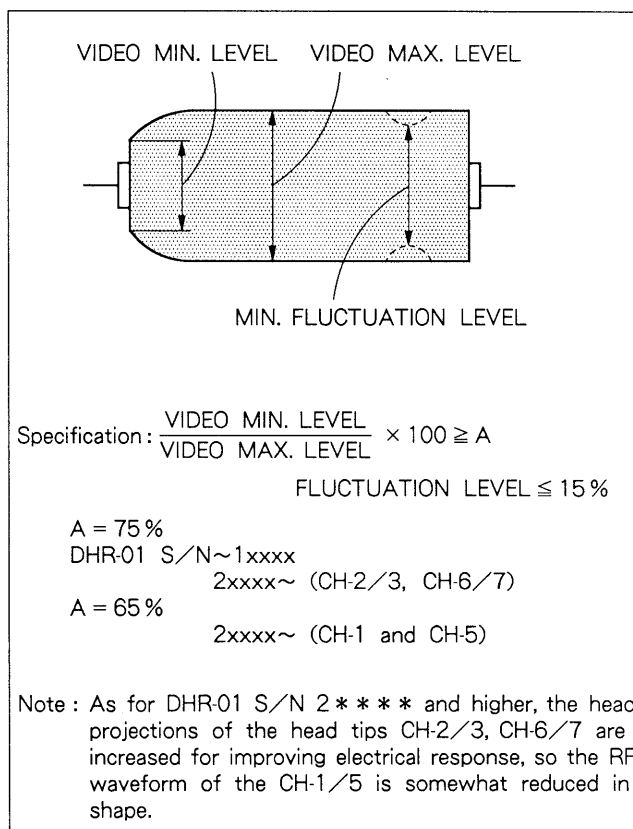


Fig. 9-13-2. Slow Waveform Check

5. Check the SLOW waveform as follows:
 - (1) Play back the recorded portion.
(Tape speed: +7/30 and -7/30)
 - (2) Check the RF waveform so that there are no RF dropout and discontinuity as shown in Fig. 9-13-3 (a). If a waveform shown in Fig. 9-13-3 (b) or (c) appears, perform the slantness adjustment of slant guide as follows:
(Refer to 9-5-2. Slant Guide Slantness Adjustment.)
 - Waveform (b): Adjust exit slant guide so that it is lower stretching. (counterclockwise)
 - Waveform (c): Adjust entrance slant guide so that it is lower stretching. (counterclockwise)

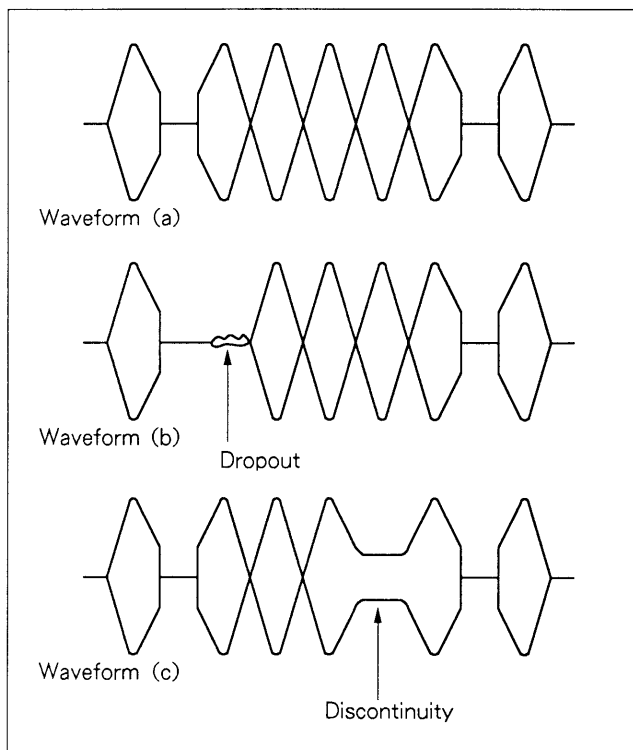


Fig. 9-13-3. Self-Record/Playback Waveform Check

9-14. TAPE EDGE DAMAGE CHECK

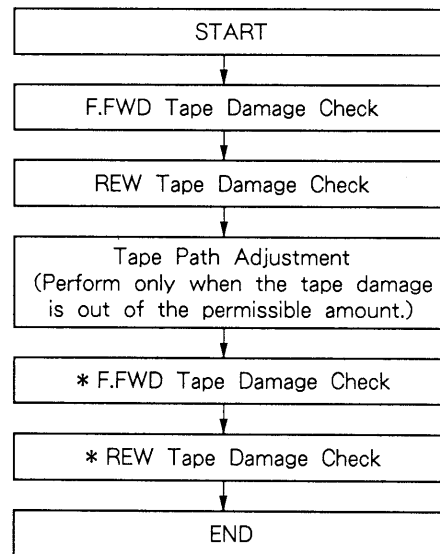
Preliminary Information

- A. Purpose of this check is to confirm the tape edge damage by playing back the tape with F.FWD and REW modes.

If tape edge damage is out of the permissible amount, it is necessary to readjust the tape path system referring to section 9-3.

- B. Prepare the followings for this check:
 - Blank tape: Type HD-1D-63 (63 minutes)
Prepare a used blank tape that has been run at least once on condition that a tape wound up into the lower side of the reel. (Refer to Fig. 9-14-1.)
 - Cleaning cloth
Sony Part No. 3-178-770-01
 - Cleaning fluid (or alcohol)
Sony Part No. 9-919-573-00

C. Check Flowchart



Adjustments marked with asterisk (*) are required only when the tape path has been adjusted.

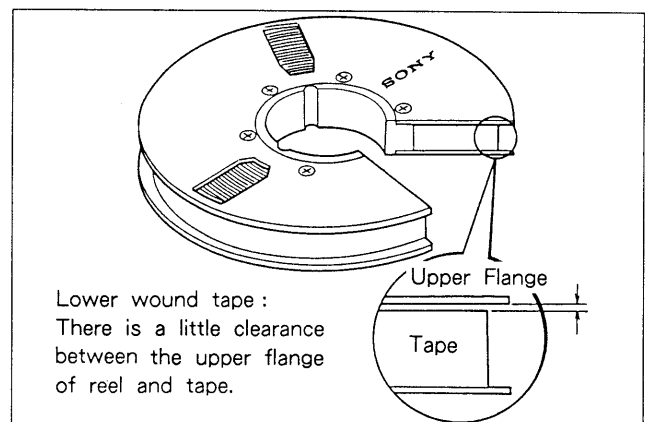


Fig. 9-14-1. HD-1D-63 Tape

Preparation

1. Thread a tape.
2. Set "S09. EOT STOP" menu to ENABLE.
(Factory set position: ENABLE)
Refer to section 1-4-3 (Operation Manual). Operation Mode Select Menu.

Note: If the EOT STOP menu has been set to DISABLE, a particle of tape will scatter with tape edge so that its makes very difficult to find the defective guide, therefore, be sure to set the EOT STOP menu to ENABLE.

Check

3. Tape Damage Check in F.FWD mode
 - (1) Run a tape in F.FWD mode.
 - (2) Check the following items while running the tape.
(Refer to Fig. 9-14-2.)
 - ① Tape's upper edge contacting surface of the full erase head
 - Is there no white powder? (oblique lines portion)
 - ② Tape's upper edge contacting portion of the capstan shaft
 - Is there no white powder? (oblique lines portion)
 - (3) Check the following items after the completion of F.FWD mode. (Refer to Fig. 9-14-3.)
In F.FWD mode, tape will stop before the end of tape with EOT STOP menu.
Check the winding condition of the tape that was wound on the T reel.
 - Check the tape's upper edge damage.
(Checking method of tape's upper edge damage)
Stroke the tape's upper edge with a fingertip. If any tame condition will be recognized in the stroking direction of tape edge, it can be judged that the tape damage happens.
 - (4) Judge the tape damage according to a result of steps (2) and (3) as follows.
 - ① In case when there is barely white powder (step 2) and no tape's upper edge damage (step 3):
 - * Tape edge damage check is no problem.
 - ② In case when there is a slight white powder but no tape's upper edge damage:
 - * Tape edge damage check is no problem.
 - ③ In case when there is not only white powder but also barely tape's upper edge damage:
 - * Be sure to perform the tape path adjustment.

Perform the tape path adjustment after the completion of the "tape damage check in REW mode".

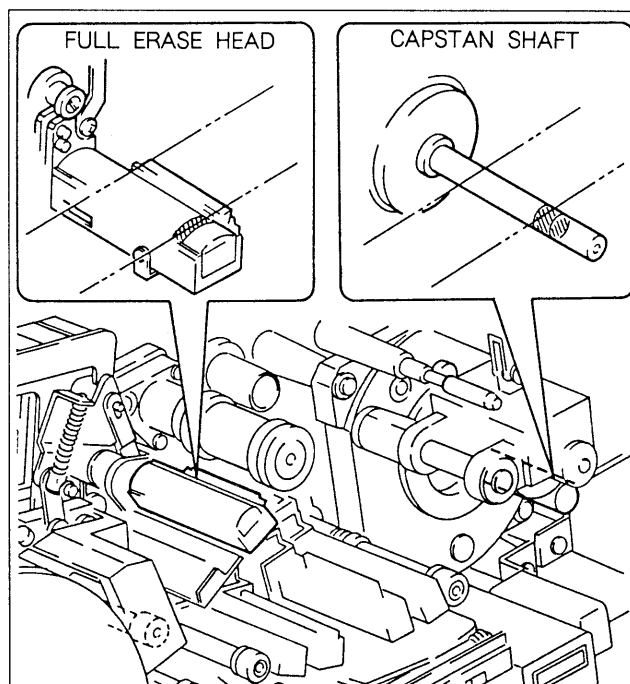


Fig. 9-14-2. Tape Edge Damage Check (1)

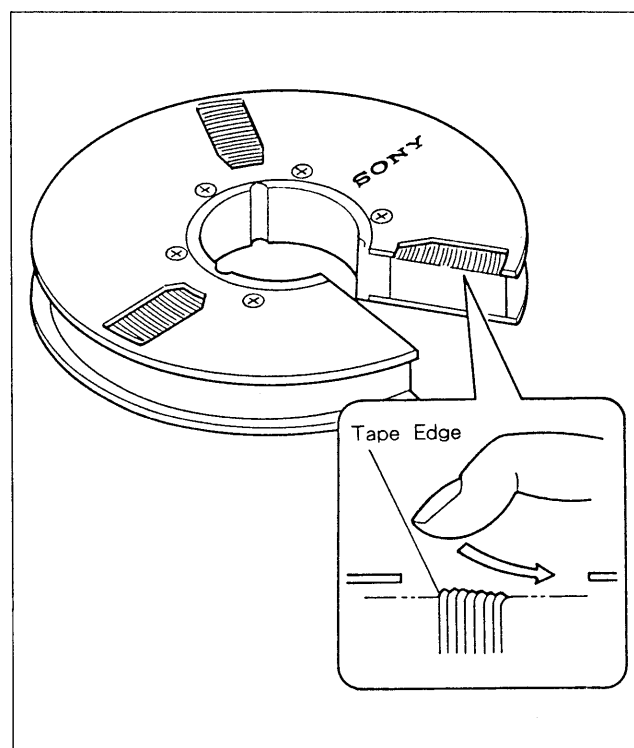


Fig. 9-14-3. Tape Edge Damage Check (2)

4. Tape Damage Check in REW mode
- (1) Run a tape in REW mode.
 - (2) Check the following items while running the tape.
(Refer to Fig. 9-14-2.)
Tape's upper edge contacting surface of the full erase head
 - Is there no white powder?
 - (3) Check the following items after the completion of REW mode.
In REW mode, tape will stop before the end of tape with EOT STOP menu.
Check the winding condition of the tape that was wound on the S reel. (Refer to Fig. 9-14-3.)
 - Check the tape's upper edge damage.
(Checking method of tape's upper edge damage)
Stroke the tape's upper edge with a fingertip. If any tame condition will be recognized in the stroking direction of tape edge, it can be judged that the tape damage happens.
 - (4) Judge the tape damage according to a result of steps (2) and (3) as follows.
 - ① In case when there is barely white powder (step 2) and no tape's upper edge damage (step 3):
 - * Tape edge damage check is no problem.
 - ② In case when there is a slight white powder but no tape's upper edge damage:
 - * Tape edge damage check is no problem.
 - ③ In case when there is not only white powder but also barely tape's upper edge damage:
 - * Be sure to perform the tape path adjustment.
5. In case when there is no tape edge damage, rewind the tape, remove the tape, then go to step 9.
6. In case when there is a tape edge damage, perform the following adjustment. (Refer to Fig. 9-14-4.)
- (1) Remove the tape from the EOT stop condition as follows.
Open the slant guide and take the tape out from the S and T reels without winding up the tape into the reel.
 - When removing the tape, slack the tape on both S and R reels.
 - When removing the tape from each guide, pay attention not to touch the tape with the upper flange.
 - If the EOT STOP menu has been set to DISABLE, a particle of tape will scatter with tape edge so that its makes very difficult to find the defective guide, therefore, be sure to set the EOT STOP menu to ENABLE.

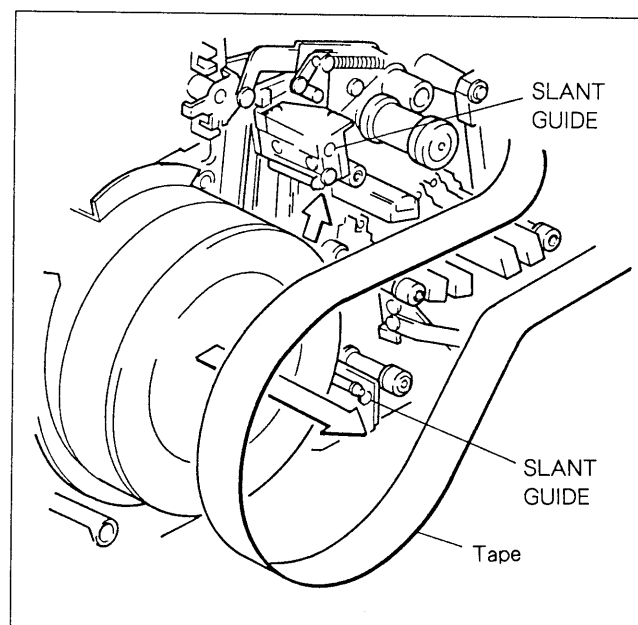


Fig. 9-14-4. Tape Edge Damage Check (3)

(2) Discriminate the defective guide to give tape edge damage before performing the tape path adjustment.

(Refer to Fig. 9-14-5.)

* In case when there is tape edge damage in F.FWD mode:

- ① If there is white powder on the full erase head which corresponds to the upper edge contacting surface of the tape, pay attention to the following guide.
 - S guide roller: Too much down pressure with upper flange
- ② If there is white powder on the capstan shaft which corresponds to the upper edge contacting surface of the tape, pay attention to the following guides.

- Guide post 2
- Taper guide
- Guide post 3

Too much down pressure with upper flange of either guide

* In case when there is tape edge damage in REW mode:

- ① If there is white powder on the full erase head which corresponds to the upper edge contacting surface of the tape, pay attention to the following guides.

- Guide post 2
- Taper guide
- Guide post 3

Too much down pressure with upper flange of either guide

- ② If there is no white powder on the full erase head and the capstan shaft which correspond to the upper edge contacting surface of the tape but there is tape damage, pay attention to the following guide.

- S guide roller: Too much down pressure with upper flange

* The guide which generates a tape damage by its tape limiting surface in each mode can be seen as a black trace on the flange. Observe the tape limiting surface of the upper flange with dental miller.

Note: Be sure not wipe off a black trace when observing the upper flange.

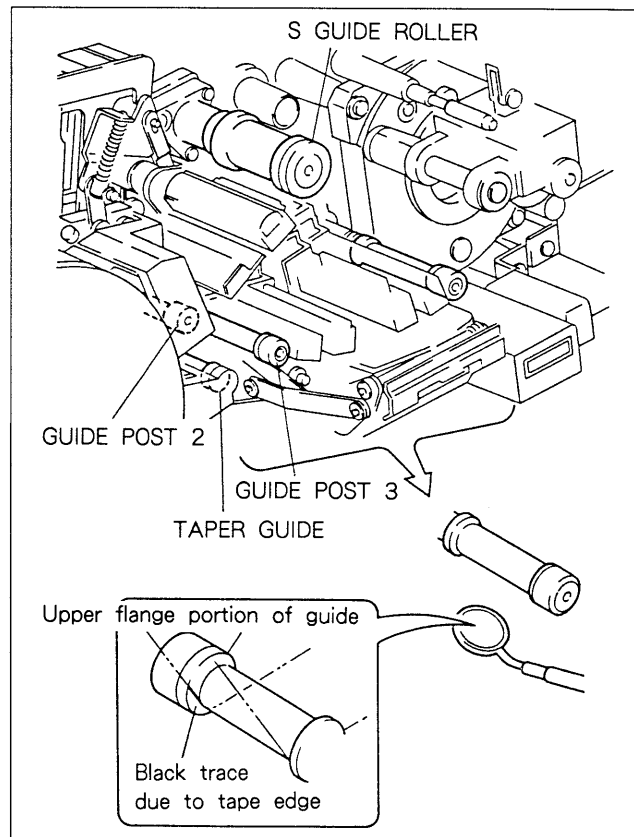
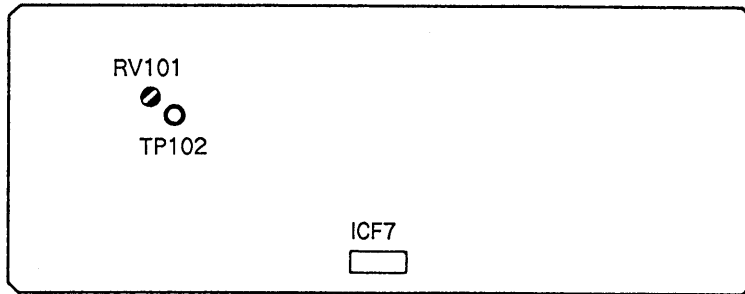


Fig. 9-15-4. Tape Edge Damage Check (4)

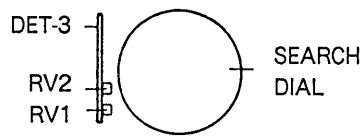
7. Perform the guide height adjustment that has been discriminated in step 6
Refer to section 9-3. Tape Path Adjustment.
 8. After the tape path adjustment, perform the following checks.
 - Tape damage check with F.FWD mode (Refer to step 3.)
 - Tape damage check with REW mode (Refer to step 4.)
- * If the tape damage can not be adjusted, readjust from step 6.
9. Clean the tape path system referring to section 5-2-1.

SECTION 10 SYSTEM CONTROL/SERVO ALIGNMENT

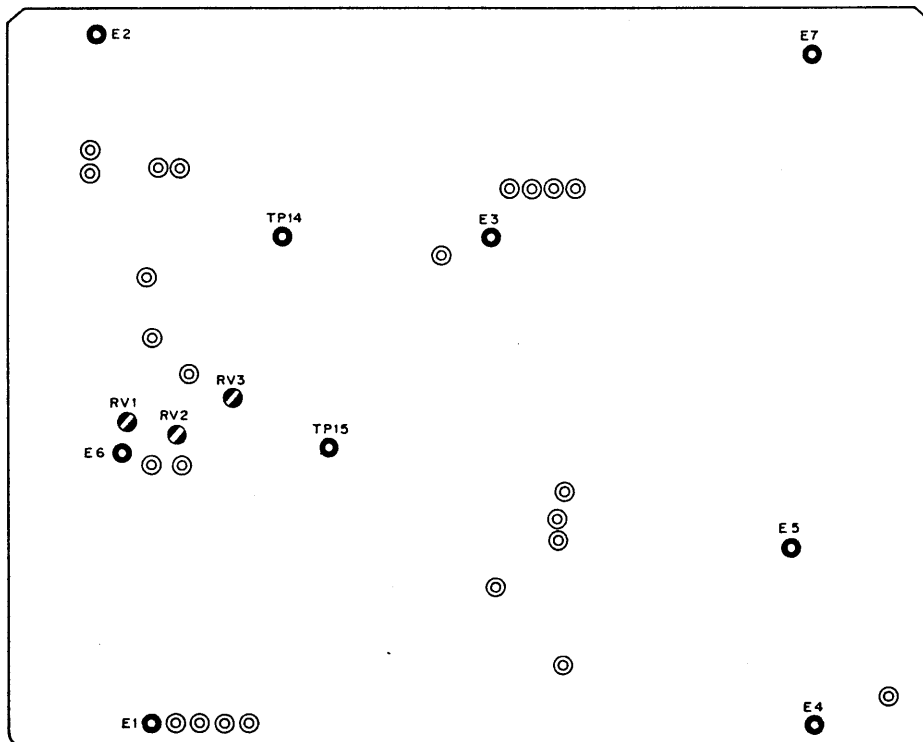
KC-14 Board



DET-3 Board



SV-90 Board



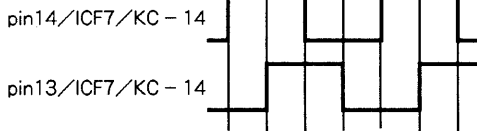
10-1. +5 V ADJUSTMENT (CONTROL PANEL)

- (1) Take out the KC-14 board from the control panel.
- (2) Connect the 8-pin multicable from Mother board to the connector CN701/KC-14 board.
- (3) Turn the power on, and adjust as follows.
TP102/KC-14 = $+ 5.0 \pm 0.01$ V dc
●RV101/KC-14 board
- (4) Turn the power off, and return the KC-14 board to the control panel.

10-2. DIAL PULSE AMPLIFIER ADJUSTMENT

- (1) Set a dual trace oscilloscope to CHOP, DC, 2 V/DIV and 2 msec/DIV. Connect it to pin14 of ICF7 and pin13 of ICF7 on KC-14 board.
- (2) Set the VTR to JOG mode and turn ●RV1 on DET-3 board CW (clockwise) /CCW (counterclockwise) while turning the search dial. Set ●RV1 in the middle of the points where the pulse appears at pin14 of ICF7 by turning ●RV1 CW/CCW.
- (3) Adjust ●RV2 on DET-3 board for pin13 of ICF7 similarly as Step 2.
- (4) Make sure that the timing of the pulse is shown below by turning the search dial in the direction of FWD/REV.

FWD



REV



10-3. SERVO A/D AND D/A CONVERTER ADJUSTMENT

- (1) Put the VTR in the STOP (STANDBY OFF) mode.
- (2) A/D converter reference voltage adjustment
TP15/SV-90 : $+ 3.000 \pm 0.002$ V dc
using digital voltmeter
●RV1/SV-90
- (3) D/A converter adjustment
Select [TTP ADJ] of the test menu [T17. MAINTENANCE]. See section 3-3.
Key in [C], [5], then press the [SET] key. [C5. DAC ADJUST] will be selected, and the following will be displayed on the control panel.

Perform adjustment as follows.

TP14/SV-90 : 0.000 ± 0.001 V dc
using digital voltmeter

●RV2/SV-90

Next, press the [7] key while pressing the blue [OUT] key, then perform the following adjustment while keeping these keys pressed.

TP14/SV-90 : $+ 2.000 \pm 0.002$ V dc
using digital voltmeter

●RV3/SV90

After adjustment, press the [C], [0] and [SET] keys in that sequence, then press the [SET] key while pressing the blue [OUT] key.

SECTION 11

AUDIO SIGNAL SYSTEM ALIGNMENT

11-1. ADJUSTMENT SEQUENCE

AUDIO OVERALL ADJUSTMENT

11-2. Adjustment Preparations
↓
11-3. CTL Playback Level Adj.
↓
11-14. REC Head CTL Playback Level Adj.
↓
11-4. TC Playback Level Adj.
↓
11-5. CUE Playback RF Level Adj.
↓
11-6. CUE Line Output Level Adj.
↓
11-7. Digital Audio Playback Equalizer Adj.
↓
11-8. CUE REC Preset Level Adj.
↓
11-9. Recording Current Adj.
↓
11-10. CTL, CUE and TC Erase Current Adj.
↓
11-11. Full Erase Current Adj.
↓
11-12. CUE S/N Adj.
↓
11-13. CTL Confi Level Adj.

AUDIO REC HEAD REPLACEMENT

11-2. Adjustment Preparations
↓
11-14. REC Head CTL Playback Level Adj.
↓
11-9. Recording Current Adj.
↓
11-12. CUE S/N Adj.

AUDIO PB HEAD REPLACEMENT

11-2. Adjustment Preparations
↓
11-3. CTL Playback Level Adj.
↓
11-4. TC Playback Level Adj.
↓
11-7. Digital Audio Playback Equalizer Adj.

AUDIO CONF HEAD REPLACEMENT

11-2. Adjustment Preparations
↓
11-5. CUE Playback RF Level Adj.
↓
11-7. Digital Audio Playback Equalizer Adj.
↓
11-12. CUE S/N Adj.
↓
11-13. CTL Confi Level Adj.

FULL ERASE HEAD REPLACEMENT

11-2. Adjustment Preparations
↓
11-11. Full Erase Current Adj.

AUDIO ERASE HEAD REPLACEMENT

11-2. Adjustment Preparations
↓
11-10. CTL, CUE and TC Erase Current Adj.

AP-22 BOARD REPLACEMENT

11-2. Adjustment Preparations
↓
11-3. CTL Playback Level Adj.
↓
11-14. REC Head CTL Playback Level Adj.
↓
11-4. TC Playback Level Adj.
↓
11-5. CUE Playback RF Level Adj.
↓
11-8. CUE REC Preset Level Adj.
↓
11-9. Recording Current Adj.
↓
11-10. CTL, CUE and TC Erase Current Adj.
↓
11-11. Full Erase Current Adj.
↓
11-13. CTL Confi Level Adj.

AU-109 BOARD REPLACEMENT

11-2. Adjustment Preparations

↓
11-6. CUE Line Output Level Adj.

↓
11-7. Digital Audio Playback Equalizer Adj.

↓
11-12. CUE S/N Adj.

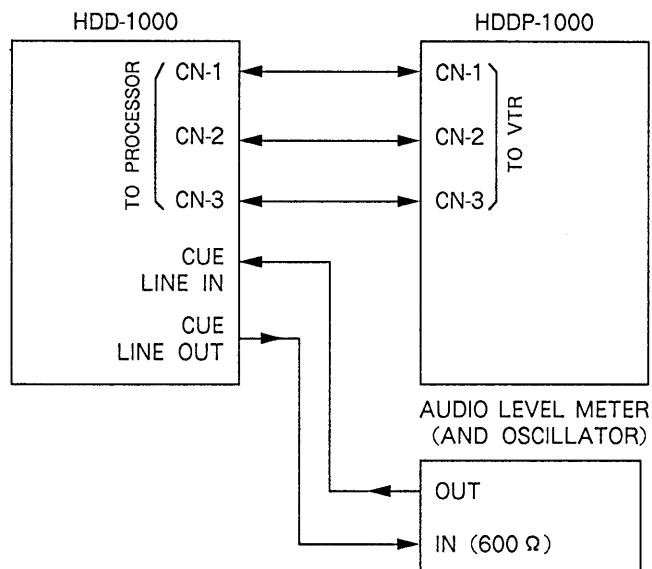
VR-74 BOARD REPLACEMENT

11-2. Adjustment Preparations

↓
11-8. CUE REC Preset Level Adj.

11-2. ADJUSTMENT PREPARATIONS

(1) Connection



(2) Menu/switch settings

LO-06 board

J1 (B-1) : SHORT

J2 (B-2) : SHORT

J27 (B-3) : SHORT

J28 (B-4) : SHORT

Level control panel

AUDIO MASTER PB level control : Preset (PUSH)

DA1 to DA8 REC level control : Preset (PUSH)

CUE REC level control : Preset (PUSH)

TRACKING control : Preset (PUSH)

REC INHIBIT switch : OFF

REMOTE/LOCAL switch : LOCAL

Function control panel

TAPE/EE key : TAPE

Menu

Using the following key operations, load the default setup data in the PROM (factory settings) to the RAM.

SETUP → **T** → **0** → **SET**

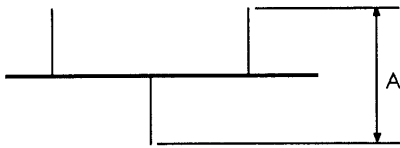
In addition, press **SETUP** → **9** and select TIMER 1.

11-3. CTL PLAYBACK LEVEL ADJUSTMENT

Connection : See Section 11-2.
Menu/Switch settings : See Section 11-2.
Mode of VTR : PB
Equipment : Oscilloscope

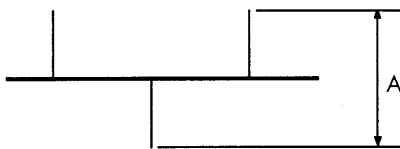
- (1) Set the REC INHIBIT switch on the level control panel to ON.
- (2) Perform the following adjustment while playing back the alignment tape.

TP2/D-8—E5/E-7/AP-22 (PB head)



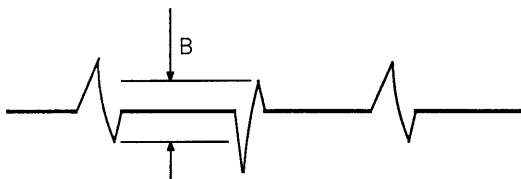
A = RF level on the alignment tape ± 0.1 V
 ●RV2/D-8/AP-22

(Serial No. 10201 and higher)
 TP5/F-8—E5/E-7/AP-22 (REC head)



A = RF level on the alignment tape ± 0.1 V
 ●RV5/F-8/AP-22

(Up to serial No. 10200)
 TP5/F-8—E5/E-7/AP-22 (REC head)



$B = 800 \text{ mV p-p} \times \frac{\text{RF level on the alignment tape}}{4.0 \text{ V}} \pm 20 \text{ mV}$
 ●RV5/F-8/AP-22

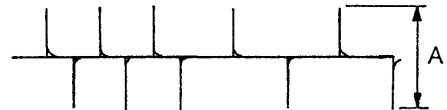
- (3) Set the REC INHIBIT switch to OFF.

11-4. TC PLAYBACK LEVEL ADJUSTMENT

Connection : See Section 11-2.
Menu/Switch settings : See Section 11-2.
Mode of VTR : PB
Equipment : Oscilloscope

- (1) Set the REC INHIBIT switch on the level control panel to ON.
- (2) Perform the following adjustment while playing back the alignment tape.

TP1/D-7—E5/E-7/AP-22



A = RF level on the alignment tape ± 0.1 V
 ●RV1/D-7/AP-22

- (3) Set the REC INHIBIT switch to OFF.

11-5. CUE PLAYBACK RF LEVEL ADJUSTMENT

Connection : See Section 11-2.
Menu/Switch settings : See Section 11-2.
Mode of VTR : PB
Equipment : Oscilloscope

- (1) Set the REC INHIBIT switch on the level control panel to ON.
- (2) Perform the following adjustment while playing back the no-signal CUE part of the alignment tape.

TP4/D-9—E5/E-7/AP-22 :

PB CUE NORM: RF level on the alignment tape ± 0.1 V
 ●RV4/D-9/AP-22

TP3/D-8—E5/E-7/AP-22 :

PB CUE INV: RF level on the alignment tape ± 0.1 V
 ●RV3/D-8/AP-22

- (3) Set the REC INHIBIT switch to OFF.

11-6. CUE LINE OUTPUT LEVEL ADJUSTMENT

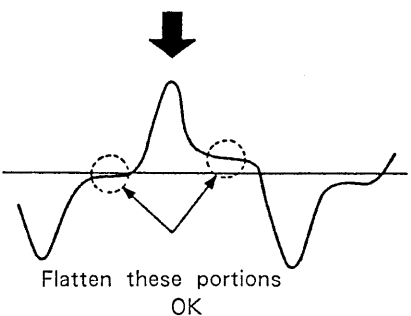
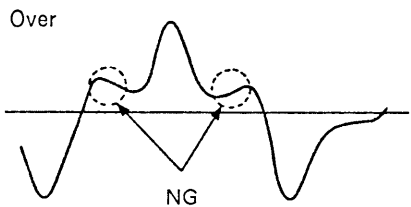
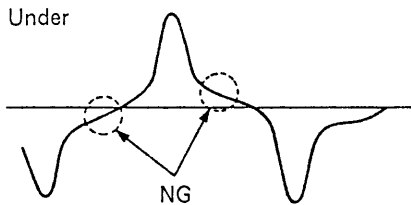
Connection : See Section 11-2.
Menu/Switch settings : See Section 11-2.
Mode of VTR : PB
Equipment : Audio level meter

- (1) Set the REC INHIBIT switch on the level control panel to ON.
- (2) Perform the following adjustment while playing back the CUE 0 VU part of the alignment tape.
 CUE LINE OUTPUT = +4 dBm ± 0.1 dB
 ●RV901/K-6/AU-109
- (3) Set the REC INHIBIT switch to OFF.

11-7. DIGITAL AUDIO PLAYBACK EQUALIZER ADJUSTMENT

Connection : See Section 11-2.
Menu/Switch settings : See Section 11-2.
Mode of VTR : PB
Equipment : Oscilloscope

- (1) Set the REC INHIBIT switch on the level control panel to ON.
- (2) Adjust the RF signal waveform while playing back the alignment tape.



The table below lists the measurement and adjustment positions.

<u>CHANNEL</u>	<u>Measurement</u> AU-109	<u>Adjustment</u> AU-109
TR1 PB	TP104/A-7	●RV101/A-6
TR2 PB	TP204/B-7	●RV201/B-6
TR3 PB	TP304/D-7	●RV301/C-6
TR4 PB	TP404/E-7	●RV401/D-6
TR5 PB	TP504/F-7	●RV501/E-6
TR6 PB	TR604/G-7	●RV601/F-6
TR7 PB	TR704/H-7	●RV701/G-6
TR8 PB	TR804/I-7	●RV801/I-6
TR1 CONF1	TP105/A-4	●RV102/A-3
TR2 CONF1	TP205/B-4	●RV202/B-3
TR3 CONF1	TP305/D-4	●RV302/C-3
TR4 CONF1	TP405/E-4	●RV402/D-3
TR5 CONF1	TP505/F-4	●RV502/E-3
TR6 CONF1	TP605/G-4	●RV602/F-3
TR7 CONF1	TP705/H-4	●RV702/G-3
TR8 CONF1	TP805/I-4	●RV802/I-3

- (3) Set the REC INHIBIT switch to OFF.

11-8. CUE REC PRESET LEVEL ADJUSTMENT

Connection : See Section 11-2.
Menu/Switch settings : See Section 11-2.
Mode of VTR : EE
Equipment : Audio level meter
CUE LINE IN signal : 1 kHz, +4.0 dB

- (1) Confirm that the CUE REC level control on the level control panel is set to PRESET (PUSH).
- (2) Supply the 1 kHz/+4 dB signal to the CUE LINE IN connector, and put the machine into the EE mode. Perform the following adjustment.
 CUE LINE OUT : +4.0 dBm ± 0.1 dB
 ●RV1/VR-74
 ●RV1/VR-74 is located on the bottom of the level control panel, and near by the CUE REC level control.

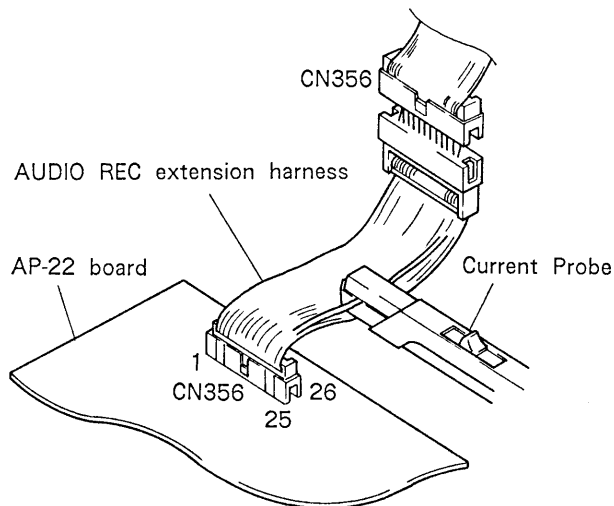
11-9. RECORDING CURRENT ADJUSTMENT

Connection : See Section 11-2.
Menu/Switch settings : See Section 11-2.
Mode of VTR : REC
Equipment : Oscilloscope
 Current probe

- (1) Set REC INHIBIT switch to ON.
- (2) Play back an alignment tape and measure the following levels :

CHANNEL	Measurement AU-109
TR1 PB	TP104/A-7
TR2 PB	TP204/B-7
TR3 PB	TP304/D-7
TR4 PB	TP404/E-7
TR5 PB	TP504/F-7
TR6 PB	TP604/G-7
TR7 PB	TP704/H-7
TR8 PB	TP804/I-7

- (3) Unthread and remove the alignment tape and set REC INHIBIT switch to OFF.
- (4) Use the AUDIO REC extension harness (Sony part No. : J-6266-030-A), extend CN356/J-9/AP-22.
- (5) Thread a blank tape and measure recording current with a current probe in the REC mode.

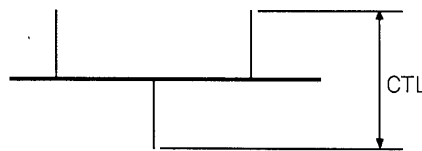


CN356, pin 24/AP-22 (CTL)
 CN356, pin 2/AP-22 (TC)
 CN356, pin 4/AP-22 (CUE INVERT)
 CN356, pin 6/AP-22 (CUE NORMAL)
 Current of each channel = 200 ± 10 mA p-p
 ●RV6/H-6/AP-22

CN356, pin 7/AP-22 (TR1)
 CN356, pin 9/AP-22 (TR2)
 CN356, pin 11/AP-22 (TR3)
 CN356, pin 13/AP-22 (TR4)
 CN356, pin 15/AP-22 (TR5)
 CN356, pin 17/AP-22 (TR6)
 CN356, pin 19/AP-22 (TR7)
 CN356, pin 21/AP-22 (TR8)
 Current of each channel = 140 ± 10 mA p-p
 ●RV7/J-6/AP-22

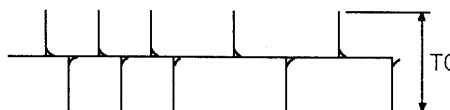
- (6) After the current adjustment is completed, play back the recorded portion and measure the following levels.

TP2/D-8 - E-5/E-7/AP-22



TP4/D-9 - E-5/E-7/AP-22 : CUE · N
 TP3/D-8 - E-5/E-7/AP-22 : CUE · I

TP1/D-7 - E-5/E-7/AP-22



CHANNEL	Measurement AU-109
TR1 PB	TP104/A-7
TR2 PB	TP204/B-7
TR3 PB	TP304/D-7
TR4 PB	TP404/E-7
TR5 PB	TP504/F-7
TR6 PB	TP604/G-7
TR7 PB	TP704/H-7
TR8 PB	TP804/I-7

Perform adjustments while repeating record/playback so that each track of CTL, TC, CUE·N and CUE·I levels meets with the following specifications, simultaneously.

$$\textcircled{R}V6/H-6/AP-22 \left\{ \begin{array}{l} 2.6 \text{ V p-p} \leq \text{CTL} \leq 4.8 \text{ V p-p} \\ 2.6 \text{ V p-p} \leq \text{TC} \leq 5.4 \text{ V p-p} \\ \text{CUE} \cdot \text{N} \leq 3.0 \text{ V p-p} \\ \text{CUE} \cdot \text{I} \leq 3.0 \text{ V p-p} \end{array} \right.$$

For TR1 through TR8, use values measured in steps (2) and (6) to obtain the value of C.

$$C = \frac{\text{Value measured in (6)}}{\text{Value measured in (2)}}$$

* The alignment tape deviation value

* Shown in the table attached with an alignment tape.
(Use coefficient 1.0 when using the temporary alignment tape.)

Perform adjustments while repeating record/playback so that the value C of all channels meet with the following specification, simultaneously.

Each channel's value $C = 1.0 \pm 0.12$ or less

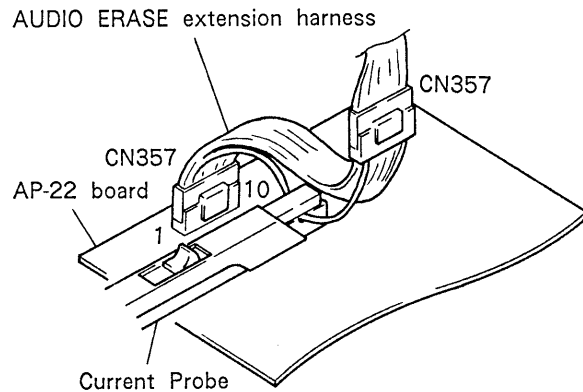
$\textcircled{R}V7/J-6/AP-22$

(7) Remove AUDIO REC extension harness from CN356 and restore CN356.

11-10. CTL, CUE AND TC ERASE CURRENT ADJUSTMENTS

Connection : See Section 11-2.
Menu/Switch settings : See Section 11-2.
Mode of VTR : REC and INSERT
Equipment : Oscilloscope
Current probe

(1) Using the AUDIO ERASE extension harness (Sony Part No. : J-6266-040-A), extend the CN357/N-2/AP-22. Thread a recording tape.



- (2) CTL erase current adjustment
Put the machine into the REC mode, and measure the current passing through pin 1 of CN357/AP-22 using a current probe.
- $\textcircled{L}V421/L-1, \textcircled{L}V422/M-1/AP-22$: MAX.
 - $\textcircled{R}V421/L-1/AP-22$: $120 \pm \frac{10}{100}$ mA p-p
- Repeatedly adjust $\textcircled{L}V421, \textcircled{L}V422$ and $\textcircled{R}V421$ several times.
- (3) CUE erase current adjustment
Put the machine into the REC mode, and measure the current passing through pin 8 of CN357/AP-22 using a current probe.
- $\textcircled{L}V461/L-3, \textcircled{L}V462/M-3/AP-22$: MAX.
 - $\textcircled{R}V461/L-3/AP-22$: $100 \pm \frac{10}{100}$ mA p-p
- Repeatedly adjust $\textcircled{L}V461, \textcircled{L}V462$ and $\textcircled{R}V461$ several times.
- (4) TC erase current adjustment
Put the machine into the REC mode, and measure the current passing through pin 4 of CN357/AP-22 using a current probe.
- $\textcircled{L}V441/L-2, \textcircled{L}V442/M-2/AP-22$: MAX.
 - $\textcircled{R}V441/L-2/AP-22$: $100 \pm \frac{10}{100}$ mA p-p
- Repeatedly adjust $\textcircled{L}V441, \textcircled{L}V442$ and $\textcircled{R}V441$ several times.

(5) CUE/TC erase cancel adjustment

① Measure the current at the following parts using a current probe.

If the measurement values meet the specifications, proceed to step (6). If not, perform step ②.

CUE INSERT mode

CN357, Pin 8 : $\geq 100 \pm \frac{10}{100}$ mA p-p

CN357, Pin 4 : ≤ 8 mA p-p

TC INSERT mode

CN357, Pin 8 : ≤ 8 mA p-p

CN357, Pin 4 : $\geq 100 \pm \frac{10}{100}$ mA p-p

② If the measurement values do not meet above specifications, perform the following adjustment.

CUE INSERT mode

CN357, Pin 4 : ≤ 5 mA p-p

TC INSERT mode

CN357, Pin 8 : ≤ 5 mA p-p

● LV1/N-3/AP-22

Put the machine into the CUE & TC INSERT mode, perform the following adjustment.

CN357, Pin 8

● LV462/M-3/AP-22 : MAX.

● RV461/L-3/AP-22 : 100 ± 20 mA p-p

Repeatedly adjust ● LV462 and ● RV461 several times.

CN357, Pin 4

● LV442/M-2/AP-22 : MAX.

● RV441/L-2/AP-22 : 100 ± 20 mA p-p

Repeatedly adjust ● LV442 and ● RV441 several times.

Perform step ① again and repeat the step ② adjustment until each current meets the specifications.

(6) Remove the AUDIO ERASE extension harness, and connect CN357 to the original position.

11-11. FULL ERASE CURRENT ADJUSTMENT

Connection : See Section 11-2.

Menu/Switch settings : See Section 11-2.

Mode of VTR : REC

Equipment : Oscilloscope

(1) Thread a recording tape, then while recording on it, check the frequency.

TP8/N-4—E10/M-4/AP-22 = 275 ± 50 kHz

(2) If the measurement value does not meet the specifications, replace C85/M-5/AP-22 with one of the following.

1800pF 5 % 500 V (Sony Part No. : 1-109-587-00)

2200pF 2 % 500 V (Sony Part No. : 1-109-642-00)

2700pF 5 % 500 V (Sony Part No. : 1-109-591-11)

When the capacitance is increased, the frequency will fall, and vice-versa.

(3) Thread a recording tape, then while recording on it, perform the following adjustments.

TP8/N-4—E10/M-4/AP-22

● RV8/K-5/AP-22 : $750 \pm \frac{50}{100}$ mV p-p

11-12. CUE S/N ADJUSTMENT

Connection : See Section 11-2.

Menu/Switch settings : See Section 11-2.

Mode of VTR : See text

Equipment : Audio level meter

CUE LINE IN signal : No signal

(1) Thread a recording tape, record on it for about 30 seconds, then while playing back the recorded passage perform the following adjustments.

CUE LINE OUTPUT = MIN. (≤ -46 dBm)

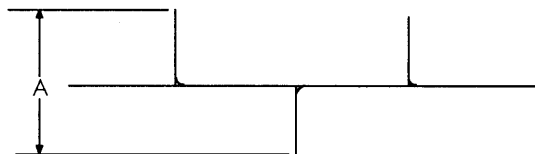
● RV902/L-9/AU-109

11-13. CTL CONF LEVEL ADJUSTMENT (S/N 10201 and higher)

Connection : See Section 11-2.
Menu/Switch settings : See Section 11-2.
Mode of VTR : REC/PB
Equipment : Oscilloscope

- (1) Thread a tape and put the machine into the REC mode. Play back the recorded portion and measure the level as follows.

CN317-15C/F-1—E1/D-1/AP-22



- (2) Put the machine into the REC mode again and perform the following adjustment.

CN317-15C/F-1—E1/D-1/AP-22

●RV9/F-8/AP-22



$$B = A \pm 10 \text{ mV}$$

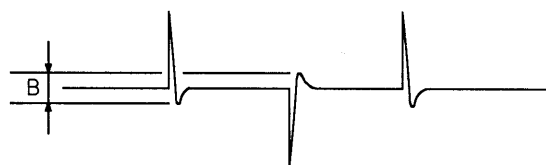
11-14. REC HEAD CTL PB LEVEL ADJUSTMENT (S/N 10001 to 10200)

Connection : See Section 11-2.
Menu/Switch settings : See Section 11-2.
Mode of VTR : PB
Equipment : Oscilloscope

- (1) Set the REC INHIBIT switch on the level control panel to ON.

- (2) While playing back the alignment tape, perform the following adjustment.

TP5/F-8—E-5/E-7/AP-22



$$B = 800 \pm 20 \text{ mV p-p}$$

●RV5/F-8/AP-22

- (3) Set the REC INHIBIT switch to OFF.

SECTION 12

VIDEO SIGNAL SYSTEM ALIGNMENT

12.1. ADJUSTMENT SEQUENCE

VIDEO OVERALL ADJUSTMENT

- 12-2. ADJUSTMENT PREPARATIONS
- ↓
- 12-3. ROTARY ERASE ADJUSTMENT
- ↓
- 12-4. PLL LOCK VOLTAGE ADJUSTMENT
- ↓
- 12-5. PLL FREE RUN FREQUENCY ADJUSTMENT
- ↓
- 12-6. PLL LOCK PHASE ADJUSTMENT
- ↓
- 12-7. PLAYBACK EQUALIZER ADJUSTMENTS
- ↓
- 12-8. RF GAIN ADJUSTMENT
- ↓
- 12-7. (1), (2), (3) PLAYBACK EQUALIZER ADJUSTMENTS
- ↓
- 12-9. DATA LATCH TIMING ADJUSTMENT
- ↓
- 12-10. RECORDING CURRENT ADJUSTMENT

DRC-1 BOARD REPLACEMENT

- 12-2. ADJUSTMENT PREPARATIONS
- ↓
- 12-4. PLL LOCK VOLTAGE ADJUSTMENT
- ↓
- 12-5. PLL FREE RUN FREQUENCY ADJUSTMENT
- ↓
- 12-6. PLL LOCK PHASE ADJUSTMENT
- ↓
- 12-7. PLAYBACK EQUALIZER ADJUSTMENTS
- ↓
- 12-8. RF GAIN ADJUSTMENT
- ↓
- 12-7. (1), (2), (3) PLAYBACK EQUALIZER ADJUSTMENTS
- ↓
- 12-9. DATA LATCH TIMING ADJUSTMENT

DRUM REPLACEMENT

- 12-2. ADJUSTMENT PREPARATIONS
- ↓
- 12-3. ROTARY ERASE ADJUSTMENT
- ↓
- 12-7. PLAYBACK EQUALIZER ADJUSTMENTS
- ↓
- 12-8. RF GAIN ADJUSTMENT
- ↓
- 12-7. (1), (2), (3) PLAYBACK EQUALIZER ADJUSTMENTS
- ↓
- 12-9. DATA LATCH TIMING ADJUSTMENT
- ↓
- 2-10. RECORDING CURRENT ADJUSTMENT

PRD-1 BOARD REPLACEMENT

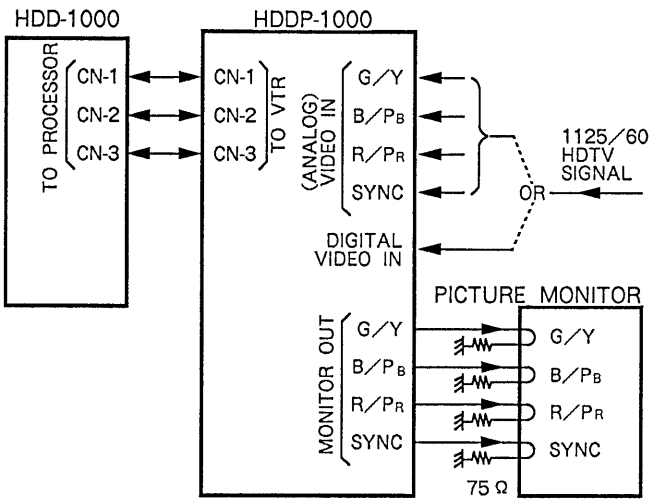
- 12-2. ADJUSTMENT PREPARATIONS
- ↓
- 12-10. RECORDING CURRENT ADJUSTMENT

FE-05 BOARD REPLACEMENT

- 12-2. ADJUSTMENT PREPARATIONS
- ↓
- 12-3. ROTARY ERASE ADJUSTMENT

12-2. ADJUSTMENT PREPARATIONS

(1) Connection



(2) Menu/Switch settings

HDDP-1000

CI-05 board S2-8/H-1 : OFF
 SG-151 board S3-8/G-1 : OFF
 PR-115 board S7-7/H-1 : OFF
 S7-8/H-1 : OFF
 ADA-12 board S1-8/H-18 : OFF

HDD-1000 level control panel

TRACKING control : Preset (PUSH)
 REC INHIBIT switch : OFF
 REMOTE/LOCAL switch : LOCAL

Menu

Using the following key operations, load the default setup data (factory setting data) in the PROM to the RAM.

SET UP → T → 0 → SET → SET UP

Set menus I80 and I81 according to the type of video signal input to the HDDP-1000.

I80. INPUT ANALOG/DIGITAL

I81. INPUT GBR/YPbPR

Set menu I83 according to the type of picture monitor.

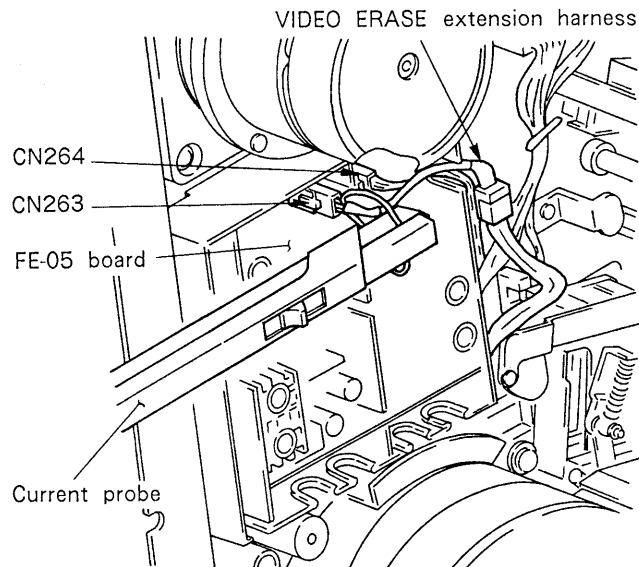
I83. OUTPUT GBR/YPbPR

12-3. ROTARY ERASE ADJUSTMENT

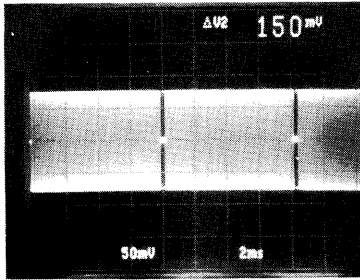
Connection : See section 12-2.
Menu/switch settings : See section 12-2 and text.
Mode of VTR : See text.
Equipment : Oscilloscope
 Current probe

- (1) Remove the tape and the shield case of the FE-05 board.
- (2) Using the VIDEO ERASE extension harness (Sony Part No.: J-6266-300-A), extend the CN263/A-3 /FE-05.

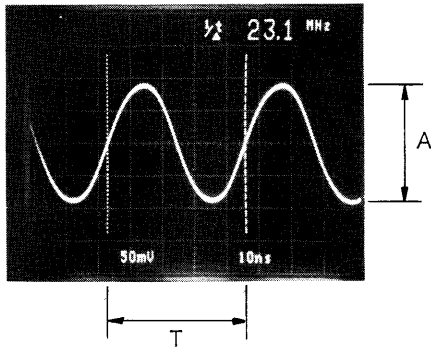
Note : Do not extend the connector with the extension harness when menu T16 is left set to ON.



- (3) Menu setting
T16. VIDEO TEST : ON
- (4) Using a current probe, measure the current at pin 1 or pin 3 of CN263, and perform adjustment as follows.



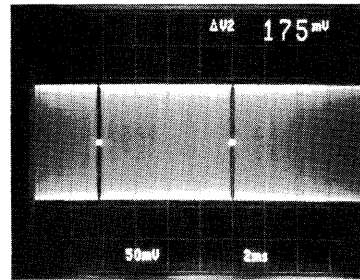
↓ Magnify



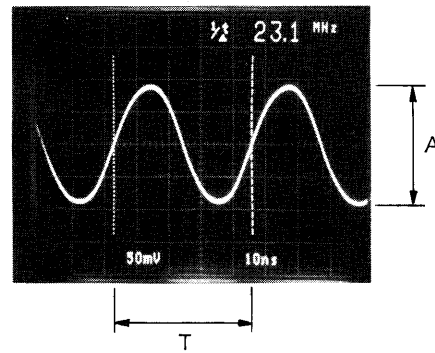
$T = 43.3 \pm 0.4 \text{ nsec}$ (Frequency = $23.1 \pm 0.2 \text{ MHz}$)
 ● CV1/A-2/FE-05
 $A = 150 \pm 10 \text{ mA p-p}$
 ● RV1/B-2/FE-05

- (5) Menu setting
T16. VIDEO TEST : OFF
- (6) Remove the VIDEO ERASE extension harness, and return CN263 to its original position.
- (7) Remove the VIDEO ERASE extension harness, and extend CN264/A-3/FE-05.
- (8) Menu setting
T16. VIDEO TEST : ON

- (9) Using a current probe, measure the current at pin 1 or pin 3 of CN264, and perform adjustment as shown below.



↓ Magnify



$T = 43.3 \pm 0.4 \text{ nsec}$ (Frequency = $23.1 \pm 0.2 \text{ MHz}$)
 ● CV2/A-4/FE-05
 $A = 175 \pm 10 \text{ mA p-p}$
 ● RV2/B-2/FE-05

- (10) Menu setting
T16. VIDEO TEST : OFF
- (11) Remove the VIDEO ERASE extension harness, and return CN264 to its original position. Install the shield case on the FE-05 board.

12-4. PLL LOCK VOLTAGE ADJUSTMENT

Connection : See section 12-2.
Menu/switch settings : See section 12-2 and text.
Mode of VTR : EE
Equipment : Oscilloscope

- (1) TP1/F-2/⑤DRC-1 = 0 ± 10 mV dc
 ⓄRV1/F-1/⑤DRC-1

TP1/F-2/④DRC-1 = 0 ± 10 mV dc
 ⓄRV1/F-1/④DRC-1

- (2) Lock confirmation

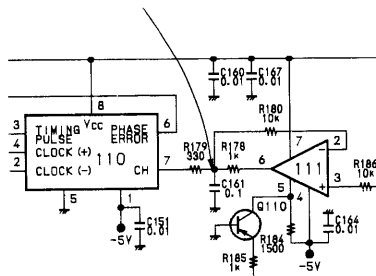
Confirm that the PLL of all channels from CH-1 to CH-8 is locked. If all ERROR A and B LEDs (yellow) on the four VD-04 boards of the HDDP-1000 are out, the PLL of the HDD-1000 is locked. If an ERROR A or ERROR B LED is lit, set test menu T06. DRC TEST 1 to Step 1 and adjust the PLL corresponding to that LED. The LED and adjustment points are shown in the table below.

After the adjustment is completed, set test menu T06. DRC TEST 1 to OFF.

VIDEO CHANNEL	ERROR LED	ADJUSTMENT
CH-1	A/⑥VD-04	ⓄRV107/M-11/⑤DRC-1
CH-2	B/⑥VD-04	ⓄRV207/M-8/⑤DRC-1
CH-3	A/⑤VD-04	ⓄRV307/M-5/⑤DRC-1
CH-4	B/⑤VD-04	ⓄRV407/M-3/⑤DRC-1
CH-5	A/④VD-04	ⓄRV107/M-11/④DRC-1
CH-6	B/④VD-04	ⓄRV207/M-8/④DRC-1
CH-7	A/③VD-04	ⓄRV307/M-5/④DRC-1
CH-8	B/③VD-04	ⓄRV407/M-3/④DRC-1

- (3) Lock voltage adjustment
 Adjust the lock voltage of CH-1 as shown below.

R179/M-11/⑤DRC-1 = 1.6 ± 0.05 V dc



ⓄLV104/M-10/⑤DRC-1

Adjust the other channels in the same way. The measurement and adjustment points are shown in the table below.

VIDEO CHANNEL	MEASUREMENT	ADJUSTMENT	Board
CH-1	R179/M-11	ⓄLV104/M-10	⑤DRC-1
CH-2	R279/M-9	ⓄLV204/M-8	
CH-3	R379/M-7	ⓄLV304/M-5	
CH-4	R479/M-4	ⓄLV404/M-3	
CH-5	R179/M-11	ⓄLV104/M-10	④DRC-1
CH-6	R279/M-9	ⓄLV204/M-8	
CH-7	R379/M-7	ⓄLV304/M-5	
CH-8	R479/M-4	ⓄLV404/M-3	

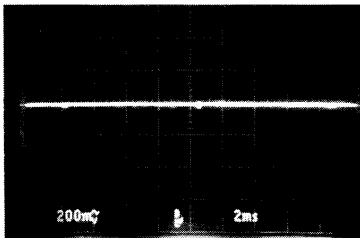
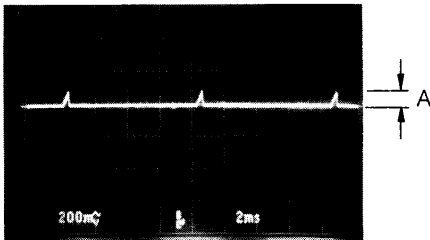
- (4) Perform the adjustments of sections 12-5 and 12-6 in that sequence.

12-5. PLL FREE RUN FREQUENCY ADJUSTMENT

Connection : See section 12-2.
Menu/switch settings : See section 12-2 and text.
Mode of VTR : PB
Equipment : Oscilloscope

Perform the adjustment of section 12-4 before performing this adjustment.

- (1) Set the REC INHIBIT switch on the level control panel to ON.
- (2) While playing back the COMPOSITE (DIST ON) signal portion of the alignment tape, adjust the free run frequency of CH-1 as shown below.
R179/M-11/ⓈDRC-1
Set A to minimum.
ⓈRV106/M-10/ⓈDRC-1



Adjust the other channels in the same way. The measurement and adjustment points are shown in the table below.

VIDEO CHANNEL	MEASUREMENT	ADJUSTMENT	Board
CH-1	R179/M-11	ⓈRV106/M-10	ⓈDRC-1
CH-2	R279/M-9	ⓈRV206/M-8	
CH-3	R379/M-7	ⓈRV306/M-6	
CH-4	R479/M-4	ⓈRV406/M-3	
CH-5	R179/M-11	ⓈRV106/M-10	④DRC-1
CH-6	R279/M-9	ⓈRV206/M-8	
CH-7	R379/M-7	ⓈRV306/M-6	
CH-8	R479/M-4	ⓈRV406/M-3	

- (3) Perform the adjustment of section 12-6 next.

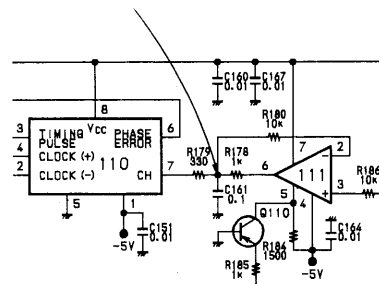
12-6. PLL LOCK PHASE ADJUSTMENT

Connection : See section 12-2.
Menu/switch settings : See section 12-2 and text.
Mode of VTR : See text.
Equipment : Oscilloscope

Perform the adjustment of sections 12-4 and 12-5 before performing this adjustment.

- (1) Set the menu and switch as follows.
Level control panel
REC INHIBIT switch : ON
Menu
I07. REEL MODE SHUTTLE : ENABLE
- (2) While playing back the COMPOSITE (DIST ON) portion of the alignment tape at +1, +8, and -8 times normal speed, adjust the lock phase of CH-1 as shown below.

R179/M-11/ⓈDRC-1

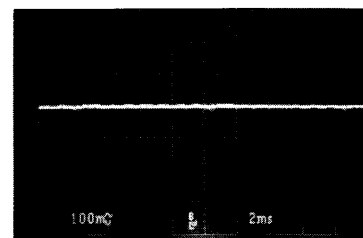
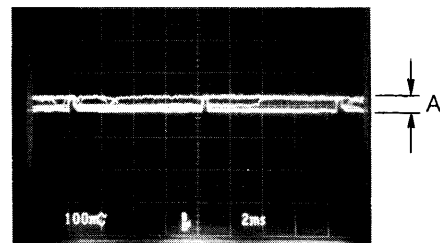


In +1 time normal speed SHUTTLE mode

R179/M-11/ⓈDRC-1

Set A to minimum.

ⓈRV107/M-10/ⓈDRC-1

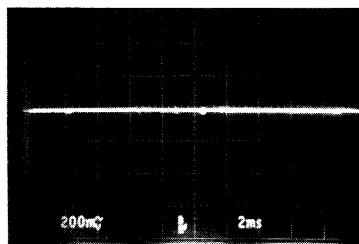
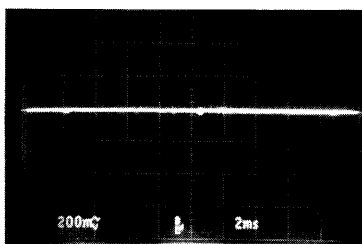
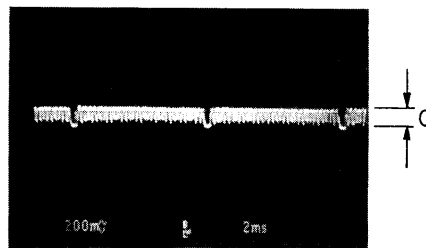
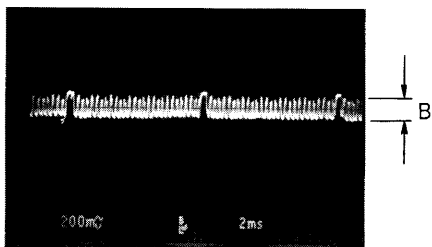


In the +8 times normal speed SHUTTLE mode, set B at R179/M-11/⑤DRC-1 to minimum.

⊗RV110/P-11/⑤DRC-1

In the -8 times normal speed SHUTTLE mode, set C at R179/M-11/⑤DRC-1 to minimum.

⊗RV109/P-11/⑤DRC-1



Adjust the other channels in the same way. The measurement and adjustment points are shown in the table below.

VIDEO CHANNEL	MEASUREMENT	ADJUSTMENT			Board
		+1 speed	+8 speed	-8 speed	
CH-1	R179/M-11	⊗RV107/M-10	⊗RV110/P-11	⊗RV109/P-11	⑤DRC-1
CH-2	R279/M-9	⊗RV207/M-8	⊗RV210/P-9	⊗RV209/P-9	
CH-3	R379/M-7	⊗RV307/M-5	⊗RV310/P-6	⊗RV309/P-6	
CH-4	R479/M-4	⊗RV407/M-3	⊗RV410/P-4	⊗RV409/P-4	
CH-5	R179/M-11	⊗RV104/M-10	⊗RV110/P-11	⊗RV109/P-11	④DRC-1
CH-6	R279/M-9	⊗RV204/M-8	⊗RV210/P-9	⊗RV209/P-9	
CH-7	R379/M-7	⊗RV304/M-5	⊗RV310/P-6	⊗RV309/P-6	
CH-8	R479/M-4	⊗RV404/M-3	⊗RV410/P-4	⊗RV409/P-4	

(3) Set the menu and switch as shown below.

REC INHIBIT switch : OFF
 I07. REEL MODE SHUTTLE : DISABLE

12-7. PLAYBACK EQUALIZER ADJUSTMENT

Connection : See section 12-2.
Menu/switch settings : See section 12-2 and text.
Mode of VTR : PB
Equipment : Oscilloscope
 (and also a spectrum analyzer if possible)

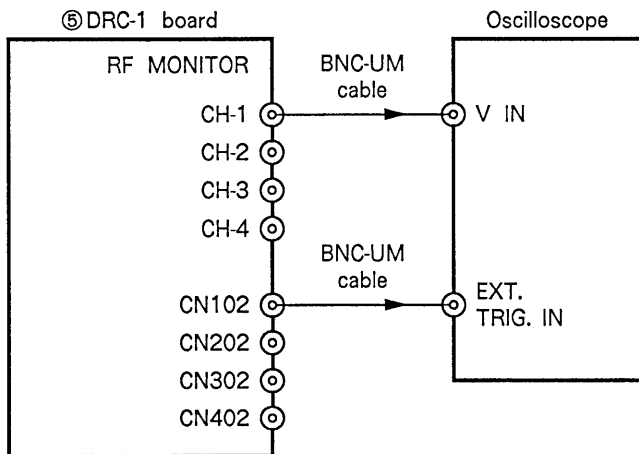
(1) Set the menu and switch as follows.

Level control panel
 REC INHIBIT switch : ON
 Menu

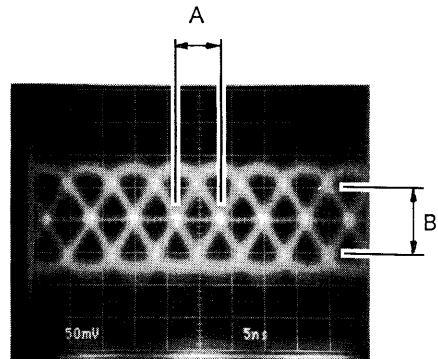
T11. ERROR FLAG DISP (MONI) : ON

(2) Adjust the equalizer of CH-1 as shown below.
 (2-1) Set S3 (FLAG M-SEL switch) on the CF-39 board of the HDDP-1000 to 1.

Connect the oscilloscope as shown in the figure below. Use two BNC-UM cables (Sony part No.: J-6264-360-A) to connect to the oscilloscope to the DRC-1 board.



Play back the COMPOSITE (DIST ON) signal portion of the alignment tape.
 CN CH-1/⑤DRC-1



Set A to maximum.

●RV103/C-5/⑤DRC-1

Set B to maximum.

●RV101/C-12/⑤DRC-1

Next, during pressing S2/SY-103, press the 3 key on the 21-key pad so that the DA level meter becomes the VIDEO CH condition meter. Perform fine adjustment of ●RV101 and ●RV103 alternately so that the CH-1 level on the VIDEO CH condition meter becomes minimum. (Light up the most LEDs)

(2-2) Turn ●RV101 a little counterclockwise so that the CH-1 level on the VIDEO CH condition meter increases, then adjust ●RV102/B-9/⑤DRC-1 so that the CH-1 level on the VIDEO CH condition meter becomes minimum. (Light up the most LEDs)

(2-3) Return to step (2-1), and readjust ●RV101.

Adjust the other channels in the same way. The measurement and adjustment points are shown in the table below.

VIDEO CHANNEL	S3 CF-39	MEASUREMENT RF MONI, TRIG	ADJUSTMENT			Board
			(2-1)	(2-2)	(2-3)	
CH-1	1	CN CH-1, CN102	RV101/C-12 RV103/C-5	RV101/C-12 RV102/B-9	RV101/C-12	⑤ DRC-1
CH-2	2	CN CH-2, CN202	RV201/C-12 RV203/D-5	RV201/C-12 RV202/D-9	RV201/C-12	
CH-3	3	CN CH-3, CN303	RV301/D-12 RV303/F-5	RV301/D-12 RV302/E-9	RV301/D-12	
CH-4	4	CN CH-4, CN403	RV401/D-12 RV403/H-5	RV401/D-12 RV402/G-9	RV401/D-12	
CH-5	5	CN CH-5, CN102	RV101/C-12 RV103/C-5	RV101/C-12 RV102/B-9	RV101/C-12	④ DRC-1
CH-6	6	CN CH-6, CN202	RV201/C-12 RV203/D-5	RV201/C-12 RV202/D-9	RV201/C-12	
CH-7	7	CN CH-7, CN303	RV301/D-12 RV303/F-5	RV301/D-12 RV302/E-9	RV301/D-12	
CH-8	8	CN CH-8, CN403	RV401/D-12 RV403/H-5	RV401/D-12 RV402/G-9	RV401/D-12	

(3) Set the menu and switch as follows.

S3/CF-39 FLAG M-SEL switch: 0

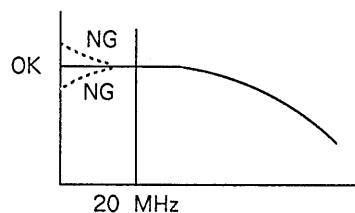
T11. ERROR FLAG DISP (MONI): OFF

(4) If a spectrum analyzer is available, adjust the low range frequency response of CH-1 as shown below. (Do not perform this adjustment if a spectrum analyzer is not available. If RV108 to RV408 are replaced, set the new potentiometers to their mechanical center positions.)

Connect the spectrum analyzer as shown in the figure below.

Play back the random pattern portion of the alignment tape, and observe the waveform on the spectrum analyzer.

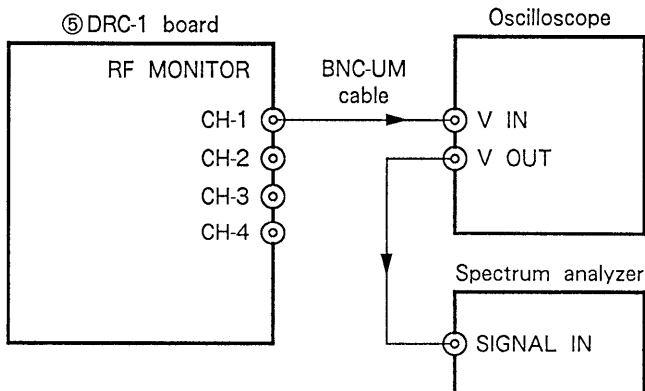
CN CH-1/⑤ DRC-1



Flatten the 0 to 20 MHz portion

RV108/C-6/⑤ DRC-1

Adjust the other channels in the same way. The measurement and adjustment points are shown in the table below.



VIDEO CHANNEL	MEASUREMENT RF MONI	ADJUSTMENT	Board
CH-1	CN CH-1	RV108/C-6	⑤ DRC-1
CH-2	CN CH-2	RV208/D-6	
CH-3	CN CH-3	RV308/F-6	
CH-4	CN CH-4	RV408/H-6	
CH-5	CN CH-5	RV108/C-6	④ DRC-1
CH-6	CN CH-6	RV208/D-6	
CH-7	CN CH-7	RV308/F-6	
CH-8	CN CH-8	RV408/H-6	

(5) Disconnect the BNC-UM cable from the DRC-1 board.

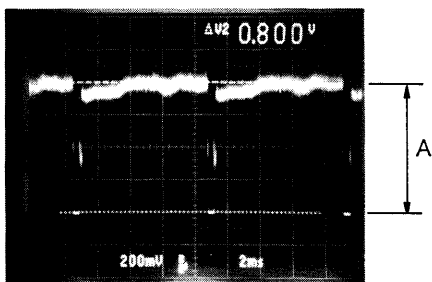
Set the REC INHIBIT switch to OFF.

12-8. RF GAIN ADJUSTMENT

Connection : See section 12-2.
Menu/switch settings : See section 12-2 and text.
Mode of VTR : PB
Equipment : Oscilloscope

- (1) Set the REC INHIBIT switch on the level control panel to ON.
- (2) While playing back the COMPOSITE (DIST ON) signal portion of the alignment tape, adjust the RF level of CH-1 as shown below.

TP101/B-10/⑤DRC-1
 Trig : TP4/D-20/SV-90
 A=800±50 mV
 ●RV104/C-4/⑤DRC-1



Adjust the other channels in the same way. The measurement and adjustment points are shown in the table below.

VIDEO CHANNEL	MEASUREMENT	ADJUSTMENT	Board
CH-1	TP101/B-10	●RV104/C-4	⑤DRC-1
CH-2	TP201/D-10	●RV204/D-4	
CH-3	TP301/E-10	●RV304/F-4	
CH-4	TP401/G-10	●RV404/H-4	
CH-5	TP101/B-10	●RV104/C-4	④DRC-1
CH-6	TP201/D-10	●RV204/D-4	
CH-7	TP301/E-10	●RV304/F-4	
CH-8	TP401/G-10	●RV404/H-4	

- (3) Perform steps (1), (2) and (3) of section 12-7. This is because the frequency response of the RF amplifier will change along with the gain adjustment, which may result in errors.

12-9. DATA LATCH TIMING ADJUSTMENT

Connection : See section 12-2.
Menu/switch settings : See section 12-2 and text.
Mode of VTR : EE
Equipment : Picture monitor

- (1) Set the menu and switch as follows.
 Level control panel
 REC INHIBIT switch : OFF
 Menu

T11. ERROR FLAG DISP (MONI) : ON

- (2) Set the FLAG M-SEL switch S3/CF-39 of the HDDP-1000 to 1, then adjust ●RV105/L-11/⑤DRC-1 so that the CH-1 level on the VIDEO CH condition meter becomes minimum. (Light up the most LEDs)

Adjust the other channels in the same way. The setting of S3/CF-39 and the adjustment points for each channel are shown in the table below.

VIDEO CHANNEL	S3/CF-39	ADJUSTMENT	Board
CH-1	1	●RV105/L-11	⑤DRC-1
CH-2	2	●RV205/L-8	
CH-3	3	●RV305/L-6	
CH-4	4	●RV405/L-4	
CH-5	5	●RV105/L-11	④DRC-1
CH-6	6	●RV205/L-8	
CH-7	7	●RV305/L-6	
CH-8	8	●RV405/L-4	

- (3) Set the menu/switch as shown below.
 T11. ERROR FLAG DISP (MONI) : OFF
 FLAG M-SEL switch S3/CF-39 : 0

12-10. RECORDING CURRENT ADJUSTMENT

Connection : See section 12-2.
Menu/switch settings : See section 12-2 and text.
Mode of VTR : REC/CONFI
Equipment : Picture monitor

- (1) Set the switch and menu as follows.
Level control panel
REC INHIBIT switch : OFF
Menu
T11. ERROR FLAG DISP (MONI) : ON
T20. SIGNAL GENERATOR : COMP
- (2) Thread a recording tape then put the VTR into the REC/CONFI mode by means of the following operation.
Press the SET UP key and the TAPE key (blue IN key) on the 21-key pad so that the TAPE lamp lights, then put the machine into the REC mode.
- (3) Set the FLAG M-SEL switch S3/CF-39 of the HDDP-1000 to 1.
Adjust \odot RV3/K-12/PRD-1 so that the CH-1 level on the VIDEO CH condition meter becomes minimum. (Light up the most LEDs)
Adjust the other channels in the same way. The setting of S3/CF-39 and the adjustment points for each channel are shown in the table below.

VIDEO CHANNEL	S3/CF-39	ADJUSTMENT /PRD-1
CH-1	1	\odot RV3/K-12
CH-2	2	\odot RV4/K-12
CH-3	3	\odot RV5/L-12
CH-4	4	\odot RV6/L-12
CH-5	5	\odot RV7/L-12
CH-6	6	\odot RV8/L-12
CH-7	7	\odot RV9/M-12
CH-8	8	\odot RV10/M-12

- (4) Set the menus and switch as follows.
T11. ERROR FLAG DISP (MONI) : OFF
T20. SIGNAL GENERATOR : OFF
FLAG M-SEL switch S3/CF-39 : 0



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