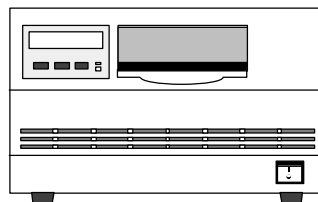
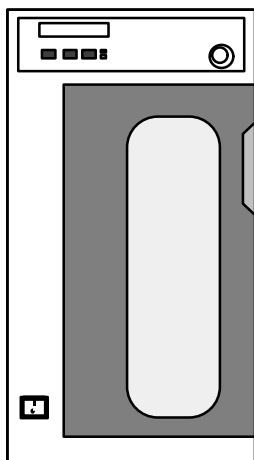




MP-8400 Series

1/2 inch Cartridge Tape Subsystem

Maintenance Manual



Thank You For Your Use.

Revision : 5.20

6/30/1999

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[Accessory and Contents List]

	Accessory and Contents	Quantity	Comments
1	User Manual	1	
2	Power Cable	1	
3	SCSI Cable		Option
4	SCSI Terminator	1	
5	Clamp Filter	2	
6	Cartridge	1	for test purposes
7	Cleaning Cartridge	1	
8	Key	(2)	Option (with CSL model)

[Notes]

[Revision Record]

Revision	Date	Manual (1)		Page or Section	Description
2.11	Apr, 1997	U		All pages	Initial Release
3.10	Sep, 1997		M	All pages	Change the all pages.
5.00	02/20/1998	U	M	Chapter 1,2,4	Change these pages.
5.10	05/20/1998		M	Section 3.3	Move to section 6.8 and change these pages.
				Section 4.5	Add the new section.
				Section 5.4 to 5.9	Change part of the pages.
				Section 5.6	Add the new error codes.
				Section 6.1	Change these pages.
				Section 6.2 to 6.5	Correct part of the pages.
				Section 6.6 to 6.7	Change these pages.
				Section 6.9	Add the new section.
				Section 7.1	Change these pages.
				Section 7.2	Change part of the pages.
				Section 7.3	Change these pages.
				Section 7.4	Deleted section.
5.20	06/30/1999	U	M	Section 2.3.5	Add the "FORCE" operation.
				Section 4.2.2	Change the password entry.
				Section 4.4	Change the menu items.
			M	Section 4.4.5	Add the new section.
				Section 4.5	Change the menu items.
				Section 6.1 to 6.2	Correct part of the pages.
				Section 6.1.5	Change the password entry.

(1) "U" is for the User Manual, "M" is for the Maintenance Manual.

Chapter 1 GENERAL DESCRIPTION

1.1 Overview

The MS-8418 is a 18 track, 1/2 inch cartridge tape drive that is fully compatible with the IBM 3480/3490. The MS-843x is a 36 track drive fully compatible with the IBM 3490E.

Both drives are equipped with the industry standard SCSI interface, which enables simple connection to computers. In addition, both drives support IDRC, the industry standard for data compression. Average of 600MB of data can be stored onto a cartridge with the MS-8418 and average of 2.4GB can be stored with the MS-843x using the extended cartridge (332m tape).

The device quipped with a Cartridge Stack Loader(CSL) that can store up to 10 cartridges for continuous automatic loading.

1.2 Features

These tape drives have the following features (the features differ depending on the specifications).

High-speed Backup

Continuous data transfers are possible at a speed of 6MB/sec., even without the use of compression. Maximum burst transfer speed is 20MB/sec.

Large-volume Backup

An average of 24GB of data can be stored per 10 cartridges when IDRC compression is used.

Compatibility

The drives are compatible with IBM 3480/90/90E, thus facilitating the exchange of data with host computers.

Easy Connection

The SCSI-2/3 interface is used for easy connection to work stations, personal computers and other types of computers.

Expandability

The drive firmware is stored in the flash ROM; to improve the functions, firmware updates are also possible from tape. The 18-track specifications can be changed to 36-track specifications and the SCSI-2 specifications can be changed to SCSI-3, etc.

10 cartridges Magazine [with CSL model]

Up to 10 cartridges can be loaded into the removable magazine. Separate magazines can be used for different applications and for portability.

1.3 Model Name

1.3.1 Model Names by Track Specification

Track Specifications Tape Speed	MS-8418	MS-843x	
	18 track Drive	18/36 track Drive	36 track Drive
Standard Speed	MS-8418	MS-843E	MS-8436
Double Speed		MS-843F MS-843M	MS-843H MS-843D

1.3.2 Model Names by SCSI Specification

Model Name		SCSI Connector Specifications	SCSI Electrical Specifications
MS-8418 MS-843x	LS	Low-density 50pin (Amphenol)	Single-ended
	NS	Hi-density 50pin	
	WS	Hi-density 68pin (Wide SCSI)	
	LD	Low-density 50pin (Amphenol)	Differential
	ND	Hi-density 50pin	
	WD	Hi-density (Wide SCSI)	

1.3.3 Model Names by CSL Specification

Model Name		Door Specification
MS-8418##- MS-843x##-	D1, X1 or Z1	without CSL model
	DA, XA or ZA	with CSL model (no door lock)
	DL, XL or ZL	with CSL model (door lock included with key)

Marks : “##” as the model names by SCSI specification.

1.4 Specifications

1.4.1 Performance Specifications

Number	Parameter		MS-8418	MS-843x	
				Standard Speed	Double Speed
1	Tape Speed	Read / Write	2 m/s (79 ips)		4 m/s (157 ips)
		Rewind	4 m/s (157 ips)		6 m/s (236 ips)
	Speed Variation		4 % (Long Term) 7 % (Short Term)		
	Access Time (Standard)	Read / Write	100 ms		200 ms
		Rewind	200 ms		600 ms
2	Load Time (average)		20 sec [without CSL model] 45 sec [with CSL model]		
	Unload Time (average)		18 sec [without CSL model] 35 sec [with CSL model]		
	Rewind Time (max.)	45 sec	90 sec	45 sec	
3 sec (from EOT)					
3	Read / Write Head		18 track	36 track	
4	Interface (1)		Fast SCSI - 2 (A Cable) SCSI - 3 (P Cable) (Single-ended or Differential)		
5	Burst Transfer Rate (SCSI asynchronous)		5 MB/s (Narrow:8 bit) 10 MB/s (Wide:16 bit)		
	Burst Transfer Rate (SCSI synchronous)		10 MB/s (Narrow:8 bit) 20 MB/s (Wide:16 bit)		
	Data Transfer Rate (tape head)		3 MB/s		6 MB/s
6	Block Size (max.)		256 kB		
7	Data Buffer Size		2 MB		
8	Cartridge Loader		10 cartridges in the Removal Magazine [with CSL model only]		

(1) Equipped with one type of interface per your specification. Refer to section 1.3.2.

1.4.2 Read/Write Operation

Number	Parameter	MS-8418	MS-843x	
		18 track Drive	18/36 track Drive	36 track Drive
1	Write Operation	18-track Format	18-track Format (2)	36-track Format
			36-track Format	
2	Read Operation	18-track Format	18-track Format	
			36-track Format	

- (2) The 18-track write operation is IBM compatible but does not conform to ANSI. Use caution when exchanging data with the drives of other companies.

1.4.3 Format Specifications

Number	Parameter		18-track Format	36-track Format
1	Recording Format	Uncompressed	IBM 3480 Compatible (ANSI X3B5)	IBM 3490E Compatible (ANSI X3B5)
		Compressed	IBM 3490 Compatible (ANSI X3B5)	IBM 3490E Compatible (ANSI X3B5)
	Compression Mode		IBM IDRC Compaction Compatible (Improved Data Recording Capability)	
	Error Correction		Cross Parity	Reed Solomon
2	Record Density		1491 cpmm (37871 bpi)	
3	Medium Length		165 m (541 ft.)	165 m (541 ft.) 332 m (1100 ft.)
4	Capacity : 1 cartridge	Uncompressed	200 MB (max.)	800 MB (max.)
		Compressed	600 MB (3:1)	2.4 GB (3:1)
	Capacity : 10 cartridges	Uncompressed	2 GB (max.)	8 GB (max.)
		Compressed	6 GB (3:1)	24 GB (3:1)

1.4.4 Reliability Specifications

Number	Parameter	Specification
1	MTBF	30000 hours (25% duty cycle)
2	MTTR	Under 30 minutes
3	Head Life	3000 hours (Tape motion)

1.4.5 Power Specifications

Number	Parameter	Specification
1	Voltage	100 to 120 V, AC 220 to 240 V, AC (Automatic ranging)
2	Line Frequency	50/60 Hz
3	Power Consumption	110 W

1.4.6 Environmental Specifications

Number	Parameter		Specification
1	Operating	Dry Bulb Temperature	10°C to 40°C
		Temperature Gradient	10°C / hour
		Wet Bulb Temperature	Max. 26°C
2	Operating	Relative Humidity	20% to 80% (non-condensing)
		Humidity Gradient	20% / hour
3	Non-operating	Dry Bulb Temperature	-10°C to 60°C
		Temperature Gradient	10°C / hour
4	Non-operating	Relative Humidity	5% to 95% (non-condensing)
		Humidity Gradient	20% / hour

NOTE

The applicable proposed ANSI specification for half-inch tape cartridge requires operation in the range of 16°C to 32°C, 20% relative humidity and a maximum wet bulb temperature of 25.6°C. Operation of this device beyond these limits may result in a degradation of media reliability.

1.4.7 Acoustical Noise

Number	Parameter	without CSL model	with CSL model
1	Power-on Idle	55 dB A (max.)	50 dB A (max.)
2	Operating	55 dB A (max.)	55 dB A (max.)
3	Load / Unload	55 dB A (max.)	70 dB A (max.)

Machine Noise

Sound power level : less than 70 db (A) according to DIN45635 part 19 (EN27779).

Maschinengeräusche

Geräuschpegel : weniger als 70 db (A) entsprechend DIN45635 Teil 19 (EN27779).

1.4.8 Mechanical Specifications

Number	Parameter		without CSL model	with CSL model
1	Dimensions	Height	176 mm (6.9 in.)	429 mm (16.9 in.)
		Width	281 mm (11.1 in.)	227 mm (8.9 in.)
		Depth	387 mm (15.2 in.)	649 mm (25.6 in.)
2	Weight		15 kg (33 lb.)	29 kg (64 lb.)
3	Shipping Weight		19 kg (42 lb.)	36 kg (79 lb.)

1.4.9 Regulation

FCC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

[Notes]

Chapter 2 OPERATION

2.1 Inspecting the Cartridge

The MS-8400 drive uses the industry-standard 3480-tape cartridge defined by ANSI Standard X3B5. Refer to Figure 2-1.

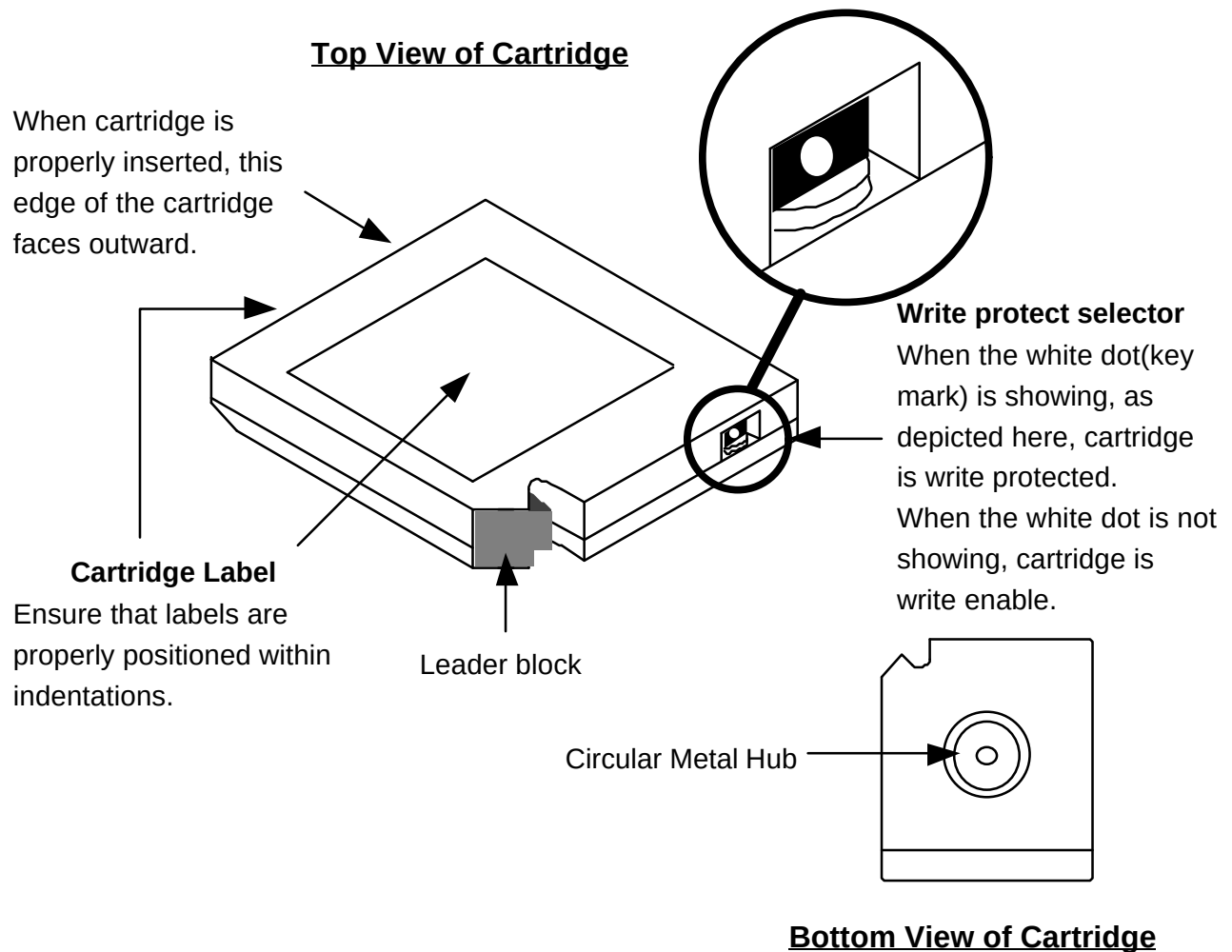


Figure 2-1 Half-inch Tape Cartridge

Prior to inserting the tape cartridge into the drive, inspect the cartridge for damage to prevent problems. A defective cartridge may prohibit successful loading of the cartridge or may damage the drive mechanism. Look for these defects:

- cracked or broken cartridge casing
- water or dirt on cartridge casing
- foreign material or obvious loose parts within the cartridge
- broken leader block or leader block not properly attached
- damaged write protect selector
- any other obvious damage
- cartridge label not properly affixed
- cartridge with other materials affixed rather than the label

The tape length that can be used differs depending on the specifications and operation. Table 2-1 shows the tape cartridges that can be used with this drive.

Table 2-1 Tape Length

Operation	Cartridge Name	Tape Length	Format Specification	
			18-track Format	36-track Format
Write	3480 (Standard)	165m (541ft.)	Recommended	OK
	Long (x1.5)	246m (807ft.)	OK	OK
	3490E (Extended)	332m (1100ft.)	NG	Recommended
Read	3480 (Standard)	165m (541ft.)	Recommended	OK
	Long (x1.5)	246m (807ft.)	OK	OK
	3490E (Extended)	332m (1100ft.)	OK	Recommended

CAUTION

The drive cannot load the cartridge if the contained tape is of insufficient length.

2.2 Operator Panel

2.2.1 Front View

The operator panel and power switch are located on the front panel. The operator panel is equipped with a 16-digit:2-line display, 3 switches and 2 indicators. These are used to operate the drive. Refer to Figure 2-2 and 2-3.

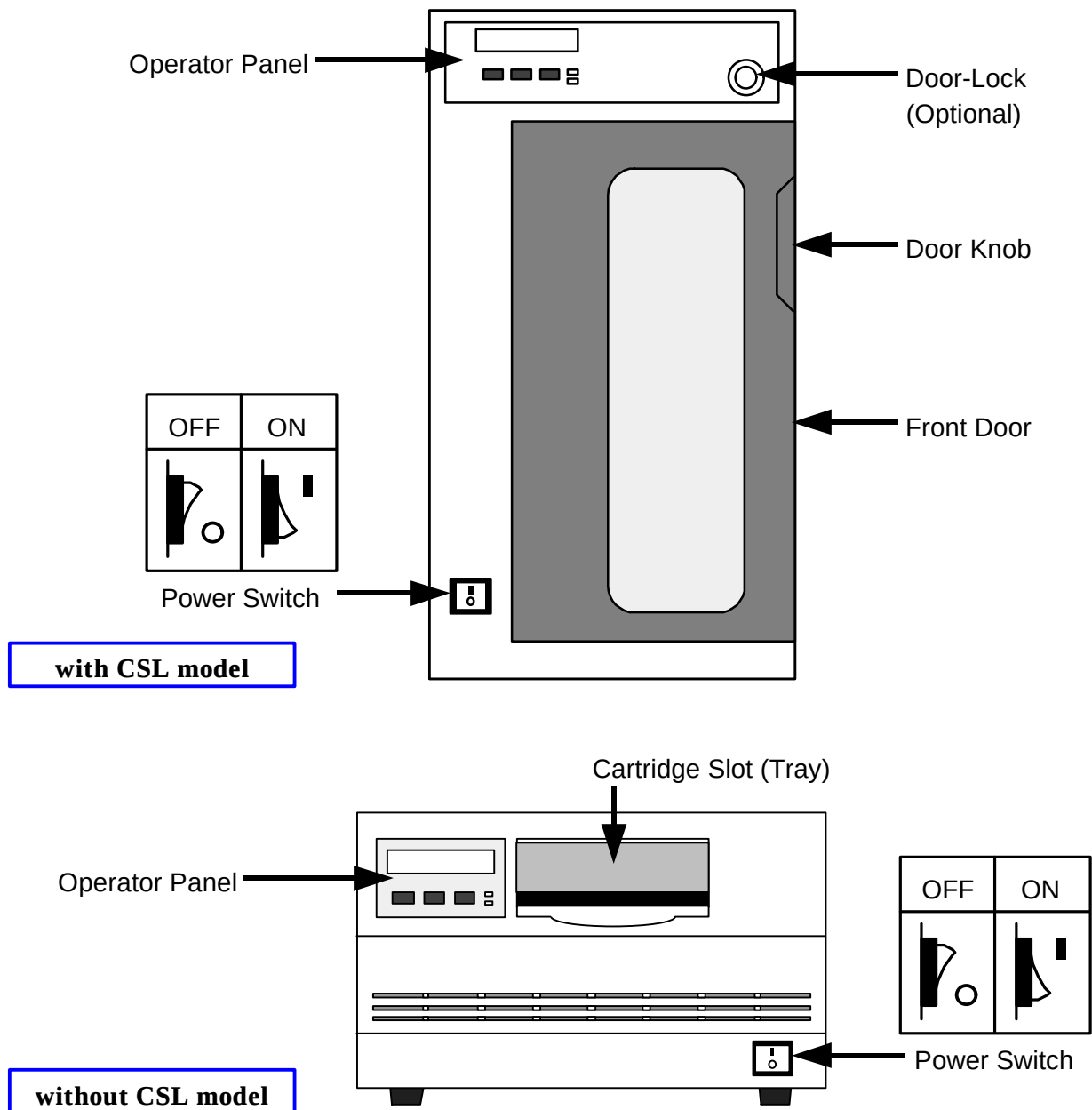


Figure 2-2 Front View of the Drive

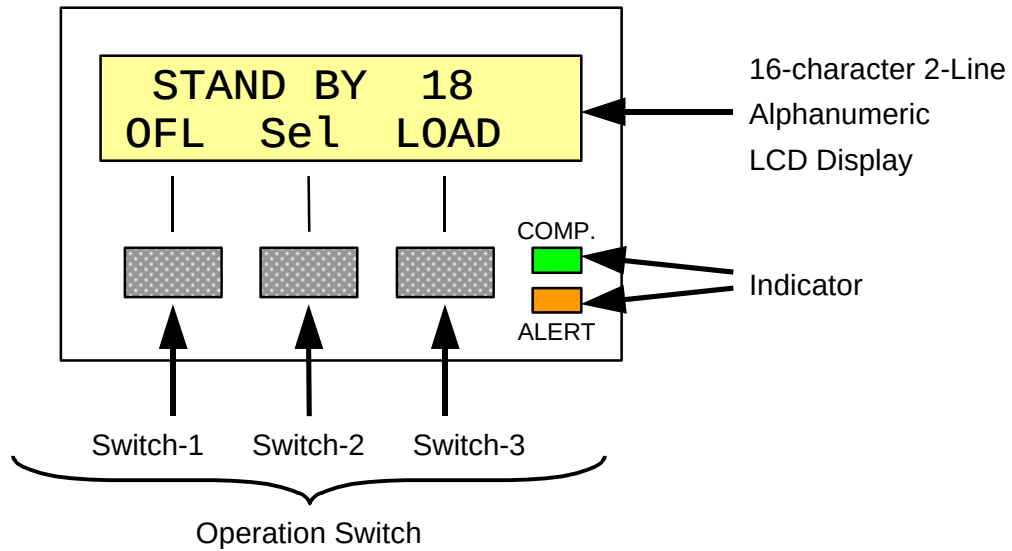


Figure 2-3 Operator Panel

2.2.2 Rear View

The SCSI connectors, maintenance port and AC power connector are located on the rear panel (Refer to Figure 2-4). The two SCSI connectors can be used for either input or output. The maintenance port is used only for troubleshooting and should not be connected during normal operation.

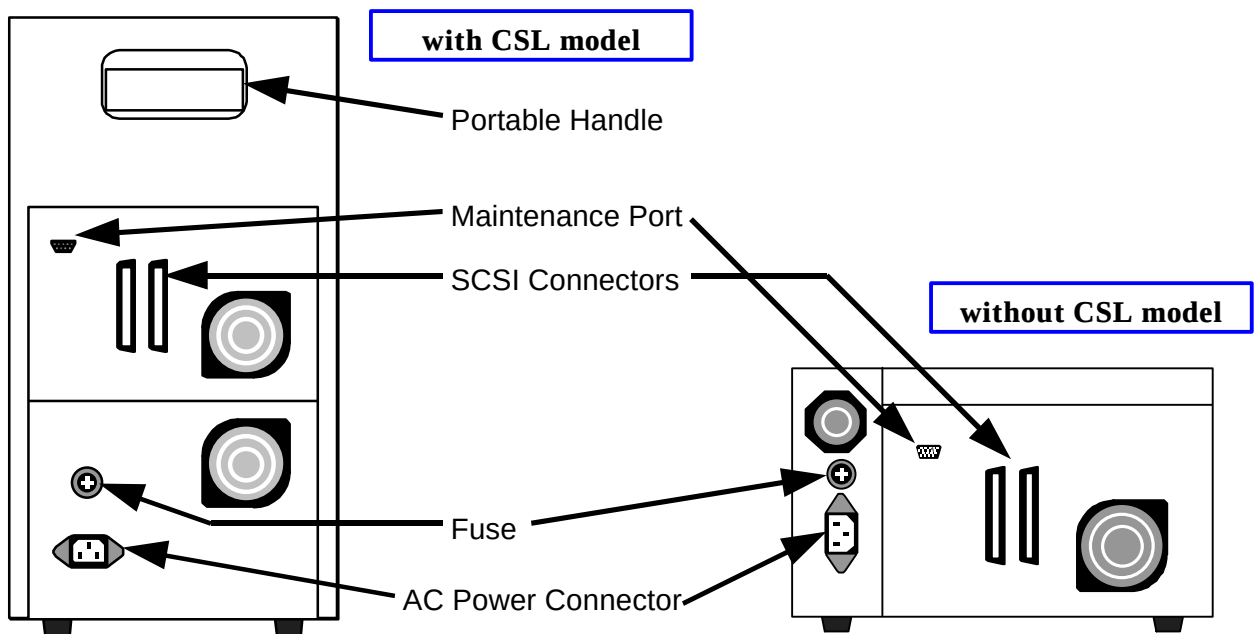


Figure 2-4 Rear View of the Drive

2.2.3 Display

The 16-character 2-line alphanumeric LCD display with backlight on the front operator panel displays various messages regarding drive operation and status.

The upper row of the display is called the “Status-Line”. It displays status information, error codes, etc.. The lower row of the display is called the “Switch-Line”. Operation switch functions are displayed here. Furthermore, the combination of the Status-Line and Switch-Line is referred to as the “Menu-Display”.

The message of the display using both upper and lower row is called the “2-Line-Message”. This message is only displayed temporarily (approx. 3 sec.).

Various “Status-Line” displays are explained in Table 2-2, 2-3 and 2-4. Various “2-Line-Message” displays are explained in Table 2-5.

Table 2-2 “Status-Line” Display (Part 1)

	Display	Description	Marks : “#” as slot number.
Drive Status	ENABLE	The drive is powering up and running the diagnostics.	
	LOADING	The drive is loading.	
	REWINDING	The drive is rewinding.	
	UNLOADING	The drive is unloading.	
	CLEAN	The drive requires cleaning with a cleaning cartridge.	
	CLEANING	The drive is being cleaned with the cleaning cartridge.	
	POWER-ON RELOAD	After again turning on the power, the drive is reloading the inserted cartridge.	
	POWER-ON UNLOAD	After again turning on the power, the drive is unloading the inserted cartridge.	
	PwrOn UNLD TO 10	After again turning on the power, the CSL return the inserted cartridge to slot 10.	
CSL Status	LOADING FROM ##	The CSL is loading from the magazine.	
	UNLOADING TO ##	The CSL is unloading to the magazine.	
	CSL INITIALIZING	The CSL is in operation.	
	WAITING CSL RDY	The CSL is in operation.	
	END OF STACK	All cartridges have been processed and unloaded.	
	DOOR OPEN	The front door is open.	
	REMOVE CART ##	Remove the cartridge from the magazine.	

Table 2-3 “Status-Line” Display (Part 2)

	Display	Description	Marks : “#” as slot number.
On-line Status	STAND BY 18	This drive is only for 18-track cartridge. The cartridge is not loaded. The drive will be ready after loading.	[MS-8418]
	STAND BY 18w/36	This drive is set to the write operation for 18-track. The cartridge is not loaded. The drive will be ready after loading.	[MS-843x] < Option >
	STAND BY 18/36w	This drive is set to the write operation for 36-track. The cartridge is not loaded. The drive will be ready after loading.	[MS-843x] < Option >
	STAND BY 36	This drive is only for 36-track cartridge. The cartridge is not loaded. The drive will be ready after loading.	[MS-843x]
	BOT ONLINE WE##	Loaded cartridge is write enable. The drive is ready for on-line operation. Tape is positioned at BOT.	
	BOT ONLINE FP##	Loaded cartridge is write protected (file protected). The drive is ready for on-line operation. Tape is positioned at BOT.	
	BOT ■■■ EOT	The cartridge is loaded and in use. The drive is ready for on-line operation. Tape is not positioned at BOT. The “■” mark indicates amount of tape used.	
Off-line Status	OFFLINE UNLOADED	The cartridge is not loaded. The drive is not-ready for off-line operation.	
	BOT OFFLINE WE	Loaded cartridge is write enable. The drive is not ready for off-line operation. Tape is positioned at BOT.	
	BOT OFFLINE FP	Loaded cartridge is write protected (file protected). The drive is not ready for off-line operation. Tape is positioned at BOT.	
	OFFLINE WE	The drive is not ready for off-line operation. Tape is not positioned at BOT.	

Table 2-4 “Status-Line” Display (Part 3)

	Display	Description
Off-line Status	ONL AFTER REWIND	The drive is rewinding. The drive will be ready when complete.
	UNLOAD AFTER REW	The drive is unloading.
Setup Mode	SCSI ID 5	“SCSI ID” Setup menu. (for example; SCSI ID=5)
	MENU FUNCTIONS	Setup mode. (Menu functions)
	CONFIGURE	Configuration menu.
	DIAGNOSTICS	Diagnostics menu.
	STATISTICS	Statistics menu.
	ENTER PASSWORD	Request for password entry.
	SAVE SETUP ?	Input request to save in this menu.
	ARE YOU SURE ?	Input request to confirm in this menu.
	Refer to items of each menu for details on the setup mode.	
Error	WRT PROTECT 1018	Cannot write to write protected cartridge.
	18Thin Tape 1026	18-track format cannot write to extended cartridges.
	NO MAGAZINE	No magazine in the CSL.
	NO CARTRIDGE	No cartridge in the inserted magazine.
	INVALID PASSWORD	Entered password is invalid.
	DIAGNOSTIC ERROR	Error detected during powering up diagnostics.
	Refer to Chapter 5 for details on errors with the lighted ALERT indicator.	

Table 2-5 “2-Line-Message” Display

	Display	Description
	DIAGNOSTICS COMPLETED OK	Powering up diagnostics have successfully completed.
Setup Mode	WILL SAVE SETUP IN FLASH ROM	Can save to Flash-ROM.
	SETUP SAVED IN FLASH ROM	Saved to Flash-ROM.
	NO CHANGES TO CONFIG SETUP	Cannot change setup.
	WILL SAVE SETUP UNTIL POWER DOWN	Settings can be used until turning off power.
	SETUP SAVED UNTIL POWER DOWN	Settings stored until turning off power.
	MUST POWER DOWN BEFORE EFFECTIVE	Turn off the power.
	DON'T POWER DOWN	Do not turn off the power.

2.2.4 Operation Switch

The 3 button type switches on the front operator panel are used to control the drive. Operation switch function are displayed on the lower row (Switch-Line) of the display. Follow the display to operate the 3 switches.

Pressing a switch changes the display contents of the menu. The Switch-Line will then display new switch functions according to the new menu. In other words, switch functions change every time a switch is pressed. Relationship of the position between the Switch-Line and the switches are explained in Figure 2-5. The function of the switches are explained in Table 2-6.

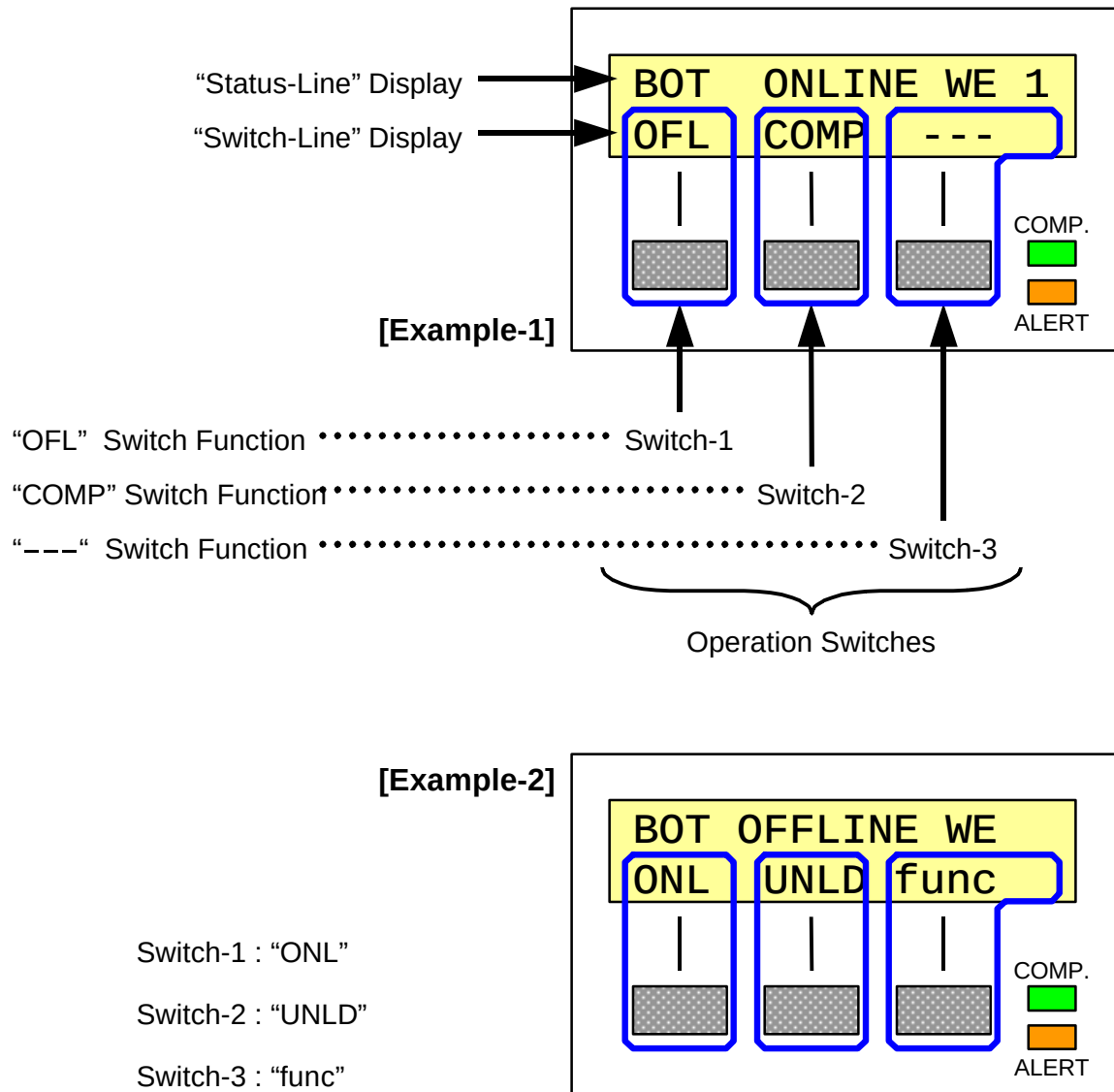


Figure 2-5 Relationship of "Switch-Line" Positions

NOTE

The display of each function is punctuated with 1 or more blank spaces.

Table 2-6 “Switch-Line” Display and Switch Function

	Display	Switch Function
Common	---	The switch is not defined.
	>>>	Change to the next menu.
	EXIT	Exit menu of the current layer.
	YES	Permit input request of the Status-Line.
	NO	Decline input request of the Status-Line.
	TEMP	Temporarily use input request of the Status-Line.
On-line	OFL	Enter the off-line operation.
	Sel	Select the magazine slot number.
	LOAD	Load a cartridge into the slot having the selected number.
	COMP	Switch the data compression mode.
Off-line	ONL	Return to the on-line operation.
	REW/UNL	Rewind.
	UNLD	Unload.
	DEN	The write operation can be switched for 18/36 track drive.
	func	The “SCSI ID” setup.
“SCSI ID” Setup	func	The setup mode.
	CHG	Change the “SCSI ID”.
	EXIT	Return to the on-line operation.
Setup Mode	CONF	The configure mode.
	DIAG	The diagnostics mode.
	STAT	The statistics mode.
	FUNLD	Recover from servo error.
	CSL	The CSL operation mode.
	CHG	Change setup.
	NEXT	Advance to the next display.
	Refer to items of each menu for details on the setup mode.	

2.2.5 Indicator

The 2 indicators on the front operator panel show the drive status. The conditions for the indicators lighting are explained in Table 2-7.

Table 2-7 Indicators

Indicator	Color	Description
COMP.	Green	When the LED is lighted, the drive writes in the compressed mode(IDRC). When the LED is not lighted, the drive writes in the uncompressed mode. This LED indicates the writing mode and does not reflect the read mode.
ALERT	Red	This LED is lighted when an error is detected. At this time, error code etc. will be displayed on the Status-Line (upper row).

2.3 Powering Up

2.3.1 Installing Cables and Interfaces

Connect the attached AC power cable to the AC power connector located on the rear panel, then insert the plug to an AC power outlet.

Refer to section 4.1 and connect the SCSI cable to the SCSI connector.

2.3.2 Turning in the Power

Turn the power switch on the front panel from off [O] to on [I] (Refer to Figure 2-2) to supply AC power to the drive. The backlight of the operator panel display will light (yellow).

Self-diagnostics will be executed for approximately 20 seconds after turning the drive on. During this time, “ENABLE...” will be displayed on the Status-Line of the display and communication with interface and operator panel operations are disabled.

“STAND BY” is displayed on the Status-Line of the display when the self-diagnostics is successfully complete and use of the drive is enabled. If an error has been detected during the self-diagnostics, the ALERT indicator will light and an error message will appear on the display.

CAUTION

When turning off the power, wait at least 10 seconds before turning the power back on.

2.3.3 On-line Mode / Off-line Mode

There are 2 types of operating modes: the on-line mode and off-line mode. The on-line mode displays an on-line status on the Status-Line, indicating that the drive is ready. The off-line mode displays an off-line status on the Status-Line, indicating that the drive is not ready. Refer to Table 2-3.

The operation mode (on-line / off-line) can be switched using the operation switch on the front panel. Figure 2-6 shows the procedure to switch from the on-line mode to the off-line mode. Figure 2-7 shows the procedure to switch from the off-line mode to the on-line mode.

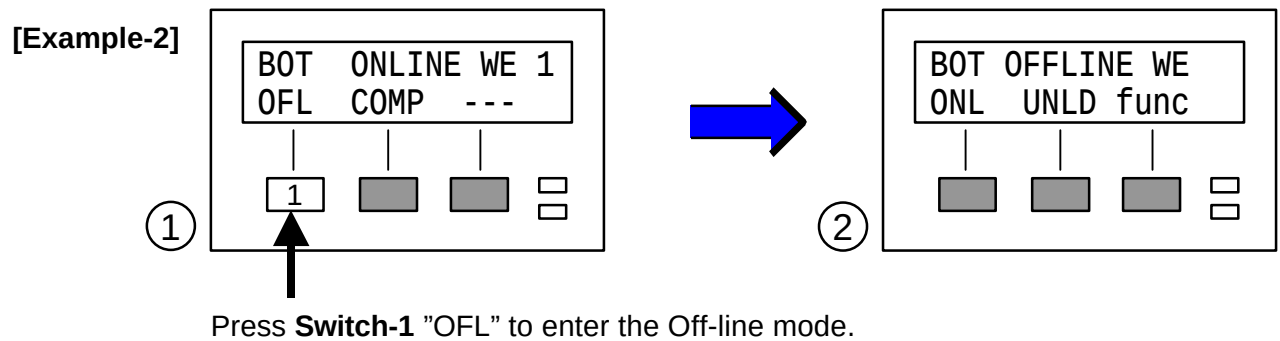
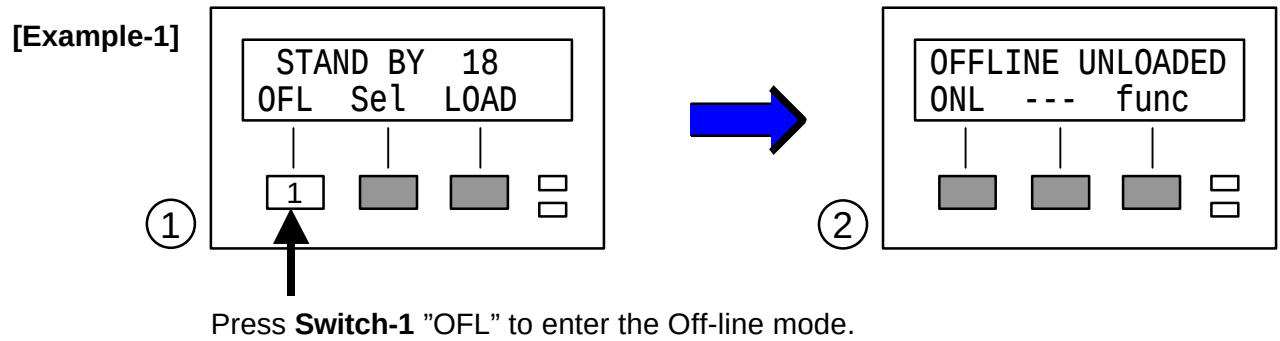


Figure 2-6 On-line Mode to Off-line Mode

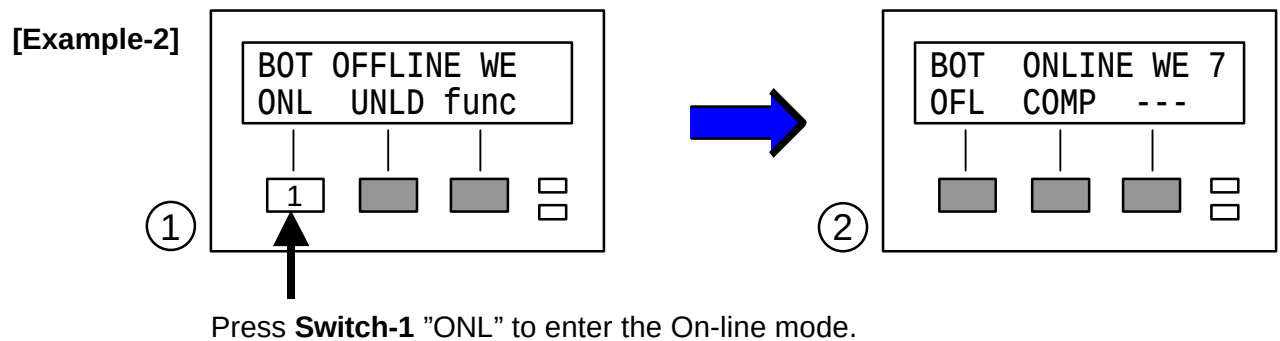
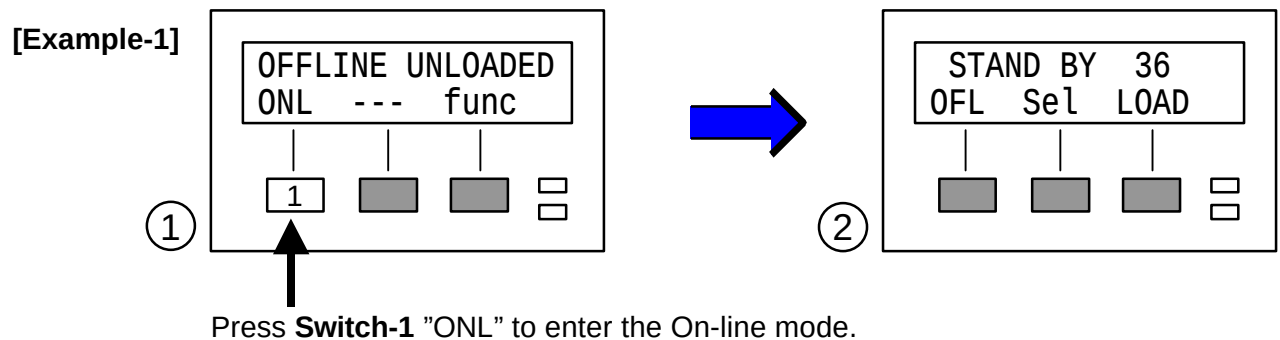


Figure 2-7 Off-line Mode to On-line Mode

During the on-line mode, tapes can be read/write when a cartridge is loaded. During the on-line mode, a cartridge can be load from the magazine when a cartridge is not loaded. The off-line mode enables unload and drive setup.

2.3.4 Switching the Recording Format

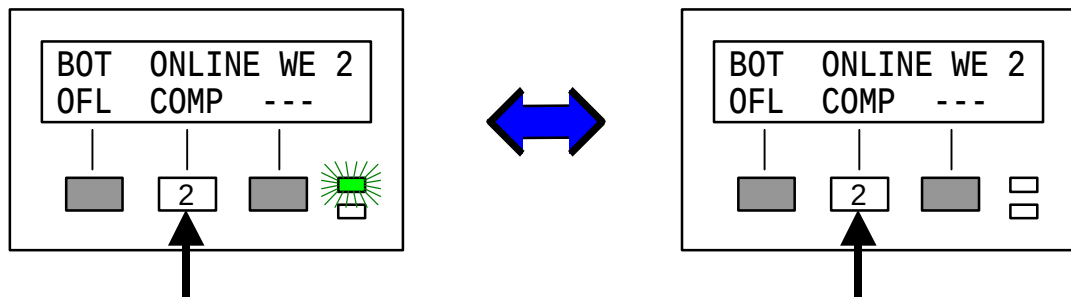
When the operation mode is in the on-line mode and when a cartridge is loaded, recording format can be switched to uncompressed or compressed. Switching of recording format is valid only tape positioned at BOT with write enable status and switching is automatic when reading data. The COMP indicator also shows the recording format during writing of data.

When the COMP indicator is lit, the drive will write in compressed format. Pressing the center Switch-2 "COMP" will turn off the indicator and the drive will write in uncompressed format. Refer to the left side of Figure 2-8.

When the COMP indicator is not lit, the drive will write in uncompressed format. Pressing the center Switch-2 "COMP" will turn on the indicator and the drive will write in compressed format. Refer to the right side of Figure 2-8.

[Compressed Recording Format]

[Uncompressed Recording Format]



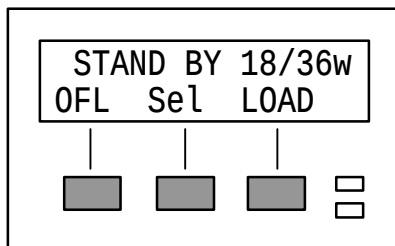
Press **Switch-2** "COMP" to switch between uncompressed and compressed.

Figure 2-8 Switching the Recording Format

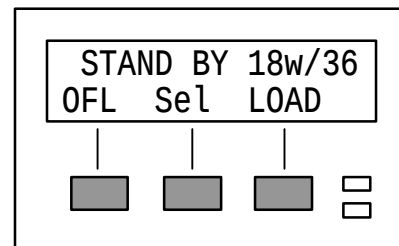
2.3.5 Switching the Write Operation [for 18/36 track drive only]

With 18/36 track drive, it is possible to switch between the 18-track and 36-track write operation using the operation switches on the front of the operator panel.

The current write operation can be determined when “STAND BY” is displayed on the center of the Status-Line. When “18/36w” is displayed on the right of the Status-Line, the 36-track write operation is selected. When “18w/36” is displayed on the right of the Status-Line, the 18-track write operation is selected. In other words, the letter “w” following the number of tracks indicates which operation is selected. Refer to Figure 2-9.



[36-track Write Operation]



[18-track Write Operation]

Figure 2-9 Current Write Operation

CAUTION

The 18-track write operation of the 18/36 track drive is IBM compatible but does not conform to ANSI. Use caution when exchanging data with the drives of other companies.

The following procedure to change the "Write Operation Setup". Refer to Figure 2-10.

- 1) First, unload the cartridge. If the operation mode is in the on-line mode, change to the off-line mode. Refer to Figure 2-6.
- 2) "DEN" will be displayed on the center Switch-Line of the display. Pressing the center Switch-2 "DEN" displays the current write operation on the Status-Line of the display. This menu is the Write Operation setup.
- 3) To change the Write Operation, pressing the center Switch-2 "CHG" each time displays another Write Operation on the Status-Line.

When "WRITE 18" is displayed on the center of the Status-Line, the 18-track write operation is selected. When "WRITE 36" is displayed on the center of the Status-Line, the 36-track write operation is selected.

When "TRACK" is displayed on the right of the Status-Line, the SCSI command is enabled the write operation to change. When "(FORCE)" is displayed on the right of the Status-Line, the SCSI command is disabled the write operation to change.

- 4) To complete the setup, press the left Switch-1 "EXIT". "SAVE SETUP?" will be displayed on the Status-Line.
- 5) Press the Switch-1 "YES" to save the current setup.
Press the Switch-2 "NO" to abort and use the previous setup.
Press the Switch-3 "TEMP" to use the current setup until turning off the power.
Pressing the Switch-2 returns this menu. Pressing the Switch-1 or Switch-3 "ARE YOU SURE ?" will be displayed on the Status-Line.
- 6) Press the Switch-1 "YES" to save the current setup.
Press the Switch-2 "EXIT" to abort and use the previous setup.
Pressing either switch, this menu will be exited and the off-line mode will return.

[Changing to 18-track Write Operation]

[Changing to 36-track Write Operation]

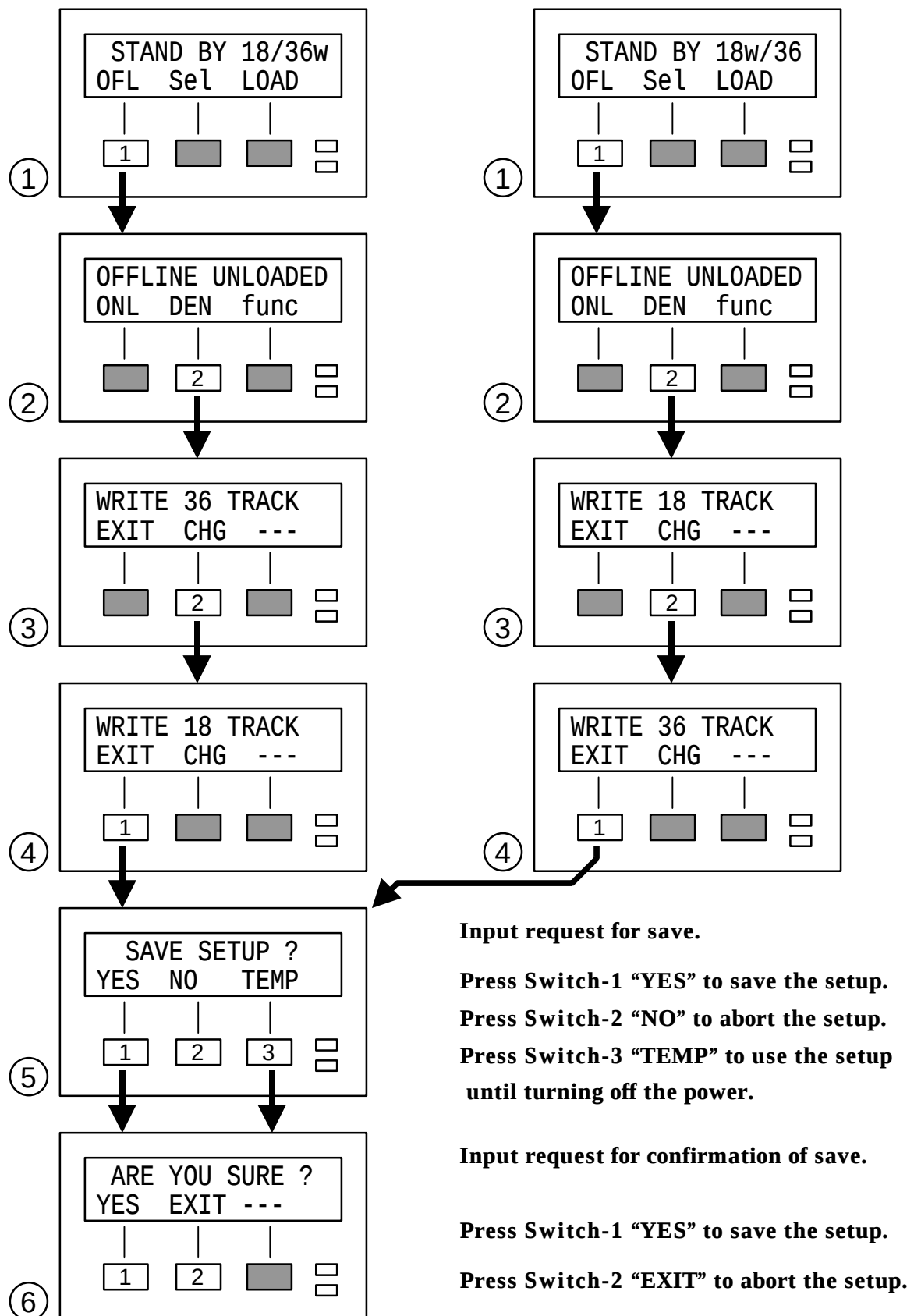


Figure 2-10 Write Operation Setup

2.3.6 CSL Operation Mode [with CSL model]

The method used by the Cartridge Stack Loader(CSL) to load and unload cartridges differs depending on the operation mode. Table 2-8 shows the operation modes and overviews. Table 2-9 explains the loading methods. Refer to section 4.2.3 for the operation mode setting method.

Table 2-8 CSL Operation Mode

Mode	Display	Description
Manual	Manual	The cartridges must be loaded one at a time.
Automatic	Auto	After the first cartridge has been loaded and then unloaded with the SCSI Unload command from the host computer, the next cartridge will be loaded automatically. A maximum of 10 cartridges can be loaded continuously and automatically in this way.
	AUTOcyc	Operation is the same as for [Auto] but, when the last cartridge has been unloaded, the first cartridge will again be loaded.
System	SYS	SCSI cartridge loader commands are supported.
	SYSauto	Operation is the same as for [SYS] but automatic loading is possible.
	Random	SCSI media changer device commands are supported.

Table 2-9 CSL Loading Methods

Operation Mode	First Cartridge		Next Cartridge	
	Load	Unload	Load	Unload
Manual	LOAD SCSI Load	UNLD SCSI Unload	LOAD SCSI Load	UNLD SCSI Unload
Automatic	LOAD SCSI Load	UNLD SCSI Unload	LOAD SCSI Load Auto Load	UNLD SCSI Unload
System	Any cartridge can be loaded and unloaded.			

Marks : LOAD UNLDManual operation using the Operator Panel.

“SCSI Load” / “SCSI Unload”Remote control from SCSI.

2.4 Loading a Cartridge

Before loading a cartridge, make sure that the write protect selector is on either write enable (white dot not showing) or write protected (white dot showing). Refer to Figure 2-1.

NOTE

The write protect selector on the cartridge protects data from being overwritten. When the write protect selector is on the write protect position, the white dot (key mark) on the flat side of the selector will be visible from the side of the cartridge.

2.4.0 Manual Loading [without CSL model]

First, enter the on-line mode if in the off-line mode (Refer to Figure 2-7). "STAND BY" will be displayed on the center Status-Line of the display.

Insert the cartridge facing in the correct direction (leading block away from you) into the cartridge slot, as shown in Figure 2-17. Insert cartridge slowly and completely until hitting the wall beyond the tray. The drive will then automatically lower the tray and load the cartridge. "LOADING" will appear on the Status-Line when loading.

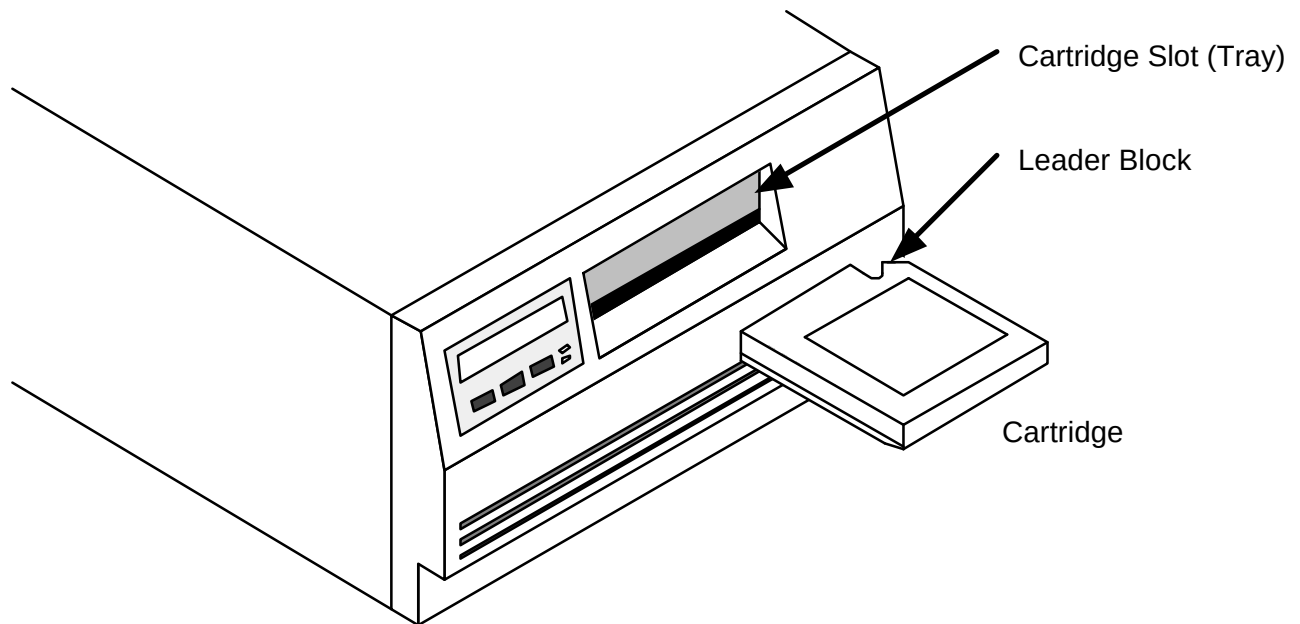


Figure 2-17 Loading a Cartridge [without CSL model]

“ONLINE” will appear on the center of the Status-Line when loading is complete and drive will be ready. The drive is now read/write enabled. Refer to Figure 2-15.

2.4.1 Front Door [with CSL model]

It is possible to lock/unlock the front door by using the supplied keys (door-lock and keys are optional). To lock the front door, insert the key in the door-lock keyhole located on the front panel and turn counterclockwise. To unlock the front door, insert the key in the door-lock keyhole located on the front panel and turn clockwise. Refer to Figure 2-11.

The front door can be opened by pulling the door knob when unlocked. “DOOR OPEN” will be displayed on the Status-Line when the front door is open. To close the front door, push it back to the original position.

NOTE

The front door can be opened or closed regardless whether the power is on. The CSL mechanism will automatically stop operation if the door is opened. The CSL mechanism will resume operation when the door is once again closed, however, operation may take some time since cartridges will be re-scanned.

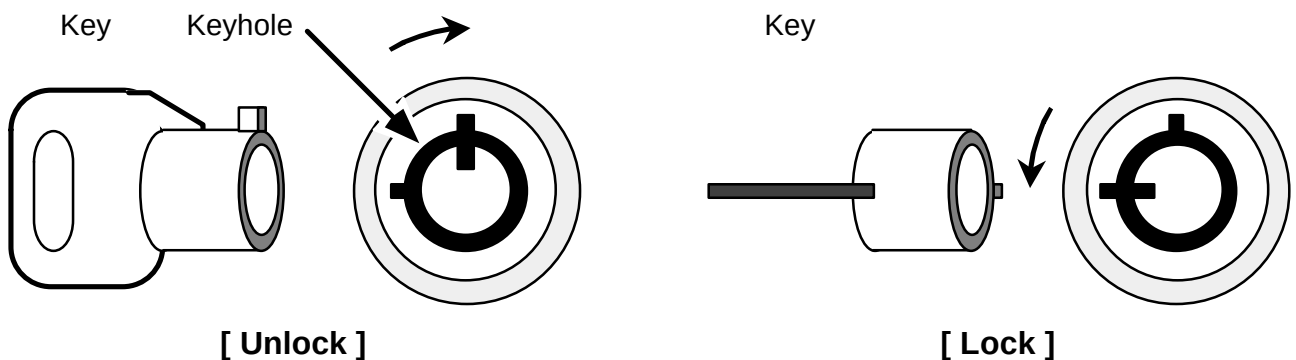


Figure 2-11 Door Lock

2.4.2 Magazine [with CSL model]

Up to 10 cartridges can be loaded into the magazine provided with the CSL. This magazine can be removed by opening the front door and can be carried using the magazine handle.

To remove the magazine from CSL: Open the front door and grasp the magazine handle. Tilt the upper section of the magazine forward and pull up.

To install the magazine into the CSL: Open the front door and while grasping the magazine handle, let the bottom of the magazine rest on the bottom holder. Push the upper section of the magazine until it locks in position. Refer to Figure 2-12.

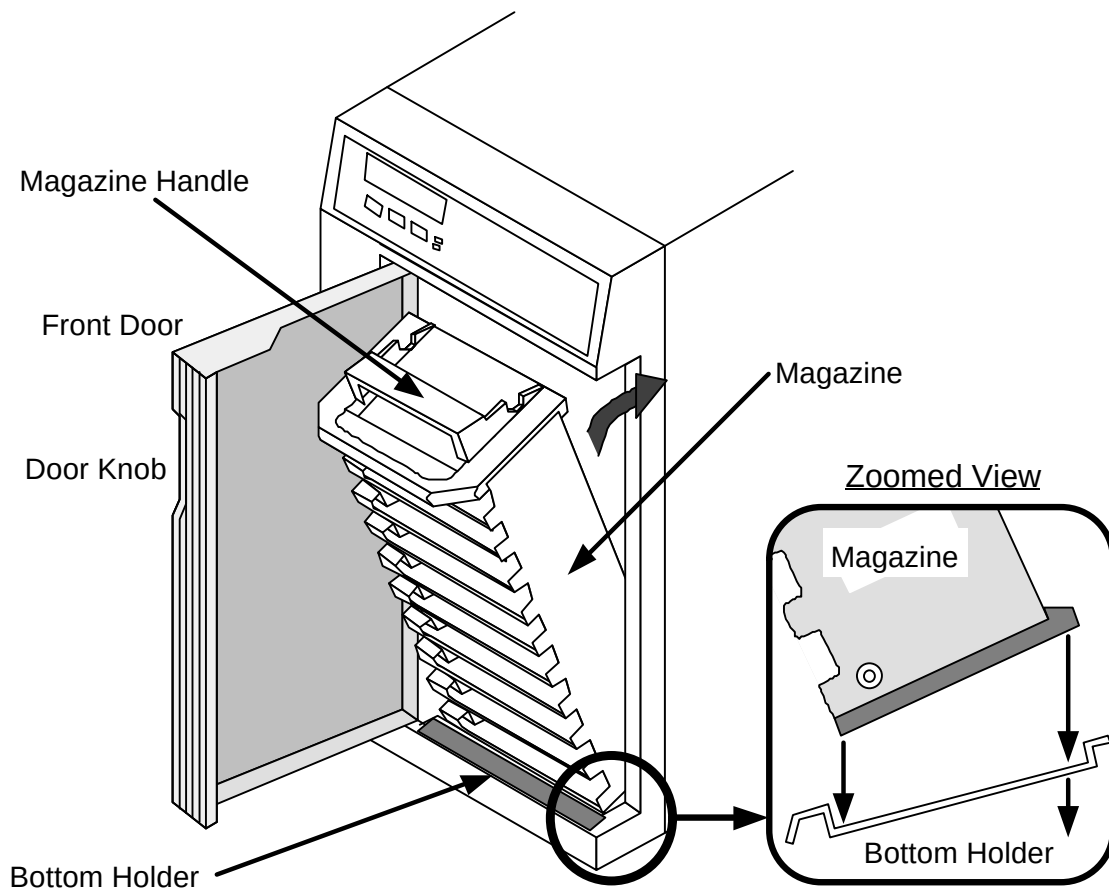


Figure 2-12 Installing the Magazine

CAUTION

When transporting the magazine, carry by the magazine handle so that the bottom of the magazine becomes directly under. Shaking the magazine may cause cartridges to fall from the slots.

2.4.3 Inserting a Cartridge [with CSL model]

Each of the magazine's 10 cartridge slot can hold one cartridge and is numbered 1 through 10, top to bottom. Each slot is the same and cartridges are only distinguished by their number. Refer to Figure 2-13.

Open the front door and insert the cartridges facing in the correct direction (leading block away from you) into the slot of the magazine, as shown in Figure 2-13. Insert cartridge completely until hitting the stopper located on the left side of the slot.

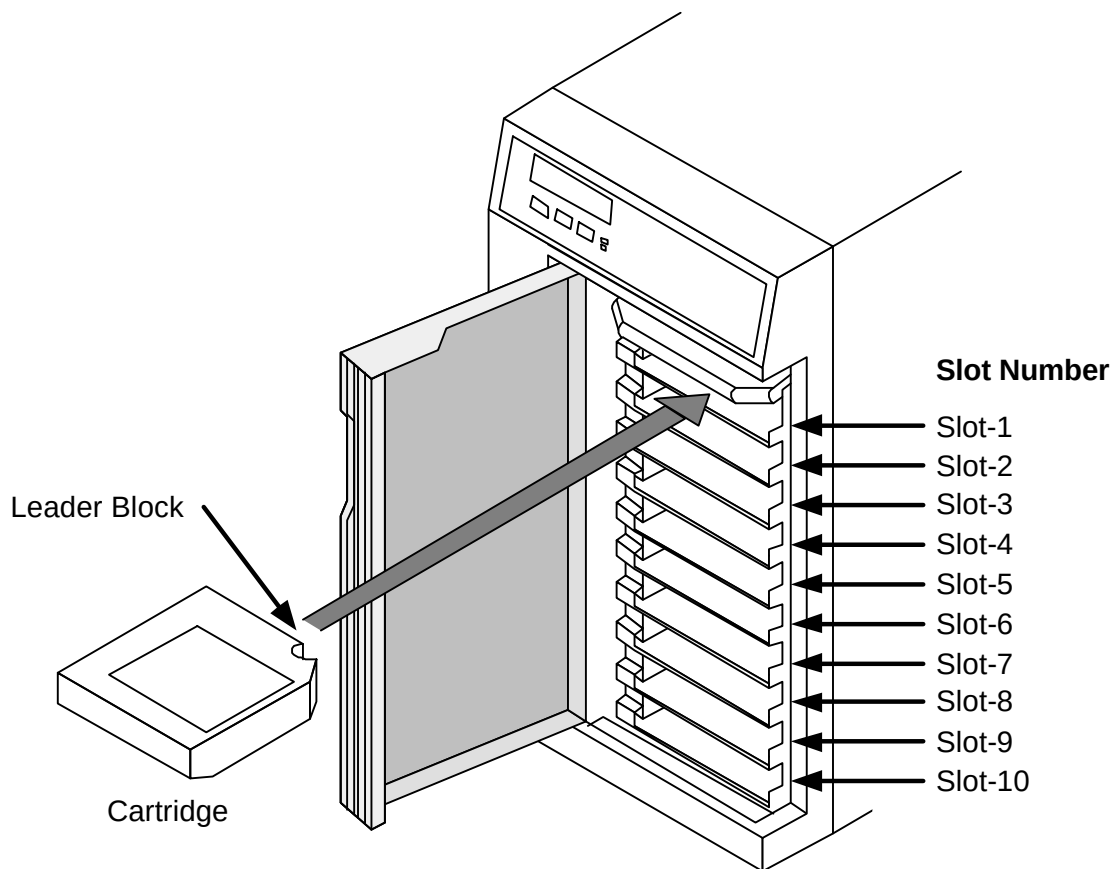


Figure 2-13 Inserting a Cartridge

NOTE

Cartridges can be inserted into magazines while removed from the CSL. Follow the same procedure as when within the CSL. Refer to Figure 2-13.

The order of the loading procedure is always the upper slot. When there are empty slots midway in the magazine, empty slots are ignored and the next inserted cartridge in sequence is loaded.

When either Automatic or Manual operation is set, the cartridge loading sequence will be as shown in Table 2-10.

Table 2-10 Cartridge Loading Sequence

		Slot Number									
		1	2	3	4	5	6	7	8	9	10
Example	1	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
	2	①	②	③	④	⑤	—	—	⑥	—	—
	3	—	—	①	—	②	③	④	—	—	⑤

Marks : ○Possible for auto load (circled numbers are the load sequence).
 —Empty slot (No cartridge).

When the System operation mode is set, the loading sequence will depend on the application program being used by the host computer.

2.4.4 Selecting a Cartridge [with CSL model]

Whether or not the slots of the magazine contain cartridges can be searched by closing the front door. During the search, “CSL INITIALIZING” will be displayed on the Status-Line of the display. When the search is ended, “STAND BY” will be displayed on the center of the Status-Line and a cartridge can be loaded into the top slot of the magazine.

At that time, the operation switches of the front operator panel can be used to select and load the cartridge in any optional slot.

The following procedure to select the “Slot Number Select setup”. Refer to Figure 2-14.

- 1) First, unload the cartridges. If the operation mode is in the off-line mode, change to the on-line mode. Refer to Figure 2-7.
- 2) “Sel” will be displayed on the center Switch-Line of the display. Pressing the center Switch-2 “Sel” displays the currently selected slot number on the Status-Line of the display. This menu is the Slot Number Select setup.
- 3) To change the Slot Number, pressing the center Switch-2 “NEXT” each time increases slot number on the right of the Status-Line. Only the numbers of slots where cartridges are inserted will be displayed.
- 4) Press the Switch-1 “SAVE” to select the currently displayed slot number.
Press the Switch-3 “EXIT”, operation will end without changing the slot number.
- 5) Pressing the Switch-3 “EXIT”, this menu will be exited and the on-line mode will return.

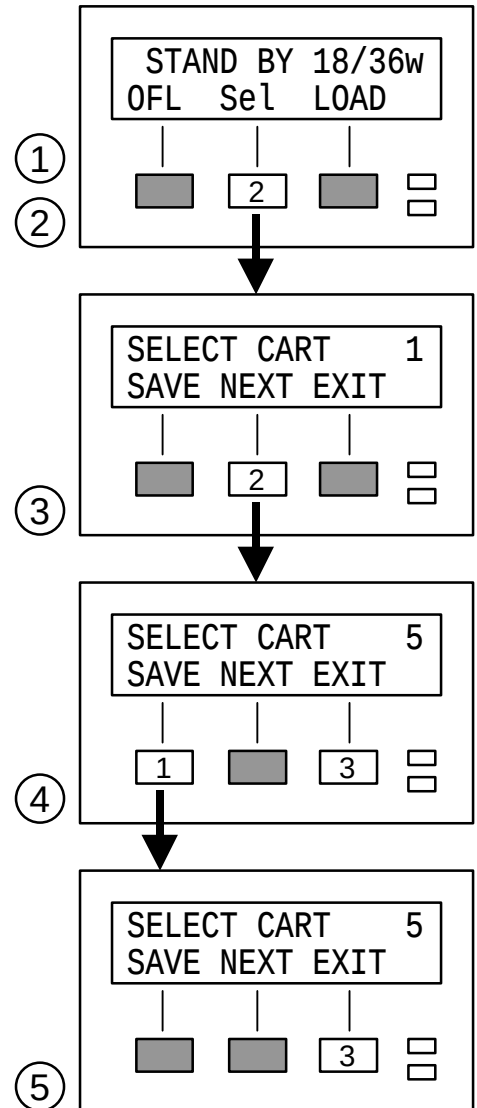


Figure 2-14 Slot Number Select

CAUTION

When the Slot Number Select setup is exited, cartridges below the selected slot number can be used. Consequently, cartridges above the selected slot number will be ignored. To use cartridges above the selected slot number, repeat the operation using the Slot Number Select setup.

2.4.5 Loading the Cartridge [with CSL model]

First, if the operation mode is in the off-line mode, change to the on-line mode (Refer to Figure 2-7). "STAND BY" will be displayed on the center Status-Line of the display.

"LOAD" will be displayed on the right Switch-Line of the display. Pressing the right Switch-3 "LOAD" begins loading the cartridge from the selected magazine slot (Refer to Table 2-9 and 2-10). Cartridge will automatically be loaded from the magazine slot to the tape path within the drive. "LOADING FROM xx" will be displayed on the Status-Line during loading. The "xx" represents the slot number.

CAUTION

The front door may be opened or closed during while the device is on ready. However, the cartridge following the one will be loaded from the upper slot when opening the door. Thus, the order of the cartridge to load may change.

"ONLINE" will appear on the center of the Status-Line when loading is complete and drive will be ready. The drive is now read/write enabled. Refer to Figure 2-15.

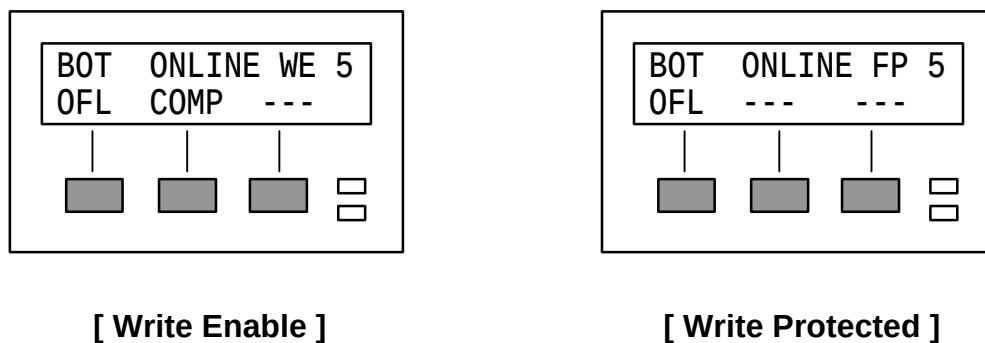


Figure 2-15 Completion of the Loading

CAUTION

The front door may be opened or closed during while the device is on ready. However, when the door is once opened or closed, the cartridge in the top slot will be loaded next and the slot number selection will become invalid. Consequently, the sequence in which the cartridges are to be loaded can be changed by opening or closing the door.

2.5 Unloading the Cartridge

2.5.1S Manual Unloading [without CSL model]

First, enter the off-line mode if in the on-line mode (Refer to Figure 2-6). "OFFLINE" will be displayed on the center Status-Line of the display.

"REW/UNL" or "UNLD" is displayed on the center of the Switch-Line. Pressing the center Switch-2 "REW/UNL" during when the display is "REW/UNL" rewinds the tape and the display changes to "UNLD". Pressing Switch-2 "UNLD" at this time unloads the cartridge. Pressing the center Switch-2 "UNLD" when "UNLD" is displayed unloads the cartridge immediately. Refer to Figure 2-13.

"UNLOADING" or "UNLOAD AFTER REW" will appear on the Status-Line when unloading, and the drive will become not ready. When the tray is lifted and cartridge is ejected, "STAND BY" is displayed on the Status-Line and unloading is complete.

2.5.1C Manual Unloading [with CSL model]

First, enter the off-line mode if in the on-line mode (Refer to Figure 2-6). "OFFLINE" will be displayed on the center Status-Line of the display.

"REW/UNL" or "UNLD" is displayed on the center of the Switch-Line. Pressing the center Switch-2 "REW/UNL" during when the display is "REW/UNL" rewinds the tape and the display changes to "UNLD". Pressing Switch-2 "UNLD" at this time unloads the cartridge. Pressing the center Switch-2 "UNLD" when "UNLD" is displayed unloads the cartridge immediately. Refer to Figure 2-16.

"UNLOADING" or "UNLOAD AFTER REW" will appear on the Status-Line when unloading, and the drive will become not ready. "UNLOADING TO xx" will be displayed on the Status-Line during unloading. The "xx" represents the slot number. The cartridge will be returned to the original slot and "STAND BY" will be displayed on the center of the Status-Line to indicate the end of the unloading operation. When all of the cartridges have been unloaded, "END OF STACK" will be displayed on the Status-Line.

Now that the unloading operation has ended, the door can be opened and the cartridges removed from the magazine.

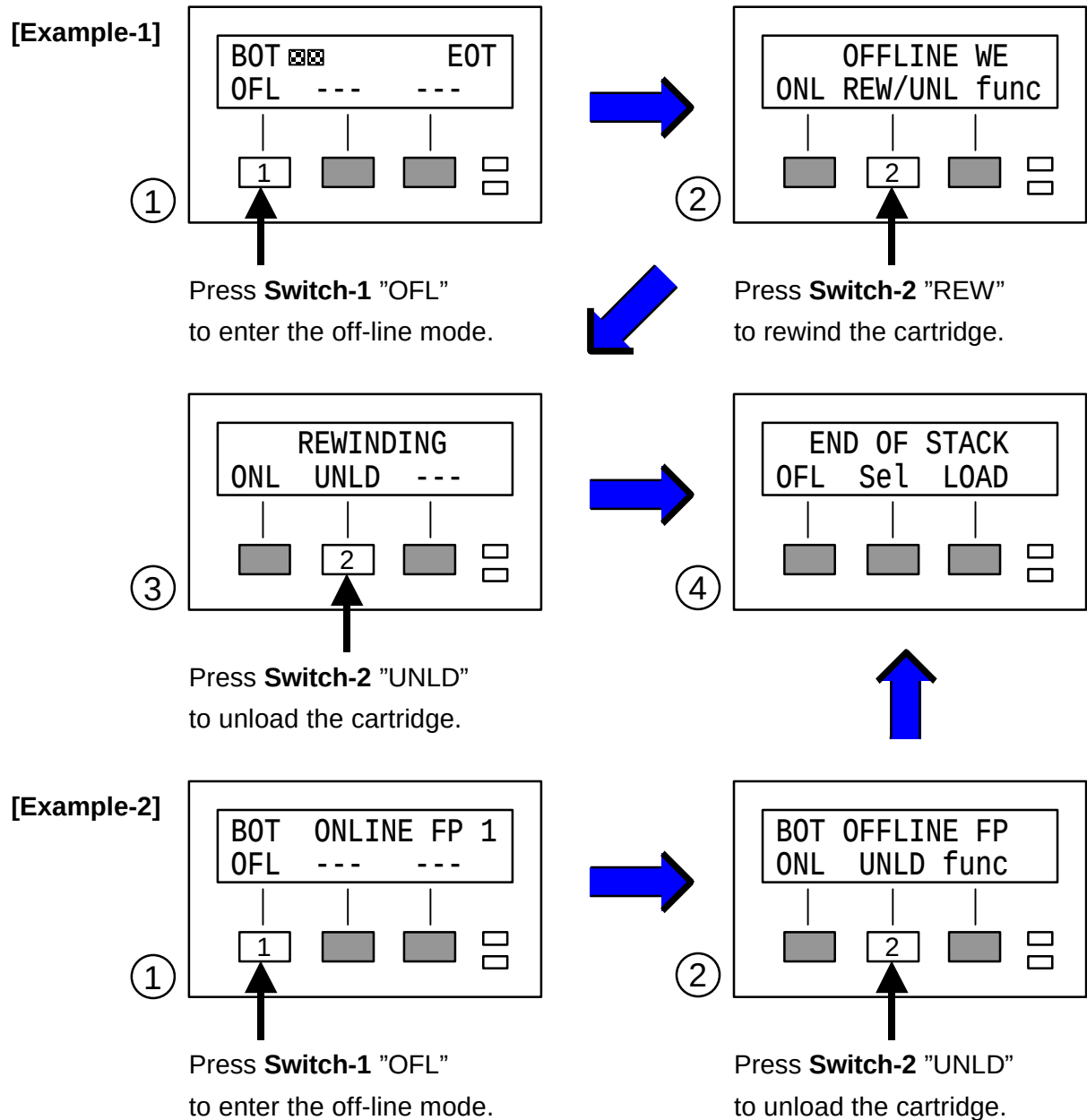


Figure 2-16 Unloading the Cartridge

CAUTION

If the drive is to be relocated or reshipped, unload and remove the cartridge first. Furthermore remove all cartridges from the magazine. If a drive is transported with the cartridge still inserted, the media could be damaged, resulting in loss data.

2.5.2S Unloading from SCSI [without CSL model]

Set the operation mode to on-line and execute the SCSI Unload Command from the host computer.

“UNLOADING” will appear on the Status-Line of the display when unloading, and the drive will become not ready. When the tray is lifted and cartridge is ejected, “STAND BY” is displayed on the Status-Line and unloading is complete.

2.5.2C Unloading from SCSI [with CSL model]

Set the operation mode to on-line and execute the SCSI Unload Command from the host computer.

“UNLOADING” or “UNLOAD AFTER REW” will appear on the Status-Line of the display when unloading, and the drive will become not ready. “UNLOADING TO xx” will be displayed on the Status-Line during unloading. The “xx” represents the slot number. The cartridge will be returned to the original slot and “STAND BY” will be displayed on the center of the Status-Line to indicate the end of the unloading operation.

After that, if there is a cartridge in the lowermost slot of the magazine, cartridges can be loaded automatically from the slots above. Refer to section 2.3.6.

If there is no cartridge in the lowermost slot, that is, when all of the cartridges have been unloaded, “END OF STACK” will be displayed on the Status-Line, and the door can be opened and the cartridges removed from the magazine.

Chapter 3 MAINTENANCE

This drive is designed for maintenance free, except as follows.

3.1 Cleaning the Tape Head

Clean the tape head and path using the IBM 3480 cleaning cartridge (IBM P/N 4780527 or compatible).

This cleaning operation should be performed periodically to help prevent read or write errors. The tape head and path should be cleaned every 8 hours during continuous operation. They should be cleaned at least once a day, even if the operation is not continuous.

Clean the tape head and path immediately if the operator panel display the "CLEAN" message on the Status-Line of the display. This message is displayed only when rewinding, loading or unloading.

Follow the manufacturer's recommendations for the use of the cleaning cartridge and keep track of the number of uses.

WARNING!

Do not clean the tape head directly with cotton swabs etc.. The tape head of the drive may be destroyed due to its thin coating structure, if the receiving force exceeds the pressure of prescription (tape tension).

Load the cleaning cartridge into the drive as with standard cartridges (Refer to Section 2.4). The drive automatically initiates cleaning when the cartridge is loaded. The cartridge is automatically unloaded when cleaning is complete.

NOTE

When cleaning is complete, the "CLEAN" display will be replaced by the standard Status-Line display.

Marking the top face label of a cleaning cartridge whenever cleaning has finished is convenient to keep track of the number of uses.

3.2 Repairing the Leader Block

Although not often, the leader block may sometimes separate from the tape. If this occurs, reattaching the leader block to recover previously recorded data is permitted one time.

CAUTION

The following procedure is only permitted when the cartridge contains important data that needs to be recovered. The leader block attachment is a temporary part permitted to recover data one time.

After reattaching the leader block and transferring the contained important data to a computer, destroy the cartridge.

The leader block of the cartridge can be reattached easily by using the leader block attachment kit (IBM P/N 4780625). This kit contains a leader block, leader block pin and clutch tool. To reattach leader block, remove tape from the cartridge then attach the leader block to the tape in a straight line. The leader block insert kit (IBM P/N 4780624) containing only a leader block and leader pin is also available. For procedure on the repair, refer to the instructions enclosed with either kit.

CAUTION

Always use the clutch tool to replace the leader block.

NOTE

For repair kits, contact the cartridge manufacturer.

Chapter 4 INSTALL and SETUP

4.1 Installation

4.1.1 Installation Procedure

Use the following procedure to install this drive. For details, refer to the “Installation Notes” of the host computer.

- 1) Install the drive in a safe place. Do not connect the SCSI cables yet.
- 2) Operate the host computer and search for a vacant SCSI ID number.
- 3) Stop the host computer system and turn off the power supply.
- 4) Connect the AC power cable and SCSI terminator to the drive. (Refer to section 4.1.3.)
- 5) Turn on the drive power supply. (Refer to section 2.3.2.)
- 6) Set the drive SCSI ID to the vacant number, and set the emulation mode, etc., to match those of the host computer system. (Refer to section 4.2.)
- 7) Turn off the drive power supply. (Refer to section 2.3.2.)
- 8) Connect the host computer system and the drive. (Refer to section 4.1.3.)
- 9) Turn on the drive power supply and then start the host computer system.
- 10) Operate the host computer and register the drive.

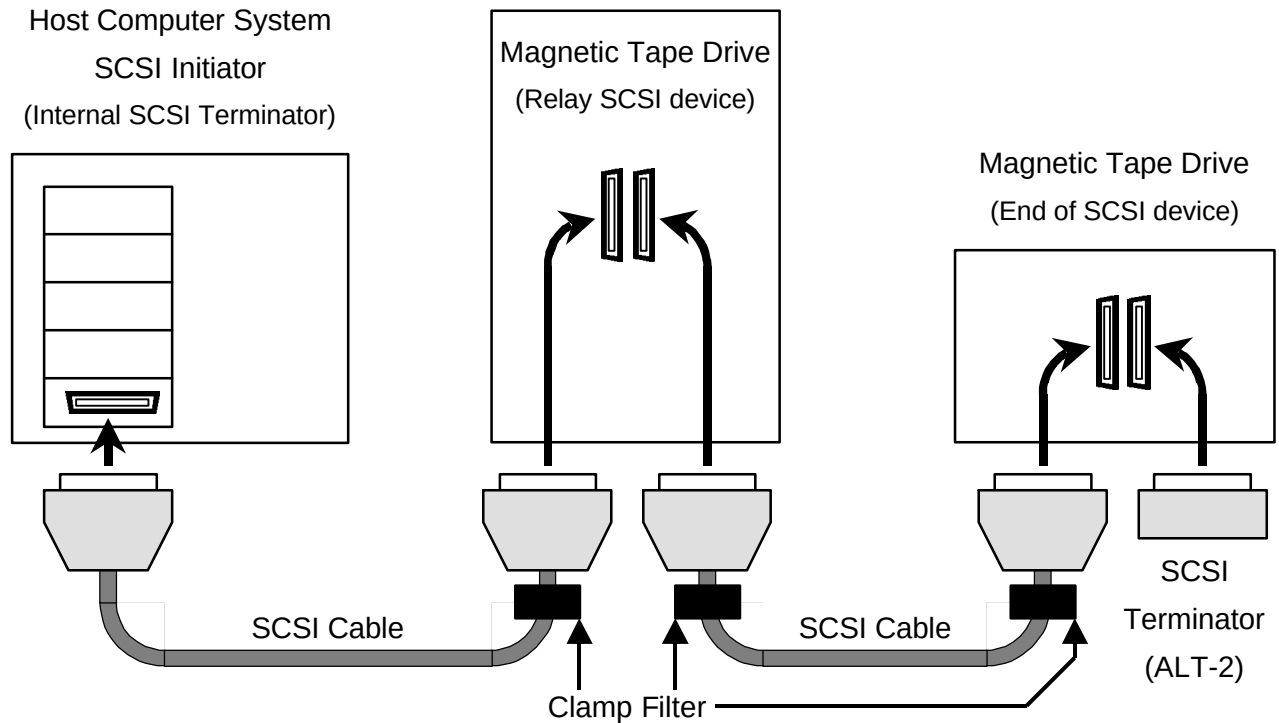
4.1.2 Installation Precautions

Observe the following precautions during installation.

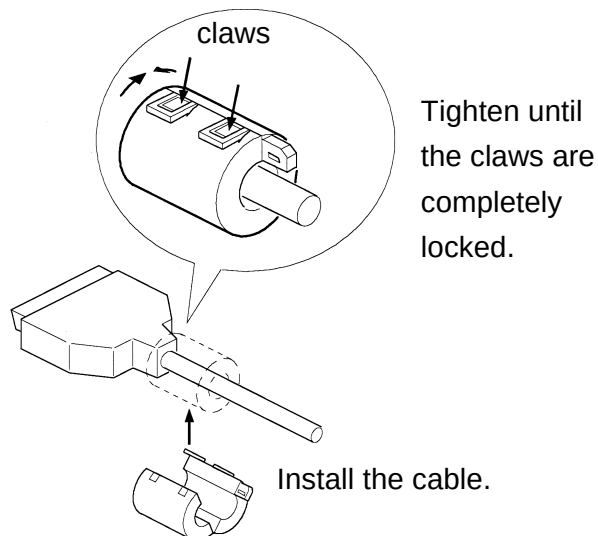
- 1) The host computer system should be operated by the systems manager.
- 2) The SCSI cable should be the minimum possible length. Also, use high-impedance shielded cable.
- 3) Always install a SCSI terminator at both ends of the SCSI system being connected. Also, use an active SCSI terminator (ALT-2) for single-end SCSI model.
- 4) Do not turn off the drive power supply while the host computer system is in use.
- 5) After turning off the drive power supply, wait at least 10 seconds before turning the power supply on again.

4.1.3 SCSI Cable Connection

The two SCSI connectors on the rear panel of the drive can be used for either input or output. Refer to Figure 4-1 and connect the SCSI cables and the SCSI terminator. Also install a clamp filter on the SCSI cable and fasten it at the end near the SCSI connector of the drive.



Clamp Filter Installation



Fastening the Clamp Filter

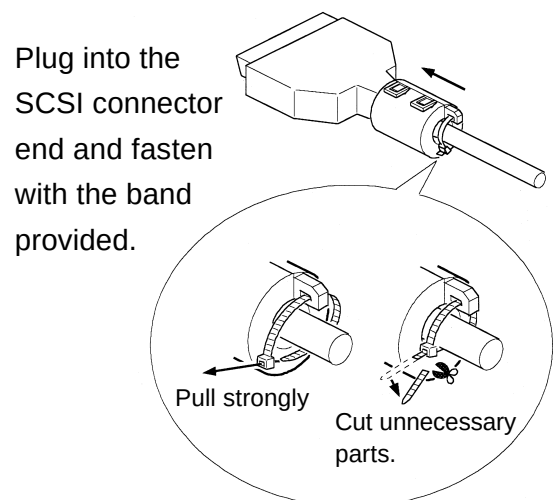


Figure 4-1 SCSI Cable Connection

4.2 Setup

This drive can be set up from the operator panel on the front.

Table 4-1 shows the standard setup values. Also, when changing the standard setup values, enter the changes in this table for reference. (Refer to section 4.5 for the values that can be set.)

Table 4-1 Setup Values

Contents		Standard Setup Value		Currently Set Value	Comments
Type	Items	MS-8418	MS-843x		
SCSI	SCSI ID	5			
	CSL LUN	1			with CSL model.
	WIDE NEG	SCSI-2 model : <u>DSABL</u> SCSI-3 model : <u>ENABL</u>			
	SYNC NEG	ENABL			
	SAVE PNTR	ENABL			
	LD/RWD STAT	OFLN			
	BUFER MODE	buff			
	FMK SYNC	all			
	BOT PRE-RD	norm			
	WR RETRIES	10			
	RD RETRIES	10			
DRIVE	COMPRESSION	OFF	ON		
	COMP SWITCH	ON			
	TAPE PWR-ON	UNLD			without CSL model.
	EMULATION	ECHO			
	DEFAULT CFG	FLASH			
	WRT ERR	norm rec			
	PERM RD ERR	norm			
	ERSE W2 DID	---	norm		
	Rd AHEAD FMK	go			
18WRT	WRITE	---	36 TRACK		18/36 track model.
CSL	CSL MODE	Auto			with CSL model.
UCODE	CURRENT CNTL	Enter when the firmware is updated.		MEC	
	CURRENT FORM			MEF	
	CURRENT SCSI			MES	
	CURRENT SERVO			MEV	
	CURRENT CSL			MEL	

4.2.1 SCSI ID Setup

CAUTION

The power supply of the drive must be turned off when changing the SCSI ID setup, so operate it independently without connecting to the host computer system.

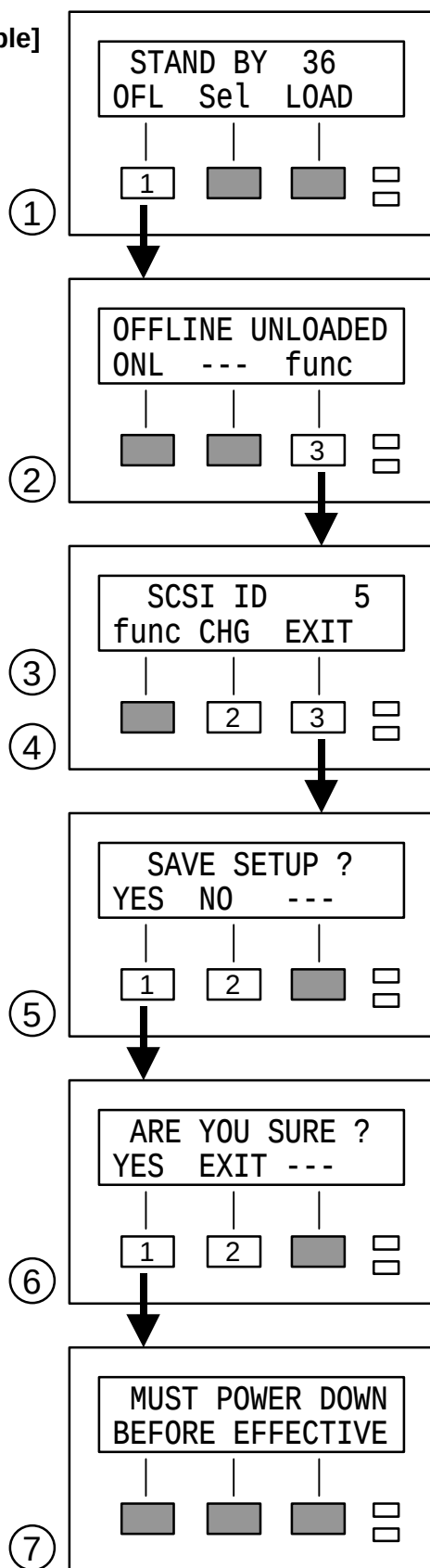
The following procedure to set the “SCSI ID setup”. Refer to Figure 4-2.

- 1) First, unload the cartridge. If the operation mode is in the on-line mode, change to the off-line mode. Refer to Figure 2-6.
- 2) “func” will be displayed on the right Switch-Line of the display. Pressing the right Switch-3 “func” displays the current “SCSI ID” on the Status-Line of the display. This menu is the SCSI ID setup.
- 3) To change the SCSI ID, pressing the center Switch-2 “CHG” each time increases SCSI ID number on the right of the Status-Line. SCSI ID can be any number from 0 to 15. (The numbers from 8 to 15 are reserved for use with SCSI-3=WIDE SCSI.)
- 4) To complete the setup, press the right Switch-3 “EXIT”. “SAVE SETUP?” will be displayed on the Status-Line.
- 5) Press the Switch-1 “YES” to save the current setup.
Press the Switch-2 “NO” to abort and use the previous setup.
Pressing the Switch-2 returns the SCSI ID setup menu. Pressing the Switch-1 “ARE YOU SURE ?” will be displayed on the Status-Line.
- 6) Press the Switch-1 “YES” to save the current setup.
Press the Switch-2 “EXIT” to abort and use the previous setup.
Pressing either switch returns the SCSI ID setup menu.
- 7) Turn off the power when changing the setup.
When not changing the setup, press the right Switch-3 “EXIT” to return to the off-line mode.

CAUTION

New setup will not be valid unless turning off the power.

[Example]

**Off-line mode menu.****Press Switch-3 “func”.****SCSI ID setup menu.****Press Switch-2 “CHG”
to increase SCSI ID.****Press Switch-3 “EXIT”
to end the setup.****Input request for save.****Press Switch-1 “YES” to save the setup.****Press Switch-2 “NO” to abort the setup.****Input request for confirmation of save.****Press Switch-1 “YES” to save the setup.****Press Switch-2 “EXIT” to abort the setup.****Turning off the power.****Figure 4-2 SCSI ID Setup**

4.2.2 Emulation Mode Setup etc.

Enter the configuration mode when changing “SCSI” or “DRIVE” setup. These setup menus will be displayed on the Status-Line when the correct password is entered.

The following procedure to set a example of “Emulation Mode setup”. Refer to Figure 4-3.

- 1) First, if the operation mode is in the on-line mode, change to the off-line mode. Refer to Figure 2-6.
- 2) “func” will be displayed on the right Switch-Line of the display. Pressing the right Switch-3 “func” displays the current SCSI ID on the Status-Line of the display.
- 3) Pressing the left Switch-1 “func” displays “MENU FUNCTIONS” on the Status-Line.
- 4) Select the menu displayed as “CONF” on the left of the Switch-Line. Pressing the left Switch-1 “CONF” displays “ENTER PASSWORD” on the Status-Line. This is the password input prompt.
- 5) Press Switch-3,-2 and -3 in sequence. The “CONFIGURE” will appear on the Status-Line. This menu is the configuration mode.
- 6) Select the menu displayed as “DRIVE” on the center of the Switch-Line. Pressing the center Switch-2 “DRIVE” displays the current “COMPRESSION” on the Status-Line. This menu is the IDRC default setup.
- 7) Press the right Switch-3 “>>>” to select the menu that displays the current “EMULATION” on the Status-Line. This menu is the Emulation Mode setup.
- 8) To change the Emulation Mode, pressing the center Switch-2 “CHG” each time displays the other mode on the Status-Line.
- 9) To complete the setup, press the left Switch-1 “EXIT”. “SAVE SETUP?” will be displayed on the Status-Line.
- 10) Press the Switch-1 “YES” to save the current setup.
Press the Switch-2 “NO” to abort and use the previous setup.
Press the Switch-3 “TEMP” to use the current setup until turning off the power.
Pressing the Switch-2 returns the configuration mode. Pressing the Switch-1 or Switch-3 “ARE YOU SURE ?” will be displayed on the Status-Line.
- 11) Press the Switch-1 “YES” to save the current setup.
Press the Switch-2 “EXIT” to abort and use the previous setup.
Pressing either switch returns the configuration mode.
- 12) Press the right Switch-3 “>>>” to select the menu that displays “EXIT” on the Switch-Line. Press this “EXIT” switch to return to the off-line mode.

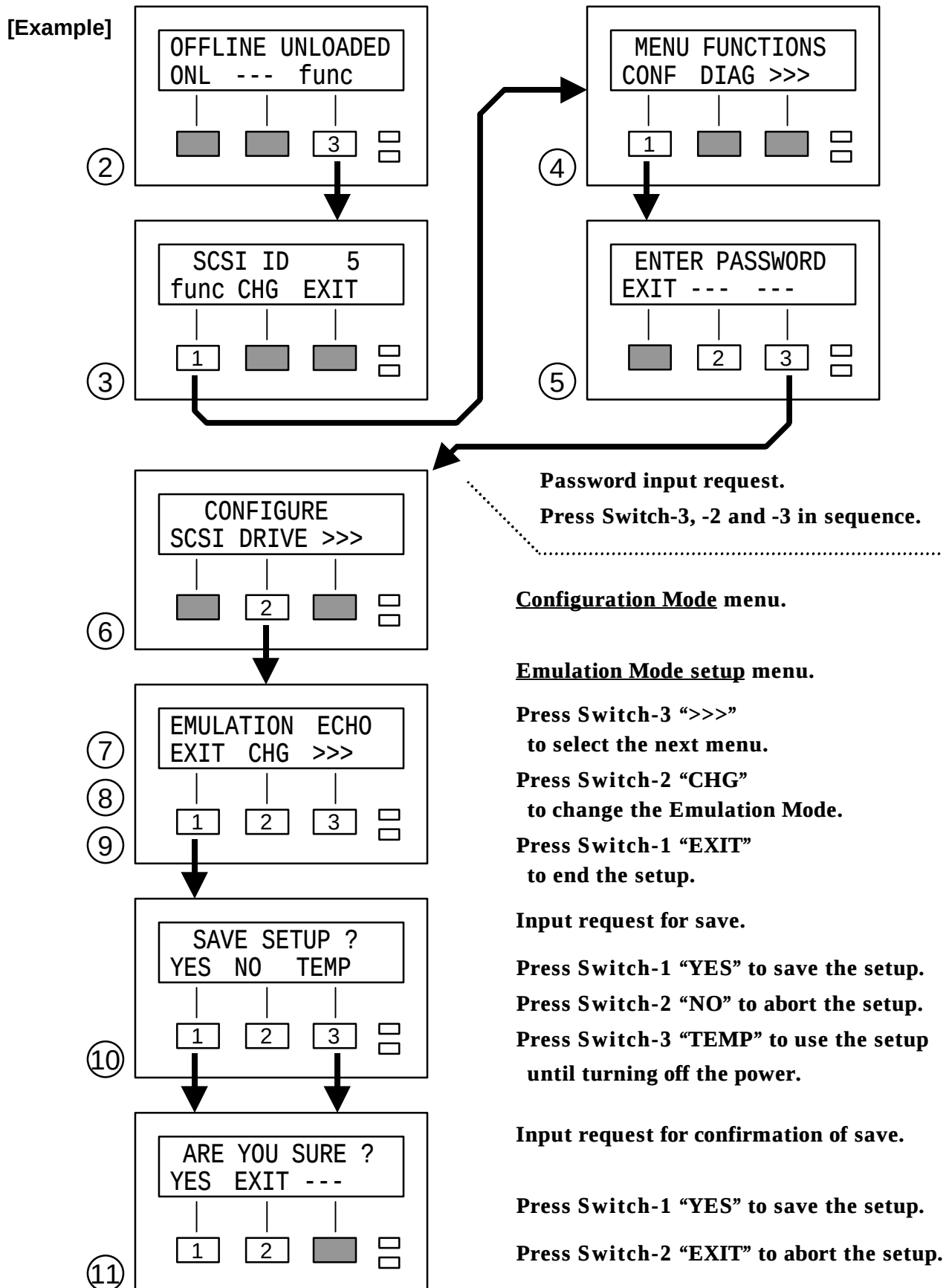


Figure 4-3 Emulation Mode Setup

4.2.3 CSL Operation Mode Setup [with CSL model]

The following procedure to set the “CSL Operation Mode setup”. Refer to Figure 4-4.

- 1) First, if the operation mode is in the on-line mode, change to the off-line mode. Refer to Figure 2-6.
- 2) “func” will be displayed on the right Switch-Line of the display. Pressing the right Switch-3 “func” displays the current SCSI ID on the Status-Line of the display.
- 3) Pressing the left Switch-1 “func” displays “MENU FUNCTIONS” on the Status-Line.
- 4) Press the right Switch-3 “>>>” to shift to the next menus.
- 5) Select the menu displayed as “CSL” on the left of the Switch-Line. Pressing the left Switch-1 “CSL” displays “ENTER PASSWORD” on the Status-Line. This is the password input prompt.
- 6) Press Switch-3,-2 and -3 in sequence. The current “CSL MODE” will appear on the Status-Line. This menu is the CSL Operation Mode setup.
- 7) To change the CSL Operation Mode, pressing the center Switch-2 “CHG” each time displays the other mode on the Status-Line.
- 8) To complete the setup, press the left Switch-1 “EXIT”. “SAVE SETUP?” will be displayed on the Status-Line.
- 9) Press the Switch-1 “YES” to save the current setup.
Press the Switch-2 “NO” to abort and use the previous setup.
Press the Switch-3 “TEMP” to use the current setup until turning off the power.
Pressing the Switch-2 returns the configuration mode. Pressing the Switch-1 or Switch-3 “ARE YOU SURE ?” will be displayed on the Status-Line.
- 10) Press the Switch-1 “YES” to save the current setup.
Press the Switch-2 “EXIT” to abort and use the previous setup.
Pressing either switch returns the configuration mode.
- 11) Select the menu displayed as “DRIVE” on the Switch-Line. Press this “EXIT” switch to return to the off-line mode.

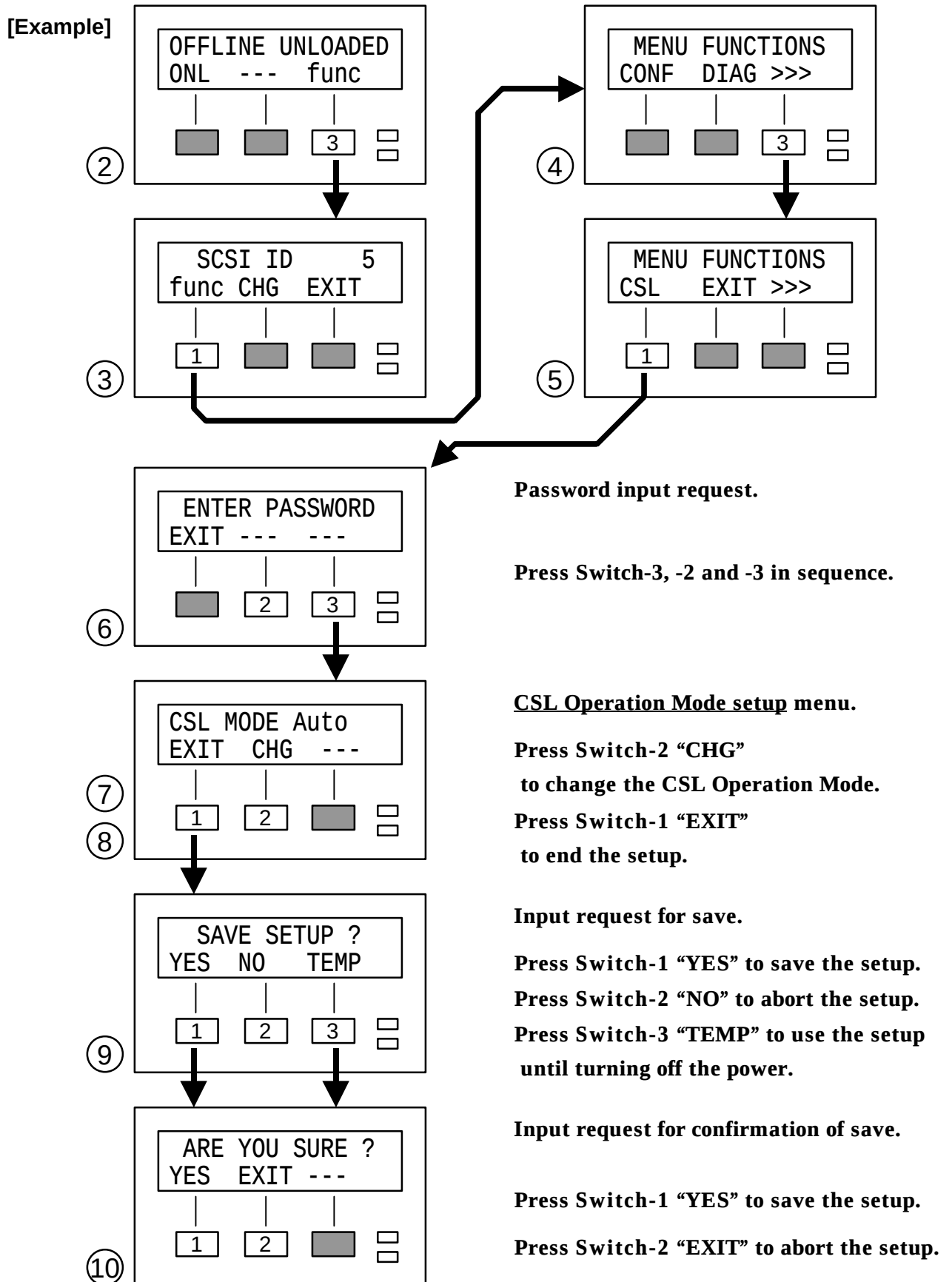


Figure 4-4 CSL Operation Mode Setup

4.3 Diagnostics

Enter the diagnostics mode when execute the self-diagnostics for read/write. A password is requested only when selecting "SERVO" in the diagnostics mode. The setup menu will be displayed on the Status-Line when the correct password is entered.

The following procedure to set a example of "Write-Test". Refer to Figure 4-5.

- 1) First, load a write-enabled cartridge. If the operation mode is in the on-line mode, change to the off-line mode. Refer to Figure 2-6.
- 2) "func" will be displayed on the right Switch-Line of the display. Pressing the right Switch-3 "func" displays the current SCSI ID on the Status-Line of the display.
- 3) Pressing the left Switch-1 "func" displays "MENU FUNCTIONS" on the Status-Line.
- 4) Select the menu displayed as "DIAG" on the center of the Switch-Line. Pressing the center Switch-2 "DIAG" displays "DIAGNOSTICS" on the Status-Line and enters the diagnostics mode.
- 5) Select the menu displayed as "RWT" on the center of the Switch-Line. Pressing the center Switch-2 "RWT" displays "READ/WRITE TESTS" on the Status-Line.
- 6) Press the right Switch-3 ">>>" to shift to the next menus.
- 7) Select the menu displayed as "WRT" on the left of the Switch-Line. Pressing the left Switch-1 "WRT" displays "WRITE TEST" on the Status-Line. This menu is the Write-Test.
- 8) Press the Switch-1 "SHORT" to execute the Short Write-Test.
Press the Switch-2 "LONG" to execute the Write-Test to EOT.
Pressing either switch displays "NUM REC =" on the center of the Status-Line and initiates writing of test data to the tape.
- 9) "DIAG PASSED" is displayed on the center of the Status-Line when successfully completing the Write-Test. Refer to Chapter 5 if an error is returned.
- 10) Press the right Switch-3 ">>>" to select the menu that displays "EXIT" on the Switch-Line. Press this "EXIT" switch to close to each of the menus.

CAUTION

Test data is written to the tape during Write-Test. Thus, data of the cartridge used for Write-Test is destroyed.

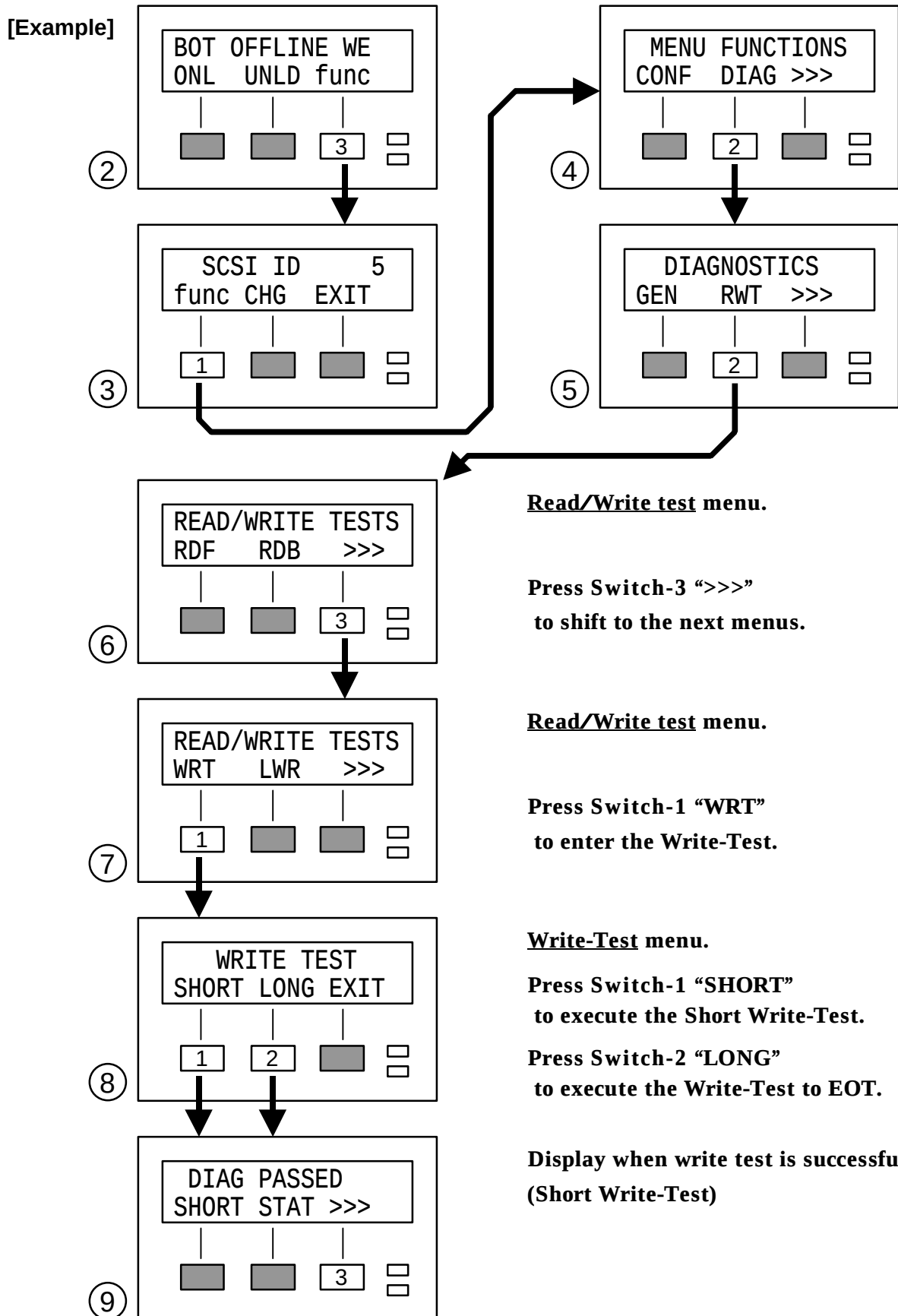
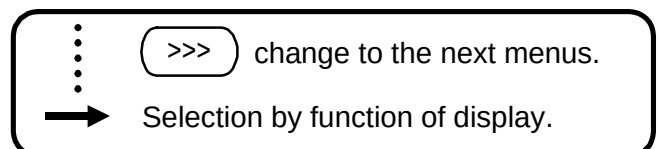


Figure 4-5 Write-Test Procedure

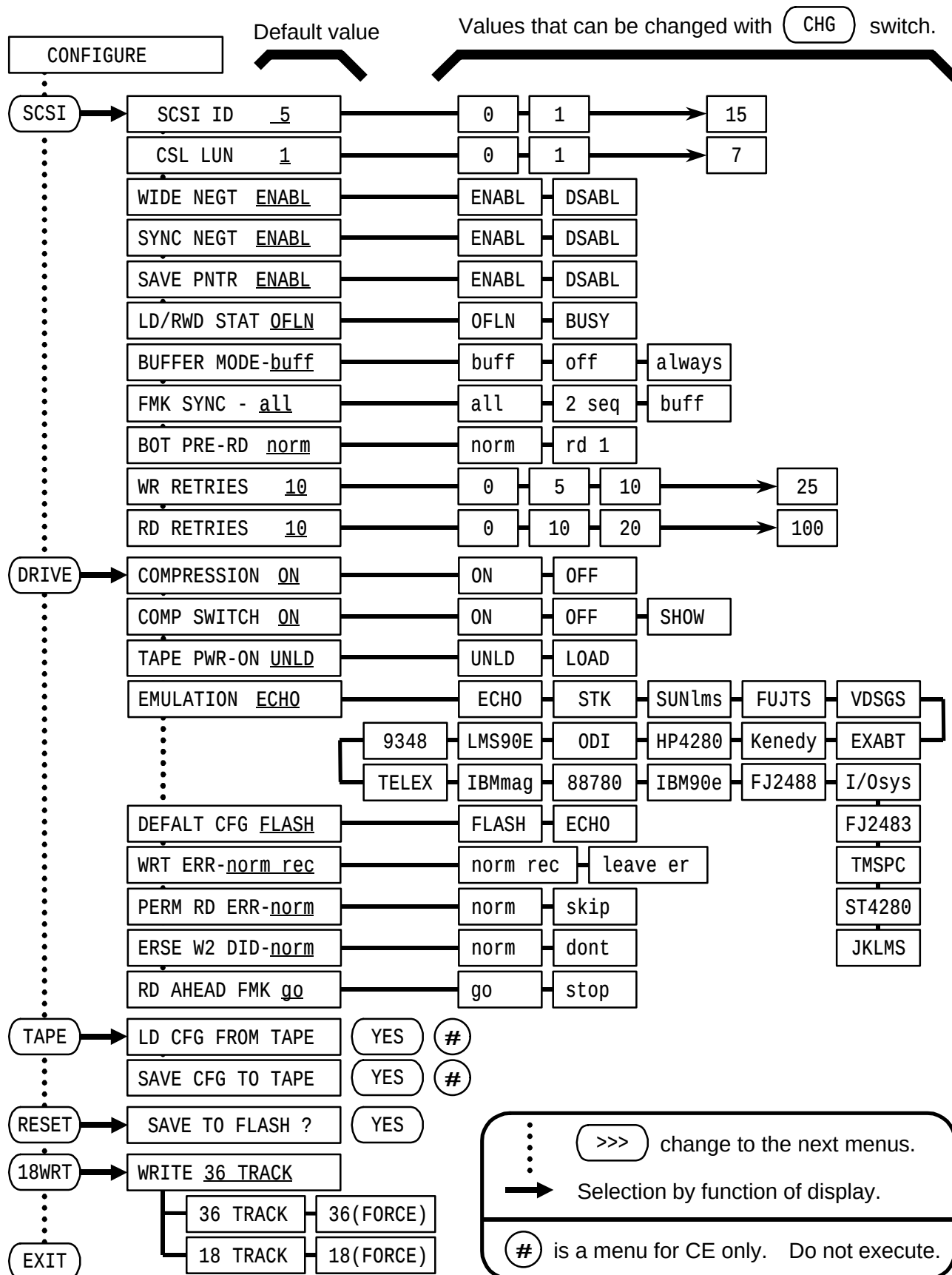
Listing of setup is given below. Items for CE (Customer Engineer) are to be performed only by persons with maintenance training.

```

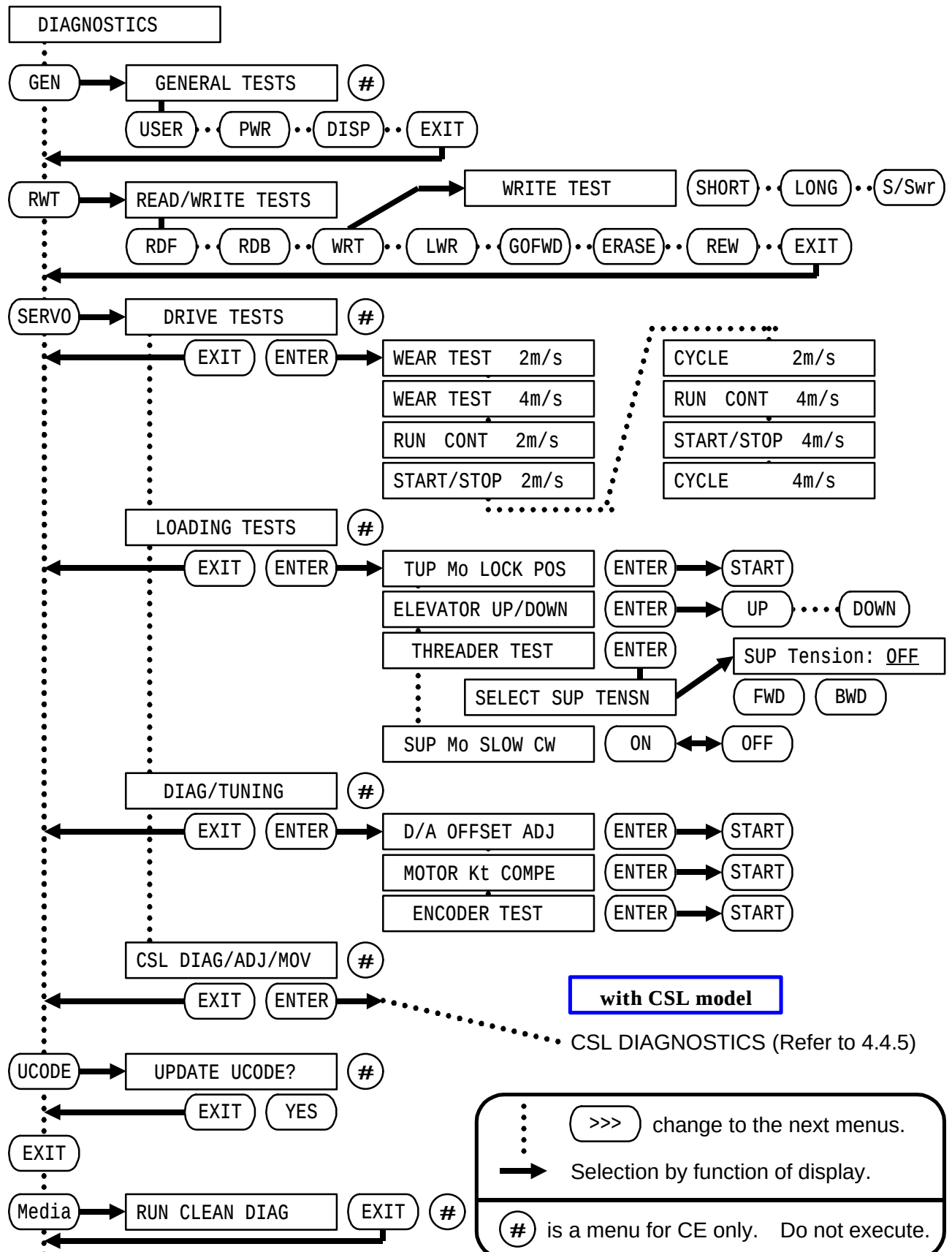
graph TD
    OFFLINE[OFFLINE UNLOADED] --> func1(func)
    func1 --> SCSI5[SCSI ID 5]
    SCSI5 --> func2(func)
    func2 --> MENU[MENU FUNCTIONS]
    MENU --> CONF(CONF)
    CONF --> CONFIG[CONFIGURE]
    MENU --> DIAG(DIAG)
    DIAG --> DIAGN[DIAGNOSTICS]
    MENU --> STAT(STAT)
    STAT --> STATIS[STATISTICS]
    MENU --> FUNLD(FUNLD)
    FUNLD -.-> RECOVERY[Recovery from Servo Error]
    MENU --> CSL(CSL)
    CSL --> CSL_MODE[CSL MODE Auto]
    CSL_MODE --> Auto[Auto]
    CSL_MODE --> SYS[SYS]
    CSL_MODE --> Random[Random]
    CSL_MODE --> AUT0cyc[AUT0cyc]
    CSL_MODE --> SYSauto[SYSauto]
    CSL_MODE --> Manual[Manual]
    Auto --- CHG1(CHG)
    SYS --- CHG1
    Random --- CHG1
    AUT0cyc --- CHG1
    SYSauto --- CHG1
    Manual --- CHG1
    CHG1 --- CHG_NOTE[with CSL model  
Values that can be changed with  
CHG switch. (Refer to 4.2.3)]
    CSL_MODE -.-> EXIT1(EXIT)
    EXIT1 -.-> SCSI6[SCSI ID 6]
    SCSI6 --> CHG2(CHG)
    CHG2 --> SAVE[SAVE SETUP ?]
    SAVE -- NO --> EXIT2(EXIT)
    SAVE -- YES --> SURE[ARE YOU SURE ?]
    SURE -- YES --> EXIT2
    SURE -- EXIT --> EXIT2
    EXIT2 -.-> EXIT3(EXIT)
    
```



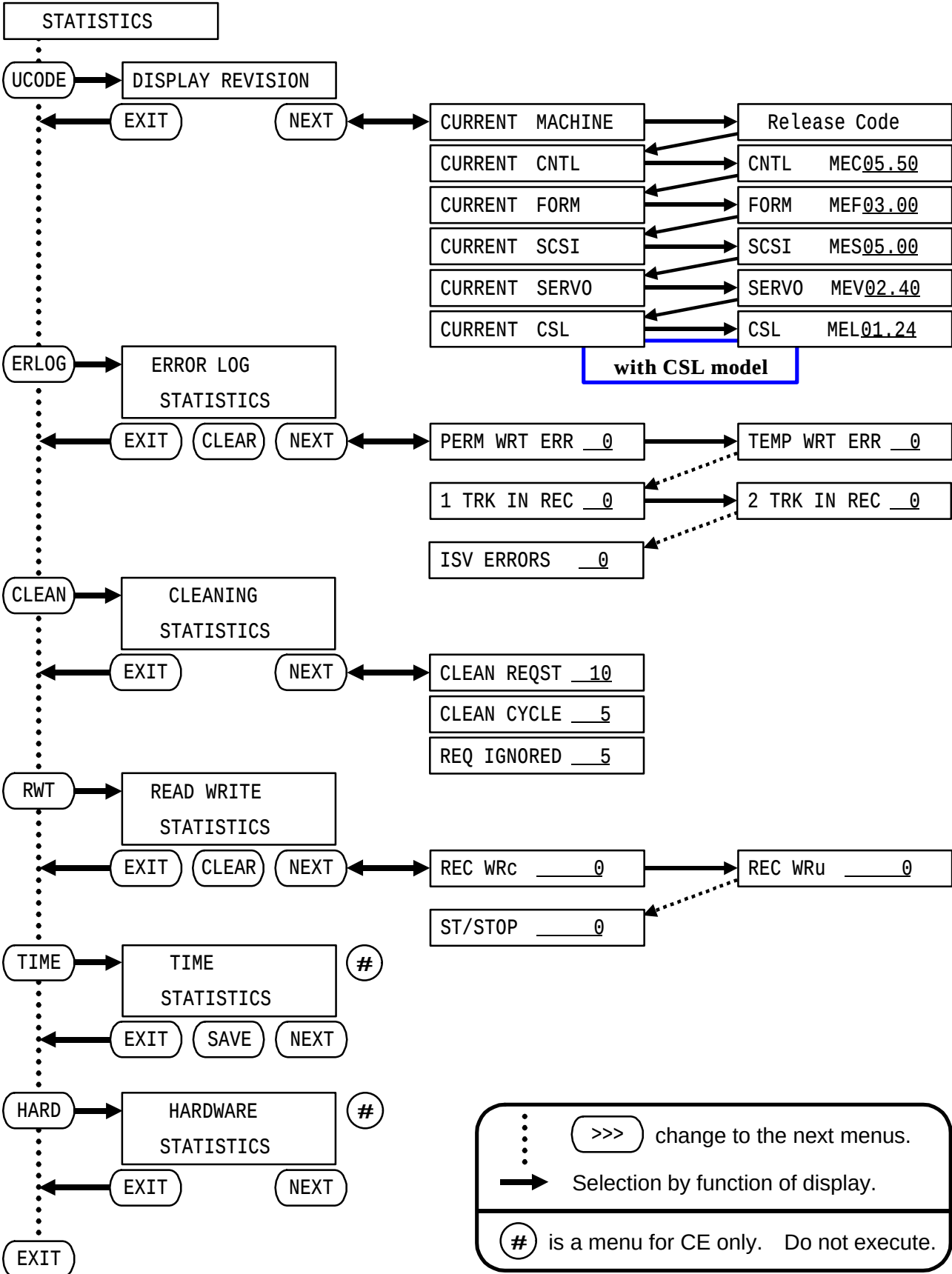
4.4.2 Structure of CONFIGURE



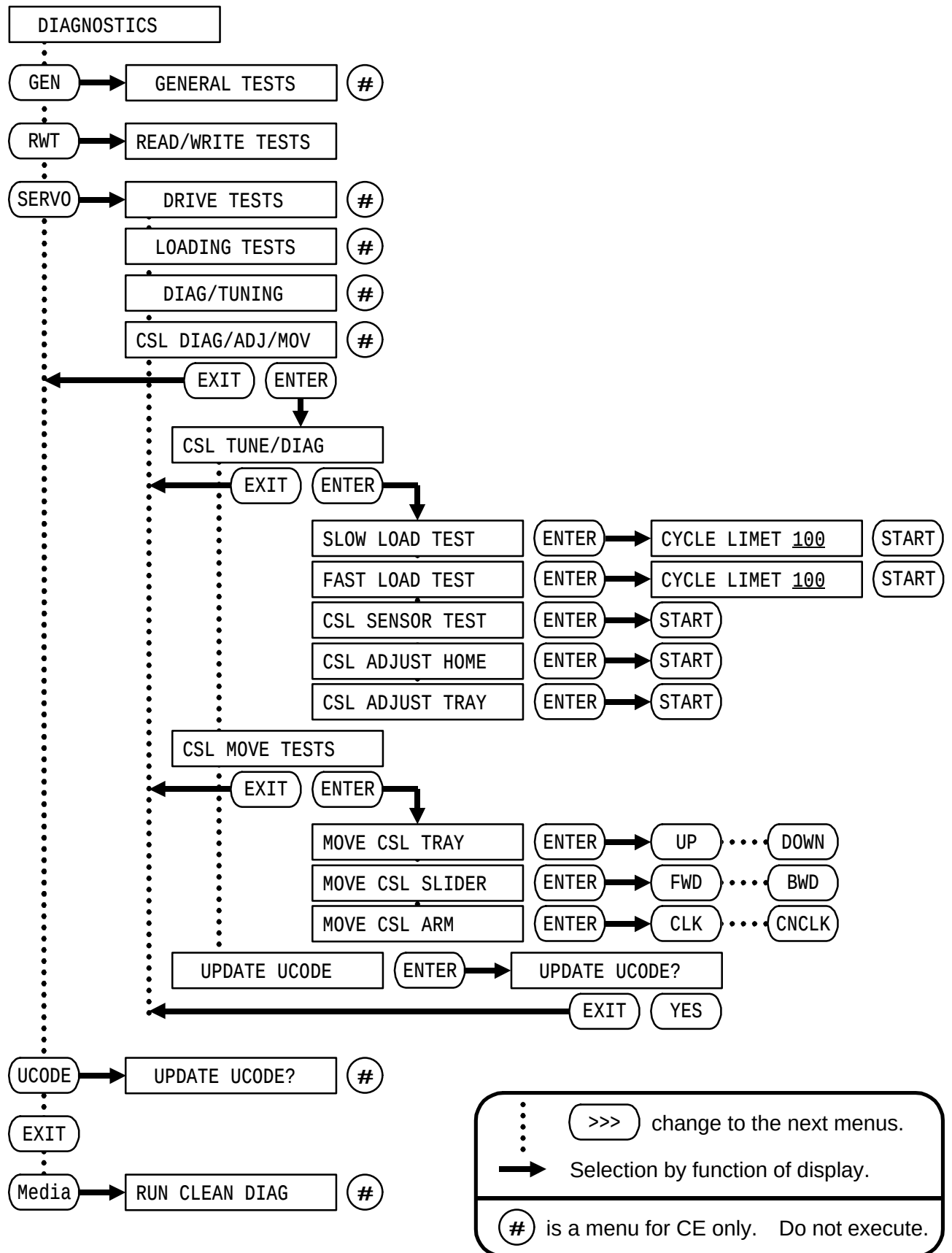
4.4.3 Structure of DIAGNOSTICS



4.4.4 Structure of STATISTICS



4.4.5 Structure of CSL DIAGNOSTICS [with CSL model]



4.5 Detail of the Setup Items

4.5.1 Setup Items for SCSI

Items	Setup Value	Description
SCSI ID	0 to 7	Target SCSI ID number.
	8 to 15	Target SCSI ID number. (Use for SCSI-3 = Wide SCSI.)
SCSI LUN	0	<i>Deleted.</i>
CSL LUN	0 to 7	Target LUN (logical unit number) for CSL. This LUN use for CSL system operation mode.
WIDE NEG	ENABL	Target enable the "Wide negotiations" by a initiator. Target can use the Wide SCSI (16bit bus).
	DSABL	Target always use the Narrow SCSI (8bit bus).
SYNC NEG	ENABL	Target enable the "Synchronous negotiations" by a initiator. Target can use the synchronous data transfer.
	DSABL	Target always use the asynchronous data transfer.
XFER TMOUT	DSABL	<i>Deleted.</i>
SAVE PNTR	ENABL	Target use the "Save data pointer message".
	DSABL	Target doesn't use the "Save data pointer message".
LD/RWD STAT	SCSI state during loading, unloading or rewinding.	
	OFLN	Target returns the "Check condition" status and "Sense key" of "Request sense" data is "Not ready".
	BUSY	Target returns the "Busy" status.
BUFER MODE	Buffer mode until changed by SCSI "Mode select" command.	
	Buff	Write commands return status after data is in buffer.
	off	Write commands return status after data is on tape.
	always	<i>Not supported.</i>
FMK SYNC	all	Write all buffer data to tape after receiving one "Write filemarks" command.
	2 seq	Write all buffer data to tape after receiving two sequential "Write filemarks" command.
	buff	Write all buffer contents to tape when the buffer is over the limits. Treat filemarks the same as buffered data.
DISC/RESEL	0	<i>Deleted.</i>

Items	Setup Value	Description
BOT PRE-RD	norm	The position is BOT at once after loading.
	rd 1	Read a first block and rewind to BOT, after loading.
WR RETRIES	0 to 25	Maximum number of retries to successfully write data. (5 by 5)
RD RETRIES	0 to 100	Maximum number of retries to successfully read data. (10 by 10)

4.5.2 Setup Items for DRIVE

Items	Setup Value	Description
COMPRESSION	ON	Default is compressed format.
	OFF	Default is uncompressed format.
COMP SWITCH	ON	Displays the “COMP” on the center Switch-Line of the display. The drive can be changed the recording format by the operation switch. (Refer to section 2.3.4.)
	OFF	Doesn't displays the “COMP” on the display. The drive can be changed the recording format by SCSI “Mode select” command.
	SHOW	Displays the “SHOW” instead of the “COMP” on the center Switch-Line of the display. Pressing the “SHOW” displays the current loaded tape format on the Status-Line.
TAPE PWR-ON	A tape (cartridge) if the drive is power-on with tape in the drive.	
	UNLD	A tape will be re-tensioned then unloaded.
	LOAD	A tape will be re-tensioned then loaded.
LANGUAGE	ENGL	Deleted.
EMULATION		Refer to section 4.5.3.
DEFALT CFG	Power-on setup values.	
	FLASH	The setup values are taken from flash ROM.
	ECHO	The setup values are set to ECHO default values.
MEDIA CLEAN	OFF	Not supported.

Items	Setup Value	Description
WRT ERR	Procedure after an unrecovered write error is detected.	
	norm rec	The drive will not continue to write.
	Leave er	The drive will continue to write. But errors left on the tape.
PERM RD ERR	Procedure after a permanent read error is detected.	
	norm	The drive will not continue to read.
	skip	The drive will skip over the bad record and continue to read.
ERSE W2 DID	Erase Wrap 2 before writing density ID in 36 track format.	
	norm	The drive will erase Wrap 2.
	dont	The drive will not erase Wrap 2.
RD AHEAD FMK	go	Read ahead records until an error is detected or buffer is full.
	stop	Read ahead records until a filemark is detected.

4.5.3 Emulation Mode

Set the emulation mode to match the host computer system. The emulation mode have effects on the “Inquiry”, “Mode Sense”, “Request Sense” or etc. commands of SCSI. Refer to the “Installation Note” for each host computer system.

Setup Value	Description
ECHO	Standard value. Vendor ID=“VDS”, Product ID=“MS-8400”. Connection under the Sun host computer system (Solaris).
STK	Emulation for the 18 track cartridge tape drive.
SUNlms	Emulation for the VDS model MS-4490 (1/2 inch cartridge tape drive). Connection under the Sun host computer system (Sun-OS 4.x).
FUJTS	Emulation for the 36 track cartridge tape drive.
VDSGS	Emulation for the VDS model GS-7000 (1/2 inch open reel tape drive). Vendor ID=“VDS”, Product ID=“GS-7000S”.
EXABT	Emulation for the 8mm DAT drive.
Kenedy	Emulation for the 1/2 inch open reel tape drive.
HP4280	Connection under the HP host computer system.
ODI	Emulation for the VDS model MS-5436 (1/2 inch cartridge tape drive).
LMS90E	Connection under the IBM host computer system.
9348	Connection under the IBM host computer system.
TELEX	Emulation for the 1/2 inch open reel tape drive.
IBMmag	Connection under the IBM host computer system.
88780	Emulation for the 1/2 inch open reel tape drive.
IBM90e	Connection under the IBM host computer system.
FJ2488	Emulation for the 36 track cartridge tape drive.
I/Osys	Special Specification.
FJ2483	Emulation for the 36 track cartridge tape drive.
TMSPC	Special Specification.
ST4280	Emulation for the 18 track cartridge tape drive.
JKLMS	Special Specification.

Chapter 5 TROUBLE SHOOTING

When a malfunction occurs in this drive, operate the drive based on the directions indicated in this chapter. When a problem cannot be solved or if there is some point that is unclear, contact the service department or the manufacturer.

5.1 Error Display

Electrical and mechanical errors can be detected by an internally equipped microprocessor. The error description can also be detected for the magnetic tape media.

When an error is detected, the ALERT indicator on the front operator panel lights and an error message or an error code are displayed on the display Status-Line. The error code is displayed as 4 decimal digits from the right side of the Status-Line.

CAUTION

The drive may not operate correctly if the setup for this drive is not executed correctly. The error code is not displayed at this time. Execute the setup operation so the drive corresponds to the host computer system that is connected. (Refer to section 4.2.)

An error code is also not displayed when there is a problem with the SCSI cables or SCSI terminators connected to the drive. Check the SCSI bus system. (Refer to section 4.1.)

5.2 Countermeasures

This section (5.2) is almost the same as the contents of the "User Manual". The next section (5.3) provides a description of the error codes and the corresponding processing operations, such as the contents of the "Maintenance Manual".

When an error occurs, first make a note of the error code. Next, refer to the error code and execute the appropriate countermeasure operations.

5.2.1 Error Code Summary

The main error descriptions are shown in Table 5-1 and the error processing procedures are shown in Table 5-2.

The procedures to eliminate an error are shown below.

- 1) The error is eliminated if the rewind or unload operations are executed.

If the error cannot be eliminated, execute the following procedures.

- 2) Unload the cartridge. When the unload operation cannot be executed, turn off the power one time.
- 3) When turning the power on again, wait more than 10 seconds.

CAUTION

Consult the system manager when turning off the power to the drive.
There is a possibility of damaging the applications of the host computer system that is connected.

Table 5-1 4 digit Error Codes

Error Code	Error Description	Processing
1018	Cannot write to write protected cartridge.	Unload the cartridge.
1026	Cannot write to an extended cartridge.	Operations B, E, C, G.
1xxx	A command from the host computer system could not be executed.	Operations B, F, D, G.
2xxx 4xxx	The control circuit board detected an error.	Operations C, D, F, G.
3003 3004	A cartridge was read that contained no data.	Rewind the cartridge.
3107	The number of tracks is different than the specifications.	Rewind the cartridge.
	An unrecognized cartridge was read.	Operations A, B, C, G.
3xxx	Position of the tape was read which did not contain recorded data.	Rewind the cartridge.
	A write operation to the tape or a read operation from the tape could not be executed.	Operations A, B, C, G.
5xxx	A failure occurred in a load operation.	Operations E, B, C, G.
	A failure occurred in an unload operation.	
	The servo circuit board detected an error.	
	The CSL circuit board detected an error. (This circuit board is installed in the CSL model.	
Others	Something may be damaged.	Operations E, C, D, G.

Marks: "xxx" as the numeric value of an optional 3 digits.

5.2.2 Error Processing Summary

The countermeasures (operations A to G) for each type of error are shown in table 5-2. When the countermeasures are specified a multiple number of times, execute these operations in the specified sequence. If the error is eliminated, it is not necessary to execute the remaining countermeasures.

Table 5-2 Error Processing

Error Processing	Countermeasure
A	Use a cleaning cartridge and clean the tape head and tape path. (Refer to section 3.1.)
B	Replace the other cartridges. The following conditions may apply to these cartridges. 1) The number of tracks differs from the drive specifications. (Read operations) 2) The tape length differs from the drive specifications. 3) An unrecognized cartridge is loaded. (Read operations) 4) The tape may be used out of the range of required operation temperature. 5) Logical damage has occurred to the tape such as write operation residue. 6) Physical damage such as a crack is present on the tape.
C	Turn the power off one time. Wait at least 10 seconds before turning the power back on again.
D	Turn the power off and check the SCSI bus connections. Wait at least 10 seconds before turning the power back on again.
E	Make sure that there are no abnormalities in the cartridge. The following conditions may apply to these cartridges. 1) The cartridge insertion direction may be reversed. 2) The leader block is open. 3) There is a problem in the cartridge label. 4) Refer to section 2.1 for a description of other problems.
F	Check the setting values for the setup. (Refer to section 4.2.)
G	It is possible that the drive is damaged. (Refer to section 5.3.)

5.3 Error Code and Processing

The sections which follow this section (5.3) describe the details of the error codes, error descriptions and countermeasures.

When an error occurs, first make a note of the error code. Next, refer to the error code and execute the appropriate countermeasure operations.

5.3.1 Error Code Determination

The error code determination is described below. Error code number 1018 is used in this example.

Error code	Error display	Error description for the error display.
↓	↓	↓
1018	WRT PROTECT 1018	File protected

Description: A write operation cannot be executed to the tape because the write protect selector is set to the write protect position.

	Possibility	Countermeasure	Ref.
1	The write protect selector of the cartridge is set to the write protect (file protect) position.	Set the write protect selector of the cartridge to the write enable position.	Figure 2-1

The cause of the error is described in the highest order of probability. Check the sequence starting from number one.

This describes the countermeasures.

This describes the section number and figure number when the countermeasure is executed for reference.

This describes the error contents of the error group described above. Even if the various error codes differ, the error descriptions are combined and explained at the same time.

CAUTION

The error codes are arranged in numeric sequence but part of the error code may be explained in previous or later sections.

5.3.2 Jump Guide

Observe the following precautions, refer to the jump guide in Table 5-3 and execute the error processing.

CAUTION

Consult the system manager when turning off the power to the drive. There is a possibility of damaging the applications of the host computer system that is connected. Wait at least 10 seconds before turning the power back on again.

**WARNING!**

Always turn off the power before removing the cover of the drive. Never touch the inside of the drive when turning the power on. Even when the power has been turned off, do not touch the area surrounding the power supply unit and the tape head.

Table 5-3 Error Code Jump Guide

Error Code	Description	Refer to Section Number
1xxx 2xxx	The control circuit board (control function block) detected an error.	Section 5.4
3xxx 4xxx	The control circuit board (formatter function block) detected an error.	Section 5.5
5xxx	The servo circuit board detected an error.	Sections 5.7 or 6.3 to 6.5
	A failure occurred in the load or unload operations.	
555x 559x	The Servo circuit board detected an error. [without CSL model]	Section 5.8
	The CSL circuit board detected an error. [with CSL model]	Sections 5.8 or 6.6 to 6.7
	A failure occurred in the load or unload operations. [with CSL mode]	
B0xx EExx	The SCSI circuit board detected an error.	Section 5.6
The display malfunctions	A malfunction occurred in the control circuit board or the operator panel.	Section 5.9
xxxx	Any type of error can be produced when the mother board and power supply unit are damaged.	Section 5.9

Marks: “x” as the numeric value (hexadecimal) of an optional 1 digits.

5.4 Control Circuit Board (Control Function Block) Errors

5.4.1 Error Codes (10xx)

1002	MUST UNLOAD 1002	NOT_UNLOADED
------	------------------	--------------

Description: The self-diagnostics mode cannot be executed because the cartridge is not unloaded.

	Possibility	Countermeasure	Ref.
1	The cartridge is not unloaded.	Unload the cartridge from the operator panel.	Section 2.5

1004	WRT/RD SEQ 1004	READF_AFTER_WRITE_SEQUENCE
------	-----------------	----------------------------

Description: The next data block (where data is unwritten) is read immediately after the write operation was executed.

	Possibility	Countermeasure	Ref.
1	The SCSI command sequence is not correct.	Check for a problem in your program on the host computer.	
2	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
3	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
4	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
5	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

1006	UNSUP CMD 1006	HOST_UNSUPPORTED_CMD
------	----------------	----------------------

Description: This drive does not support the following SCSI commands.

	Possibility	Countermeasure	Ref.
1	The drive setup is not correct.	Correct the setup.	Section 4.2
2	This SCSI command is out of specifications.	Check for a problem in your program on the host computer.	

3	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
4	The SCSI driver circuit board is damaged	Replace this circuit board.	Section 7.3.3
5	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
6	The control circuit board is damaged	Replace this circuit board.	Section 7.3.7

1008	WRT TOO BIG 1008	HOST WRITE TOO BIG
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Description: The block length specified by the SCSI read and write commands is too long.

	Possibility	Countermeasure	Ref.
1	This SCSI command is out of specifications. (It exceeds a value that is returned by the Read Block Limits command.)	There is an error in your program on the host computer. (Reduce the block length.)	
2	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
3	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
4	The SCSI circuit board is damaged	Replace this circuit board.	Section 7.3.7

1012	NOT ONLINE 1012	PANEL NOT ONLINE
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Description: The on-line mode is not set.

	Possibility	Countermeasure	Ref.
1	The on-line mode is not set.	Set the on-line mode from the operator panel.	Section 2.3.3

1014	MUST LOAD 1014	NOT_LOADED
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Description: The self-diagnostics mode cannot be executed because the cartridge is not loaded.

	Possibility	Countermeasure	Ref.
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1	The cartridge is not loaded.	Load the cartridge.	Section 2.4
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1016	RD REV COMP 1016	CANT_RD_REV_COMP_RECS
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Description: The reverse read operation (tape read in the reverse direction) cannot be executed because the data is compressed.

	Possibility	Countermeasure	Ref.
1	This SCSI command is out of specifications,	Check for a problem in your program on the host computer.	
2	A reverse read is executed on a compressed data.	Create the tape again without data compression.	Section 2.3.4
3	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
4	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
5	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
6	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7

1018	WRT PROTECT 1018	FILE_PROTECTED
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Description: A write operation cannot be executed to the tape because the write protect selector of the cartridge is set to the write protect position.

	Possibility	Countermeasure	Ref.
1	The write protect selector of the cartridge is set to the write protect position.	Set the write protect selector of the cartridge to the write enable position.	Figure 2-1
2	The write protect detection switch in the drive is damaged.	Replace the drive.	Section 7.3.4
3	The cable that connects the write protect detection switch and the mother circuit board in the drive is disconnected or damaged.	Replace the drive.	Section 7.3.4
4	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
6	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
7	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
8	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7

1022	36/18 MIX 1022	CANT WRT 36 ON 18 MUST REWIND
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Description: A write append cannot be executed with 36 tracks on a tape that was written in 18 tracks.

	Possibility	Countermeasure	Ref.
1	A write append is executed with 36 tracks on a tape that was written in 18 tracks.	A write append must be executed with 36 track drive for 36 track tape and with 18 track drive for 18 track tape.	
2	A write operation is executed without rewinding to tape written in 18 tracks.	Check for a problem in your program on the host computer such as a write operation executed after a rewind.	
3	The analog read circuit board or the digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
4	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
5	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
6	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
7	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7

1024	BAD CFG PRM 1024	CONFIGURE COMMAND BAD PARAMETER
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Description: A malfunction occurs during communication between the internal

microprocessors (SCSI - Control).

	Possibility	Countermeasure	Ref.
1	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
2	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

1026	18Thin Tape 1026	CANT_WRT_18_ON_THIN_TAPE
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Description: A write operation cannot be executed to an extended cartridge on 18 track drive.

	Possibility	Countermeasure	Ref.
1	A write operation cannot be executed to an extended cartridge on 18 track drive.	Use a standard length cartridge (165m).	Section 2.1
2	The tape length is out of specifications.	Use a cartridge that is a standard product.	Section 2.1
3	The tape in the cartridge is loose.	Use a new cartridge.	
4	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
5	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4
6	The cable that connects the motor described above and the mother circuit board is disconnected or damaged.	Replace the drive.	Section 7.3.4
7	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

1028	Short Tape 1028	CANT_WRT_SHORT_TAPE
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Description: The tape length is shorter than the standard.

	Possibility	Countermeasure	Ref.
1	The tape length is shorter than the standard.	Use a cartridge that is a standard product.	Section 2.1
2	Cut the leading edge of the tape and attach a leader block, then use the tape.	Only change the leader block one time.	Section 3.2

3	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
4	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4
5	The cable that connects the motor described above and the mother circuit board is disconnected or damaged.	Replace the drive.	Section 7.3.4
6	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

1029	36 track	1029	CANT_READ_36_ON_18
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Description: A read operation cannot be executed on 18 track drive to the tape that was written on 36 track.

	Possibility	Countermeasure	Ref.
1	A tape that was written in a 36 track is read on an 18 track drive.	Read a 36 track tape on a 36 track drive	
2	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
3	The analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
4	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

1050		LOADED_AND_UNLOADED_CLEANING
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Description: The cleaning operations are completed by the cleaning cartridge.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5.4.2 Error Codes (11xx)

1102	PEOT HIT	1102	PEOT_ENCOUNTERED
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Description: The tape position reached the physical end of the tape (PEOT).

	Possibility	Countermeasure	Ref.
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1	A mandatory stop is executed at the physical EOT in order to ignore the logical EOT when a write operation is executed.	There is a problem in your program on the host computer system. (verify EOM of SCSI)	
2	A forced stop is executed to read a tape which has completed the write operation as far as the physical EOT.	Create the tape again to complete the writing as far as the logical EOT position	
3	Numerous write retry operations occur. The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirt.	Section 3.1
4	Numerous write retry operations occur. The tape media is damaged.	Use a new cartridge and execute the write operation again.	
5	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
6	The analog write circuit board, analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
7	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
8	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
9	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
10	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
11	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7

1104	BOT HIT	1104	BOT_ENCOUNTERED
1106	LEOT HIT	1106	LEOT_ENCOUNTERED
1108	FMK HIT	1108	FMK_ENCOUNTERED

Description: An unexpected internal status is generated.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
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1112	END OF RECORDING	EOD_ENCOUNTERED
1112	END OF ALL DATA	EOD_ENCOUNTERED ##

Description: A read is executed behind the End of Data (EOD).

	Possibility	Countermeasure	Ref.
1	A read is executed to the data behind the end of data.	There is a problem in your program on the host computer.	
2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
4	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
5	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
6	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

1114	BF Bk ID er 1114	BUFF_BLOCK_ID_SEQUENCE_ERROR
1116	EX Bk ID er 1116	EXPECTED_BLOCK_ID_SEQUENCE_ERROR
1118	Explain in the next section.	
1120	RDB BLK ERR 1120	BUFF_BLOCK_ID_SEQUENCE_ERROR_RD_BACKWARD S

Description: The data block number (BLOCK ID) or the status is abnormal. A read or write error may have occurred.

	Possibility	Countermeasure	Ref.
1	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirt.	Section 3.1
2	Tape media damage is shown when a write operation is executed	Use a new cartridge and execute the write operation again.	

3	When a read operation is executed, the data is either corrupted or there is no valid data present.	Use a new cartridge and create a new data tape again.	
4	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
5	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
6	The analog write circuit board, analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
7	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
8	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4
9	The cable that connects the motor described above and the mother circuit board is disconnected or damaged.	Replace the drive.	Section 7.3.4

1118	POS EOD bkw 1118	EOD_ON_READ BACKWARD
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Description: When a reverse read (read in the reverse direction) is executed, the End of Data (EOD) is detected.

	Possibility	Countermeasure	Ref.
1	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirt.	Section 3.1
2	When a read operation is executed, the data is either corrupted or there is no valid data present.	Use a new cartridge and create a new data tape again.	
3	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
4	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
5	The analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
6	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
7	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4

8	The cable that connects the motor described above and the mother circuit board is disconnected or damaged.	Replace the drive.	Section 7.3.4
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1120	Already explained in the previous section.
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5.4.3 Error Codes (12xx to 18xx)

1200	H0ST DET ER 1200	HOST DETECTED ERROR
1202	H0ST STOP E 1202	HOST ERR STOP_ERASE

Description: Errors which are not to be displayed.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

1333	R BUF EMPTY 1333	BUF_EMPTY
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Description: There is no data transmitted to the host because the internal buffer is empty when a read operation is executed.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7

1355	W BUF FULL 1355	BUF_NO_ROOM
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Description: The data cannot be transmitted from the host because the internal buffer is full when a write operation is executed.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7

1366	BUF OVRFLOW 1366	BUF_OVERFLOW
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Description: There is no empty area in the internal buffer and part of the data is lost.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7

1400		BUF_RD_PATTERN
1502		BUF_WRT_SYNC
1504		BUF_RID_RD_AHEAD
1506		BUF_DIFF_RD_TYPE

Description: An error occurs in the internal buffer control.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

1602	P WR 349crc 1602	END_PHY_WRITE_IDRC_CRC_ERROR
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Description: A CRC error is detected in an internal buffer when a compressed write operation is executed.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7

1604	P WR 348crc 1604	END_PHY_WRITE_3480_CRC_ERROR
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Description: A CRC error is detected in an internal buffer when a non-compressed write operation is executed.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7

1606		MISCOMPARE_OF_LAST_PACKET
1608		MISCOMPARE_OF_M32_UNCOMP_COUNT
1610		UNKNOWN_PERM_RD_ERROR
1612		UNKNOWN_PERM_WRT_ERROR

Description: An error is detected in an internal buffer. A read or write error may have occurred.

	Possibility	Countermeasure	Ref.
1	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirt.	Section 3.1
2	Tape media damage is shown when a write operation is executed	Use a new cartridge and execute the write operation again.	
3	When a read operation is executed, the data is either corrupted or there is no valid data present.	Use a new cartridge and create a new data tape again.	
4	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
5	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
6	The analog write circuit board, analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
7	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
8	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4
9	The cable that connects the motor described above and the mother circuit board is disconnected or damaged.	Replace the drive.	Section 7.3.4

1702	FORM WC PAT 1702	FORM_WRT_BACK_CHECK_BAD_PATTERN
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Description: An error (Read echo-back error) is detected when a write operation is executed.

	Possibility	Countermeasure	Ref.
1	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirt.	Section 3.1

2	Tape media damage is shown when a write operation is executed	Use a new cartridge and execute the write operation again.	
3	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
4	The analog write circuit board, analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
5	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
6	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
7	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4
8	The cable that connects the motor described above and the mother circuit board is disconnected or damaged.	Replace the drive.	Section 7.3.4

1704	ADD EOD/FCR 1704	DONT_ADD EOD OR FCR IN_ADD_PHY_READ
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Description: Invalid data is detected in an internal buffer. A read or write error may have occurred.

	Possibility	Countermeasure	Ref.
1	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirt.	Section 3.1
2	Tape media damage is shown when a write operation is executed	Use a new cartridge and execute the write operation again.	
3	When a read operation is executed, the data is either corrupted or there is no valid data present.	Use a new cartridge and create a new data tape again.	
4	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
5	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
6	The analog write circuit board, analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7

7	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
8	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4
9	The cable that connects the motor described above and the mother circuit board is disconnected or damaged.	Replace the drive.	Section 7.3.4

1706	READB COMP 1706	LOG_START_OF_COMP_REV_READ
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Description: Compressed data which was read reverse (a read in the reverse direction) is detected in an internal buffer.

	Possibility	Countermeasure	Ref.
1	A reverse read operation is executed to a compressed data.	Create the tape again without using compression.	
2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

1708	WRT/BSB ERR 1708	REPOSITION_BSB_FAILURE
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Description: The data can not be recovered even though the write-retry operations are executed.

	Possibility	Countermeasure	Ref.
1	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirt.	Section 3.1
2	Tape media damage is shown when a write operation is executed	Use a new cartridge and execute the write operation again.	
3	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
4	The analog write circuit board, analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
5	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
6	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

7	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4
8	The cable that connects the motor described above and the mother circuit board is disconnected or damaged.	Replace the drive.	Section 7.3.4

1802	IDRC CNT 1 1802	IDRC_COUNT_1_ERROR
1804	IDRC CNT A 1804	IDRC_COUNT_A_ERROR
1806	IDRC CMP WR 1806	IDRC_COMP_WRT_CNT_A SCSI_CNT_ERR
1808	IDRC UCMP W 1808	IDRC_UNCOMP_WRT_CNT_2 SCSI_CNT_ERR
1810	IDRC Dcrc1 1810	IDRC_DCRC1_ERROR
1812	IDRC crc1 1812	IDRC_CRC1_ERROR
1814	IDRC ODD 1814	ODD_BYTES_COMP
1816	3480 CLOSE 1816	CLOSING_3480_ERROR
1820		IDRC_NO_SOFTWARE_DECODE
1820		IDRC_NO_SOFTWARE_DECODE ##

Description: An error is detected when a read or write operation is executed in data compression mode.

	Possibility	Countermeasure	Ref.
1	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirt.	Section 3.1
2	Tape media damage is shown when a write operation is executed	Use a new cartridge and execute the write operation again.	
3	When a read operation is executed, the data is either corrupted or there is no valid data present.	Use a new cartridge and create a new data tape again.	
4	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
5	The analog write circuit board, analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
6	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5.4.4 Error Codes (19xx)

1902	T0 SV0 cmd 1902	WAIT_ERR_TIMEOUT_SERVO_CMD_TAKEN
1904	T0 SV0 done 1904	WAIT_ERR_TIMEOUT_SERVO_DONE
1906	T0 SV0 loc 1906	WAIT_ERR_TIMEOUT_SERVO_LOC_SECTOR
1908	Explain in the next section.	
1910	CLEAN FAILED1910	WAIT_ERR_TIMEOUT_CLEAN_NEVER_FINISHED

Description: An error occurs during communication with the servo circuit board.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4
4	The cable that connects the motor described above and the mother circuit board is disconnected or damaged.	Replace the drive.	Section 7.3.4

1908	CSL LOAD FAILURE	WAIT_ERR_TIMEOUT_CSL_DIDNT_LOAD
1910	Already explained in the previous section.	
1920	CSL not RDY 1920	WAIT_ERR_TIMEOUT_CSL_READY

Description: An error occurs during communication with the CSL circuit board. [with CSL model]

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The CSL circuit board is damaged.	Replace the CSL.	Section 7.3.4
4	The cables that connect the CSL circuit board and drive are disconnected or damaged.	Replace the CSL.	Section 7.3.4

5.4.5 Error Codes (20xx)

2002	TO H READY 2002	WAIT_ERR_TIMEOUT_HOST_DATA_READY
2004	TO H COMPLT 2004	WAIT_ERR_TIMEOUT_HOST_DATA_COMPLETE
2006	TO Hwr DONE 2006	WAIT_ERR_TIMEOUT_HOST_WRT_DONE
2008	TO Hrd DONE 2008	WAIT_ERR_TIMEOUT_HOST_RD_DONE
2010	TO FREE FLG 2010	WAIT_ERR_TIMEOUT_HOST_FREE_FLAG
2012	TO RDY FLAG 2012	WAIT_ERR_TIMEOUT_HOST_READY_FLAG
2014	TO COUNT A 2014	WAIT_ERR_TIMEOUT_COUNT_A_DONE
2016	TO COUNT B 2016	WAIT_ERR_TIMEOUT_COUNT_B_DONE
2018	TO MSG_ACK 2018	WAIT_ERR_TIMEOUT_HOST_MSG_ACK

Description: An error occurs in the SCSI circuit board during communication with the host.

	Possibility	Countermeasure	Ref.
1	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
2	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
3	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
4	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2020	DIAG STOP 2020	DIAGNOSTIC_STOP_PRESSED
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Description: The self-diagnostics mode is interrupted from the operator panel.

	Possibility	Countermeasure	Ref.
1	The self-diagnostics mode is interrupted from the operator panel.	Execute the self-diagnostics mode from the operator panel one more time.	

2022	TO DIAG CMD 2022	WAIT_ERR_TIMEOUT_HOST_DIAG_CMD
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Description: An error occurs during communication with the SCSI circuit board when the self-diagnostics mode is executed.

	Possibility	Countermeasure	Ref.
1	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
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2024	T0 CSL LOAD 2024	WAIT_ERR_TIMEOUT_CSL_FREE_FLAG
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Description: An error occurs during communications with the CSL circuit board. [with CSL model]

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The CSL circuit board is damaged.	Replace the CSL.	Section 7.3.4
4	The cables that connect the CSL circuit board and the drive are disconnected or damaged.	Replace the CSL.	Section 7.3.4

2026	T0 BD EOP 2026	WAIT_ERR_TIMEOUT_BD_EOP
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Description: A time-out is detected during control of the internal buffer.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5.4.6 Error Codes (21xx to 22xx)

2102	T0 FORM TSK 2102	WAIT_ERR_TIMEOUT_FORM_TASK_DONE
2103	T0 FORM CMD 2103	WAIT_ERR_TIMEOUT_FORM_SEND_CMD

Description: An error occurs in transmission with the internal formatter. A read or write error may have occurred.

	Possibility	Countermeasure	Ref.
1	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirt.	Section 3.1

2	Tape media damage is shown when a write operation is executed	Use a new cartridge and execute the write operation again.	
3	When a read operation is executed, the data is either corrupted or there is no valid data present.	Use a new cartridge and create a new data tape again.	
4	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
5	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
6	The analog write circuit board, analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
7	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
8	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4
9	The cable that connects the motor described above and the mother circuit board is disconnected or damaged.	Replace the drive.	Section 7.3.4

2202	T0 FIF EMTY 2202	WAIT_ERR_TIMEOUT_FIFO_EMPTY
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Description: An error occurs during communication with the internal FIFO.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2204	T0 RD LOG 2204	WAIT_ERR_TIMEOUT_TST_RD_LOGICAL
2206	T0 WRT LOG 2206	WAIT_ERR_TIMEOUT_TST_WRT_LOGICAL

Description: A time-out is detected in the self-diagnostics mode including the tape update.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
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2208	T0 PHY REPO 2208	WAIT_ERR_TIMEOUT_FORM_PHY_POSITION
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Description: An error is detected in the internal buffer control.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2210	T0 SE PEOT 2210	WAIT_ERR_TIMEOUT_PEOT_DONE
2216	T0 SE PEOT 2216	WAIT_ERR_TIMEOUT_PEOT_FORM_ERR

Description: An error is detected in the final write processing (at PEOT).

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2212	T0 IDRC RDY 2212	WAIT_ERR_TIMEOUT_IDRC_READY
2214	T0 SOFT CRC 2214	WAIT_ERR_TIMEOUT_SOFT_IDRC_FIFO_FULL

Description: An error occurs in the internal compression buffer control.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2216	Already explained in the previous section.		
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2221		WAIT_ERR_TIMEOUT_FIFO_EMPTY_1
2222		WAIT_ERR_TIMEOUT_FIFO_EMPTY_2
2223		WAIT_ERR_TIMEOUT_FIFO_EMPTY_3
2224		WAIT_ERR_TIMEOUT_FIFO_EMPTY_4
2225		WAIT_ERR_TIMEOUT_FIFO_EMPTY_5
2226		WAIT_ERR_TIMEOUT_FIFO_EMPTY_6
2227		WAIT_ERR_TIMEOUT_FIFO_EMPTY_7

Description: An error occurs during communication with an internal FIFO.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2230		WAIT_ERR_TIMEOUT_FLAPPER_STALL
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Description: An error code is used by the drive with special specifications.

	Possibility	Countermeasure	Ref.
1	The specifications are different.	Check the specifications.	
2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2280	ER FP SWTCH 2280	BAD_FILE_PROTECT_SWITCH
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Description: A malfunction is detected in the write protect detection switch during operation.

	Possibility	Countermeasure	Ref.
1	The write protect selector of the cartridge is in an incorrect position.	Place the write protect selector of the cartridge in the correct position.	Figure 2-1
2	The write protect detection switch in the drive is damaged.	Replace the drive.	Section 7.3.4
3	The cable that connects the write protect detection switch and the mother circuit board in the drive is disconnected or damaged.	Replace the drive.	Section 7.3.4
4	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
5	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5.4.7 Error Codes (23xx to 24xx)

2302	STR WR BLK 2302	START_PHY_WRT_BLOCK_ID_SEQUENCE_ERROR
2304	WRT BLK ID 2304	WRT_BLOCK_ID_SEQUENCE_ERROR_POSITION_LOST

Description: The data block number (BLOCK ID) is abnormal. A write error may have occurred.

	Possibility	Countermeasure	Ref.
1	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirt.	Section 3.1
2	Tape media damage is shown when a write operation is executed	Use a new cartridge and execute the write operation again.	
3	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
4	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
5	The analog write circuit board, analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
6	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
7	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4
8	The cable that connects the motor described above and the mother circuit board is disconnected or damaged.	Replace the drive.	Section 7.3.4

2400	Cycle Power 2400	BAD_INTERRUPT
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Description: An unexpected internal interrupt occurs.

	Possibility	Countermeasure	Ref.
1	The AC power is operating abnormally.	Turn the power off. Check the AC power supply. Turn the power on again one more time.	Section 1.4.5
2	The power supply unit is damaged.	Replace the power supply block.	Section 7.3.4
		Replace the power supply unit. (For CSL model)	Section 7.3.9

3	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
4	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
5	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2444		SOFT_RESET_FAILED
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Description: A soft reset fails when it is attempted from the operator panel.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5.4.8 Error Codes (25xx to 26xx)

2502	P0 DRAM PS2 2502	CNTL_POWER_ON_ERR_DRAM_PASS2
2504	P0 DRAM PS3 2504	CNTL_POWER_ON_ERR_DRAM_PASS3

Description: An error is detected in internal RAM when the power is turned on.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2506	P0 SMR CHK 2506	CNTL_POWER_ON_ERR_SMR_CHEC
2508	Explain in the next section.	
2510	P0 SMR FORM 2510	FORM_POWER_ON_ERR_SMR_CHECK

Description: An error is detected in the internal interface when the power is turned on.

	Possibility	Countermeasure	Ref.
1	A failure occurs in a firmware update.	Replace the control circuit board.	Section 7.3.7

2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The mother circuit board connection is not correct.	Re-install the control circuit board, SCSI circuit board and servo circuit board.	Section 7.3.7
4	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4
5	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
6	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2508	P0 SMR SCSI 2508	SCSI_POWER_ON_ERR_SMR_CHECK
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Description: An error is detected in the internal interface when the power is turned on.

	Possibility	Countermeasure	Ref.
1	A failure occurs in a firmware update.	Replace the control circuit board.	Section 7.3.7
2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
4	The mother circuit board connection is not correct.	Re-install the control circuit board, SCSI circuit board and servo circuit board.	Section 7.3.7
5	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4
6	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2510	Already explained in the previous section	
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2512	P0 SMR SRV0 2512	SERVO_POWER_ON_ERR_SMR_CHECK
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Description: An error is detected in the internal interface when the power is turned on.

	Possibility	Countermeasure	Ref.
1	A failure occurs in a firmware update.	Replace the control circuit board.	Section 7.3.7

2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
4	The mother circuit board connection is not correct.	Re-install the control circuit board, SCSI circuit board and servo circuit board.	Section 7.3.7
5	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4
6	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2514	P0 SMR WRT 2514	CNTL_POWER_ON_ERR_SMR_WRT_CHECK
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Description: An error is detected in the internal interface when the power is turned on.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The mother circuit board connection is not correct.	Re-install the control circuit board, SCSI circuit board and servo circuit board.	Section 7.3.7
3	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4
4	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
5	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2602	XILINX INIT 2602	CNTL_POWER_ON_ERR_NO_XILINX_INIT
2604	XILINX DONE 2604	CNTL_POWER_ON_ERR_NO_XILINX_DONE

Description: An error is detected in an internal circuit (XILINX) initialization when the power is turned on.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2606	INTR TEST 2606	INTERRUPT_TEST_FAILED
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Description: An error is detected in an internal interruption test when the power is turned on.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The mother circuit board connection is not correct.	Re-install the control circuit board, SCSI circuit board and servo circuit board.	Section 7.3.7
3	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4
4	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
5	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2608	SCSI DEAD 2608	SCSI_PROC_NOT_RESPONDING
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Description: There is no response from the SCSI circuit board when the power is turned on.

	Possibility	Countermeasure	Ref.
1	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	A failure occurs in a firmware update.	Replace the control circuit board.	Section 7.3.7
3	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
4	The mother circuit board connection is not correct.	Re-install the control circuit board, SCSI circuit board and servo circuit board.	Section 7.3.7
5	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4

2610	SERVO DEAD 2610	SERVO_PROC_NOT_RESPONDING
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Description: There is no response from the servo circuit board when the power is turned on.

	Possibility	Countermeasure	Ref.
1	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2	A failure occurs in a firmware update.	Replace the control circuit board.	Section 7.3.7
3	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
4	The mother circuit board connection is not correct.	Re-install the control circuit board, SCSI circuit board and servo circuit board.	Section 7.3.7
5	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4

2612	FORM DEAD 2612	FORM_PROC_NOT_RESPONDING
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Description: There is no response from the formatter when the power is turned on.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	A failure occurs in a firmware update.	Replace the control circuit board.	Section 7.3.7

2614	FLASH 50000 2614	ERASING_FLASH_SMR_AREA_FAILED
2616	FLASH 50000 2616	SAVING_SMR_AREA_FAILED

Description: An error occurs in internal flash ROM when the power is turned on.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	A failure occurs in a firmware update.	Replace the control circuit board.	Section 7.3.7

2620	SERVO SEN 1 2620	SERVO_SENSE_1_FAILED
2622	SERVO SEN 2 2622	SERVO_SENSE_2_FAILED

Description: An error is detected in servo circuit board when the power is turned on.

	Possibility	Countermeasure	Ref.
1	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2624	FORM SMR VD 2624	FORM_SMR_VALID_FAILED
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Description: An error is detected in an internal interface when the power is turned on.

	Possibility	Countermeasure	Ref.
1	A failure occurs in a firmware update.	Replace the control circuit board.	Section 7.3.7
2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The mother circuit board connection is not correct.	Re-install the control circuit board, SCSI circuit board and servo circuit board.	Section 7.3.7
4	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4
5	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
6	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2626	SCSI SMR VD 2624	SCSI_SMR_VALID_FAILED
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Description: An error is detected in an internal interface when the power is turned on.

	Possibility	Countermeasure	Ref.
1	A failure occurs in a firmware update.	Replace the control circuit board.	Section 7.3.7
2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
4	The mother circuit board connection is not correct.	Re-install the control circuit board, SCSI circuit board and servo circuit board.	Section 7.3.7
5	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4
6	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2630		ERASING_CNTL_CODE_FAILED
2631		SAVING_CNTL_CODE_FAILED
2642		ERASING_FORM_CODE_FAILED

2643		SAVING_FORM_CODE_FAILED
2654		ERASING_SCSI_CODE_FAILED
2655		SAVING_SCSI_CODE_FAILED
2666		ERASING_SERV_CODE_FAILED
2667		SAVING_SERV_CODE_FAILED
2678		ERASING_XLNX_CODE_FAILED
2679		SAVING_XLXN_CODE_FAILED

Description: A failure occurs when a firmware update is executed using a debugger.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5.4.9 Error Codes (27xx to 2800)

2700	CNTL LENGTH 2700	CODE_UPLOAD_LENGTH_ERROR
2701	FORM LENGTH 2701	
2702	SCSI LENGTH 2702	
2703	SERV LENGTH 2703	
2710	CNTL CRC 2710	CODE_UPLOAD_CRC_ERROR
2711	FORM CRC 2711	
2712	SCSI CRC 2712	
2713	SERV0 CRC 2713	
2720	CNTL VALID 2720	CODE_UPLOAD_VALID_CHECK_ERROR
2721	FORM VALID 2721	
2722	SCSI VALID 2722	
2723	SERV0 VALID 2723	
2730		TAPE_DOES_NOT_HAVE_5_FILEMARKS
2740		ERROR_READING_HEADER_RECORD
2750		ERROR_READING_REVISION_RECORD
2760		ERROR_READING_LENGTH_AND_CRC_RECORD
2770		ERROR_READING_UCODE_RECORD
2780		DRAM_FAILED_VALIDATION_TEST
2791	CFG LENGTH 2791	CODE_CFG_LENGTH_ERROR
2792	CFG TMK 2792	CODE_CFG_MISSING_FMK_ERROR
2793	CFG VALID 2793	CODE_CFG_VALID_ERROR

Description: A failure occurs when a firmware update is executed using an update tape.

	Possibility	Countermeasure	Ref.
1	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirt.	Section 3.1
2	When a read operation is executed, the data is either corrupted or there is no valid data present.	Use a new cartridge and create a new data tape again.	
3	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
4	The analog write circuit board, analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
5	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
6	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
7	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2800	ER FP SWTCH 2280	BAD_FILE_PROTECT_SWITCH
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Description: An malfunction is detected in a write protect detection switch during operation.

	Possibility	Countermeasure	Ref.
1	The write protect selector of the cartridge is in an incorrect position.	Place the write protect selector of the cartridge in the correct position.	Figure 2-1
2	The write protect detection switch in the drive is damaged.	Replace the drive.	Section 7.3.4
3	The cable that connects the write protect detection switch and the mother circuit board in the drive is disconnected or damaged.	Replace the drive.	Section 7.3.4
4	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
5	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

[Notes]

5.5 Control Circuit Board (Formatter Function Block) Errors

5.5.1 Error Codes (30xx)

3001	RD NO IBG	3001	RD_ERR_NO_IBG_BLANK_TAPE_BIT_ON
3002	RD TIMEOUT	3002	RD_ERR_NADA_IBG_BLANK_RD_TIMEOUT
3003	RD NO DENS	3003	RD_ERR_NO_DENSITY_ID_TIMEOUT
3004	RD BLANK	3004	RD_ERR_NO_PAT_DATA_BLANK_TAPE_BIT_ON
3005	RD NO DATA	3005	RD_ERR_NADA_PAT_DATA_BLANK_RD_TIMEOUT
3006	RD NADA PAT	3006	RD_ERR_NADA_PAT_DATA_IN_1_0_MSEC

Description: A blank (no data) tape is read.

	Possibility	Countermeasure	Ref.
1	A blank (no data) tape is read.	Execute rewind operation	
2	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirty.	Section 3.1
3	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
4	The analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
5	The control circuit board is damaged.	Replace this circuit board	Section 7.3.7
6	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
7	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4
8	The cable that connects the motor described above and the motherboard is disconnected or damaged.	Replace the drive.	Section 7.3.4

3007	RD T00 IBG	3007	RD_ERR_TOO_MUCH_IBG
3008	RD FAR TMK	3008	RD_ERR_TMK_TOO_FAR_MISSING_REC

Description: An invalid IBG or filemark is detected when a read or write operation is executed.

	Possibility	Countermeasure	Ref.
1	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirty.	Section 3.1

2	Tape media damage is shown when a write operation is executed.	Use a new cartridge and execute the write operation again.	
3	When a read operation is executed, the data is either corrupted or there is no valid data present.	Use a new cartridge and create a new data tape again.	
4	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
5	The analog write circuit board, analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
6	The control circuit board is damaged.	Replace this circuit board	Section 7.3.7
7	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
8	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4
9	The cable that connects the motor described above and the motherboard is disconnected or damaged.	Replace the drive.	Section 7.3.4

3009	RD WRT CUR 3009	RD_ERR_WRT_CUR_ON_WHEN_READING
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Description: A malfunction is detected in a write circuit during a read operation.

	Possibility	Countermeasure	Ref.
1	The analog write circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The control circuit board is damaged.	Replace this circuit board	Section 7.3.7
3	The digital read circuit board is damaged.	Replace this circuit board.	Section 7.3.7
4	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
5	The analog read circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5.5.2 Error Codes (31xx to 34xx)

3101	RD NO EDM 3101	RD_ERR_MISSING_EDM_IBG_SEEN
3102	RD ECC UNC 3102	RD_ERR_ECC_UNCORRECTABLE
3104	RD NO IBG D 3104	RD_ERR_NO_IBG_AFTER_DATA
3105	RD NO IBG F 3105	RD_ERR_NO_IBG_AFTER_FMK
3106	RD NO IBG W 3106	RD_ERR_NO_IBG_AFTER_WRAP
3107	RD SPEC ID 3107	RD_ERR_BAD_FCR_OR_EOD_BLOCK_ID
3108	RD ERR FAKE 3108	RD_ERR_FAKE_ERROR
3109	RD NO IBG E 3109	RD_ERR_NO_IBG_AFTER_EG

Description: A format error is detected when a read or write operation is executed.

	Possibility	Countermeasure	Ref.
1	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirty.	Section 3.1
2	Tape media damage is shown when a write operation is executed.	Use a new cartridge and execute the write operation again.	
3	When a read operation is executed, the data is either corrupted or there is no valid data present.	Use a new cartridge and create a new data tape again.	
4	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
5	The analog write circuit board, analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
6	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

3111	RD BLK ID 3111	RD_ERR_3480_FWD_BLK_ID_NOT_IN_ORDER
3112	RD BLK ID 3112	RD_ERR_3480_BWD_BLK_ID_NOT_IN_ORDER
3113	RD BLK ID 3113	RD_ERR_3490_FWD_BLK_ID_NOT_IN_ORDER
3114	RD BLK ID 3114	RD_ERR_3490_BWD_BLK_ID_NOT_IN_ORDER
3116	RD BLK ID 3116	RD_ERR_3480_FWD_BLK_ID_OFF_BY_ONE
3117	RD BLK ID 3117	RD_ERR_3480_BWD_BLK_ID_OFF_BY_ONE
3118	RD BLK ID 3118	RD_ERR_3490_FWD_BLK_ID_OFF_BY_PACKET
3119	RD BLK ID 3119	RD_ERR_3490_BWD_BLK_ID_OFF_BY_PACKET
3199		RD_ERR_OK_SKIP_RD_ERRORS

Description: A position error is detected when a read or write operation is executed.

	Possibility	Countermeasure	Ref.
1	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirty.	Section 3.1
2	Tape media damage is shown when a write operation is executed.	Use a new cartridge and execute the write operation again.	
3	When a read operation is executed, the data is either corrupted or there is no valid data present.	Use a new cartridge and create a new data tape again.	
4	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
5	The analog write circuit board, analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
6	The control circuit board is damaged.	Replace this circuit board	Section 7.3.7
7	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
8	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4
9	The cable that connects the motor described above and the motherboard is disconnected or damaged.	Replace the drive.	Section 7.3.4

3202	RD DSK2 UNC 3202	RD_ERR_DESKW_UNCORRECTABLE
3203	RD DSKW CRC 3203	RD_ERR_DESKW_CRC
3204		RD_ERR_ISV_ERROR

Description: A data error is detected when a read or write operation is executed. (The deskew circuit is detected the error factor.)

	Possibility	Countermeasure	Ref.
1	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirty.	Section 3.1
2	Tape media damage is shown when a write operation is executed.	Use a new cartridge and execute the write operation again.	

3	When a read operation is executed, the data is either corrupted or there is no valid data present.	Use a new cartridge and create a new data tape again.	
4	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
5	The analog write circuit board, analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
6	The control circuit board is damaged.	Replace this circuit board	Section 7.3.7
7	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
8	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4
9	The cable that connects the motor described above and the motherboard is disconnected or damaged.	Replace the drive.	Section 7.3.4

3300	RD NO GAPIN 3300	RD_ERR_GAPIN_TIMEOUT
3301	RD STP GAPN 3301	RD_ERR_GAPIN_WAITING_STOPPED

Description: A position error is detected when a read or write operation is executed. In other cases, the read or write operations cannot be executed.

	Possibility	Countermeasure	Ref.
1	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirty.	Section 3.1
2	Tape media damage is shown when a write operation is executed.	Use a new cartridge and execute the write operation again.	
3	When a read operation is executed, the data is either corrupted or there is no valid data present.	Use a new cartridge and create a new data tape again.	
4	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
5	The analog write circuit board, analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7

6	The control circuit board is damaged.	Replace this circuit board	Section 7.3.7
7	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
8	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4
9	The cable that connects the motor described above and the motherboard is disconnected or damaged.	Replace the drive.	Section 7.3.4

34xx	RD PAT T0	34xx	RD_ERR_PATTERN_TIMEOUT
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Description: A pattern detection can not be executed and caused an error in a read or write operation.

	Possibility	Countermeasure	Ref.
1	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirty.	Section 3.1
2	Tape media damage is shown when a write operation is executed.	Use a new cartridge and execute the write operation again.	
3	When a read operation is executed, the data is either corrupted or there is no valid data present.	Use a new cartridge and create a new data tape again.	
4	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
5	The analog write circuit board, analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
6	The control circuit board is damaged.	Replace this circuit board	Section 7.3.7
7	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
8	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4
9	The cable that connects the motor described above and the motherboard is disconnected or damaged.	Replace the drive.	Section 7.3.4

5.5.3 Error Codes (35xx to 37xx)

3500	RDBK DEN ID 3500	RDBK_ERR_DENSITY_ID_ERR
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Description: A write error of density-ID is detected when a write operation is executed from BOT.

	Possibility	Countermeasure	Ref.
1	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirty.	Section 3.1
2	Tape media damage is shown when a write operation is executed	Use a new cartridge and execute the write operation again.	
3	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
4	The analog write circuit board, analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
5	The control circuit board is damaged.	Replace this circuit board	Section 7.3.7
6	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
7	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4
8	The cable that connects the motor described above and the motherboard is disconnected or damaged.	Replace the drive.	Section 7.3.4

3601	RDBK NO BDM 3601	RDBK_ERR_MISSING_BDM
3602	RDBK NO EOD 3602	RDBK_ERR_MISSING_EOD
3603	RDBK CRC ER 3603	RDBK_ERR_CRC_MATCH_ERR
3604	RDBK BLK ID 3604	RDBK_ERR_BLOCK_ID_NOT_REC_EOD_FCR
3605	RDBK Q FULL 3605	RDBK_ERR_QUEUE_FULL
3607	RDBK EG IBG 3607	RDBK_ERR_NO_TRAILING_IBG_ON_ERG
3608	RDBK EODibg 3608	RDBK_ERR_NO_TRAILING_IBG_ON_EOD
3609	RDBK WR CUR 3609	RDBK_ERR_NO_WRT_CUR_ON_WHEN_WRITING
3610	RDBK ID REC 3610	RDBK_ERR_BLOCK_ID_MATCH_ERR_REC
3611	RDBK ID FCR 3611	RDBK_ERR_BLOCK_ID_MATCH_ERR_FCR

3612	RDBK ID EOD 3612	RDBK_ERR_BLOCK_ID_MATCH_ERR_EOD
3613	RDBK SM IBG 3613	RDBK_ERR_LEADING_IBG_TOO_SHORT
3614	RDBK FAKE 3614	RDBK_ERR_FAKE_ERROR
3616	RDBK 10 IBG 3616	RDBK_ERR_10_PERCENT_IBG_TIMEOUT
3617	RDBK WRAP 3617	RDBK_ERR_WRAP_PATTERN
3618		RDBK_ERR_NO_TRAILING_IBG_ON_WRAP4

Description: An error (read echo-back error) is detected when a write operation is executed.

	Possibility	Countermeasure	Ref.
1	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirty.	Section 3.1
2	Tape media damage is shown when a write operation is executed.	Use a new cartridge and execute the write operation again.	
3	When a read operation is executed, the data is either corrupted or there is no valid data present.	Use a new cartridge and create a new data tape again.	
4	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
5	The analog write circuit board, analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
6	The control circuit board is damaged.	Replace this circuit board	Section 7.3.7
7	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
8	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4
9	The cable that connects the motor described above and the motherboard is disconnected or damaged.	Replace the drive.	Section 7.3.4

3700	RDBK T IBG 3700	RDBK_ERR_NO_TRAILING_IBG_GAPOUT_SENT
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Description: A position error is detected when a read or write operation is executed.

	Possibility	Countermeasure	Ref.
1	The tape head and tape path are dirty.	Use a cleaning cartridge to clean off the dirty.	Section 3.1

2	Tape media damage is shown when a write operation is executed.	Use a new cartridge and execute the write operation again.	
3	When a read operation is executed, the data is either corrupted or there is no valid data present.	Use a new cartridge and create a new data tape again.	
4	The tape head or the head cable is damaged.	Replace these parts as necessary.	Section 7.3.6
5	The analog write circuit board, analog read circuit board or digital read circuit board is damaged.	Replace these circuit boards as necessary.	Section 7.3.7
6	The control circuit board is damaged.	Replace this circuit board	Section 7.3.7
7	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
8	Either the take-up reel motor or the supply reel motor is damaged.	Replace the drive.	Section 7.3.4
9	The cable that connects the motor described above and the motherboard is disconnected or damaged.	Replace the drive.	Section 7.3.4

5.5.4 Error Codes (4xxx)

4001	LWR ILLIGAL 4001	LWR_ERR_WF_FAILED_ILLEG_CMDS
4100	LWR TONES 4100	LWR_ERR_TONES_FAILED
4200	LWR ONES 4200	LWR_ERR_ONES_FAILED
4301	LWR DSKW CT 4301	LWR_ERR_DESKEW_CNTRS_NOT_ZERO
4302	LWR NO WIRQ 4302	LWR_ERR_NO_WF_WIRQ_TIMEOUT
4303	LWR NO BDM 4303	LWR_ERR_NO_BDM_TIMEOUT
4304	LWR NO RIRQ 4304	LWR_ERR_NO_RF_RIRQ_TIMEOUT
4305	LWR NO IBG 4305	LWR_ERR_NO_IBG_AFTER_DATA

Description: An error is detected in the loop test in the self-diagnostics mode.

	Possibility	Countermeasure	Ref.
1	The digital read circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2	The control circuit board is damaged.	Replace this circuit board	Section 7.3.7
3	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
4	The motherboard is damaged.	Replace the drive.	Section 7.3.4

4401	WIRQ REJECT 4401	WRT_ERR_CMD_REJ
4402	WIRQ LATE 4402	WRT_ERR_CMD_LATE
4403	WIRQ CRC 4403	WRT_ERR_CRC_ERR

Description: An error is detected during the execution of the write command.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board	Section 7.3.7
2	The digital read circuit board is damaged.	Replace this circuit board.	Section 7.3.7

4500	PWRON MEM 4500	POWER_ON_ERR_MEMORY_TEST
4501	PWRON MEM 4501	POWER_ON_ERR_MEMORY_CHECK

Description An error is detected in the internal RAM when the power is turned on.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board	Section 7.3.7

4510	PWRON XLNX 4510	POWER_ON_ERR_NO_XILINX_INIT
4511	PWRON XLNX 4511	POWER_ON_ERR_NO_XILINX_DONE

Description: An error is detected in the initialization of the internal circuit (XILINX) when the power is turned on.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board	Section 7.3.7

4600	COMM UNKN 4600	CNTL_ERR_UNKNOWN_CMD
4601	CNTL LWR IL 4601	CNTL_ERR_ILLEGAL_LWR_CMD
4602	CNTL CFG IL 4602	CNTL_ERR_ILLEGAL_CFG_CMD

Description: An error occurs during communication with internal control.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board	Section 7.3.7
2	A failure occurs in a firmware update.	Replace the control circuit board.	Section 7.3.7

5.6 SCSI Circuit Board Errors

Refer to a SCSI specification book such as ANSI for a description of the vocabulary used in this section.

The SPC (SCSI-Protocol-Chip) means a SCSI control LSI.

5.6.1 Error Codes (B0xx)

B000		OLD_SPC_VERSION
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Description: Transmission of block length larger than 64K bytes cannot be executed because the SPC version is old.

	Possibility	Countermeasure	Ref.
1	The SPC version is old.	Replace the SCSI circuit board.	Section 7.3.7
2	This SCSI command is out of specifications. (It exceeded the value returned by the Read Block Limits command.)	Decrease the block length to solve the problems of your program on the host	

5.6.2 Error Codes (EEE0 to EEED)

EEE3		MSGIDE_RCVD_IN_DIN ##
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Description: A initiator detected error messages is detected during a read data transmission (DIN).

	Possibility	Countermeasure	Ref.
1	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
2	Other SCSI drive is reset or turned power on.	There is a problem in an application on the host side.	
3	There is an error in the setup of the drive.	Correct the setup of the drive.	Section 4.2
4	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3

5	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
6	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
7	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4

EEE4		WAIT_WAIT_READ_DATA_XFR_TMOERR_IN_DOUT ##
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Description: A time-out is detected during a read data transmission (DIN).

	Possibility	Countermeasure	Ref.
1	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
2	Other SCSI drive is reset or turned power on.	There is a problem in an application on the host side.	
3	There is an error in the setup of the drive.	Correct the setup of the drive.	Section 4.2
4	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
5	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
6	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

EEE5		FIFO_PARITY_ERROR_IN_DIN ##
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Description: A parity error in the data from the control circuit board is detected during a data transmission (DIN).

	Possibility	Countermeasure	Ref.
1	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4

4	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
5	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3

EEE6		FAS_RESET_IN_DOUT
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Description: A forced reset is executed to the SPC because the operation hangs up during a data transmission (DOUT).

	Possibility	Countermeasure	Ref.
1	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
2	Other SCSI drive is reset or turned power on.	There is a problem in an application on the host side.	
3	There is an error in the setup of the drive.	Correct the setup of the drive.	Section 4.2
4	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
5	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
6	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

EEE7		FAS_RESET_IN_DIN
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Description: A forced reset is executed to the SPC because the operation hangs up during a data transmission (DIN)

	Possibility	Countermeasure	Ref.
1	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
2	Other SCSI drive is reset or turned power on.	There is a problem in an application on the host side.	
3	There is an error in the setup of the drive.	Correct the setup of the drive.	Section 4.2

4	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
5	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
6	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

EEE8		WAIT_CNTL_RSP_IN_SCRESET_TMOERR
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Description: A communication failure with the control circuit board occurs after a receiving a reset signal on the SCSI bus.

	Possibility	Countermeasure	Ref.
1	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
2	Other SCSI drive is reset or turned power on.	There is a problem in an application on the host side.	
3	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
4	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
5	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

EEE9		WAIT_BUFF_DATA_READY_AFT_OK_TMOERR
EEEE		WAIT_FIFO_EMPTY_TMOERR

Description: The transmission is not completed during an internal data transmission.

	Possibility	Countermeasure	Ref.
1	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3

EEEE		WAIT_CNTL_RSP_TMOERR
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Description: A command is not completed during communication with the control circuit board.

	Possibility	Countermeasure	Ref.
1	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

EEEC		BUFF_ERROR_RECEIVED_IN_DIN
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Description: A data buffer error is detected during a data transmission (DIN).

	Possibility	Countermeasure	Ref.
1	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3

EEED		BUFF_ERROR_RECEIVED_IN_DOUT
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Description: A data buffer error is detected during a data transmission (DOUT).

	Possibility	Countermeasure	Ref.
1	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3

5.6.3 Error Codes (EEEE to EE5)

EEEE		FASINT_TMOERR_IN_DIN
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Description: An interrupt is not asserted from the SPC during a data transmission (DIN).

	Possibility	Countermeasure	Ref.
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1	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
3	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

EEEF		UKNMSG_RCVD_IN_DIN
EEF0		MSGREJ_RCVD_IN_DIN

Description: An unexpected message is received during a read data transmission (DIN).

	Possibility	Countermeasure	Ref.
1	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
2	There is an error in the setup of the drive.	Correct the setup of the drive.	Section 4.2
3	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
4	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
5	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

EEF1		SCSI_PERR_IN_DIN
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Description: A parity error in the SCSI bus is detected during a read data transmission (DIN).

	Possibility	Countermeasure	Ref.
1	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
2	Other SCSI drive is reset or turned power on.	There is a problem in an application on the host side.	
3	There is an error in the setup of the drive.	Correct the setup of the drive.	Section 4.2
4	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3

5	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
6	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

EEF2		WAIT_BUFF_CMPLT_TMOERR_IN_DIN
EEF3		WAIT_BUFF_ERROR_TMOERR_IN_DIN

Description: The transmission is not completed during a data transmission (DIN).

	Possibility	Countermeasure	Ref.
1	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
2	Other SCSI drive is reset or turned power on.	There is a problem in an application on the host side.	
3	There is an error in the setup of the drive.	Correct the setup of the drive.	Section 4.2
4	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
5	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
6	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

EEF4		WAIT_DIAG_RSP_TMOERR
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Description: A time-out is detected during a self-diagnostics operation.

	Possibility	Countermeasure	Ref.
1	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3

EEF5		DIAG_BUFF_DATA_READY_TMOERR
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Description: A buffer can not be used during a self-diagnostics operation.

	Possibility	Countermeasure	Ref.
1	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3

5.6.4 Error Codes (EEF6 to EEFF)

EEF6		FASINT_TMOERR_IN_DOUT
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Description: An interrupt is not asserted from the SPC during a data transmission (DOUT).

	Possibility	Countermeasure	Ref.
1	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
3	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

EEF7		UKNMSG_RCVD_IN_DOUT
EEF8		MSGREJ_RCVD_IN_DOUT

Description: An unexpected message is received during a write data transmission (DOUT).

	Possibility	Countermeasure	Ref.
1	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
2	There is an error in the setup of the drive.	Correct the setup of the drive.	Section 4.2
3	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
4	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
5	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

EEF9		SCSI_PERR_IN_DOUT
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Description: A parity error in the SCSI bus is detected during a write data transmission (DOUT).

	Possibility	Countermeasure	Ref.
1	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
2	Other SCSI drive is reset or turned power on.	There is a problem in an application on the host side.	
3	There is an error in the setup of the drive.	Correct the setup of the drive.	Section 4.2
4	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
5	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
6	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

EEFA		WAIT_BUFF_CMPLT_TMOERR_IN_DOUT
EEFB		WAIT_BUFF_ERROR_TMOERR_IN_DOUT

Description: A time-out is detected during a data transmission (DOUT).

	Possibility	Countermeasure	Ref.
1	The SCSI command corrupted. The SCSI cable is too long or the SCSI connector contact is loose.	Check the SCSI cable and terminator.	Section 4.1
2	Other SCSI drive is reset or turned power on.	There is a problem in an application on the host side.	
3	There is an error in the setup of the drive.	Correct the setup of the drive.	Section 4.2
4	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3
5	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
6	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

EEFC		WAIT_FASFIFO_EMPTY_TMOERR
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Description: The internal FIFO cannot be cleared.

	Possibility	Countermeasure	Ref.
1	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3

EEFD		WAIT_FASINT_TMOERR
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Description: An interrupt is not asserted from the SPC.

	Possibility	Countermeasure	Ref.
1	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The SCSI driver circuit board is damaged.	Replace this circuit board.	Section 7.3.3

EEFE		RSPACT_CHK_TMOERR
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Description: The command completion status is not received correctly during communication with the control circuit board.

	Possibility	Countermeasure	Ref.
1	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

EEFF		CMD_TAKEN_TMOERR
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Description: The Control can not receive commands during communication with the control circuit board.

	Possibility	Countermeasure	Ref.
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1	The SCSI circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5.7 Servo Circuit Board Errors

5.7.1 Error Codes (550x)

5501	SV0 RAD SML 5501	SERVO_RADIUS_TOO_SMALL
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Description: The tape radius in the cartridge is too small.

	Possibility	Countermeasure	Ref.
1	The inserted cartridge is different than the standard length cartridge.	Use a standard length cartridge.	Section 2.1
2	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	Either the reel motor or the cable that connects the motor and the mother circuit board is damaged.	Replace the drive.	Section 7.3.4

5502	SV0 RAD LRG 5502	SERVO_RADIUS_TOO_LARGE
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Description: The tape radius in the cartridge is too large.

	Possibility	Countermeasure	Ref.
1	The inserted cartridge is different than the standard length cartridge.	Use a standard length cartridge.	Section 2.1
2	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	Either the reel motor or the cable that connects the motor and the mother circuit board is damaged.	Replace the drive.	Section 7.3.4

5503	SV0 NO EOT 5503	SERVO_NOT_FIND_EOT
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Description: The EOT can not be found on the tape.

	Possibility	Countermeasure	Ref.
1	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	Either the reel motor or the cable that connects the motor and the mother circuit board is damaged.	Replace the drive.	Section 7.3.4

5.7.2 Error Codes (554x to 5550)

5540	SV0 int ram 5540	SERVO_INTERNAL_RAM_ERROR
5541	SV0 loc ram 5541	SERVO_LOCAL_RAM_ERROR

Description: The RAM on the servo circuit board is abnormal.

	Possibility	Countermeasure	Ref.
1	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5542	SV0 NOV ram 5542	SERVO_NOV_RAM_ERROR
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Description: The NOV RAM on the servo circuit board is abnormal.

	Possibility	Countermeasure	Ref.
1	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5543	SV0 DWNL D 5543	SERVO_DOWN_LOAD_ERROR
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Description: The program cannot be downloaded to the servo local RAM.

	Possibility	Countermeasure	Ref.
1	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5544	SV0 VOLT 24 5544	SERVO_ABNORMAL_VOLTAGE_24
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Description: A power voltage of +24V is abnormal.

	Possibility	Countermeasure	Ref.
1	The power supply unit is damaged.	Replace the power supply block.	Section 7.3.4
		Replace the power supply unit. (For CSL model)	Section 7.3.9
2	The cable of the +24V is damaged.	Replace the drive.	Section 7.3.4

3	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
4	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4

5545	SV0 VOLT 12 5545	SERVO_ABNORMAL_VOLTAGE_12
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Description: A power voltage of +12V is abnormal.

	Possibility	Countermeasure	Ref.
1	The regulator IC of the 12V power supply of the mother circuit board or the cable is damaged.	Replace the drive.	Section 7.3.4
2	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The power supply unit is damaged.	Replace the power supply block.	Section 7.3.4
		Replace the power supply unit. (For CSL model)	Section 7.3.9

5546	SV0 VOLT m5 5546	SERVO_ABNORMAL_VOLTAGE_m5
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Description: A power voltage of -5V is abnormal.

	Possibility	Countermeasure	Ref.
1	The regulator IC of the -5V power supply of the mother circuit board or the cable is damaged.	Replace the drive.	Section 7.3.4
2	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The power supply unit is damaged.	Replace the power supply block.	Section 7.3.4
		Replace the power supply unit. (For CSL model)	Section 7.3.9

5547	SV0 A/D er 5547	SERVO_A_D_AND_D_A_MALFUNCTION
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Description: The A/D and D/A converter on the servo circuit board is abnormal.

	Possibility	Countermeasure	Ref.
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1	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
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5548	SV0 MDA cal 5548	SERVO_MDA_CALIBRATION_ERROR
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Description: The calibration of the motor drive amplifier cannot be executed on the servo circuit board.

	Possibility	Countermeasure	Ref.
1	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5549	SV0 cal TUP 5549	SERVO_ENCODER_ERROR_TUP
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Description: The encoder of the take-up motor is abnormal.

	Possibility	Countermeasure	Ref.
1	Either the reel motor or the cable that connects the motor and the mother circuit board is damaged.	Replace the drive.	Section 7.3.4
2	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5550	SV0 cal SUP 5550	SERVO_ENCODER_ERROR_SUP
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Description: The encoder of the supply motor is abnormal.

	Possibility	Countermeasure	Ref.
1	Either the reel motor or the cable that connects the motor and the mother circuit board is damaged.	Replace the drive.	Section 7.3.4
2	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5.7.3 Error Codes (556x to 557x)

5560	SV0 elev dn 5560	SERVO_ELEVATOR_NOT_COME_DOWN_RETRY_OVER
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Description: The tray does not move to lower position or does not eject the cartridge when the load operation is executed.

Caution: Execute the following procedures in the indicated sequence to remove the cartridge when it cannot be unloaded, then execute the countermeasure.

- (1) Execute the setup mode FUNDL. (Refer to section 6.3)
- (2) Turn the power switch off and then turn it on after waiting more than ten seconds to unload.
- (3) Unload the cartridge by the electric operation mode. (Refer to section 6.4)
- (4) Unload the cartridge by the manual operation mode. (Refer to section 6.5)

	Possibility	Countermeasure	Ref.
1	The inserted cartridge is different than the standard cartridge.	Use a standard cartridge.	Section 2.1
2	The elevator mechanism is damaged.	Replace the drive.	Section 7.3.4
3	The tray is damaged.	Replace the drive.	Section 7.3.4
4	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5561	SV0 thread1 5561	SERVO_THREADING_ERROR_1_TAPE_CUT_OFF
5563	SV0 thread3 5563	SERVO_THREADING_ERROR_3_TAPE_CUT_OFF
5565	SV0 thread5 5565	SERVO_THREADING_ERROR_5_TAPE_CUT_OFF

Description: The tape can not be pulled out to the take-up reel when the load operation is executed. (There is a possibility that the tape is cut.)

Caution: Execute the following procedures in the indicated sequence to remove the cartridge when it cannot be unloaded, then execute the countermeasure.

- (1) Execute the setup mode FUNLD. (Refer to section 6.3)
- (2) Turn the power switch off and then turn it on after waiting more than ten seconds to unload.
- (3) Unload the cartridge by the electric operation mode. (Refer to section 6.4.)
- (4) Unload the cartridge by the manual operation mode. (Refer to section 6.5.)

	Possibility	Countermeasure	Ref.
1	The tape is cut during loading.	Use a normal cartridge.	Section 2.1
2	The leader block fell out from the picker according to a leader lock malfunction.	Use a normal cartridge.	Section 2.1

3	The leader block fell out from the picker due to damage to the threader mechanism.	Replace the threader mechanism.	Section 7.3.5
4	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5562	SV0 thread2 5562	SERVO_THREADING_ERROR_STOPPED
5564	SV0 thread4 5564	SERVO_THREADING_ERROR_4_COULD_NOT_RETRY

Description: The tape can not be pulled out to the take-up reel when the load operation is executed. (There is a possibility that the tape is cut.)

Caution: Execute the following procedures in the indicated sequence to remove the cartridge when it cannot be unloaded, then execute the countermeasure.

- (1) Execute the setup mode FUNLD. (Refer to section 6.3)
- (2) Turn the power switch off and then turn it on after waiting more than ten seconds to unload.
- (3) Unload the cartridge by the electric operation mode. (Refer to section 6.4.)
- (4) Unload the cartridge by the manual operation mode. (Refer to section 6.5.)

	Possibility	Countermeasure	Ref.
1	The threader stopped in the middle of the tape path due to a cartridge malfunction.	Use a normal cartridge.	Section 2.1
2	The threader stopped in the middle of the tape path due to a threader mechanism malfunction.	Replace the threader mechanism.	Section 7.3.5
3	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5566	SV0 index 5566	SERVO_COULD_NOT_DETECT_INDEX
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Description: The take-up reel cannot move normally when the load operation is executed.

	Possibility	Countermeasure	Ref.
1	The take-up reel touches the chassis or other part and does not move.	Replace the drive.	Section 7.3.4
2	The take-up motor or cable is damaged.	Replace the drive.	Section 7.3.4
3	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5567	SV0 not rew 5567	SERVO_CANNOT_REWIND_TAPE_CUT_OFF
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Description: The tape cannot rewind when the unload operation is executed.

	Possibility	Countermeasure	Ref.
1	The take-up motor or cable is damaged.	Replace the drive.	Section 7.3.4
2	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5568	SV0 eject 5567	SERVO_CANNOT_EJECT_CARTRIDGE
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Description: The cartridge cannot be ejected when the unload operation is executed.

Caution: Execute the following procedures in the indicated sequence to remove the cartridge when it cannot be unloaded, then execute the countermeasure.

- (1) Execute the setup mode FUNLD. (Refer to section 6.3)
- (2) Turn the power switch off and then turn it on after waiting more than ten seconds to unload.
- (3) Unload the cartridge by the electric operation mode. (Refer to section 6.4.)
- (4) Unload the cartridge by the manual operation mode. (Refer to section 6.5.)

	Possibility	Countermeasure	Ref.
1	The inserted cartridge is different than the standard cartridge.	Use a standard cartridge.	Section 2.1
2	The elevator mechanism is damaged.	Replace the drive.	Section 7.3.4
3	The tray is damaged.	Replace the drive.	Section 7.3.4
4	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5569	SV0 sup>100 5569	SERVO_THREADER_STOPPED_1_SUP_CNT_GT_100
5570	SV0 sup<100 5570	SERVO_THREADER_STOPPED_2_SUP_CNT_LT_100

Description: The leader block is stopped on the tape path when the unload operation is executed.

Caution: Execute the following procedures in the indicated sequence to remove the cartridge when it cannot be unloaded, then execute the countermeasure.

- (1) Execute the setup mode FUNLD. (Refer to section 6.3)
- (2) Turn the power switch off and then turn it on after waiting more than ten

seconds to unload.

(3) Unload the cartridge by the electric operation mode. (Refer to section 6.4.)

(4) Unload the cartridge by the manual operation mode. (Refer to section 6.5.)

	Possibility	Countermeasure	Ref.
1	The threader mechanism is damaged.	Replace the threader mechanism.	Section 7.3.5
2	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5571	SV0 unthred 5571	SERVO TAPE IS CUT OFF UNTHREADING
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Description: The tape is cut when the unload operation is executed.

Caution: Execute the following procedures in the indicated sequence to remove the cartridge when it cannot be unloaded, then execute the countermeasure.

- (1) Execute the setup mode FUNLD. (Refer to section 6.3)
- (2) Turn the power switch off and then turn it on after waiting more than ten seconds to unload.
- (3) Unload the cartridge by the electric operation mode. (Refer to section 6.4.)
- (4) Unload the cartridge by the manual operation mode. (Refer to section 6.5.)

	Possibility	Countermeasure	Ref.
1	The threader mechanism is damaged.	Replace the threader mechanism.	Section 7.3.5
2	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5572	SV0 tension 5572	SERVO COULD NOT GENERATE TENSION
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Description: The tape tension can not be produced when the load operation is executed.

Caution: Execute the following procedures in the indicated sequence to remove the cartridge when it cannot be unloaded, then execute the countermeasure.

- (1) Execute the setup mode FUNLD. (Refer to section 6.3)
- (2) Turn the power switch off and then turn it on after waiting more than ten seconds to unload.
- (3) Unload the cartridge by the electric operation mode. (Refer to section 6.4.)
- (4) Unload the cartridge by the manual operation mode. (Refer to section 6.5.)

	Possibility	Countermeasure	Ref.
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1	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The drive main unit is damaged.	Replace the drive.	Section 7.3.4

5573	SV0 mtr cur 5573	SERVO_ABNORMAL_GEAR_MOTOR_CURRENT
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Description: Abnormal current is supplied to the gear motor when the load operation is executed.

Caution: Execute the following procedures in the indicated sequence to remove the cartridge when it cannot be unloaded, then execute the countermeasure.

- (1) Execute the setup mode FUNLD. (Refer to section 6.3)
- (2) Turn the power switch off and then turn it on after waiting more than ten seconds to unload.
- (3) Unload the cartridge by the electric operation mode. (Refer to section 6.4.)
- (4) Unload the cartridge by the manual operation mode. (Refer to section 6.5.)

	Possibility	Countermeasure	Ref.
1	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The drive main unit is damaged.	Replace the drive.	Section 7.3.4

5.7.4 Error Codes (558x)

5581	SV0 CUR SUP 5581	SERVO_ABNORMAL_MOTOR_CURRENT_SUP
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Description: Abnormal current is supplied to the supply motor.

Caution: Execute the following procedures in the indicated sequence to remove the cartridge when it cannot be unloaded, then execute the countermeasure.

- (1) Execute the setup mode FUNLD. (Refer to section 6.3)
- (2) Turn the power switch off and then turn it on after waiting more than ten seconds to unload.
- (3) Unload the cartridge by the electric operation mode. (Refer to section 6.4.)
- (4) Unload the cartridge by the manual operation mode. (Refer to section 6.5.)

	Possibility	Countermeasure	Ref.
1	The supply motor or cable is damaged.	Replace the drive.	Section 7.3.4

2	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
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5582	SV0 CUR TUP 5582	SERVO_ABNORMAL_MOTOR_CURRENT_TUP
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Description: Abnormal current is supplied to the take-up motor.

Caution: Execute the following procedures in the indicated sequence to remove the cartridge when it cannot be unloaded, then execute the countermeasure.

- (1) Execute the setup mode FUNLD. (Refer to section 6.3)
- (2) Turn the power switch off and then turn it on after waiting more than ten seconds to unload.
- (3) Unload the cartridge by the electric operation mode. (Refer to section 6.4.)
- (4) Unload the cartridge by the manual operation mode. (Refer to section 6.5.)

	Possibility	Countermeasure	Ref.
1	The take-up motor or cable is damaged.	Replace the drive.	Section 7.3.4
2	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5583	SV0 TENSION 5583	SERVO_LOST_TENSION
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Description: The tape lost tension.

Caution: Execute the following procedures in the indicated sequence to remove the cartridge when it cannot be unloaded, then execute the countermeasure.

- (1) Execute the setup mode FUNLD. (Refer to section 6.3)
- (2) Turn the power switch off and then turn it on after waiting more than ten seconds to unload.
- (3) Unload the cartridge by the electric operation mode. (Refer to section 6.4.)
- (4) Unload the cartridge by the manual operation mode. (Refer to section 6.5.)

	Possibility	Countermeasure	Ref.
1	The tape sticks to the head due to deterioration or quality.	Use a cleaning cartridge to clean off the dirty parts. Use a normal cartridge.	Section 3.1
2	Either the reel motor or the cable that connects the motor and the mother circuit board is damaged.	Replace the drive.	Section 7.3.4
3	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7

4	The power supply unit is damaged.	Replace the power supply block.	Section 7.3.4
		Replace the power supply unit. (For CSL model)	Section 7.3.9

5584	SV0 DISCRIM 5584	SERVO COUNLD NOT DISCRIMINATE TAPE
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Description: The cartridge cannot be discriminated.

Caution: Execute the following procedures in the indicated sequence to remove the cartridge when it cannot be unloaded, then execute the countermeasure.

- (1) Execute the setup mode FUNLD. (Refer to section 6.3)
- (2) Turn the power switch off and then turn it on after waiting more than ten seconds to unload.
- (3) Unload the cartridge by the electric operation mode. (Refer to section 6.4.)
- (4) Unload the cartridge by the manual operation mode.

	Possibility	Countermeasure	Ref.
1	The cartridge is not a standard product.	Use a standard length cartridge.	Section 2.1
2	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The drive main unit is damaged.	Replace the drive.	Section 7.3.4

5585	SV0 RAMP UP 5585	SERVO COULD NOT RAMP UP
5586	SV0 not 2M 5586	SERVO NOT REACHED 2M PER SEC
5587	SV0 not 4M 5586	SERVO NOT REACHED 4M PER SEC

Description: The tape cannot start correctly or the correct speed is not reached.

Caution: Execute the following procedures in the indicated sequence to remove the cartridge when it cannot be unloaded, then execute the countermeasure.

- (1) Execute the setup mode FUNLD. (Refer to section 6.3)
- (2) Turn the power switch off and then turn it on after waiting more than ten seconds to unload.
- (3) Unload the cartridge by the electric operation mode. (Refer to section 6.4.)
- (4) Unload the cartridge by the manual operation mode.

	Possibility	Countermeasure	Ref.
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1	The tape sticks to the head due to deterioration or quality.	Use a cleaning cartridge to clean off the dirty parts. Use a normal cartridge.	Section 3.1
2	The servo circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	The drive main unit is damaged.	Replace the drive.	Section 7.3.4
4	The power supply unit is damaged.	Replace the power supply block.	Section 7.3.4
		Replace the power supply unit. (For CSL model)	Section 7.3.9

5.8 CSL Circuit Board Errors [with CSL model]

5.8.1 Error Codes (5551 to 5559)

5551	CHECK TRAY 5551	CSL TRAY error
5552	CHECK TRAY 5552	CSL TRAY error

Description: There is a malfunction in the CSL tray while a cartridge is carried.

Caution: Remove the cartridge from the CSL tray before executing each countermeasure.
(Refer to section 6.7.3)

	Possibility	Countermeasure	Ref.
1	Dirt is attached to the cartridge and the clamp lever of the CSL tray cannot catch the cartridge.	Clean the cartridge.	Section 2.1
2	Dirt is attached to the clamp lever of the CSL tray and the clamp lever cannot catch the cartridge.	Clean the clamp lever.	Section 6.8
3	The drive is not positioned and adjusted correctly for the CSL tray.	Execute the drive position adjustment.	Section 6.6.3
4	The sensors (front sensor, rear sensor and cartridge sensor) are prevented from normal detection with dirt and debris.	Clean the sensors on the CSL tray.	Section 6.8
5	The CSL tray is abnormal.	Replace the CSL.	Section 7.3.4
6	The cable that connects the CSL tray and the CSL circuit board is disconnected or damaged.	Replace the CSL.	Section 7.3.4
7	The CSL circuit board is damaged.	Replace the CSL.	Section 7.3.4

5553	CHK MAGAZIN 5553	CSL MAGAZINE error
5554	CHK MAGAZIN 5554	CSL MAGAZINE error

Description: There is an malfunction in the magazine while a cartridge is carried.

Caution: Remove the cartridge from the CSL tray before executing each countermeasure.
(Refer to section 6.7.3)

	Possibility	Countermeasure	Ref.
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1	The inserted cartridge is different than the standard cartridge.	Use a standard cartridge.	Section 2.1
2	Dirt is attached to the cartridge and the clamp lever of the CSL tray cannot catch the cartridge.	Clean the cartridge.	Section 2.1
3	Dirt is attached to the clamp lever of the CSL tray and the clamp lever cannot catch the cartridge.	Clean the clamp lever.	Section 6.8
4	The magazine is not positioned and adjusted correctly for the CSL tray.	Replace the CSL	Section 7.3.4
5	The sensors (front sensor, rear sensor and cartridge sensor) are prevented from normal detection with dirt and debris.	Clean the sensors on the CSL tray.	Section 6.8
6	The holding mechanism of the cartridge in the magazine is abnormal.	Replace the magazine.	
7	The cable that connects the CSL tray and the CSL circuit board is disconnected or damaged.	Replace the CSL.	Section 7.3.4
8	The CSL circuit board is damaged.	Replace the CSL.	Section 7.3.4

5555	CSL ERROR 5555	CSL ELEVATOR time out
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Description: The up-down movement of the CSL tray take longer than 30 seconds and a time-out occurs.

Caution: Remove the cartridge from the CSL tray before executing each countermeasure. (Refer to section 6.7.3)

	Possibility	Countermeasure	Ref.
1	There is out of grease in the up-down mechanism.	Supply grease to the up-down mechanism.	Section 6.8
2	The up-down mechanism is abnormal.	Replace the CSL.	Section 7.3.4
3	The CSL circuit board is damaged.	Replace the CSL.	Section 7.3.4

5558	CSL ERROR 5558	CSL receives unknown load command
5559	CSL ERROR 5559	CSL receives unknown load command

Description: The CSL received a load command that is out of specifications.

	Possibility	Countermeasure	Ref.
1	The cables that connect the CSL circuit board and drive are disconnected or damaged.	Replace the CSL.	Section 7.3.4
2	The CSL circuit board is damaged.	Replace the CSL.	Section 7.3.4
3	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5.8.2 Error Codes (5590 to 5599)

5590	SENSOR ERR 5590	CSL REAR sensor error
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Description: The rear sensor is prevented from normal detection.

Caution: Remove the cartridge from the CSL tray before executing each countermeasure.(Refer to section 6.7.3)

	Possibility	Countermeasure	Ref.
1	The rear sensor is prevented from normal detection with dirt and debris.	Clean the sensor on the CSL tray.	Section 6.8
2	The rear sensor is abnormal.	Replace the CSL.	Section 7.3.4
3	The CSL tray is abnormal.	Replace the CSL.	Section 7.3.4
4	The cable that connects the CSL tray and the CSL circuit board is disconnected or damaged.	Replace the CSL.	Section 7.3.4
5	The CSL circuit board is damaged.	Replace the CSL.	Section 7.3.4

5591	SENSOR ERR 5591	CSL HOME POSITION sensor error
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Description: The home position sensor is prevented from normal detection.

Caution: Remove the cartridge from the CSL tray before executing each countermeasure.
(Refer to section 6.7.3)

	Possibility	Countermeasure	Ref.
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1	The home position sensor is prevented from normal detection with dirt and debris.	Clean the sensor on the CSL tray.	Section 6.8
2	The home position sensor is abnormal.	Replace the CSL.	Section 7.3.4
3	The cable that connects the CSL tray and the CSL circuit board is disconnected or damaged.	Replace the CSL.	Section 7.3.4
4	The CSL circuit board is damaged.	Replace the CSL.	Section 7.3.4

5592	SENSOR ERR 5592	CSL FRONT sensor error
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Description: The front sensor is prevented from normal detection.

Caution: Remove the cartridge from the CSL tray before executing each countermeasure.
(Refer to section 6.7.3)

	Possibility	Countermeasure	Ref.
1	The front sensor is prevented from normal detection with dirt and debris.	Clean the sensor on the CSL tray.	Section 6.8
2	The front sensor is abnormal.	Replace the CSL.	Section 7.3.4
3	The CSL tray is abnormal.	Replace the CSL.	Section 7.3.4
4	The cable that connects the CSL tray and the CSL circuit board is disconnected or damaged.	Replace the CSL.	Section 7.3.4
5	The CSL circuit board is damaged.	Replace the CSL.	Section 7.3.4

5593	SENSOR ERR 5593	CSL CARTRIDGE sensor error
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Description: The cartridge sensor is prevented from normal detection.

Caution: Remove the cartridge from the CSL tray before executing each countermeasure.
(Refer to section 6.7.3)

	Possibility	Countermeasure	Ref.
1	The cartridge sensor is prevented from normal detection with dirt and debris.	Clean the sensor on the CSL tray.	Section 6.8

2	The cartridge sensor is abnormal.	Replace the CSL.	Section 7.3.4
3	The magazine is not positioned and adjusted correctly against the CSL tray.	Replace the CSL.	Section 7.3.4
4	The cable that connects the CSL tray and the CSL circuit board is disconnected or damaged.	Replace the CSL.	Section 7.3.4
5	The CSL circuit board is damaged.	Replace the CSL.	Section 7.3.4

5594	SENSOR ERR 5594	CSL ELEVATOR sensor error
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Description: The elevator sensor is prevented from normal detection.

Caution: Remove the cartridge from the CSL tray before executing each countermeasure.
(Refer to section 6.7.3)

	Possibility	Countermeasure	Ref.
1	The cartridge sensor is prevented from normal detection with dirt and debris.	Clean the sensor on the CSL tray.	Section 6.8
2	The elevator sensor is abnormal.	Replace the CSL.	Section 7.3.4
3	The cable that connects the CSL tray and the CSL circuit board is disconnected or damaged.	Replace the CSL.	Section 7.3.4
4	The CSL circuit board is damaged.	Replace the CSL.	Section 7.3.4

5595	POWER ERR 5595	CSL abnormal voltage 15 V
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Description: +15V on the CSL circuit board is abnormal.

	Possibility	Countermeasure	Ref.
1	The power unit is damaged.	Replace the power unit.	Section 7.3.9
2	The cable that connects the CSL circuit board and the power unit is disconnected or damaged.	Replace the CSL.	Section 7.3.4
3	The CSL circuit board is damaged.	Replace the CSL.	Section 7.3.4

5596	POWER ERR	5596	CSL abnormal voltage 24 V
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Description: +24V on the CSL circuit board is abnormal.

	Possibility	Countermeasure	Ref.
1	The power unit is damaged.	Replace the power unit.	Section 7.3.9
2	The cable that connects the CSL circuit board and the power unit is disconnected or damaged.	Replace the CSL.	Section 7.3.4
3	The CSL circuit board is damaged.	Replace the CSL.	Section 7.3.4

5597	CHECK TRAY	5597	CSL TRAY error
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Description: There is a malfunction in the CSL tray while a cartridge is carried.

Caution: Remove the cartridge from the CSL tray before executing each countermeasure.
(Refer to section 6.7.3)

	Possibility	Countermeasure	Ref.
1	Dirt is attached to the cartridge and the clamp lever of the CSL tray cannot catch the cartridge.	Clean the cartridge.	Section 2.1
2	Dirt is attached to the clamp lever of the CSL tray and the clamp lever cannot catch the cartridge.	Clean the clamp lever.	Section 6.8
3	The drive is not positioned and adjusted correctly for the CSL tray.	Execute the drive position adjustment.	Section 6.6.3
4	The sensors (front sensor, rear sensor and cartridge sensor) are prevented from normal detection with dirt and debris.	Clean the sensors on the CSL tray.	Section 6.8
5	The CSL tray is abnormal.	Replace the CSL.	Section 7.3.4
6	The cable that connects the CSL tray and the CSL circuit board is disconnected or damaged.	Replace the CSL.	Section 7.3.4
7	The CSL circuit board is damaged.	Replace the CSL.	Section 7.3.4

5598	CHK MAGAZIN	5598	CSL MAGAZINE error
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Description: There is a malfunction in the magazine while a cartridge is carried.

Caution: Remove the cartridge from the CSL tray before executing each countermeasure.
(Refer to section 6.7.3)

	Possibility	Countermeasure	Ref.
1	Dirt is attached to the cartridge and the clamp lever of the CSL tray cannot catch the cartridge.	Clean the cartridge.	Section 2.1
2	Dirt is attached to the clamp lever of the CSL tray and the clamp lever cannot catch the cartridge.	Clean the clamp lever.	Section 6.8
3	The magazine is not positioned and adjusted correctly for the CSL tray.	Replace the CSL.	Section 7.3.4
4	The sensors (front sensor, rear sensor and cartridge sensor) are prevented from normal detection with dirt and debris.	Clean the sensors on the CSL tray.	Section 6.8
5	The holding mechanism of the cartridge in the magazine is abnormal.	Replace the magazine.	
6	The cable that connects the CSL tray and the CSL circuit board is disconnected or damaged.	Replace the CSL.	Section 7.3.4
7	The CSL circuit board is damaged.	Replace the CSL.	Section 7.3.4

5599	CSL ERROR	5599	CSL FLASH ROM ERROR
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Description: There is a malfunction in the FLASH ROM on the CSL circuit board.

	Possibility	Countermeasure	Ref.
1	A failure occurs during a firmware update.	Execute the firmware update again.	Section 6.1.4
2	The cables that connect the CSL circuit board and drive are disconnected or damaged.	Replace the CSL.	Section 7.3.4
3	The CSL circuit board is damaged.	Replace the CSL.	Section 7.3.4
4	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

5.9 Other Errors

The errors that cannot be displayed on the display on the operator panel are explained in this section.

5.9.1 Without CSL Model

Description: The fan motor in the rear panel of the drive does not rotate.

	Possibility	Countermeasure	Ref.
1	The AC power supply cable is not connected correctly.	Connect the AC power supply cable correctly.	Section 2.3.1
2	The AC power is operating abnormally.	Turn the power off. Check the AC power supply. Turn the power on again one more time.	Section 1.4.5
3	The fuse in the rear panel of the drive is disconnected or broken.	Replace the fuse.	Section 7.3.8
4	The fan motor in the power supply block is damaged.	Replace the power supply block.	Section 7.3.4
5	The fan motor in the drive is damaged.	Replace the drive.	Section 7.3.4
6	The power supply switch is damaged.	Replace the front panel.	Section 7.3.2
7	The power supply unit is damaged.	Replace the power supply block.	Section 7.3.4
8	The cable that connects the power supply unit and the power supply switch is disconnected or damaged.	Replace the front panel.	Section 7.3.2
9	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4

Description: The display backlight in the operator panel does not light.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7

2	The operator panel (OCP) is damaged.	Replace the front panel.	Section 7.3.2
3	The cable that connects the drive and the operator panel is disconnected or damaged.	Replace the front panel.	Section 7.3.2
4	The power supply unit is damaged.	Replace the power supply block.	Section 7.3.4
5	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4

Description: The character on the display of the operator panel is not correct.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	A failure occurs during a firmware update using an update tape.	Replace the control circuit board.	Section 7.3.7
3	A failure occurs in a firmware update using a debugger.	Replace the control circuit board.	Section 7.3.7
4	The operator panel (OCP) is damaged.	Replace the front panel.	Section 7.3.2
5	The cable that connects the drive and the operator panel is disconnected or damaged.	Replace the front panel.	Section 7.3.2
6	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4
7	The power supply unit is damaged.	Replace the power supply block.	Section 7.3.4

	DIAGNOSTIC ERROR	
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Description: The ALERT indicator on the operator panel stays turned on when the power is turned on.

	Possibility	Countermeasure	Ref.
1	Error occurs when the power-on check is executed.	The error code is displayed when the Switch-2 "INFO" in the center of the operator panel is pressed.	Table 5-3

2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	A failure occurs during a firmware update using an update tape.	Replace the control circuit board.	Section 7.3.7
4	A failure occurs in a firmware update using a debugger.	Replace the control circuit board.	Section 7.3.7
5	The operator panel (OCP) is damaged.	Replace the front panel.	Section 7.3.2
6	The cable that connects the drive and the operator panel is disconnected or damaged.	Replace the front panel.	Section 7.3.2
7	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4
8	The power supply unit is damaged.	Replace the power supply block.	Section 7.3.4

5.9.2 With CSL Model

Description: The fan motor in the rear panel of the drive does not rotate.

	Possibility	Countermeasure	Ref.
1	The AC power supply cable is not connected correctly.	Connect the AC power supply cable correctly.	Section 2.3.1
2	The AC power is operating abnormally.	Turn the power off. Check the AC power supply. Turn the power on again one more time.	Section 1.4.5
3	The fuse in the rear panel of the drive is disconnected or broken.	Replace the fuse.	Section 7.3.8
4	The fan motor in the lower part of the rear panel of the CSL is damaged.	Replace the CSL.	Section 7.3.4
5	The fan motor in the drive is damaged. Replace the drive.	Replace the drive.	Section 7.3.4
6	The power supply switch is damaged.	Replace the front panel.	Section 7.3.2
7	The power supply unit is damaged.	Replace the power supply unit.	Section 7.3.9

8	The cable that connects the power supply unit and the power supply switch is disconnected or damaged.	Replace the front panel.	Section 7.3.2
9	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4

Description: The display backlight in the operator panel does not light.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	The operator panel (OPC) is damaged.	Replace the front panel.	Section 7.3.2
3	The cables that connect the drive and the CSL circuit board are disconnected or damaged.	Replace the CSL.	Section 7.3.4
4	The cable that connects the CSL circuit board and the operator panel is disconnected or damaged.	Replace the CSL.	Section 7.3.4
5	The CSL circuit board is damaged.	Replace the CSL.	Section 7.3.4
6	The power supply unit is damaged.	Replace the power supply unit.	Section 7.3.9
7	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4

Description: The character on the display of the operator panel is not correct.

	Possibility	Countermeasure	Ref.
1	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
2	A failure occurs during a firmware update using an update tape.	Replace the control circuit board.	Section 7.3.7
3	A failure occurs in a firmware update using a debugger.	Replace the control circuit board.	Section 7.3.7
4	The operator panel (OCP) is damaged.	Replace the front panel.	Section 7.3.2

5	The cables that connect the drive and the CSL circuit board are disconnected or damaged.	Replace the CSL.	Section 7.3.4
6	The cable that connects the CSL circuit board and the operator panel is disconnected or damaged.	Replace the CSL.	Section 7.3.4
7	The CSL circuit board is damaged.	Replace the CSL.	Section 7.3.4
8	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4
9	The power supply unit is damaged.	Replace the power supply unit.	Section 7.3.9

	DIAGNOSTIC ERROR	
--	------------------	--

Description: The ALERT indicator on the operator panel stays turned on when the power is turned on.

	Possibility	Countermeasure	Ref.
1	An error occurs when the power-on check is executed.	The error code is displayed when Switch-2 "INFO" in the center of the operator panel is pressed.	Table 5-3
2	The control circuit board is damaged.	Replace this circuit board.	Section 7.3.7
3	A failure occurs during a firmware update using an update tape.	Replace the control circuit board.	Section 7.3.7
4	A failure occurs in a firmware update using a debugger.	Replace the control circuit board.	Section 7.3.7
5	The operator panel (OCP) is damaged.	Replace the front panel.	Section 7.3.2
6	The cables that connect the drive and the CSL circuit board are disconnected or damaged.	Replace the CSL.	Section 7.3.4
7	The cable that connects the CSL circuit board and the operator panel is disconnected or damaged.	Replace the CSL.	Section 7.3.4
8	The CSL circuit board is damaged.	Replace the CSL.	Section 7.3.4

9	The mother circuit board is damaged.	Replace the drive.	Section 7.3.4
10	The power supply unit is damaged.	Replace the power supply unit.	Section 7.3.9

Chapter 6 OPERATIONS for the CE

This chapter is for the CE (Customer Engineer). These operations are to be performed only by persons with maintenance training.

6.1 Firmware

6.1.1 Overview of the Firmware

The firmware in this drive can be updated in order to perform operation improvement within the drive by adding setup items and other operations.

The 4 (without CSL model) or 5 (with CSL mode) kind of firmware are stored in the flash ROM on the control circuit board. Turn on the drive power supply, the firmware are transferred from the flash ROM to the memory on the each circuit boards. The microprocessors (MPU) on the circuit board will be started, use of the drive is enabled. The setup values are stored in the flash ROM. The firmware diagram is shown in Figure 6-1A.

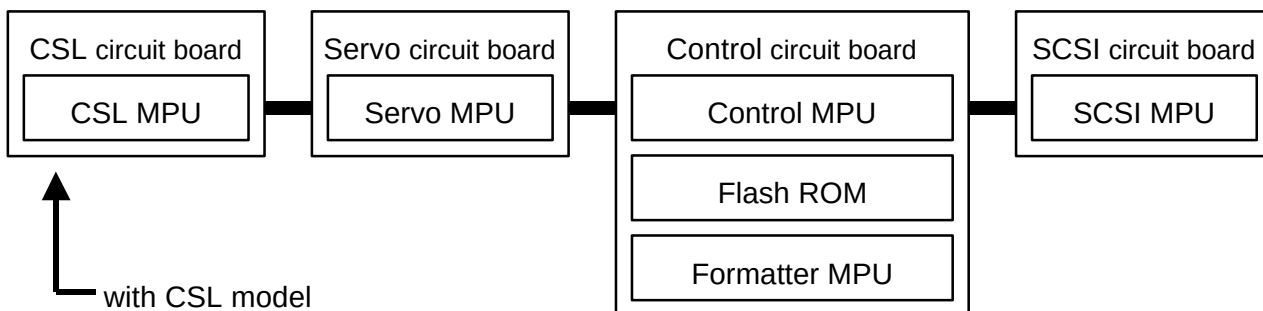


Figure 6-1A Firmware Diagram

CAUTION

The firmware and the setup values are changed when the control circuit board is replaced.

It may not produce the updating the firmware in the case of any hardware version.

6.1.2 Firmware Revision

The following procedure to display the “Current Firmware Revision”. Refer to Figure 6-1B.

- 1) First, if the operation mode is on the on-line mode, change to the off-line mode. Refer to Figure 2-6.
- 2) “func” will be displayed on the right Switch-Line of the display. Pressing the right Switch-3 “func” displays the current SCSI ID on the Status-Line.
- 3) Pressing the left Switch-1 “func” displays “MENU FUNCTIONS” on the Status-Line.
- 4) Press the right Switch-3 “>>>” to shift to the next menus.
- 5) Select the menu displayed as “STAT” on the left of the Switch-Line. Pressing the left Switch-1 “STAT” displays “STATISTICS” on the Status-Line and enters the statistics mode.
- 6) Select the menu displayed as “UCODE” on the left of the Switch-Line. Pressing the left Switch-1 “UCODE” displays “DISPLAY REVISION” on the Status-Line. This menu is the Current Firmware Revision.
- 7) Pressing each time the Switch-1 “NEXT” on the left, the name and the revision of the firmware are displayed alternately. The following names are:

Display of the firmware revision		Description
Name	Example of revision	
CURRENT MACHINE	Release Code	Revision of entire drive
CURRENT CNTL	CNTL MEC05.50	Revision of control firmware
CURRENT FORM	FORM MEF03.00	Revision of formatter firmware
CURRENT SCSI	SCSI MES05.00	Revision of SCSI firmware
CURRENT SERVO	SERVO MEV02.40	Revision of servo firmware
CURRENT CSL	CSL MEL01.24	Revision of CSL firmware (with CSL model)

Press the right Switch-3 “EXIT” returns to the statistics mode.

- 8) Press the right Switch-3 “>>>” to select the menu that displays “EXIT” on the Switch-Line. Press this “EXIT” switch to close to each of the menus.

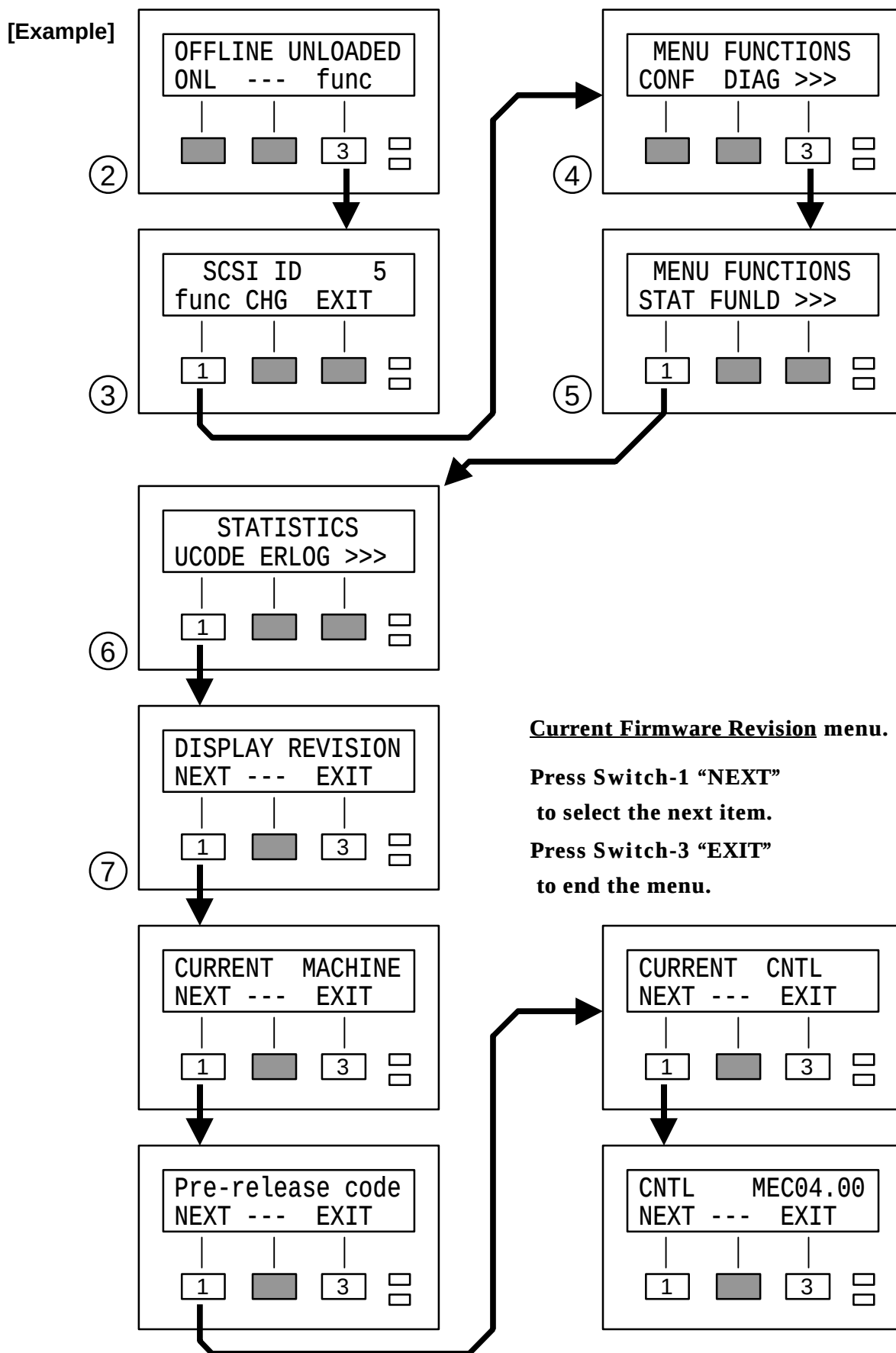


Figure 6-1B Current Firmware Revision

6.1.3 Hardware Revision

The following procedure to display the “Current Hardware Revision”. Refer to Figure 6-1C.

- 1) First, if the operation mode is on the on-line mode, change to the off-line mode. Refer to Figure 2-6.
- 2) “func” will be displayed on the right Switch-Line of the display. Pressing the right Switch-3 “func” displays the current SCSI ID on the Status-Line.
- 3) Pressing the left Switch-1 “func” displays “MENU FUNCTIONS” on the Status-Line.
- 4) Press the right Switch-3 “>>>” to shift to the next menus.
- 5) Select the menu displayed as “STAT” on the left of the Switch-Line. Pressing the left Switch-1 “STAT” displays “STATISTICS” on the Status-Line and enters the statistics mode.
- 6) Press the right Switch-3 “>>>” to select the menu displayed as “HARD” on the center of the Switch-Line. Pressing the center Switch-2 “HARD” displays “HEAD” on the left of the Status-Line. This menu is the Current Hardware Revision.
- 7) Pressing each time the Switch-1 “NEXT” on the left, the name and the revision of the hardware are displayed together. The following names are:

Display of the hardware revision		Description
Name	Example of revision	
HEAD	36 TRACK	Number of the tracks on the tape head
SPEED	2 METER/S	Tape speed
CONTROLLER	1	Revision of control circuit board
IDRC	one channel	Specification of the IDRC
BUFFER SIZE	2 meg	Data buffer size
FORMATTER	1	Revision of formatter circuit board
DIGITAL READ	2	Revision of digital read circuit board
ANALOG READ	1	Revision of analog read circuit board
ANALOG WRITE	6	Revision of analog write circuit board
SCSI CARD	9	Revision of SCSI circuit board
DRV	S.E. big 50	Specification of the SCSI connector
SERVO CARD	0	Revision of servo circuit board
CSL CARD	MEL	Revision of CSL circuit board (with CSL model)
	No Erase head	Specification of the write operation

Press the right Switch-3 “EXIT” returns to the statistics mode.

- 8) Press the right Switch-3 “>>>” to select the menu that displays “EXIT” on the Switch-Line. Press this “EXIT” switch to close to each of the menus.

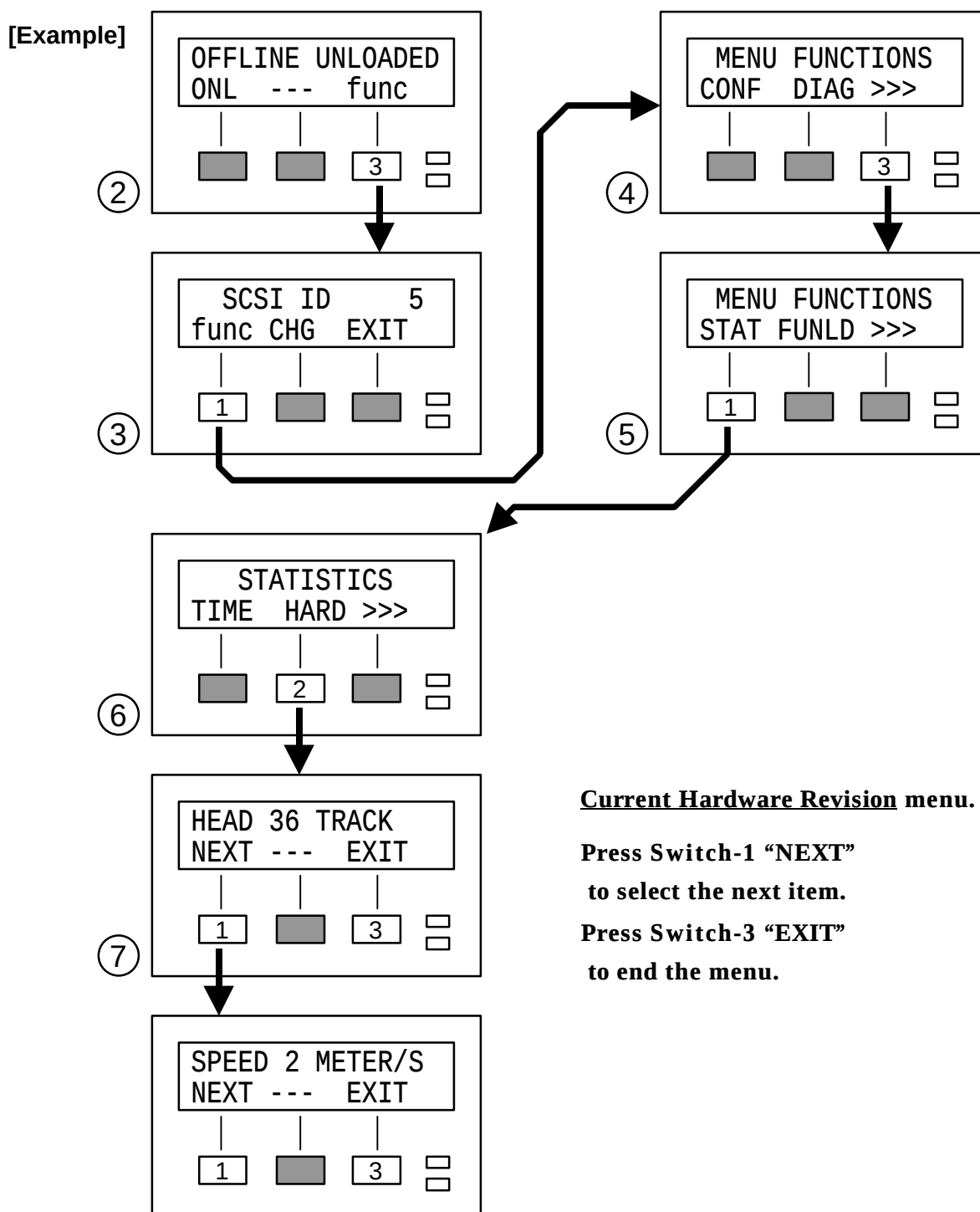


Figure 6-1C Current Hardware Revision

6.1.4 Firmware Update

CAUTION

When updating the firmware, it is necessary to use the standard (default) setup values. When other than the standard values are being used, note the current values in Table 4-1 of the user manual and reconfigure them after updating is completed.

The following update procedures that use the special cartridge for updating. Refer to Figure 6-2A.

- 1) First, load the special update cartridge. If the operation mode is on the on-line mode, change to the off-line mode. Refer to Figure 2-6.
- 2) "func" will be displayed on the right Switch-Line of the display. Pressing the right Switch-3 "func" displays the current SCSI ID on the Status-Line.
- 3) Pressing the left Switch-1 "func" displays "MENU FUNCTIONS" on the Status-Line.
- 4) Select the menu displayed as "DIAG" on the center of the Switch-Line. Pressing the center Switch-2 "DIAG" displays "DIAGNOSTICS" on the Status-Line and enters the diagnostics mode.
- 5) Press the right Switch-3 ">>>" to shift to the next menus.
- 6) Select the menu displayed as "UCODE" on the center of the Switch-Line. Pressing the center Switch-2 "UCODE" displays "UPDATE UCODE?" on the Status-Line. This menu is the Firmware Update.
- 7) Pressing the left Switch-1 "YES", the contents of the tape will be read in the internal buffer of the drive. During reading, the firmware revisions will be displayed one after the other. When the update preparations have been made, "CONFIRM UPDATE?" will be displayed on the Status-Line.
- 8) Pressing the left Switch-1 "YES", the cartridge will be unloaded and updating of the firmware will start.
- 9) During the updating, "UPDATING CODE.." will be displayed on the Status-Line. After that, the drive will start in the same way as when the power is turned on.
- 10) When the updating ends normally, "STAND BY" will be displayed on the Status-Line and updating of the firmware will be completed.
- 11) Always follow-up by resetting the standard (default) setup values from section 6.1.5 on the next page.

CAUTION

Never turn off the power while performing the update. For the CSL model, never open the door performing the update.

If the standard setup values are not reset, the drive will mis-operate and may not be recognized by the host computer system.

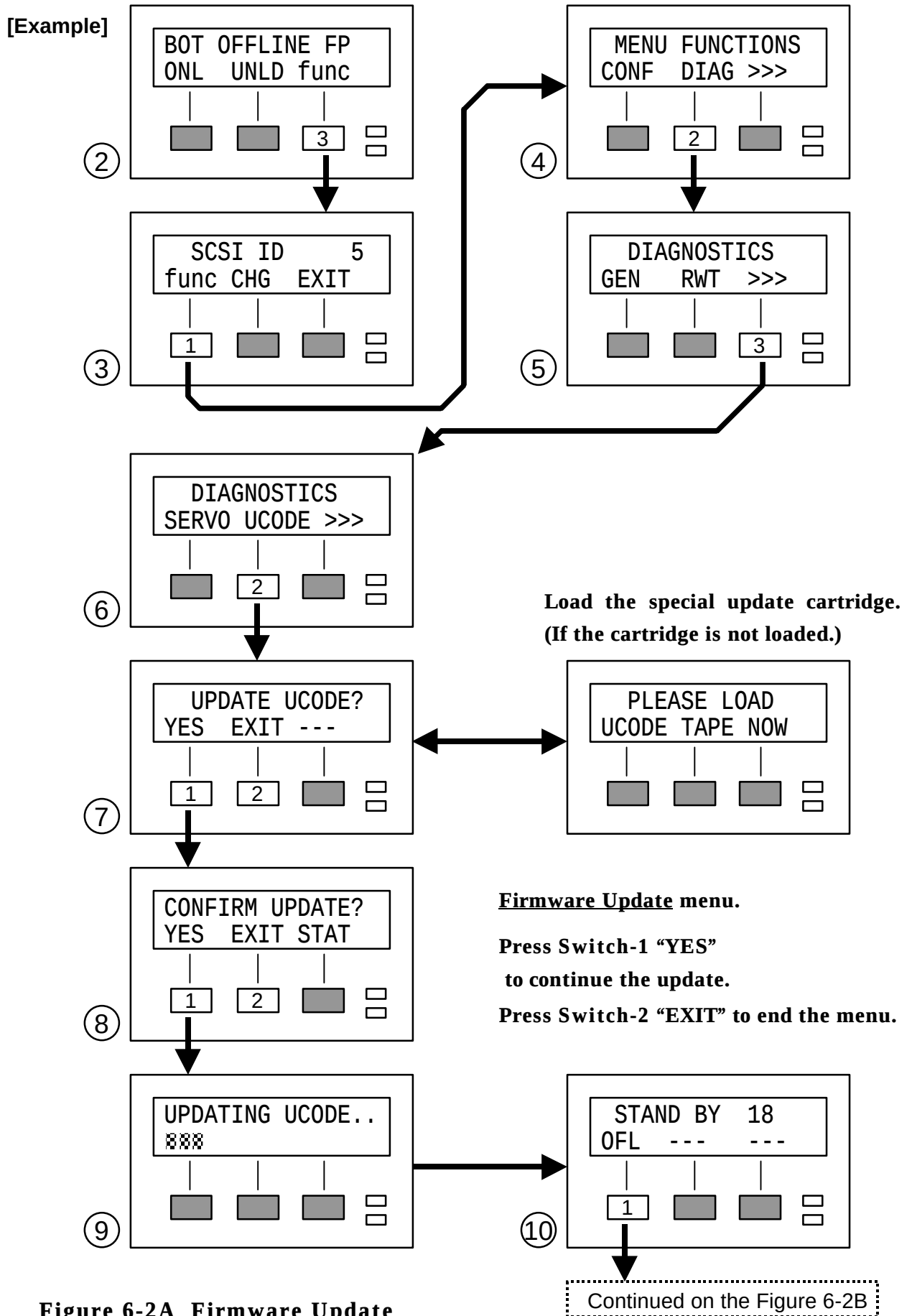


Figure 6-2A Firmware Update

6.1.5 Standard Setup Values

CAUTION

Setting the standard setup values, the SCSI ID will not be changed.
Changing the SCSI ID, refer to section 4.2.1.

When the firmware is updated or a circuit board is replaced, it is necessary to initialize the setup and set to the standard (default) setup values. The following procedure to set the “Standard Setup Values”. Refer to Figure 6-2B

- 1) If the operation mode is on the on-line mode, change to the off-line mode. Refer to Figure 2-6.
- 2) “func” will be displayed on the right Switch-Line of the display. Pressing the right Switch-3 “func” displays the current SCSI ID on the Status-Line.
- 3) Pressing the left Switch-1 “func” displays “MENU FUNCTIONS” on the Status-Line.
- 4) Select the menu displayed as “CONF” on the left of the Switch-Line. Pressing the left Switch-1 “CONF” displays “ENTER PASSWORD” on the Status-Line. This is the password input prompt.
- 5) Press Switch-3,-2 and -3 in sequence. The “CONFIGURE” will appear on the Status-Line. This menu is the configuration mode.
- 6) Press the right Switch-3 “>>>” to shift to the next menus.
- 7) Select the menu displayed as “RESET” on the center of the Switch-Line. Pressing the center Switch-2 “RESET”, the message “ALL PARAMETERS BACK TO DEFAULT” will appear briefly on the display. This menu is the Standard Setup Values. After that, “SAVE TO FLASH?” will be displayed on the Status-Line.
- 8) Press the Switch-1 “YES” to initialize the setup and save to the standard setup values. Press the Switch-2 “EXIT” to abort the setup menu.
- 9) Press the right Switch-3 “>>>” to select the menu that displays “EXIT” on the Switch-Line. Press this “EXIT” switch to close to each of the menus.

CAUTION

When other than the standard values are being used, reconfigure the previous values in Table 4-1 of the user manual.

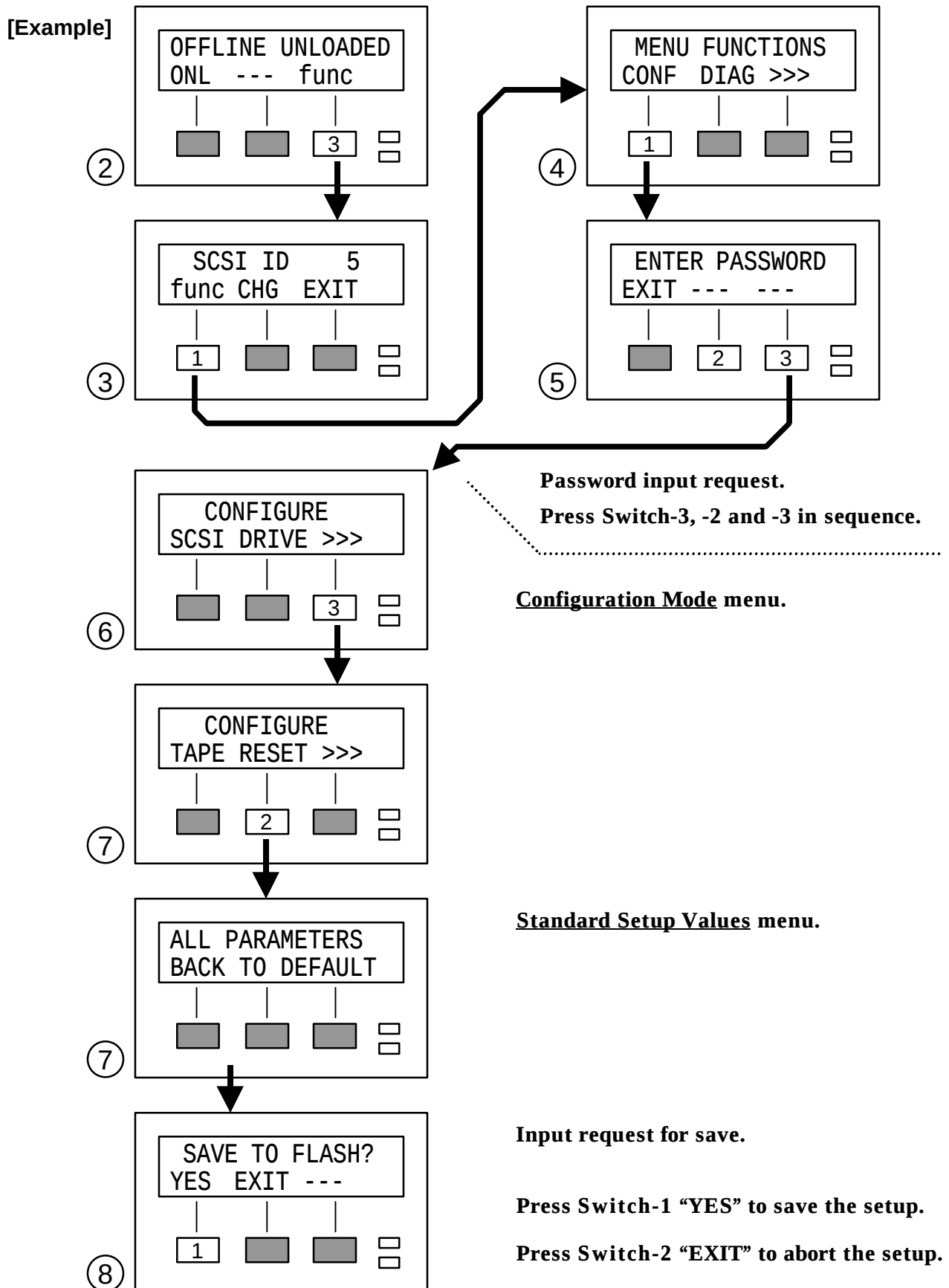


Figure 6-2B Standard Setup Values

6.2 Drive Adjustment Procedures

The drive is required to be adjusted when the servo circuit board is replaced. Enter the diagnostics mode at this time.

The following procedure to adjust the “Drive Adjustment”. Refer to Figure 6-3.

- 1) First, unload the cartridge. If the operation mode is on the on-line mode, change to the off-line mode. Refer to Figure 2-6.
- 2) “func” will be displayed on the right Switch-Line of the display. Pressing the right Switch-3 “func” displays the current SCSI ID on the Status-Line.
- 3) Pressing the left Switch-1 “func” displays “MENU FUNCTIONS” on the Status-Line.
- 4) Select the menu displayed as “DIAG” on the center of the Switch-Line. Pressing the center Switch-2 “DIAG” displays “DIAGNOSTICS” on the Status-Line and enters the diagnostics mode.
- 5) Press the right Switch-3 “>>>” and select the menu displayed as “SERVO” on the left of the Switch-Line. Pressing the left Switch-1 “SERVO” displays “ENTER PASSWORD” on the Status-Line. This is the password input prompt.
- 6) Press Switch-3,-2 and -3 in sequence. “DRIVE TESTS” will be displayed on the Status-Line.
- 7) Press the right Switch-3 “>>>” and select the menu displayed as “DIAG / TUNING” on the Status-Line. Pressing the center Switch-2 “ENTER” displays “D/A OFFSET ADJ” on the Status-Line. This menu is the Drive Adjustment Procedures.
- 8) Press the center Switch-2 “ENTER” and then press the center Switch-2 “START” in order to execute the “D/A OFFSET ADJ”. “Adjusting ...” is displayed on the Status-Line and the adjustment operation starts.
- 9) When the adjustment is completed , “COMPLETED OK” is displayed on the Status-Line. Pressing the left Switch-1 “EXIT” displays “D/A OFFSET ADJ” on the Status-Line one more time.
- 10) Press the right Switch-3 “>>>” and select the menu displayed as “MOTOR Kt COMPE” on the Status-Line. Press the center Switch-2 “ENTER” and then press the center Switch-2 “START” in order to execute the “MOTOR Kt COMPE”. “Executing ...” is displayed on the Status-Line and the adjustment operation starts.
- 11) When the adjustment is completed , “COMPLETED,” is displayed on the center of the Status-Line. Pressing the left Switch-1 “EXIT” displays “MOTOR Kt COMPE” on the Status-Line one more time.
- 12) Turn the power off to validate the setting.



Figure 6-3 Drive Adjustment Procedures

6.3 Unloading by Electric Operation Part-1

If an error occurs when loading or unloading is performed, the cartridge unloading and error recovery operations can be performed by the operation switches on the operator panel.

The procedures to recover the drive without turning the power off are described in this section (6.3). Execute the procedures in the next section (6.4) when the recovery cannot be performed even if the procedures in this section are executed.

CAUTION

The following operations should be performed after removing the cover of this drive to enable to observe the tape path.



WARNING!

Always turn off the power before removing the cover of the drive. Never touch the inside of the drive when turning the power on. Even when the power has been turned off, do not touch the area surrounding the power supply unit and the tape head.

Refer to Chapter 7 for the disassembly procedures of the drive.

The unloading and recover procedures are described below. Refer to Figure 6-4.

- 1) Make a memo of the error message and error code which is displayed on the Status-Line of the display. If the operation mode is on the on-line mode, change to the off-line mode. Refer to Figure 2-6.
- 2) "func" will be displayed on the right Switch-Line of the display. Pressing the right Switch-3 "func" displays the current SCSI ID on the Status-Line.
- 3) Pressing the left Switch-1 "func" displays "MENU FUNCTIONS" on the Status-Line.
- 4) Press the right Switch-3 ">>>" to shift to the next menus.
- 5) Select the menu displayed as "FUNLD" on the center of the Switch-Line. Press the center Switch-2 "FUNLD" to execute the unloading operation. "UNLOADING" is displayed on the Status-Line and the cartridge unloading starts. If the message "SVO DWNLD" is displayed on the Status-Line, press the center Switch-2 "FUNLD" one more time.
- 6) When the unloading is completed, "OFFLINE UNLOADED" is displayed on the Status-Line.
- 7) Press the right Switch-3 ">>>" and select the menu displayed as "EXIT" on the Switch-Line. Pressing switch "EXIT" returns the off-line mode.
- 8) Set operation to the on-line mode. (Refer to Figure 2-6.) The ALERT indicator will have gone off by this time.

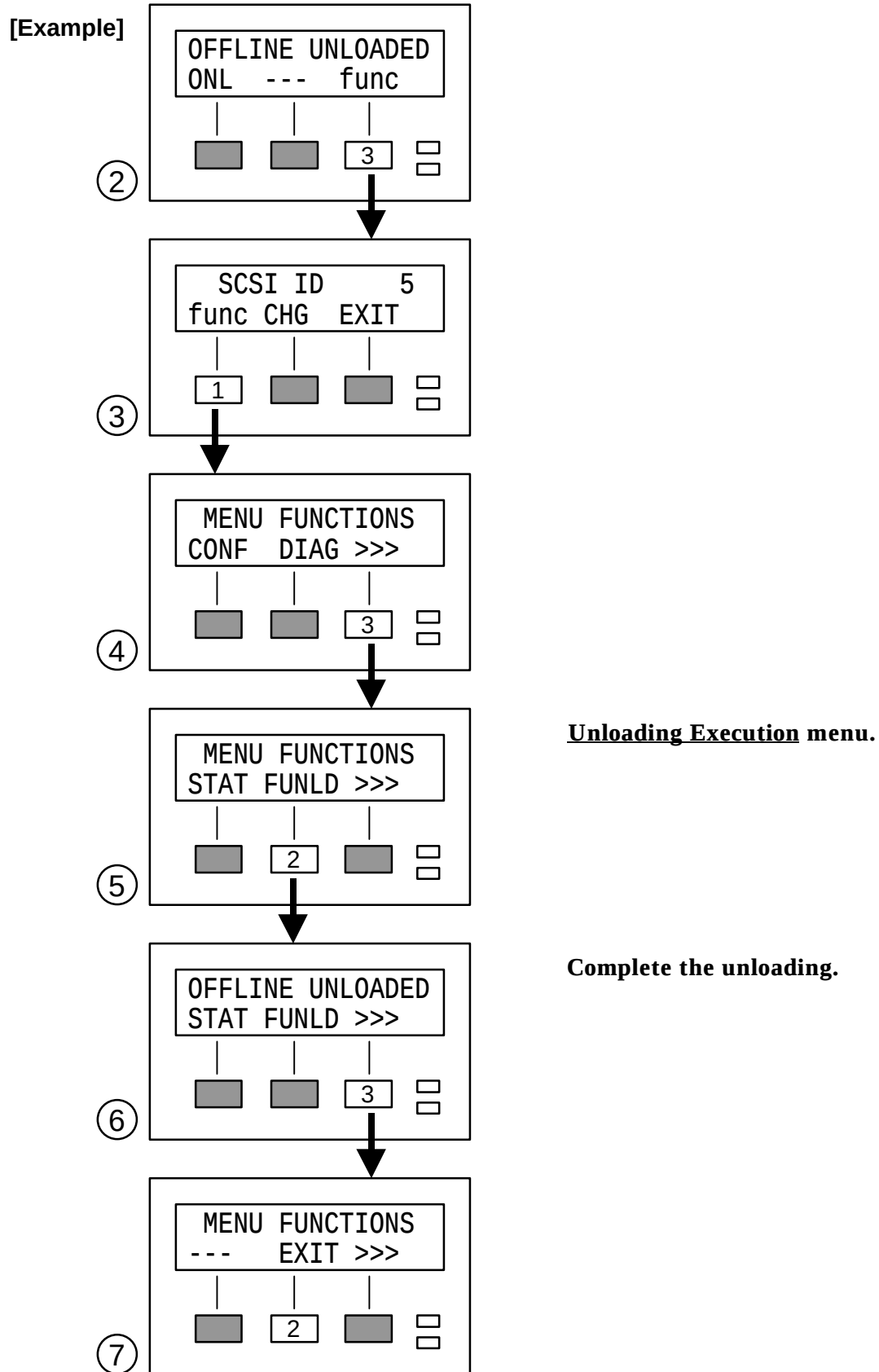


Figure 6-4 Unloading and Error Recovery

6.4 Unloading by Electric Operation Part-2

If an error occurs when loading or unloading is performed, the cartridge unloading and error recovery operations can be performed by the operation switches on the operator panel.

The procedures to recover the drive after turning the power off and disassembling the drive are described in this section (6.4).

CAUTION

The following operations should be performed after removing the cover of this drive to enable to observe the tape path.



WARNING!

Always turn off the power before removing the cover of the drive. Never touch the inside of the drive when turning the power on. Even when the power has been turned off, do not touch the area surrounding the power supply unit and the tape head.

Refer to Chapter 7 for the disassembly procedures of the drive.

6.4.1 Selecting the Unloading Procedure

The operation differs according to the tape condition. Confirm the location of the tape on the tape path, from the threader home position, and tape head to threader reel position, referring to Figure 6-5.

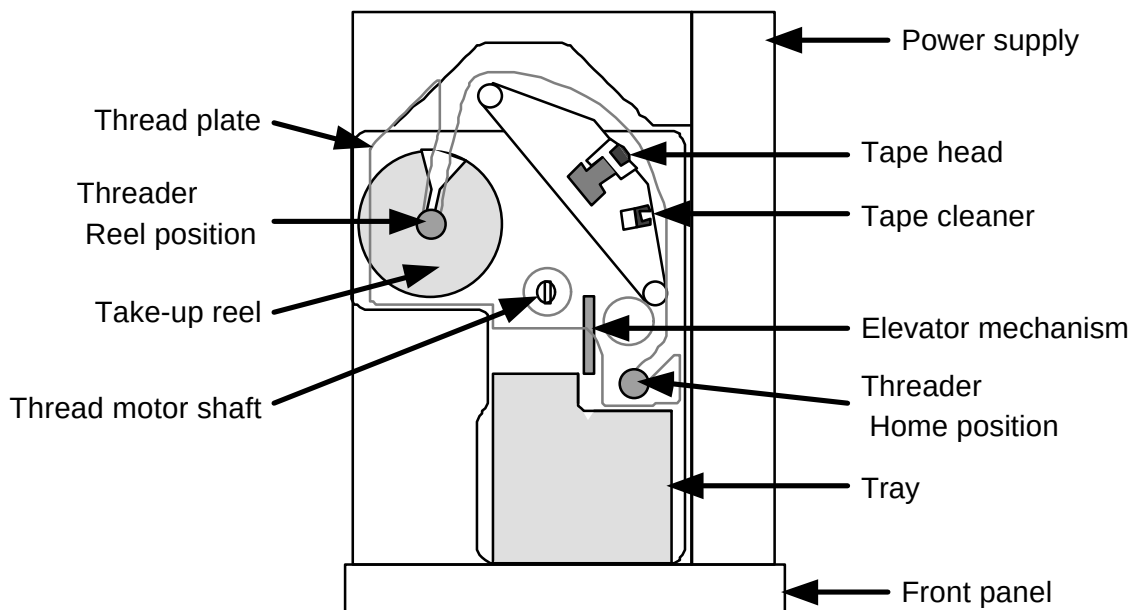


Figure 6-5 Tape Path

When the tape position is determined, select the procedure according to the flowchart in Figure 6-6 and execute the operation.

CAUTION

Be especially careful when operating this drive. If you make any mistake it may damage the drive or tape.

Always check the tape path while operations are executed. When operation is interrupted or an abnormal sound has occurred, turn off the power immediately.

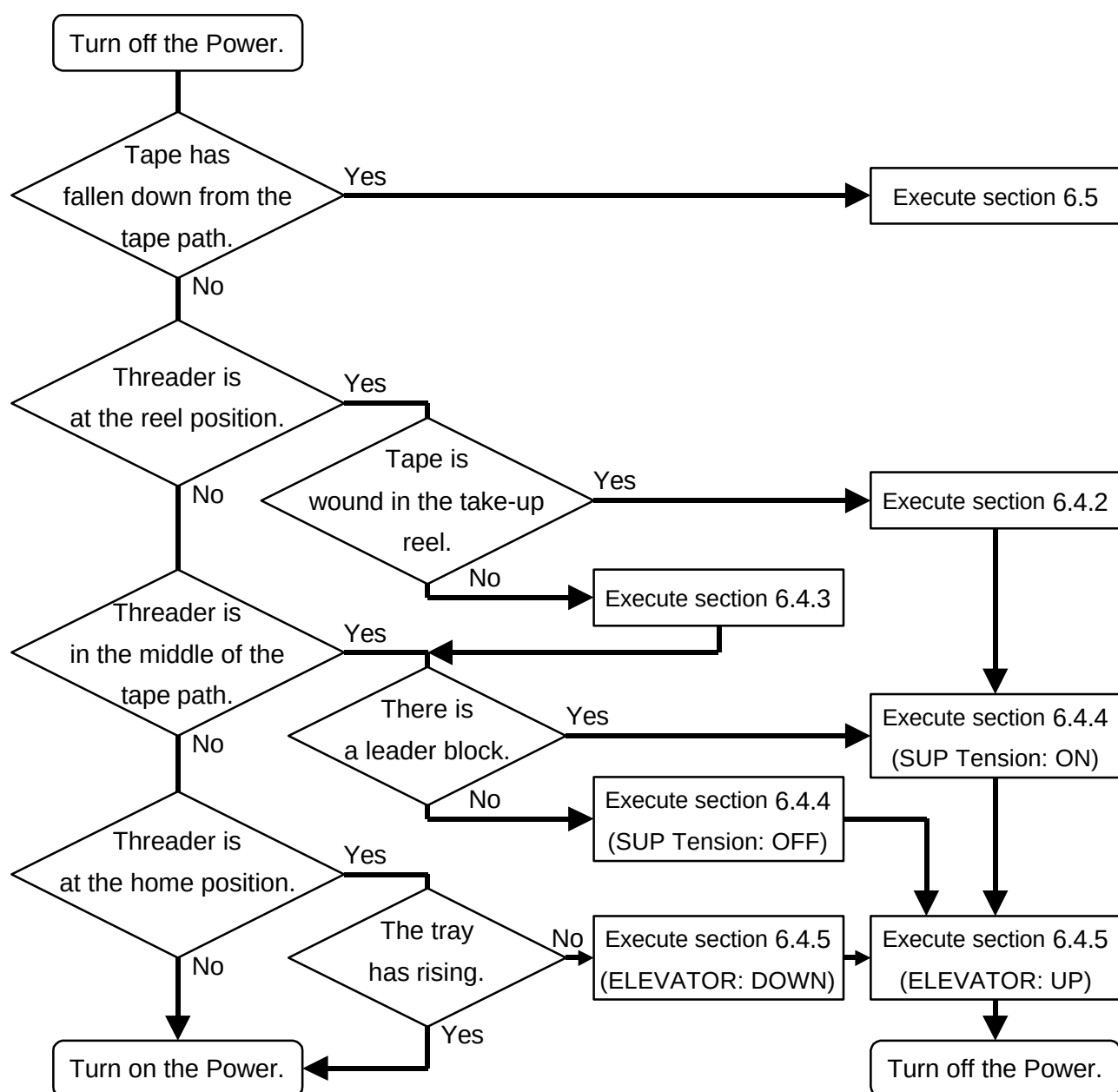


Figure 6-6 Flowchart of Unloading by Electric Operation

6.4.2 Rewinding the Tape

The tape must be rewound to the position where the leader block can be pulled out when the tape is wound in the take-up reel. The procedures using the electric operation mode are described below. Refer to Figure 6-7.

- 1) Turn the power on. Please observe the drive carefully because the unloading operation may start when the power is turned on. When the drive operation is stopped, continue the following operation if the tape does not fall down from the tape path and continues to be wound up in the take-up reel.
- 2) If the operation mode is on the on-line mode, change to the off-line mode. Refer to Figure 2-6.
- 3) "func" will be displayed on the right Switch-Line of the display. Pressing the right Switch-3 "func" displays the current SCSI ID on the Status-Line.
- 4) Pressing the left Switch-1 "func" displays "MENU FUNCTIONS" on the Status-Line.
- 5) Select the menu displayed as "DIAG" on the center of the Switch-Line. Pressing the center Switch-2 "DIAG" displays "DIAGNOSTICS" on the Status-Line and enters the diagnostics mode.
- 6) Press the right Switch-3 ">>>" and select the menu displayed as "SERVO" on the left of the Switch-Line. Pressing the left Switch-1 "SERVO" displays "ENTER PASSWORD" on the Status-Line. This is the password input prompt.
- 7) Press Switch-3,-2 and -3 in sequence. "DRIVE TESTS" will be displayed on the Status-Line.
- 8) Press the right Switch-3 ">>>" and select the menu displayed as "LOADING TESTS" on the Status-Line. Pressing the center Switch-2 "ENTER" displays "TUP Mo LOCK POS" on the Status-Line and enters the electric operation mode.
- 9) Press the right Switch-3 ">>>" and select the menu displayed as "SUP Mo SLOW CW" on the Status-Line. Pressing the center Switch-2 "ENTER" displays "SUP SLOW CW: OFF" on the Status-Line. This menu is the Rewinding the Tape.
- 10) Press the center Switch-2 "ON", the supply reel starts winding the tape and the tape in the take-up reel is rewound.
- 11) When all the tape in the take-up reel is rewound and the rotation stops at the position where the leader block (threader) can be pulled out, immediately press the left Switch-1 "EXIT". This menu ends and "SUP Mo SLOW CW" is displayed on the Status-Line again.

CAUTION

When executing the next section (6.4.4) continuously, check the flowchart in Figure 6-6. If the conditions are satisfied, the operation can be started from item 9) in section 6.4.4.

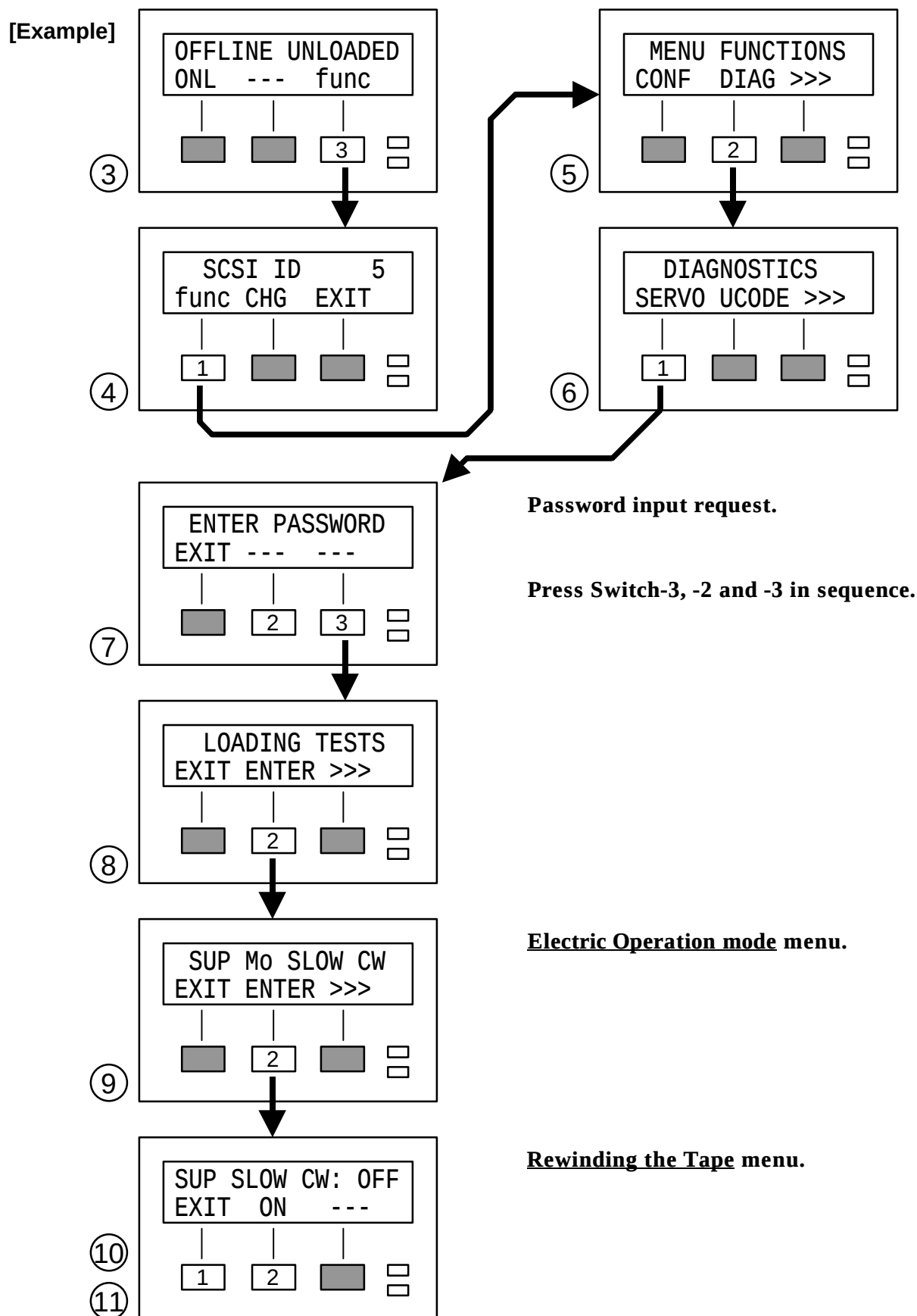


Figure 6-7 Rewinding the Tape

6.4.3 Adjustment at the Threader Reel Position

When the threader is positioned in the threader reel position, the take-up reel must be rotated so it pulls out the leader block (threader) from the take-up reel. The procedures using the electric operation mode are described below. Refer to Figure 6-8.

- 1) Turn the power on. Please observe the drive carefully because the unloading operation may start when the power is turned on. When the drive operation is stopped, continue the following operation if the tape does not fall down from the tape path and the threader is at the reel position.
- 2) Enter the electric operation mode from the off-line mode using the procedures described in items 2) to 8) in the previous section (6.4.2). "TUP Mo LOCK POS" is displayed on the Status-Line of the display.
- 9) Press the right Switch-3 ">>>" and select the menu displayed as "TUP Mo LOCK POS" on the Status-Line. Pressing the center Switch-2 "ENTER" displays "TUP Mo LOCK POS" on the Status-Line again. This menu is the Adjustment at the Threader Reel Position.
- 10) Press the center Switch-2 "START", "RUNING TUP MOTOR" is displayed on the Status-Line, the take-up reel rotates and the adjustment operation starts.
- 11) When the rotation stops at the position where the take-up reel can pull out the leader block (threader), immediately press the left Switch-1 "EXIT". This menu ends and "TUP Mo LOCK POS" is displayed on the Status-Line again.

CAUTION

When executing the next section (6.4.4) continuously, check the flowchart in Figure 6-6. If the conditions are satisfied, the operation can be started from item 9) in section 6.4.4.

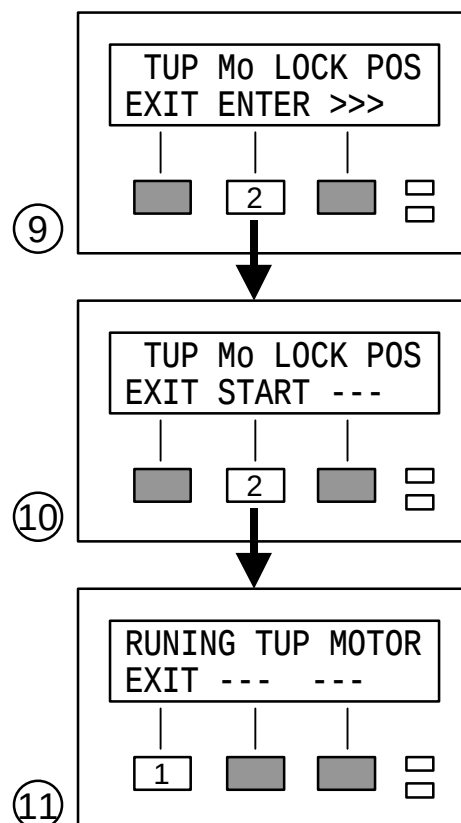


Figure 6-8 Adjustment at the Threader Reel Position

6.4.4 Return to the Threader Home Position

When the threader is at the threader reel position in the take-up reel or in the middle of the tape path, the threader must return to the threader home position of the tray. The procedures using the electric operation mode are described below. Refer to Figure 6-9.

- 1) Turn the power on. Please observe the drive carefully because the unloading operation may start when the power is turned on. When the drive operation is stopped, continue the following operation if the tape does not fall down from the tape path and the threader is at the reel position or in the middle of the tape path.
- 2) Enter the electric operation mode from the off-line mode using the procedures described in items 2) to 8) in the previous section (6.4.2). "TUP Mo LOCK POS" is displayed on the Status-Line of the display.
- 9) Press the right Switch-3 ">>>" and select the menu displayed as "THREADER TEST" on the Status-Line. Pressing the center Switch-2 "ENTER" displays "SELECT SUP TENSN" on the Status-Line. This menu is the Return to the Threader Home Position.
- 10) If the tape is in the tape path (there is a leader block), press the right Switch-3 "ON". If the tape is not in the tape path, press the center Switch-2 "OFF". "SUP Tension:" is displayed on the center of the Status-Line.
- 11) Press the center Switch-3 "BWD", the threader start moving to the home position.
- 12) When the threader finishes moving to the home position, immediately press the left Switch-1 "STOP". Then press the left Switch-1 "EXIT", this menu ends and "THREADER TEST" is displayed on the Status-Line again.

CAUTION

When executing the next section (6.4.5) continuously, check the flowchart in Figure 6-6. If the conditions are satisfied, the operation can be started from item 9) in section 6.4.5.

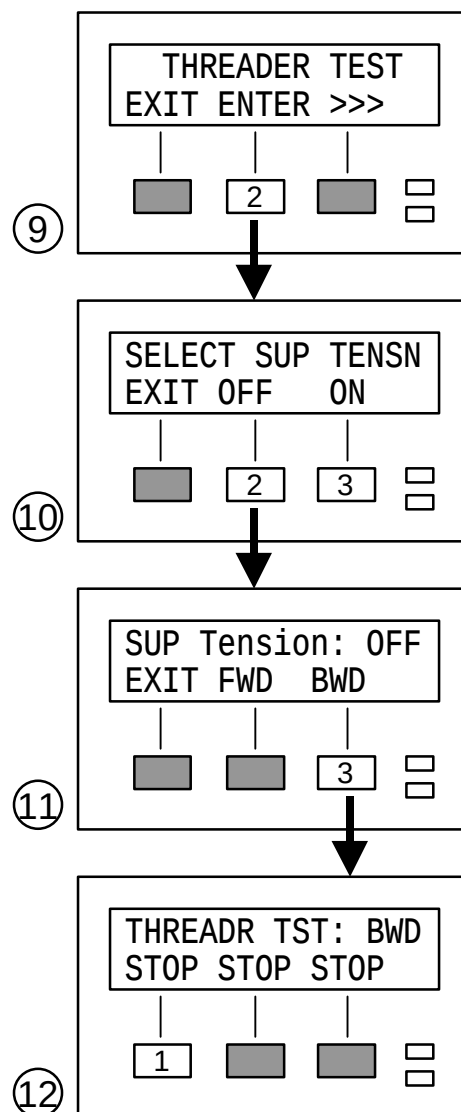


Figure 6-9 Return to the Threader Home Position

6.4.5 Raising the Tray

When the tray does not rise, the tray must be raised by using the elevator mechanism. The procedures using the electric operation mode are described below. Refer to Figure 6-10.

- 1) Turn the power on. Please observe the drive carefully because the unloading operation may start when the power is turned on. When the drive operation is stopped, continue the following operation if the tape does not exist in the tape path and the threader is at the home position.
- 2) Enter the electric operation mode from the off-line mode using the procedures described in items 2) to 8) in the previous section (6.4.2). "TUP Mo LOCK POS" is displayed on the Status-Line of the display.
- 9) Press the right Switch-3 ">>>" and select the menu displayed as "ELEVATOR UP/DOWN" on the Status-Line. Pressing the center Switch-2 "ENTER" displays "ELEVATOR UP/DOWN" on the Status-Line again. This menu is the Raising the Tray.
- 10) If the tray is not lowered, press the right Switch-3 "DOWN" to lower the tray completely. "ELEV GOING DOWN" is displayed on the Status-Line and the tray is lowered.
- 11) If the tray is lowered completely, press the center Switch-2 "UP". "ELEV GOING UP" is displayed and the tray rises.
- 12) When the tray has risen completely and stopped, immediately press the left Switch-1 "STOP". Then press the left Switch-1 "EXIT", this menu ends and "ELEVATOR UP/DOWN" is displayed on the Status-Line again.

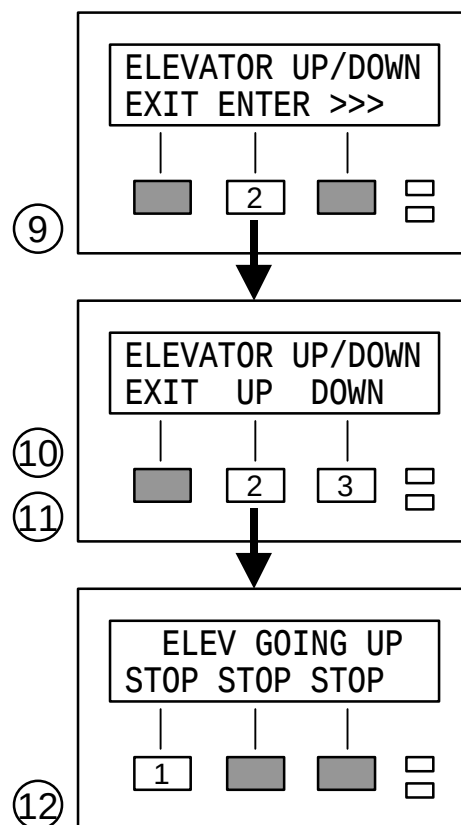


Figure 6-10 Raising the Tray

6.5 Unloading by Manual Operation

If an error occurs when loading or unloading is performed, the drive mechanism must be operated manually under the following conditions.

- 1) The tape has fallen down of the tape path.
- 2) The tape is cut off.
- 3) The remote control operation using switches on the operator panel failed.
- 4) The drive has malfunctioned.

The procedures to recover the drive manually after turning the power off and disassembling the drive are described in this section (6.5).

CAUTION

The following operations should be performed after removing the cover of this drive to enable to observe the tape path.



WARNING!

Always turn off the power before removing the cover of the drive. Never touch the inside of the drive when turning the power on. Even when the power has been turned off, do not touch the area surrounding the power supply unit and the tape head.

Refer to Chapter 7 for the disassembly procedures of the drive.

6.5.1 Selecting the Unloading Procedure

The operation differs according to the tape condition. Confirm the location of the tape on the tape path, from the threader home position, and tape head to threader reel position, referring to Figure 6-5.

When the tape position is determined, select the procedure according to the flowchart in Figure 6-11 and execute the operation.

CAUTION

Be especially careful when operating this drive. If you make any mistake it may damage the drive or tape.

Always check the tape path while operations are executed. When operation is interrupted or an abnormal sound has occurred, turn off the power immediately.

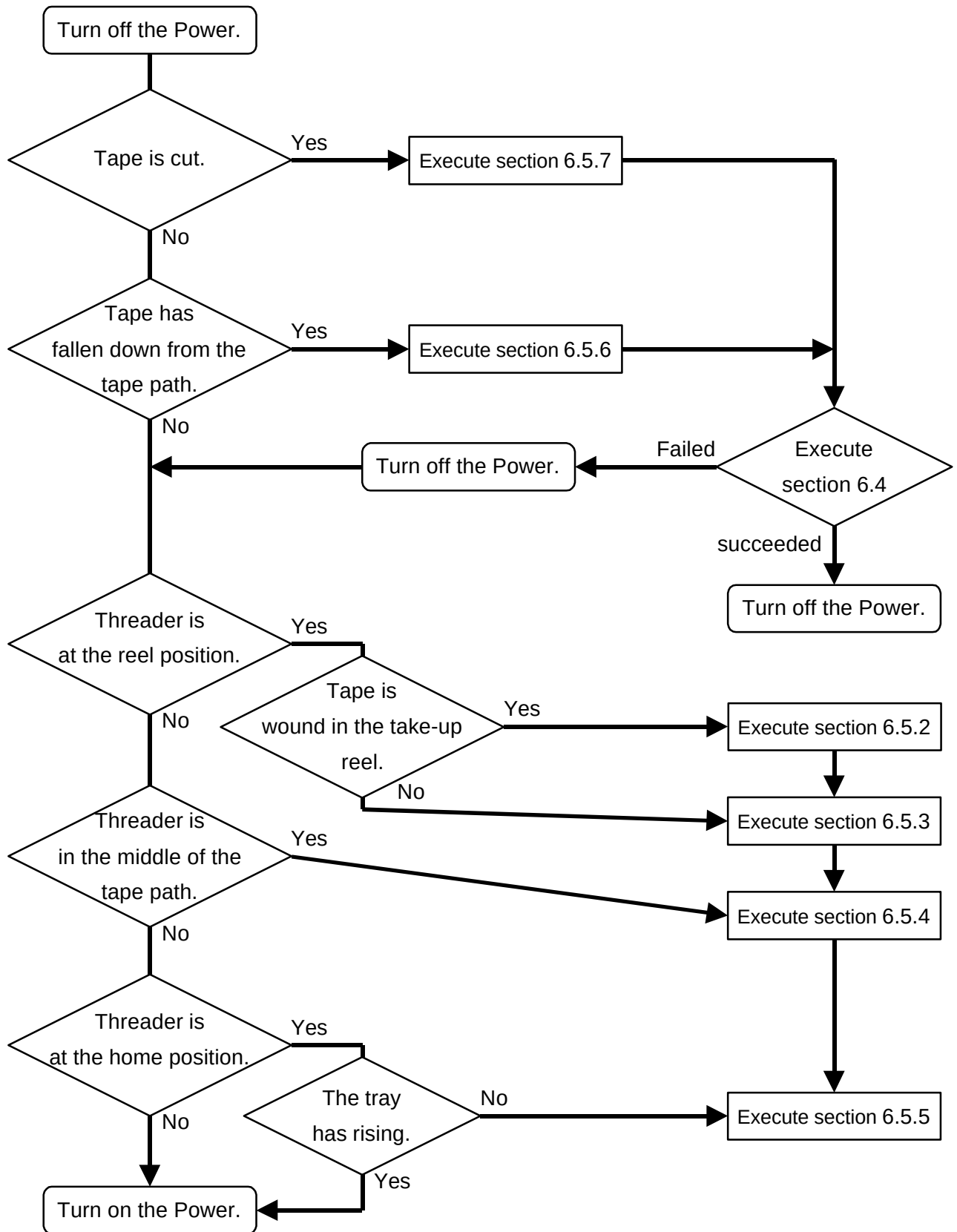


Figure 6-11 Flowchart of Unloading by Manual Operation

6.5.2 Rewinding the Tape

The tape must be rewound to the position where the leader block can be pulled out when the tape is wound in the take-up reel. The tape can be rewound by rotating the supply reel motor under the tray. The procedures are described below.

- 1) Always turn off the power. Place the drive so the power supply is in the bottom position. (Refer to Figure 6-12.) Continue the following operation if the tape does not fall down from the tape path.
- 2) Remove the bottom cover of the drive part. (Refer to Chapter 7.)
- 3) Insert the 3mm-hexagon wrench into the supply motor shaft shown in Figure 6-12. Be careful when performing an operation so the wrench does not contact the circuit boards around the supply motor shaft.
- 4) Turn the wrench slowly clockwise while observing the tape path, which is a right turn from the position of the tape path side. It is a counterclockwise turn, which is a left turn when viewed from the bottom part. The supply reel starts to wind a tape by rotating a supply reel motor and the tape in the take-up reel is rewound. Turn the wrench slowly and carefully so the tape does not fall down from the tape path at this time.
- 5) This operation is completed when the entire tape is rewound and the take-up reel is stopped rotating at the position where the leader block (threader) can be pulled out. (Refer to Figure 6-5.) If the tape has fallen down, perform operations from section 6.5.6 again.

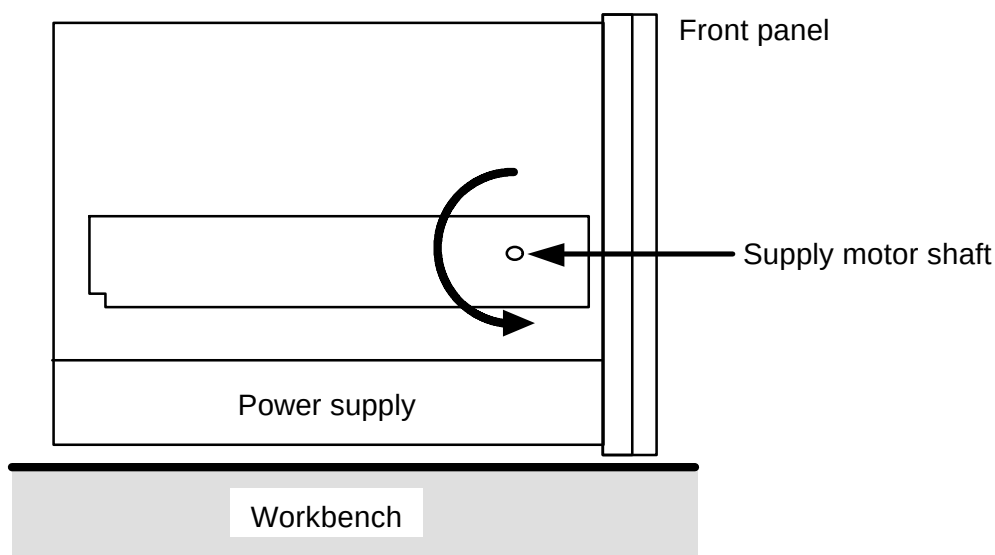


Figure 6-12 Bottom View

6.5.3 Adjustment at the Threader Reel Position

When the threader is positioned in the threader reel position, the take-up reel must be rotated so it pulls out the leader block (threader) from the take-up reel. The procedures are described below.

- 1) Always turn off the power. When the tape is loaded in the tape path, place the drive so the power supply is in the bottom position. (Refer to Figure 6-13.) Continue the following operation if the tape does not fall down from the tape path. When the tape is not loaded in the tape path, the drive can be placed in the regular position or position where the power supply is in the bottom.
- 2) Lightly touch the take-up reel shown in Figure 6-13 with your hand and rotate it slowly until the position where the leader block (threader) can be pulled out. Rotate the take-up reel slowly and carefully so the tape does not fall down from the tape path at this time.
- 3) This operation is completed if the tape is not fall down from the tape path. If the tape has fallen down, perform operations from section 6.5.6 again.

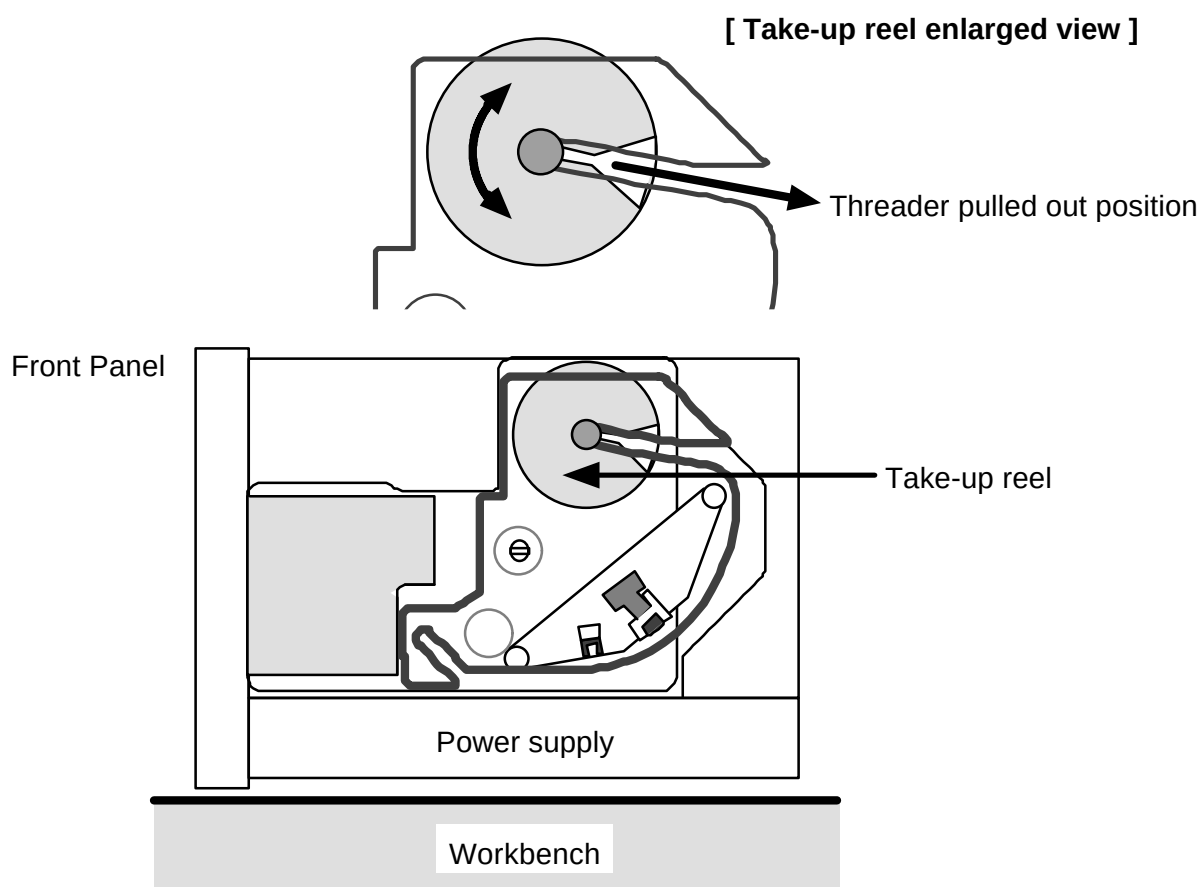


Figure 6-13 Take-up Reel

6.5.4 Return to the Threader Home Position

When the threader is at the threader reel position in the take-up reel or in the middle of the tape path, the threader must return to the threader home position of the tray. The procedures are described below.

- 1) Always turn off the power. When the tape is loaded in the tape path, place the drive so the power supply is in the bottom position. (Refer to Figure 6-14.) Continue the following operation if the tape does not fall down from the tape path. When the tape is not loaded in the tape path, the drive can be placed in the regular position or position where the power supply is in the bottom.
- 2) When the tape is loaded in the tape path, the threader must be moved carefully while rewinding a tape according to the procedure described in section 6.5.2 so the tape does not fall down from the tape path.
- 3) Insert the 6mm-screwdriver or coin into the thread motor shaft shown in Figure 6-14. Be careful because the shaft may be damaged if an incorrectly sized screwdriver is used.
- 4) Turn the thread motor shaft slowly counterclockwise while observing the tape path, which is a left turn from the position of the tape path side. Turn it slowly and carefully so the tape does not fall down from the tape path at this time. Also be careful so the pulley (head of the threader) does not run on or get under the thread plate.
- 5) This operation is completed when the threader is moved completely to the home position and the leader block and entire tape are stored in the cartridge. If the tape has fallen down, perform operations from section 6.5.6 again.

CAUTION

Do not hold the picker or pulley when moving the threader.

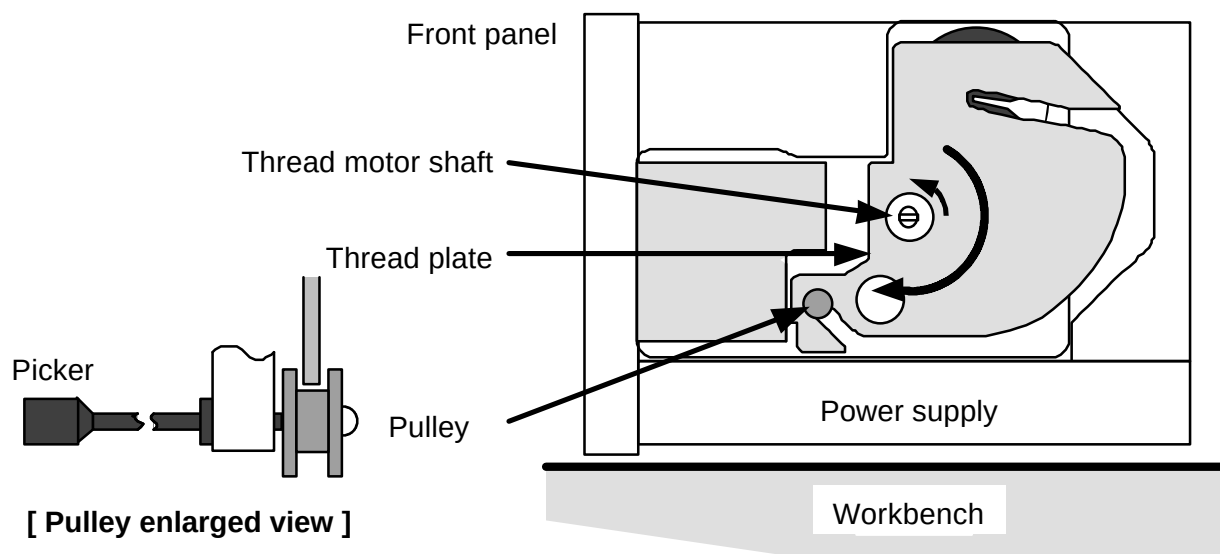


Figure 6-14 Threader

6.5.5 Raising the Tray

When the tray does not rise, the tray must be raised by using the elevator mechanism. The procedures are described below.

- 1) Always turn off the power. Place the drive in the regular position. Continue the following operation if the tape or leader block are not loaded in the tape path.
- 2) The tray rises when the lever of the elevator mechanism (elevator cam assembly) is turned. The following explanation indicates the order by referencing the position when viewed from the front. (Refer to Figure 6-15.)
- 3) First of all, engage the gear of the elevator motor and the lever each other by pressing the lever. Turn the lever to the front side. The tray rises a slightly if the engagement is correct.
- 4) Next, leave the distance between the gear of the elevator motor and the lever. Turn the lever to the rear side. The tray does not rise if the engagement is completely released.
- 5) Repeat the operations 3) and 4) described above until the gear does not turn to the front side. Keep performing these operations even though the tray finished rising. The cartridge in the tray is ejected by the time the gear stops turning.

CAUTION

Do not hold and raise the tray directly with your hand.

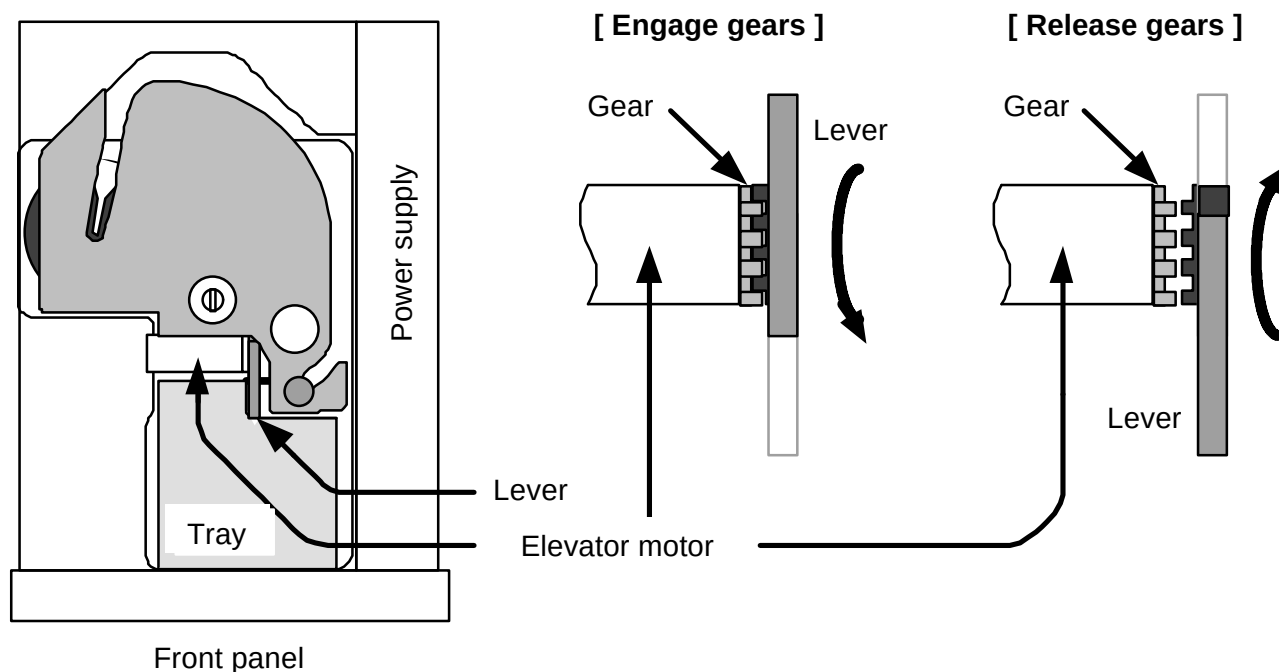


Figure 6-15 Elevator Mechanism

6.5.6 Return to the Tape Path

When the tape has fallen down from the tape path, it must be return the tape to the tape path. The procedures are described below.

- 1) Always turn off the power. Place the drive so the power supply is in the bottom position. (Refer to Figure 6-16.) Follow the flowchart in Figure 6-11 after that the tape is returned by placing the drive in this position.

Perform the operations according to conditions of each number, referencing the Figure 6-16 and following the flowchart shown in Figure 6-11.

- 2) **Caution:** Never touch the recording surface (the surface contacts the tape head) and the tape head with your hand when moving the tape position. Be careful so the leader block does not contact the tape head when the leader block is in the tape path.
- 3) When the threader is in the reel position, move the tape so the tape passes through guides in four locations. Turn the take-up reel clockwise viewed from the tape path and wind the tape slack to the tape-up reel referring to section 6.5.3.
- 4) When the leader block is in the tape path, move the tape so the tape passes through each guide. Turn the supply reel clockwise viewed from the tape path and wind the tape slack to the supply reel referring to section 6.5.2.
- 5) When the leader block has fallen down from the threader, move the leader block to the home position. Turn the supply reel clockwise viewed from the tape path and wind the tape slack to the supply reel referring to section 6.5.2 at this time. Then raise the tray and remove the cartridge referring to section 6.5.5. Refer to section 2.1 and install the leader block in the cartridge securely.

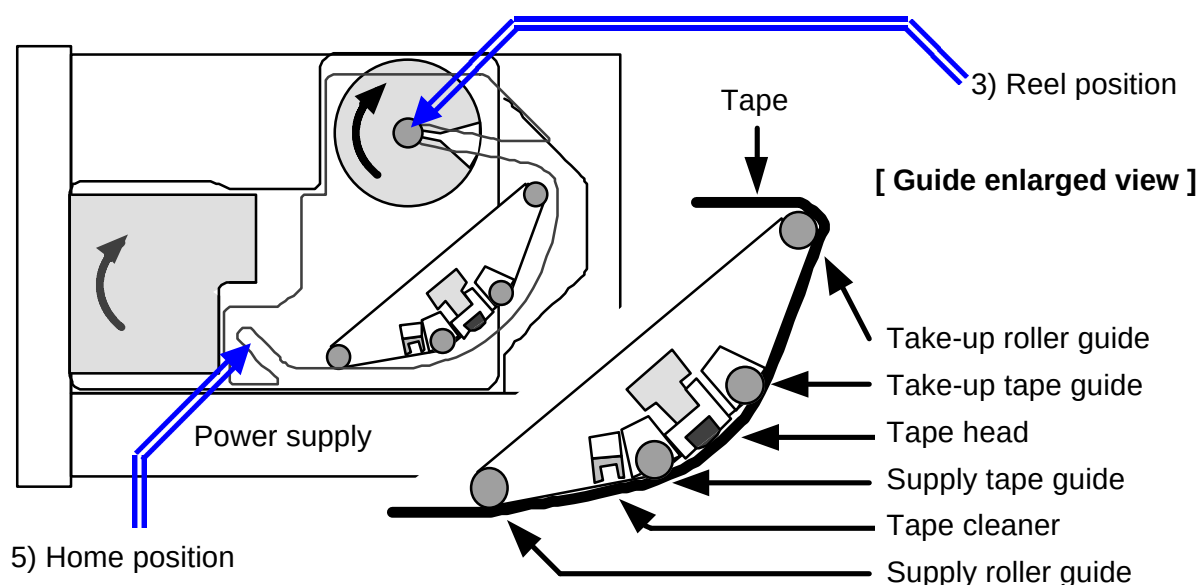


Figure 6-16 Tape Path and Tape Guide

6.5.7 Leader Block Removal

When the tape is cut, both the tape and the leader block must be removed. The procedures are described below.

- 1) Always turn off the power. Place the drive so the power supply is in the bottom position. (Refer to Figure 6-16.)

Perform the operations according to conditions of each number, referencing the Figure 6-16 and following the flowchart shown in Figure 6-11.

- 2) **Caution:** Never touch the recording surface (the surface contacts the tape head) and the tape head with your hand when moving the tape and leader block positions. Be careful so the leader block does not contact the tape head when the leader block is in the tape path.
- 3) When the leader block is in the take-up reel, raise the tray and remove the cartridge refer to section 6.5.5. Remove the tape and leader block that are left in the take-up reel by pulling the end of the tape directly and turning the take-up reel. Destroy these cartridge and tape.
- 4) When the leader block is not in the take-up reel, raise the tray and remove the cartridge refer to section 6.5.5. Remove the tape and leader block that are left in the tape path by pulling the end of the tape directly and turning the take-up reel. Refer to section 3.2 for additional operation procedures.

6.6 CSL Adjustment Procedure

6.6.1 Adjustment of the CSL Tray Home Position

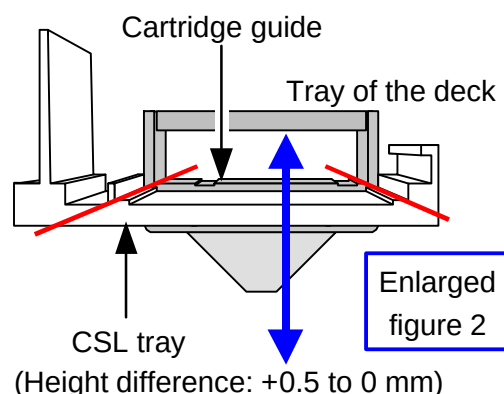
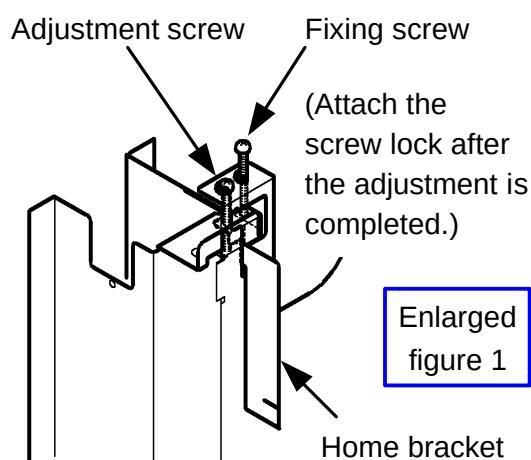
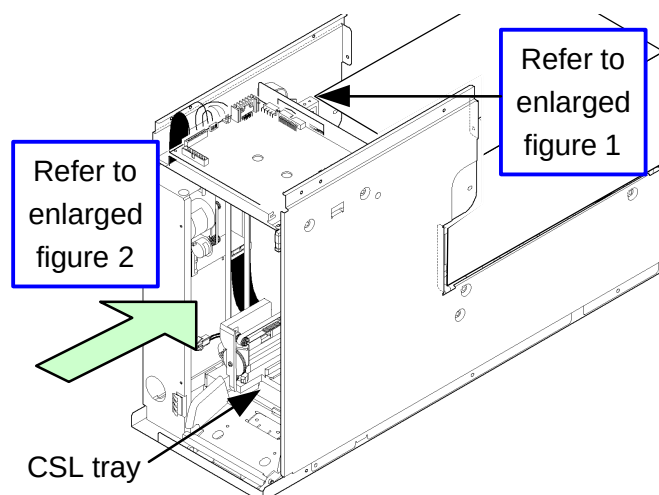
The CSL tray home position must be adjusted when the drive unit is replaced. Home position as; the CSL tray position when the cartridge is carried to the drive unit.

§ Adjustment procedure

- 1) Take out the magazine, close the front door and turn on the power.
- 2) The CSL tray moves to the home position and the message “STAND BY” is displayed on the operator panel. Next open the front door.
- 3) Check the height of the CSL tray and the cartridge guide from the front.
- 4) If the CSL tray is lower than the cartridge guide, loosen the fixing screw by turning counterclockwise and rise the home bracket height by turning the adjustment screw clockwise. If the CSL tray is higher, turn the adjustment screw counterclockwise to lower the home bracket height.
- 5) Close the front door and execute the “Home position mode (Refer to section 6.6.3)” from the operator panel, then move the CSL tray back to the home position once again.
- 6) After performing the adjustment to set the following accuracy, turn the fixing screw counterclockwise to secure the home bracket position. (Attach the screw lock after the adjustment is completed.)

§ Adjustment accuracy

Height difference between the CSL tray and the cartridge guide : +0.5 to 0 mm (“+” as CSL tray is higher than cartridge guide.)



6.6.2 Adjustment of the Drive Horizontal Position

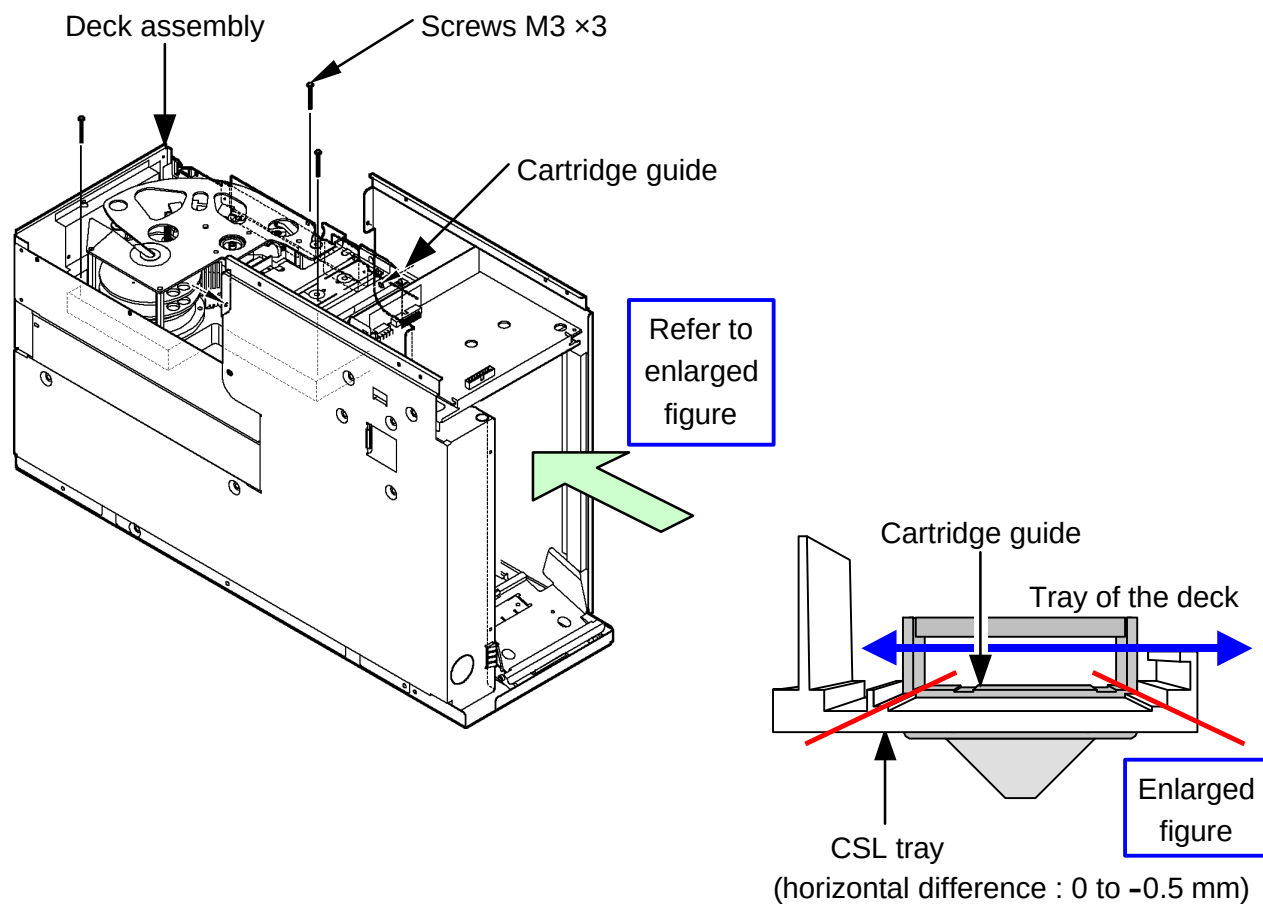
When the drive unit is replaced, adjust the drive horizontal position with the CSL tray.

§ Adjustment procedure

- 1) Move the CSL tray to the home position. (Refer to section 6.6.3.)
- 2) Observe the horizontal position of the CSL tray and the cartridge guide from the front.
- 3) Loosen the M3 screws in 3 locations which secure the deck assembly. Adjust the horizontal position with the CSL tray distance.
- 4) Perform the adjustment to set the following accuracy and secure it.

§ Adjustment accuracy

Height difference between the CSL tray and the cartridge guide : 0 to -0.5 mm (“-” as the direction that the CSL tray leans to left from the point view of the front.)



6.6.3 CSL Home Position Mode

The CSL tray can be moved to the home position by using the “CSL Home Position Mode” when the “Adjustment of the CSL Tray Home Position” (Section 6.6.1) is executed. The procedures are described below. Refer to Figure 6-17.

- 1) First, if the operation mode is on the on-line mode, change to the off-line mode. Refer to Figure 2-6.
- 2) “func” will be displayed on the right Switch-Line of the display. Pressing the right Switch-3 “func” displays the current SCSI ID on the Status-Line.
- 3) Pressing the left Switch-1 “func” displays “MENU FUNCTIONS” on the Status-Line.
- 4) Select the menu displayed as “DIAG” on the center of the Switch-Line. Pressing the center Switch-2 “DIAG” displays “DIAGNOSTICS” on the Status-Line and enters the diagnostics mode.
- 5) Press the right Switch-3 “>>>” and select the menu displayed as “SERVO” on the left of the Switch-Line. Pressing the left Switch-1 “SERVO” displays “ENTER PASSWORD” on the Status-Line. This is the password input prompt.
- 6) Press Switch-3,-2 and -3 in sequence. “DRIVE TESTS” will be displayed on the Status-Line.
- 7) Press the right Switch-3 “>>>” and select the menu displayed as “CSL DIAG / ADJ / MOV” on the Status-Line. Pressing the center Switch-2 “ENTER” displays “CSL TUNE / DIAG” on the Status-Line. This menu is the CSL Adjustment Mode.
- 8) Press the center Switch-2 “ENTER” displays “SLOW LOAD TEST” on the Status-Line.
- 9) Press the right Switch-3 “>>>” and select the menu displayed as “CSL ADJUST HOME” on the Status-Line. Pressing the center Switch-2 “ENTER” enter the menu of the CSL Home Position Mode.
- 10) Press the center Switch-2 “START” in order to execute the “CSL ADJUST HOME”.
- 11) “ADJUSTING HOME” is displayed on the Status-Line and the CSL tray is moved to the home position.
- 12) When the movement is completed , “CSL ADJUST HOME” is displayed on the Status-Line one more time.
- 13) Press the right Switch-3 “>>>” to select the menu that displays “EXIT” on the Switch-Line. Press this “EXIT” switch to close to each of the menus.

CAUTION

Don't open the door performing the movement.

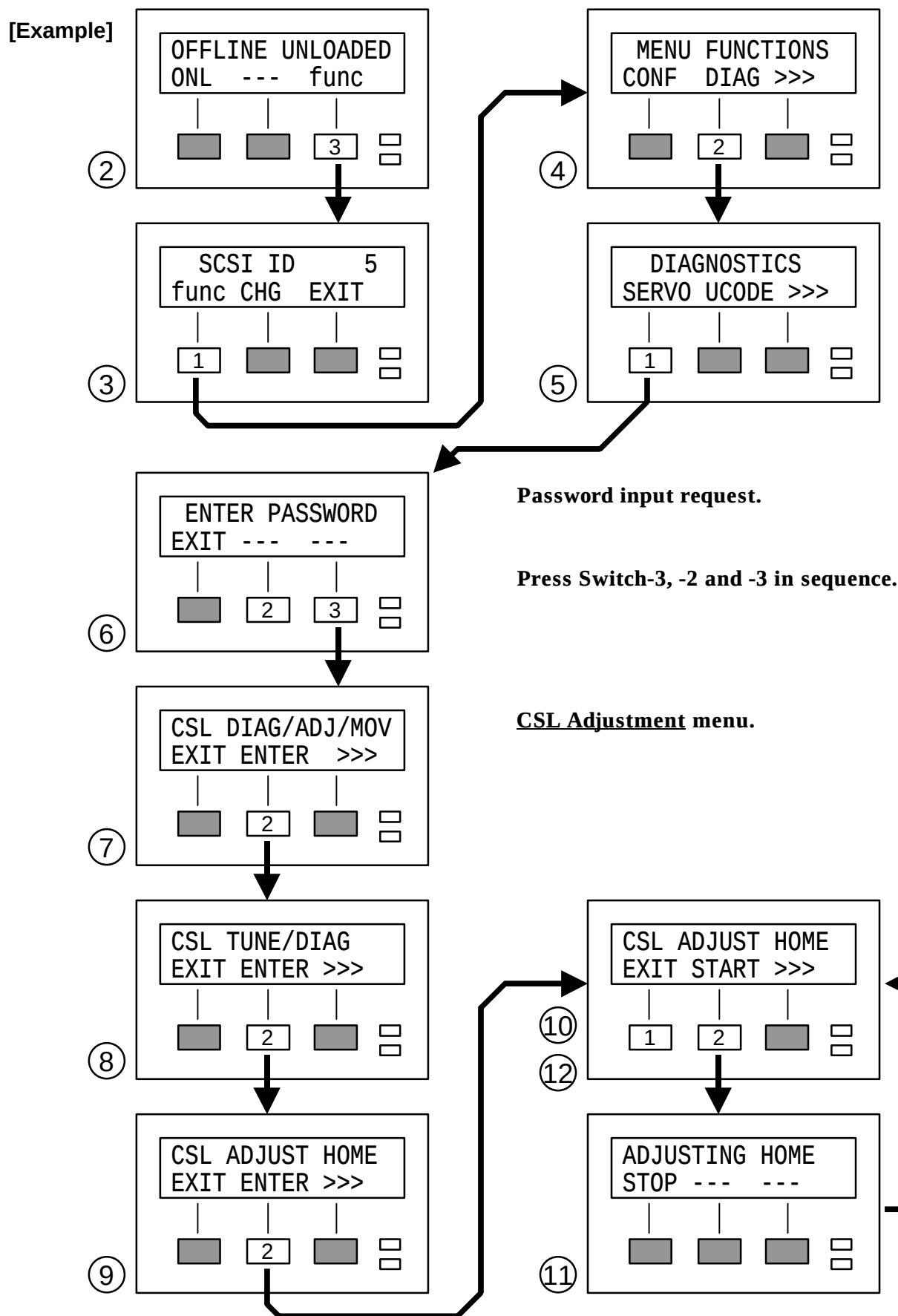


Figure 6-17 CSL Home Position Mode

6.6.4 Checking the Front Panel

Check the following procedure when the front panel assembly is installed or removed.

§ Relative position of the cartridge and the front door

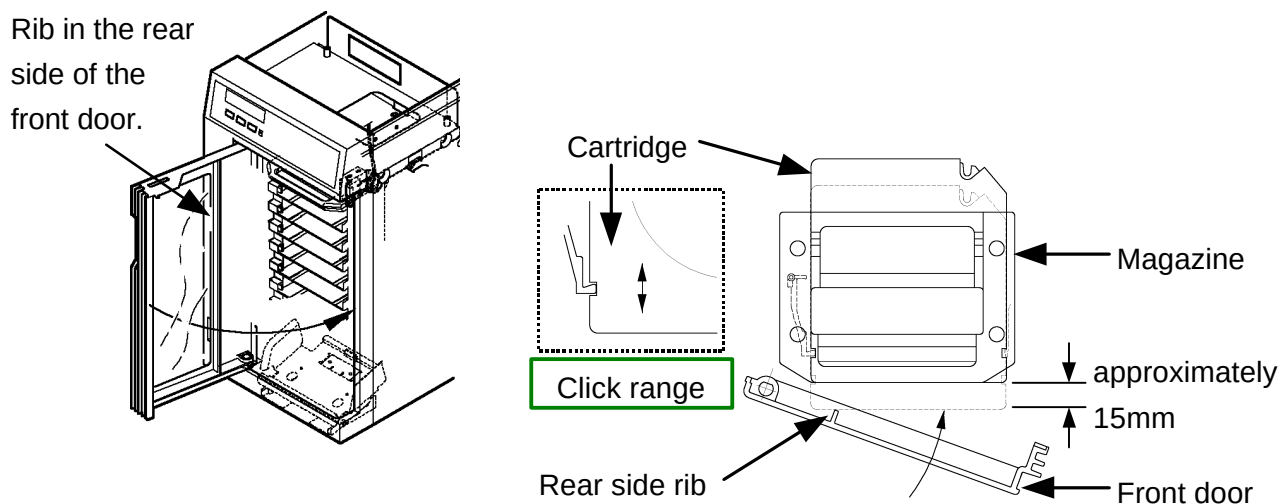
Check the relative position of the cartridge and rib in the rear side of the front door. Make sure that the following conditions are satisfied. If the conditions are not satisfied, loosen the M4 screws in 4 locations that secure the front panel assembly and adjust the front and rear position of the front panel assembly.

§ Procedure

- 1) Open the front door and set sliding out the cartridge at the position approximately 15 mm in front from the magazine. (The 1st and the 10th slot.)
- 2) Close the front door slowly to push in the cartridge.
- 3) Open the front door to verify the cartridge position.

§ Conditions

- 1) The cartridge must be within the click range of the magazine.
- 2) The cartridge must be moved to the rear side approximately 1 mm.



§ Micro-switch check and adjustment

Check the micro-switch position when the front door is closed.

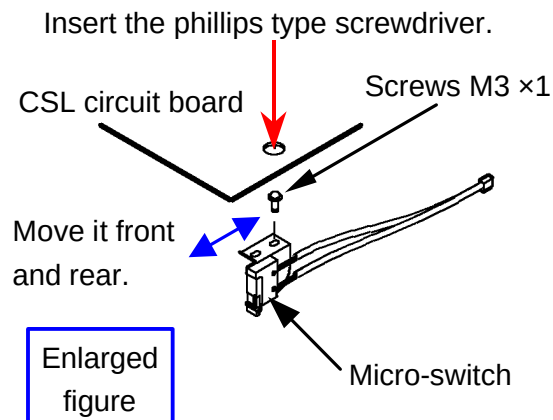
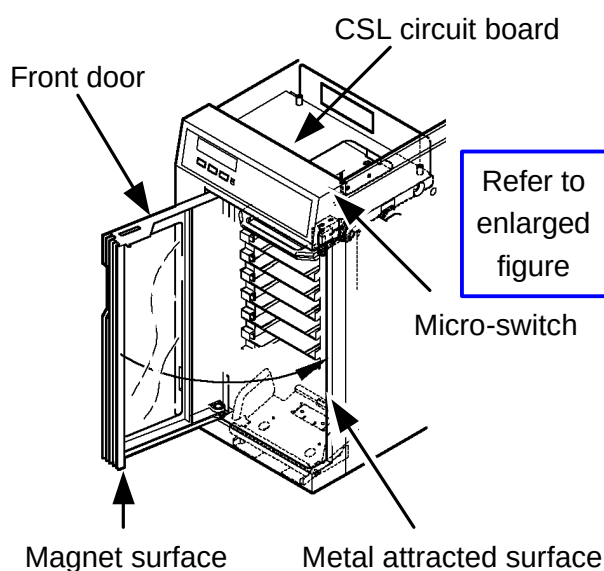
Make sure that the following conditions are satisfied. If this conditions are not satisfied, adjust the front and rear position of the micro-switch.

§ Conditions

- 1) The micro-switch must work at 0.5 to 1.0 mm before the front door closes. (Make sure the click sounds.)
- 2) There must be no space between the front door and the upper part of the front panel while closing the front door. (Between the magnet surface of the front door and the metal attracted surface)

§ Adjustment

- 1) Insert the phillips type screwdriver from the circuit board hole and loosen the M3 screw.
- 2) Move the micro-switch front and rear and secure it in the position where the work condition is satisfied.

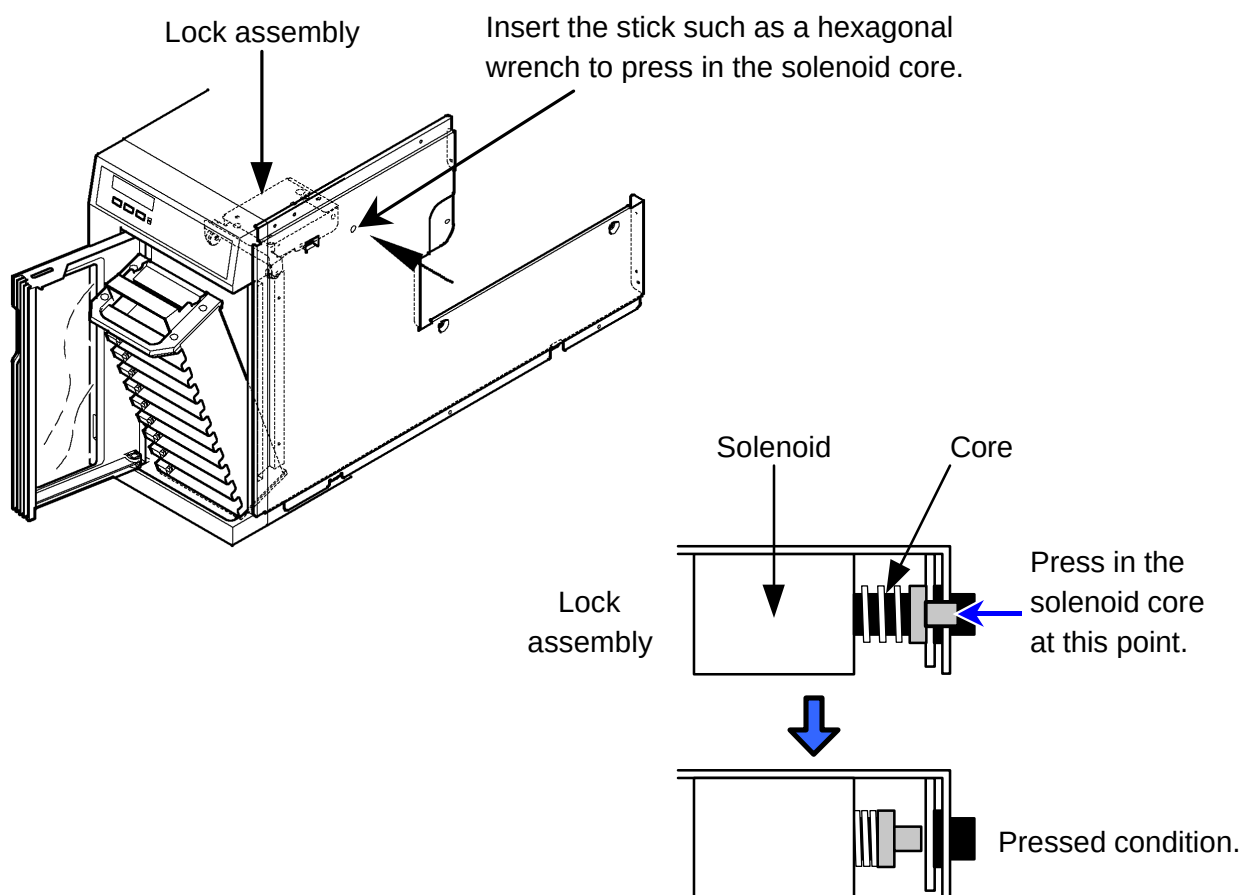


6.7 CSL Operation by Manual Operation

6.7.1 Releasing the Magazine Lock

This drive has a magazine lock mechanism so the magazine remains locked during operation. The magazine lock mechanism must be released in order to take out the magazine when the magazine is locked by some error during operation.

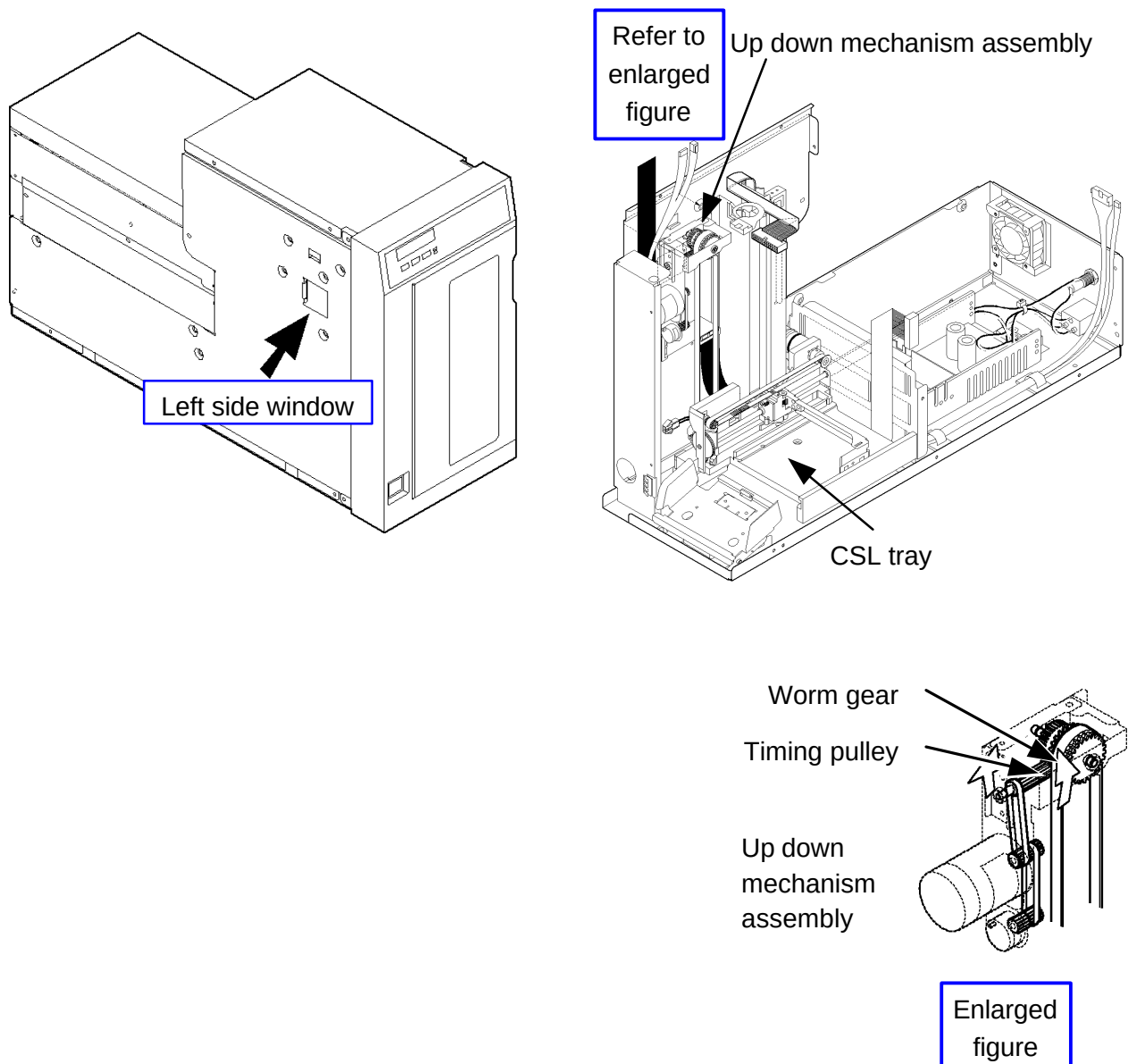
- 1) Open the front door and check the location of the solenoid in the lock assembly from the upper space of the magazine.
- 2) Insert an appropriate stick which has a diameter approximately 2 to 3 mm such as a hexagonal wrench from the round hole in the right side of the CSL cover.
- 3) Press in the solenoid core in the magazine lock to release the lock.



6.7.2 Vertical Moving the CSL Tray

Perform the following procedure to move the CSL tray manually in vertical direction.

- 1) Remove the cover. (Refer to section 7.3.1.)
- 2) Insert the finger from the window in the left side of the drive and turning the timing pulley in front of the worm gear.
- 3) If the timing pulley is turned clockwise from the point view of the front, the CSL tray is moved down. If the timing pulley is turned counterclockwise, the CSL tray is moved up.



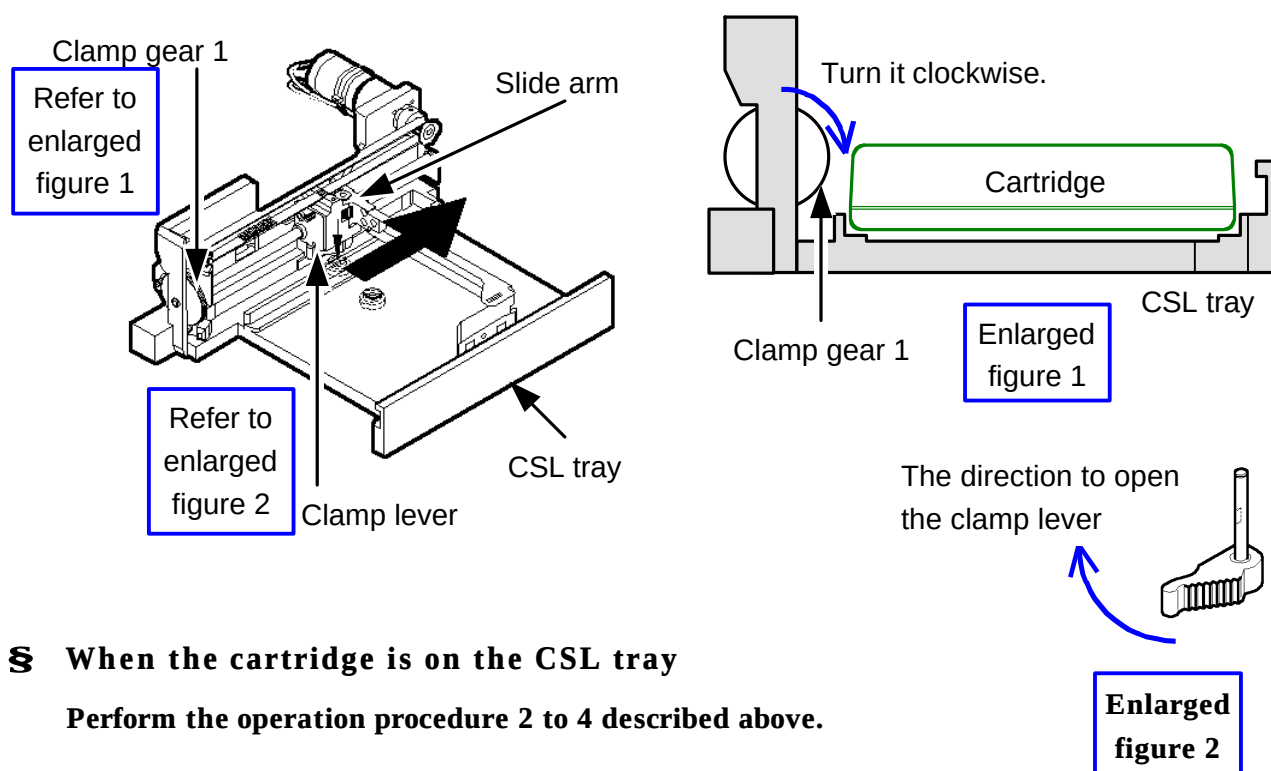
6.7.3 Cartridge Removal from the CSL

When an error occurs during the loading or unloading operation of the CSL is performed, perform the following procedure to remove the cartridge from the CSL tray.

Open the front door and check the conditions of the cartridge which is stopped in the CSL tray. Perform the following operations according to the conditions.

§ When the cartridge is between the CSL tray and the magazine

- 1) Press the left end of the cartridge from the magazine slot on the CSL tray, or hold the bottom of the slide arm to slide the cartridge to the rear side.
- 2) Release the magazine lock and remove the magazine. (Refer to section 6.7.1.)
- 3) Turn the clamp gear 1 clockwise to open the clamp lever.
- 4) Remove the cartridge.



§ When the cartridge is on the CSL tray

Perform the operation procedure 2 to 4 described above.

§ When the cartridge is between the CSL tray and the drive

Perform the operation procedure 2 to 4 described above.

§ When the cartridge is in the drive

Refer to sections 6.3, 6.4 and 6.5.

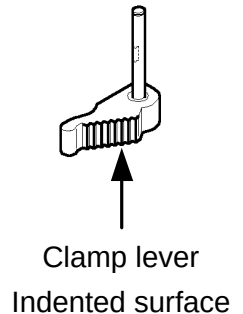
6.8 CSL Maintenance

Perform the following maintenance to ensure a smooth CSL operation (approximately once a year). Refer to section 7.3 for the installation and removal of the parts like covers.

6.8.1 CSL tray

§ Cleaning of the clamp lever

Clean indented surface that holds a cartridge using cotton swabs and ethyl alcohol.



§ Cleaning of the slide arm

Clean interior metal surface that holds a cartridge using cotton swabs and ethyl alcohol.

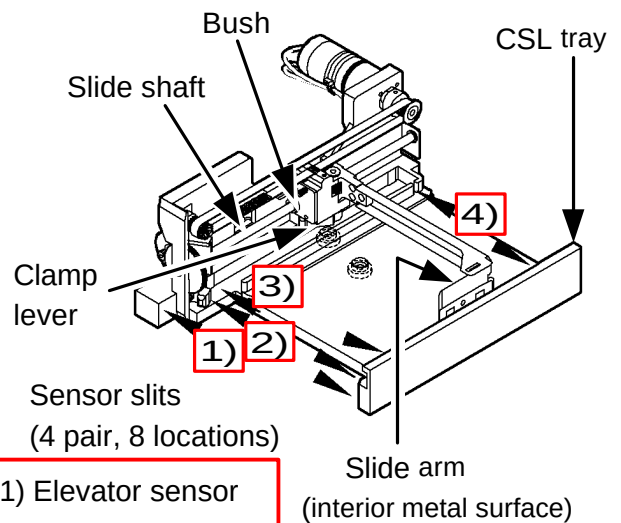
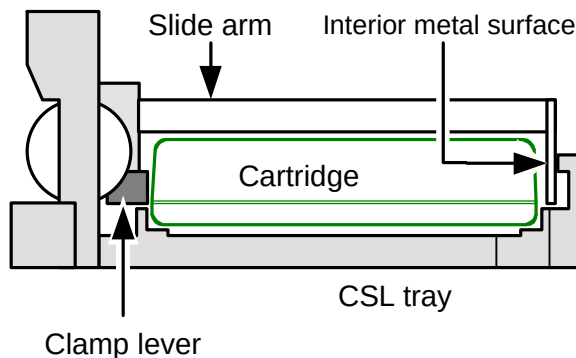
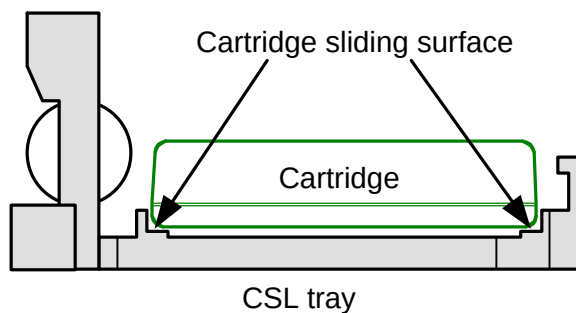
§ Cleaning of the CSL tray

Clean cartridge sliding surfaces using cotton swabs and ethyl alcohol.

Remove any debris from sensor slits. (4 pair, 8 locations)

§ Greasing the slide shaft

Apply small amount of Molykote (refer to Table 7-4) to the sliding parts of the shaft and the bush.

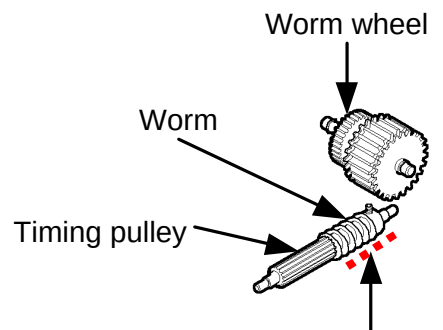
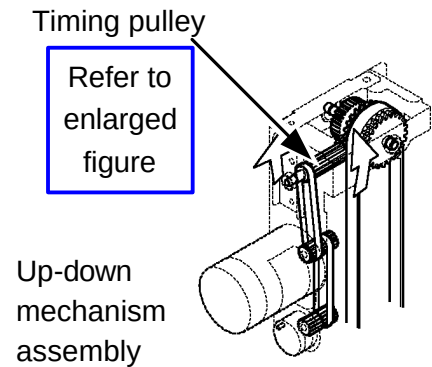
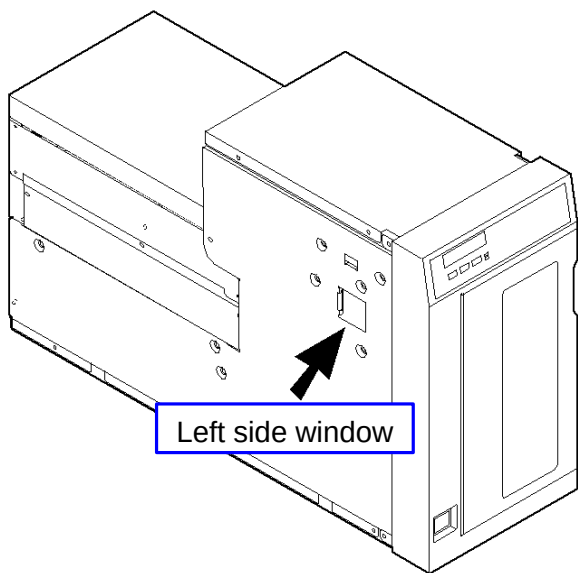


- 1) Elevator sensor
- 2) Cartridge sensor
- 3) Front sensor
- 4) Rear sensor

6.8.2 Up-down mechanism assembly

§ Greasing the worm gear

Check the worm and the worm wheel from the window on the left side of the drive. Apply a thin coat of Lithium soup grease for extreme-pressure (refer to Table 7-4) while turning the timing pulley using cotton swabs, brush, etc.



Apply a thin coat of Lithium soup grease for extreme-pressure.

Enlarged
figure

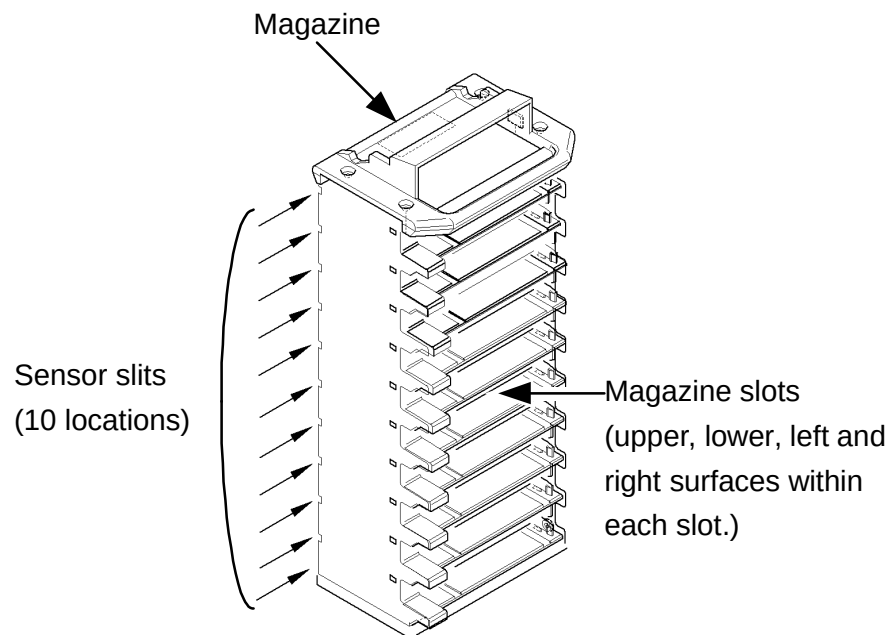
6.8.3 Magazine

§ Cleaning of the magazine slot

Clean the interior surfaces of slots using cotton swabs, etc. (upper, lower, left and right surfaces within each slot.).

§ Cleaning of the sensor slit

Remove any debris on the sensor slits (10 locations).



6.9 Error Logs

This drive can display error logs when the conditions of writing or reading. These are such thing that confirms a cause of error when an error is detected.

When an error is not recovered although error correction or retry sequence has been done, the drive returns the error information to the host computer system via SCSI. Then the error content and code are displayed on the Status-Line of the display. (Refer to Chapter 5.)

When an error is recovered by error correction or retry sequence, an occurrence frequency is not seen. Then the numbers of error correction etc. are able to confirm by this Error Log Display.

Enter the menu of Error Log Display, the error log item is displayed on the center Status-Line of the display and error counter is displayed on the right Status-Line. The error counter can count until 255. 255 or more are displayed as "255". The error items are explained in Table 6-51

Table 6-51 Error Log Items

	Items	Description
1	PERM WRT ERR	Number of unrecovered (permanent) write errors.
2	TEMP WRT ERR	Number of recovered (temporary) write errors.
3	PERM RDF ERR	Number of unrecovered (permanent) read forward errors.
4	TEMP RDF ERR	Number of recovered (temporary) read forward errors.
5	PERM RDB ERR	Number of unrecovered (permanent) read backward errors.
6	TEMP RDB ERR	Number of recovered (temporary) read backward errors.
7	1 TRK IN REC	Number of tracks in recovered error per record (1 of 18 tracks).
8	2 TRK IN REC	Number of tracks in recovered error per record (2 of 18 tracks).
9	3 TRK IN REC	Number of tracks in recovered error per record (3 of 18 tracks).
10	4 TRK IN REC	Number of tracks in recovered error per record (4 of 18 tracks).
11	ISV ERRORS	Number of ISV (short term speed variation) error.
12	TRACK 1 ERR	Number of track in error on an individual basis. Displays the existing track 1 to 36 and number of errors Refer to the comment at the next page.
	TRACK 36 ERR	

Comments : When an error track number is discovered, the errors are corrected by using the track of others without an error. If an error track number is not discovered, the drive execute the automatic retry sequence because the error correction is failure.

The following procedure to display the “Error Logs”. Refer to Figure 6-51.

- 1) First, if the operation mode is on the on-line mode, change to the off-line mode. Refer to Figure 2-6.
- 2) “func” will be displayed on the right Switch-Line of the display. Pressing the right Switch-3 “func” displays the current SCSI ID on the Status-Line.
- 3) Pressing the left Switch-1 “func” displays “MENU FUNCTIONS” on the Status-Line.
- 4) Press the right Switch-3 “>>>” to shift to the next menus.
- 5) Select the menu displayed as “STAT” on the left of the Switch-Line. Pressing the left Switch-1 “STAT” displays “STATISTICS” on the Status-Line and enters the statistics mode.
- 6) Select the menu displayed as “ERLOG” on the center of the Switch-Line. Pressing the center Switch-2 “ERLOG” displays “PERM WRT ERR” on the Status-Line. This menu is the Error Log Display.
- 7) Pressing each time the left Switch-1 “NEXT” on the left, the item and the log are displayed together. Refer to Table 6-51.
Press the center Switch-2 “CLEAR” to initialize all the counters.
Press the right Switch-3 “EXIT” returns to the statistics mode.
- 8) Press the right Switch-3 “>>>” to select the menu that displays “EXIT” on the Switch-Line. Press this “EXIT” switch to close to each of the menus.

CAUTION

Perform the cleaning of the tape head, when there are many numbers of an error log, even in the case that error is recovered by error corrections or retry sequences. Refer to Chapter 3.

Exchange to other cartridges, when there are many numbers of an error log even after cleaning. Refer to item “B” in Table 5-2.

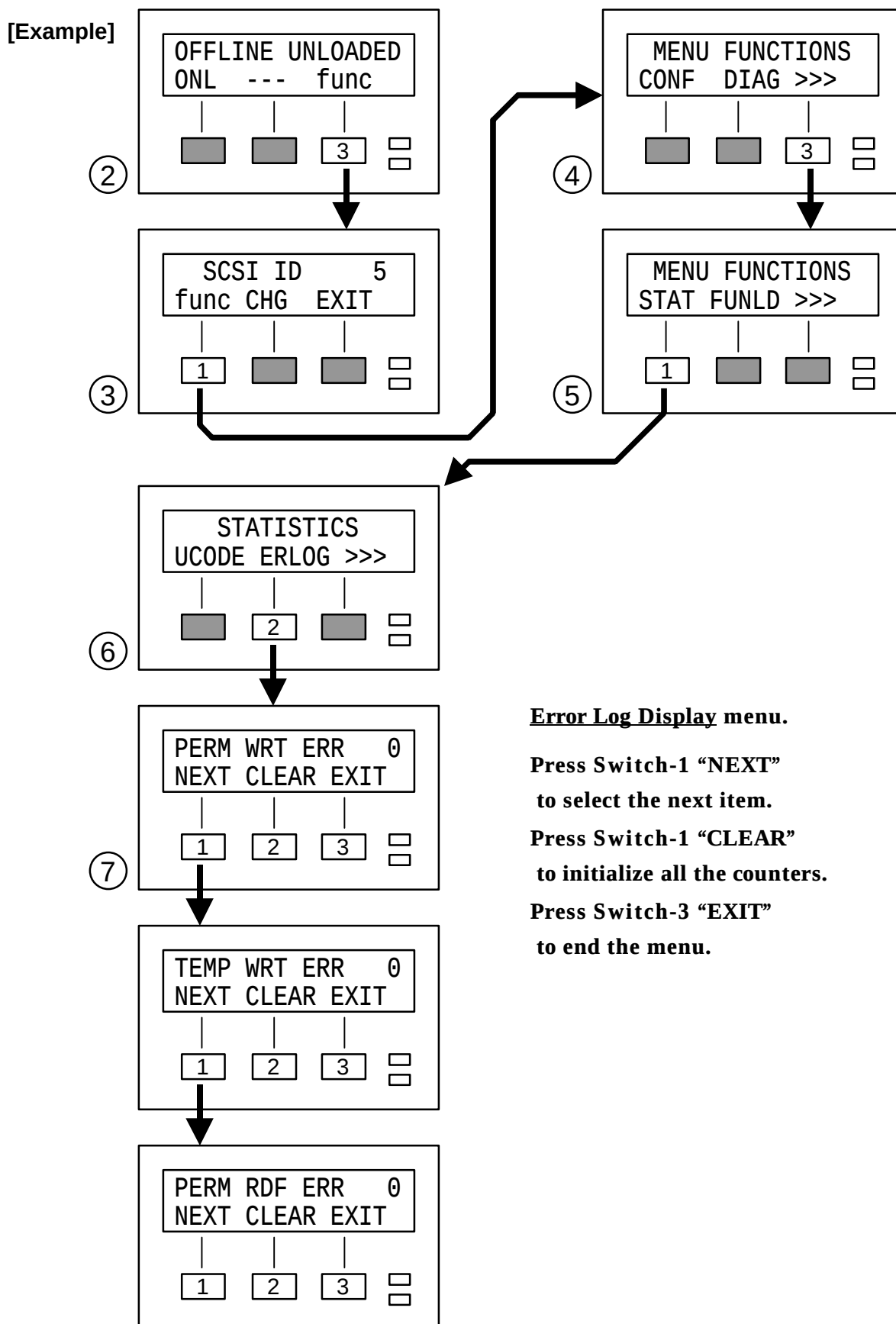


Figure 6-51 Error Log Display

The condition, initializing the number of an error log is shown below.

- 1) The drive is power-on.**
- 2) Unloading a cartridge.**
- 3) Pressing the center Switch-2 "CLEAR" of the display using the procedures described in previous item 7).**
- 4) Receiving SCSI "Log Clear" command from host computer system.**

Chapter 7 Parts Installation and Removal

7.1 Parts Configuration

7.1.1 Block Diagram

The block diagram without CSL model is shown in Figure 7-1S. The block diagram with CSL model is shown in Figure 7-1C. The block diagram is different for each model specifications.

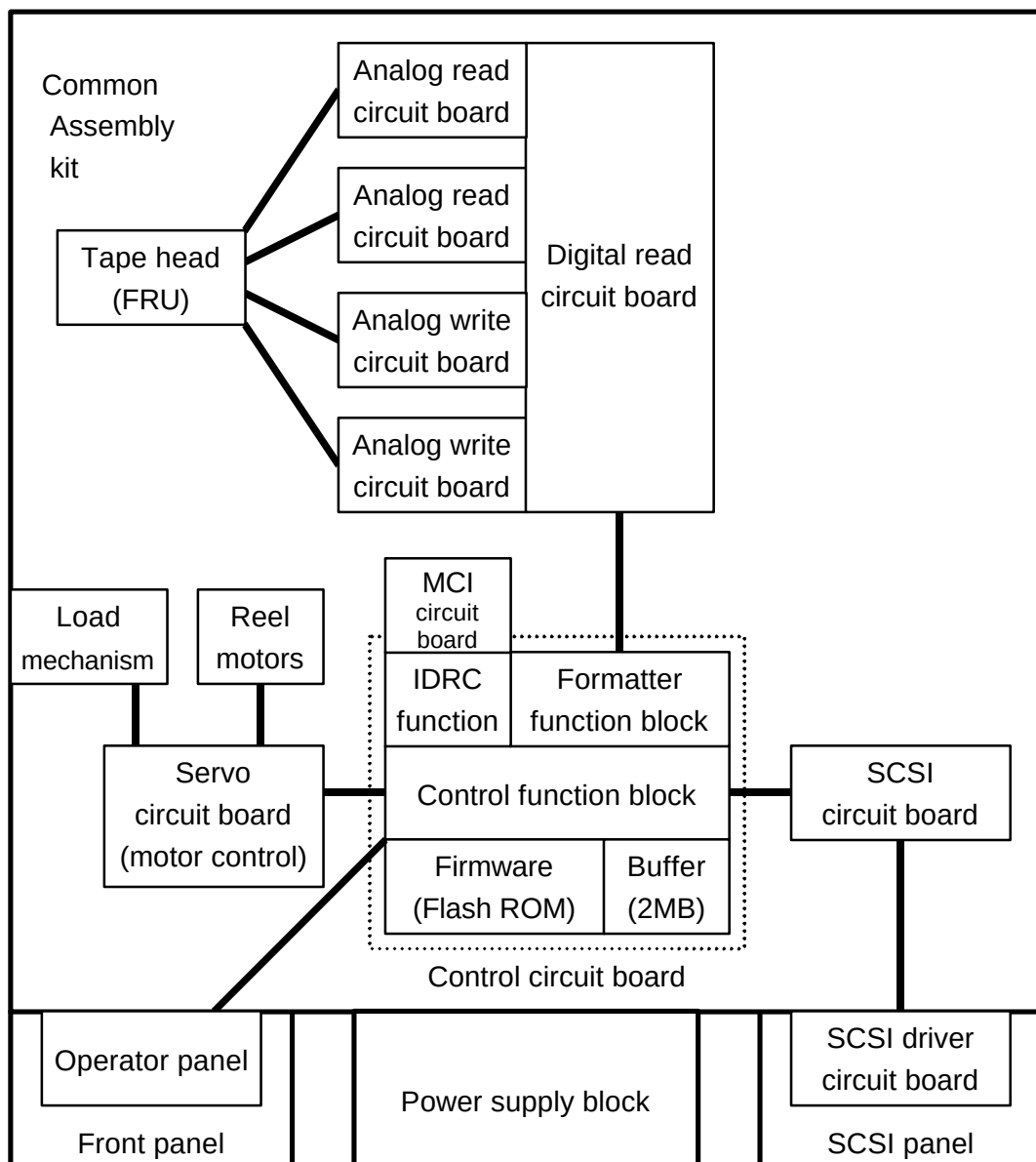


Figure 7-1S Block Diagram [without CSL model]

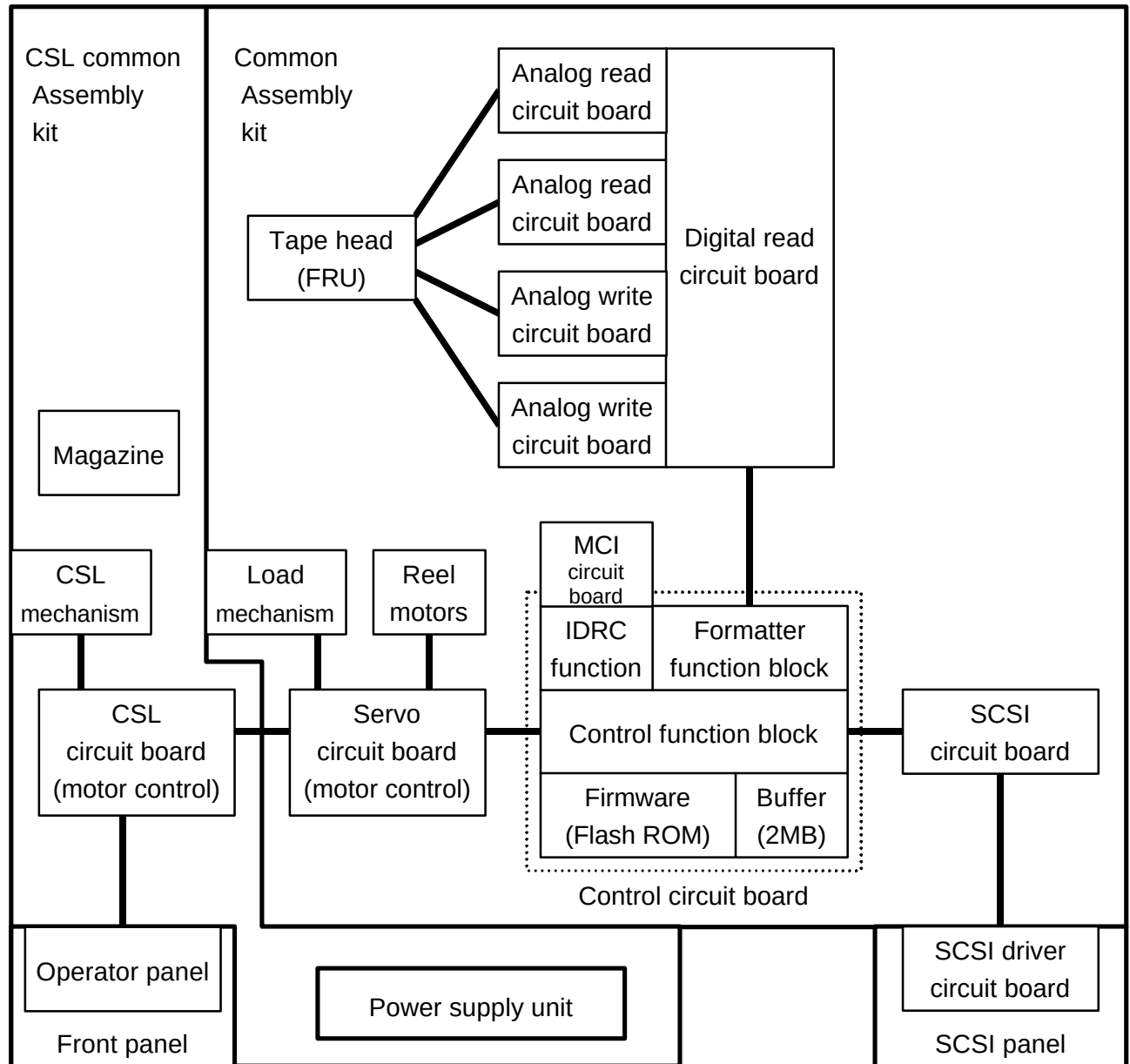


Figure 7-1C Block Diagram [with CSL model]

The periodic replacement parts are also shown in these tables.

Parts name		Parts number	Model name							Service life	Refer to section number
			MS-8418	MS-8436	MS-843D	MS-843E	MS-843F	MS-843H	MS-843M		
Common assembly kit (Refer to Table 7-2A) (Refer to Table 7-2B)		KAL-MFA9001-001	O								Section 7.3.4
		KAL-MFA9002-001		O							
					O						
						O					
							O				
								O			
									O		
Power supply block		KAL-MSS0091-001	Common								Section 7.3.4
	Fan motor	KEF1021	Common							6,000 hours	
	Fuse	KMF51A2-5R0S	Common								Section 7.3.8
Front panel assembly		KAL-MFS0071-001	Common								Section 7.3.2
	Operator panel (OCP)	KAL-MSA0095-001	Common								
	Power switch	KAL-MSS0094-001	Common								
SCSI panel		Refer to Table 7-3	Common								Section 7.3.3
Cover		KKP10757-002	Common								Section 7.3.1

Table 7-1C Parts Configuration [with CSL model]

Parts name		Parts number	Model name						Service life	Refer to section number	
			MS-8418	MS-8436	MS-843D	MS-843E	MS-843F	MS-843H			MS-843M
Common assembly kit (Refer to Table 7-2A) (Refer to Table 7-2B)		KAL-MFA9001-001	O								Section 7.3.4
		KAL-MFA9002-001		O							
					O						
						O					
							O				
								O			
									O		
CSL common assembly kit		KAL-MFA9006-001	Common								
	CSL common assembly (Refer to Table 7-2C)				Common					Section 7.3.4	
	Front panel assembly				No door lock model					Section 7.3.1	
					Door lock model						
		Operator panel (OCP)		KAL-MSA0095-002		Common					
		Front door assembly				Common					
		Power switch		KAL-MSS0094-001		Common					
	Magazine		KAL-MSS0104-001		Common					Section 2.4.2	
SCSI panel		Refer to Table 7-3		Common					Section 7.3.3		
Cover		KKP10781-001		Common					Section 7.3.1		

Table 7-2A Common Assembly Kit

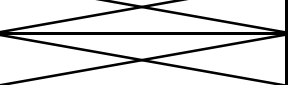
Parts name		Parts number	Model name						Service life	Refer to section number
			MS-8418	MS-8436	MS-843D	MS-843E	MS-843F	MS-843H		
Deck assembly			O	O	O	O	O	O		
FRU (Tape head etc.)		KAL-MSA0096-001	O						3,000 hours	Section 7.3.6
		KAL-MSA0096-003		O	O			O	3,000 hours	
		KAL-MSA0096-004				O	O		O	
	Supply motor assembly		Common						8,000 hours	
	Take-up motor		Common						8,000 hours	
	Elevator cam assembly		Common						100,000 times	
	Tray assembly		Common						100,000 times	
	Thread plate assembly		Common						100,000 times	Section 7.3.5
Mother circuit board			Common							
Fan motor		KEF1022	Common						6,000 hours	
Head cable	W	KWS0394-002	O							Section 7.3.6
	R	KWS0394-001	O							
	W1	KWS0449-002		MS-843x Common						
	W2	KWS0451-002		MS-843x Common						
	R1	KWS0450-002		MS-843x Common						
	R2	KWS0448-002		MS-843x Common						
Head shielded plate		KJU32867-001		MS-843x Common						Section 7.3.6
PWB shielded plate		KJU32898-002		MS-843x Common						Section 7.3.7

Table 7-2B Circuit Boards in Common Assembly Kit

Parts name		Parts number	Model name							Service life	Refer to section number
			MS-8418	MS-8436	MS-843D	MS-843E	MS-843F	MS-843H	MS-843M		
Digital read circuit board		KAL-MPS0099-001	O								Section 7.3.7
		KAL-MPS0116-001		O	O	O	O	O	O		
Analog read circuit board (1)	R	KAL-MPS8098-002	1								Section 7.3.7
	R1 R2	KAL-MPS8098-002		2		2					
	R1 R2	KAL-MPS0120-001			2		2	2	2		
Analog write circuit board (2)	W	KAL-MPS0117-002	1								Section 7.3.7
	W1	KAL-MPS0118-001				1					
	W1 W2	KAL-MPS0117-001		2		1					
	W1	KAL-MPS0119-001					1		1		
	W1 W2	KAL-MPS0121-001			2			2			
						1		1	1		
Control circuit board		KAL-MPS8097-002	Common								Section 7.3.7
MCI circuit board		KAL-MPS0122-001					O	O			
SCSI circuit board		KAL-MPS0107-001	Common								Section 7.3.7
Servo circuit board		KAL-MPS0095-001	Common								Section 7.3.7

- (1) The “1” or “2” are defined by number of circuit boards. It is not different either “R1” or “R2”.
- (2) The “1” or “2” are defined by number of circuit boards. Use the two circuit board, it is not different either “W1” or “W2”.

Table 7-2C CSL Common Assembly

Parts name		Parts number	Service life	Refer to section number
CSL tray assembly			100,000 times	
	Tray circuit board			
	Slide motor		100,000 times	
	Clamp motor		100,000 times	
CSL up-down mechanism assembly			100,000 times	
	Up-down motor		100,000 times	
	Encoder			
Flexible cable				
Lock assembly			1,000,000 times	
Bottom holder assembly				
Micro switch assembly			50,000 times	
Rear panel assembly				Section 7.3.9
	Fan motor	KEF1022	6,000 hours	
	Fuse	KMF51A2-5R0S		Section 7.3.8
CSL circuit board				
Power supply unit		FYG131/55GP-1		Section 7.3.9

Table 7-3 SCSI panel

		Parts name (SCSI driver circuit board)	Parts number	Service life	Refer to section number
Classification by specifications	LS	Large single panel	KAL-MSA0091-001		
		SCSI LDS circuit board			
		Single terminator	KET5001-050		
	WS	Wide single panel	KAL-MSA0091-002		
		SCSI WDS circuit board			
		Single terminator	KET5002-068		
	NS	Narrow single panel	KAL-MSA0091-003		
		SCSI NAS circuit board			
		Single terminator	KET5003-050		
	LD	Large differential panel	KAL-MSA0091-004		
		SCSI LDD circuit board			
		Differential terminator	FCN-789P050-L/D		
	WD	Wide differential panel	KAL-MSA0091-005		
		SCSI WDD circuit board			
		Differential terminator	KET5005-068		

7.2 Tools for Maintenance, Installation and Removal

The tools that are required to perform maintenance, installation and removal are shown in Table 7-4. Perform operations in section 7.3 and other similar operations using these tools.

Table 7-4 Tool List

Number	Tools or other items	Type	Remarks	Mark
1	Phillips type screwdriver	Plus No.2		O
2	Screwdriver	Minus 6mm		O
3	Hexagonal wrench	Opposite side 2.5mm		O
4	Cleaning fluid	Ethyl alcohol		O
5	Cotton swab			O
6	Cotton cloth (gauze)			O
7	Scale			#
8	Cutting pliers			#
9	Tweezers			#
10	Screw lock	1401C	Three Bond	#
11	Head cap F	for the MS-8418 model		#
12	Head cap S	for the MS-843x model		#
13	Molykote	EM-30L	Dow Coring	#
14	Lithium soup grease for extreme-pressure	TFB grease	THK	#

Mark as: O ----- Necessary item

----- Convenient item

7.3 Major Parts Installation and Removal

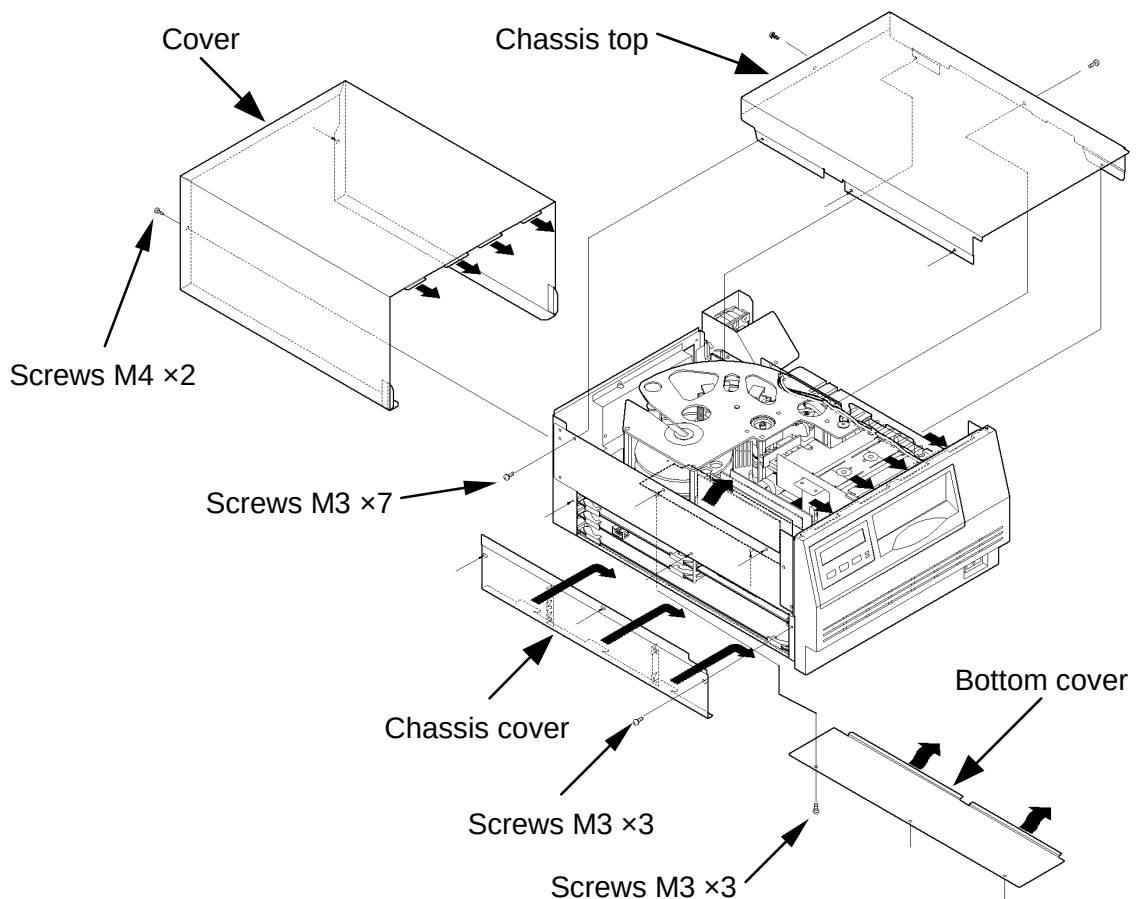
7.3.1S Cover and Chassis Top Installation and Removal [without CSL model]

§ Cover and chassis top removal

- 1) Remove the M4 screws in 2 locations in the rear side of the drive that secure the cover.
Slide the cover to the rear and remove it.
- 2) Remove the M3 screws in 7 locations that secure the chassis top.
Lift up the chassis top to the upper rear direction and remove it.
- 3) Remove the M3 screws in 3 locations that secure the chassis cover.
Slide the chassis cover to the rear and open it. And then remove it.
- 4) Stand the drive on its side and remove the M3 screws in 3 locations that secure the bottom cover.

§ Cover and chassis top installation

Perform the reverse order of procedure described above to install this assembly.



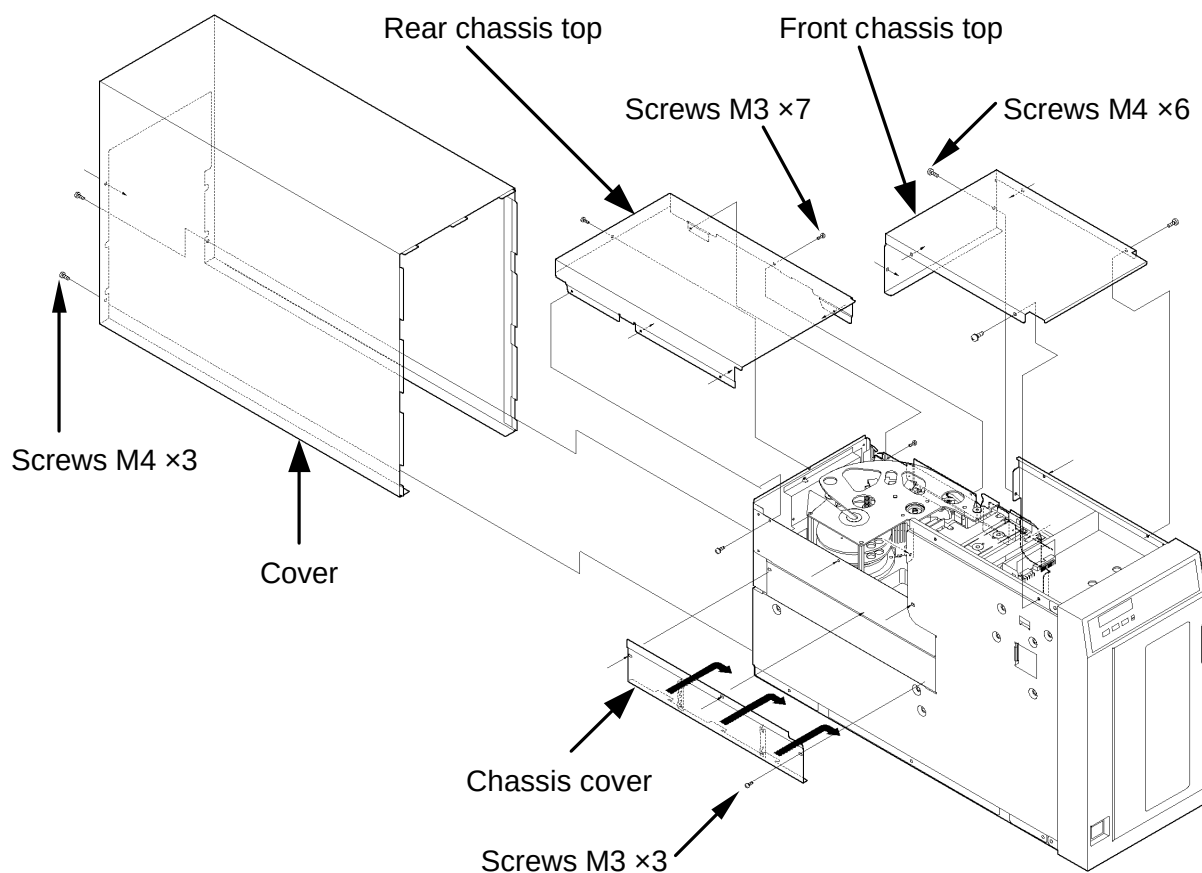
7.3.1C Cover and Chassis Tops Installation and Removal [with CSL model]

§ Cover and chassis tops removal

- 1) Remove the M4 screws in 3 locations in the rear side of the drive that secure the cover.
Slide the cover to the rear and remove it.
- 2) Remove the M4 screws in 6 locations that secure the front chassis top.
Lift up the front chassis top to the upper rear direction and remove it.
- 3) Remove the M3 screws in 7 locations that secure the rear chassis top.
Lift up the rear chassis top to the upper rear direction and remove it.
- 4) Remove the M3 screws in 3 locations that secure the chassis cover.
Slide the chassis cover to the rear and open it. And then remove it.

§ Cover and chassis tops installation

Perform the reverse order of procedure described above to install.



7.3.2S Front Panel Assembly Installation and Removal [without CSL model]

§ Front panel assembly removal

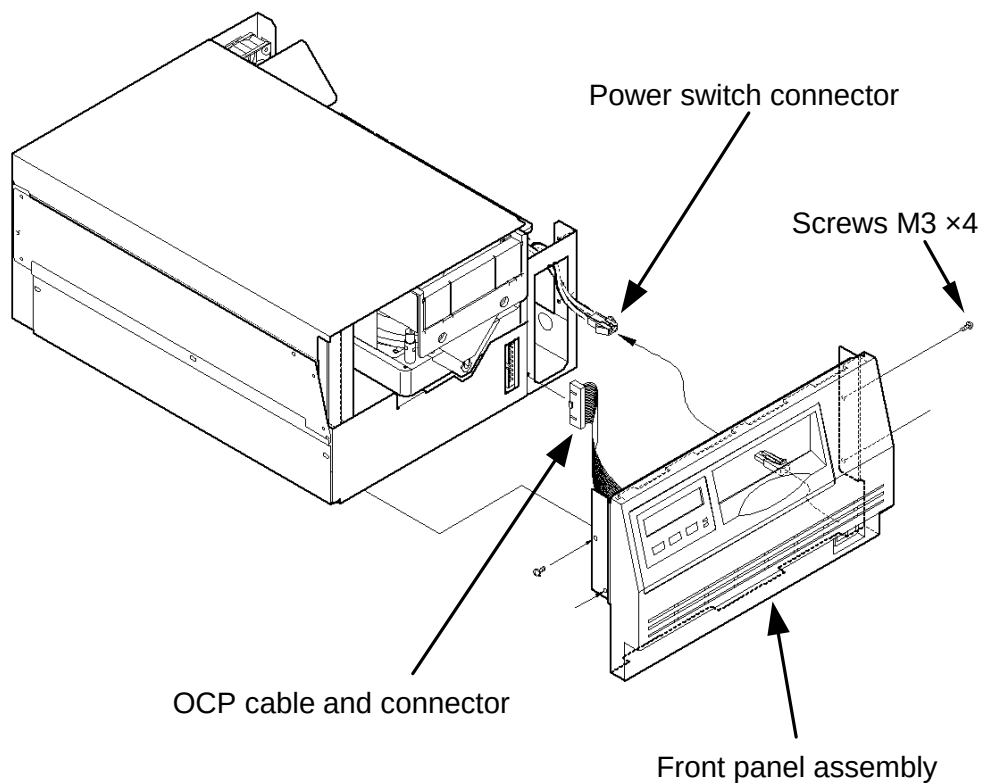
- 1) Remove the cover. (Refer to section 7.3.1S.)
- 2) Remove the M3 screws in 4 locations in the side (left and right) of the drive that secure the front panel assembly.
- 3) Slide the front panel assembly approximately 5 cm to the front and disconnect the OCP cable connector and the power switch connector.

§ Front panel assembly installation

Perform the reverse order of procedure described above to install this assembly.

CAUTION

Do not apply excessive force to the cable wires and the circuit board when connecting or disconnecting the connectors.



7.3.2C Front Panel Assembly Installation and Removal [with CSL model]

§ Front panel assembly removal

- 1) Remove the cover and the front chassis top. (Refer to section 7.3.1C.)
- 2) Disconnect the OCP cable and the connector CN1 of the CSL circuit board.
- 3) Open the front door and remove the cover inside. (Remove only the M3 screw on the upper side and loosen the screw on the bottom.)
- 4) Unlock the cable clamp on the left of the chassis-inside and slide the protection tube to the rear side. And then remove the power switch connector.
- 5) Remove the M4 screws in 4 locations in the side (left and right) of the drive that secure the front panel assembly. Slide the front panel assembly to the front and remove it.

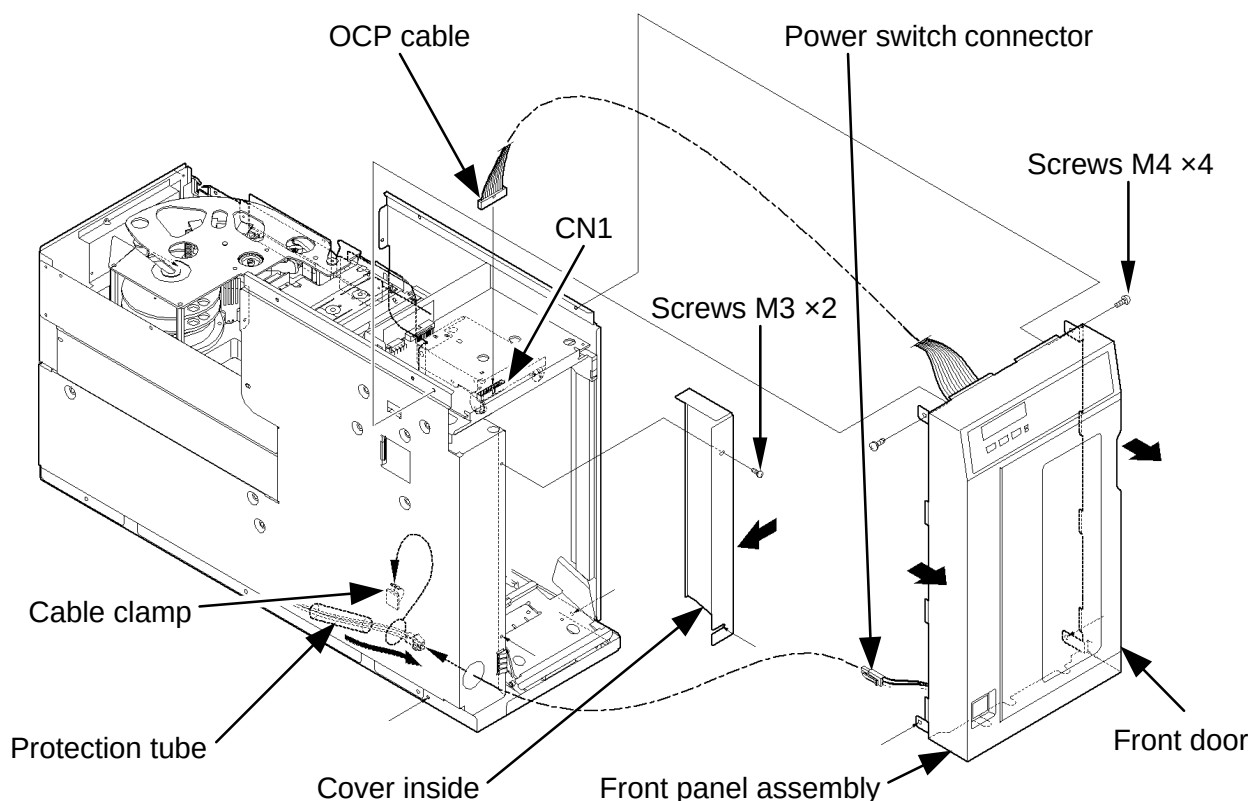
§ Front panel assembly installation

Perform the reverse order of procedure described above to install this assembly. Install the front panel assembly while placing it to the front side.

Perform the checking procedure described in section 6.6.4 after installed it.

CAUTION

Do not apply excessive force to the cable wire and the circuit board when connecting or disconnecting the connectors.



7.3.3 SCSI Panel (SCSI driver circuit board) Installation and Removal

§ SCSI panel removal

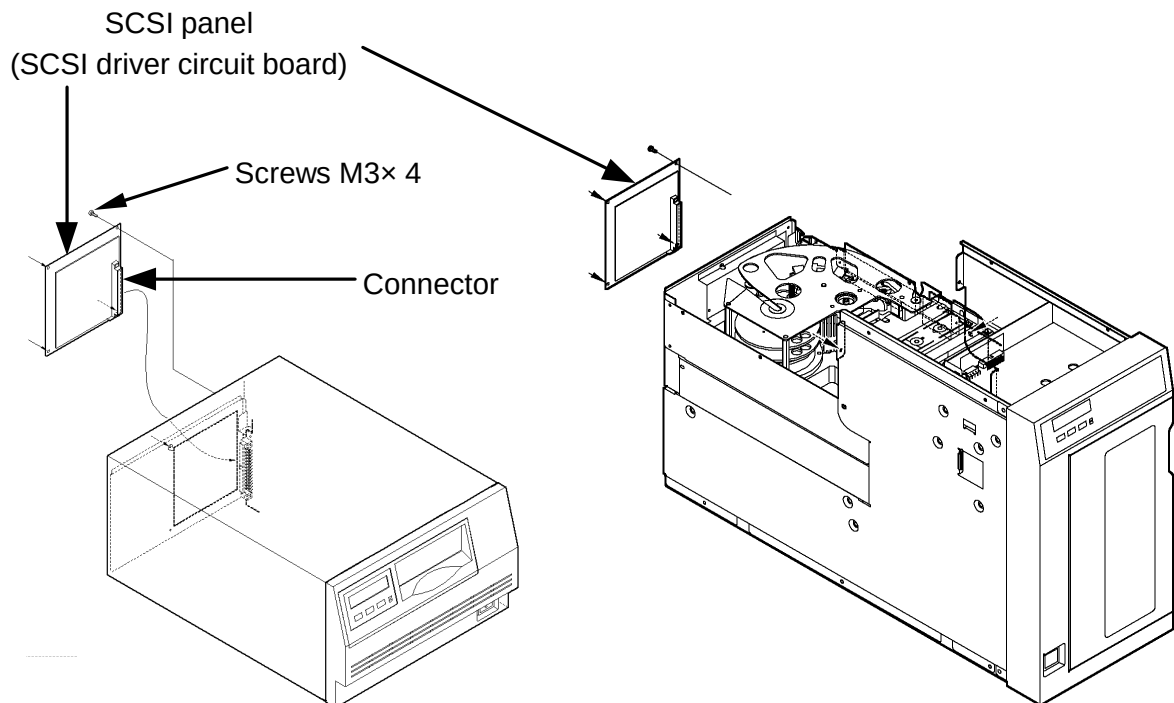
- 1) Remove the M3 screws in 4 locations that secure the SCSI panel.
- 2) Hold both sides of the SCSI panel and move straight to the rear side to pull it off.

§ SCSI panel installation

- 1) Hold both sides of the SCSI panel and fit the SCSI driver board connector to the mother circuit board connector. Insert the connector straight from the rear.
- 2) Tighten the M3 screws in 4 locations to secure the SCSI panel.

CAUTION

Do not apply excessive force of other direction than the inserting direction to the circuit board when connecting or disconnecting the connector.



7.3.4S Power Block Assembly Installation and Removal [without CSL model]

NOTE

The installation and removal of the drive is the same as this procedure.

§ Power block assembly removal

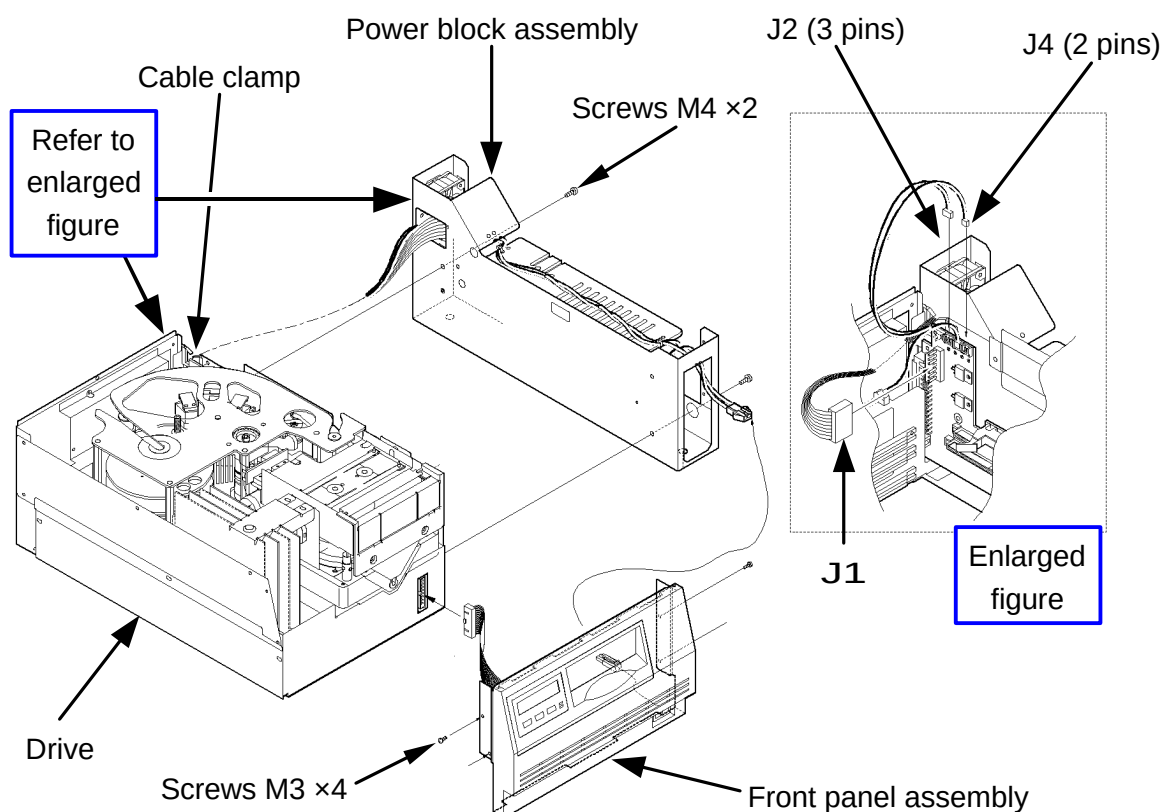
- 1) Remove the cover and the chassis top. (Refer to section 7.3.1S.)
- 2) Remove the front panel assembly. (Refer to section 7.3.2S.)
- 3) Disconnect 3 connectors J1, J2 and J4 from the mother circuit board in the rear side of the drive.
- 4) Remove the M4 screws in 2 locations that secure the power block assembly.
- 5) Remove the wire from the cable clamp.

§ Power block assembly installation

Perform the reverse order of procedure described above to install this assembly.

CAUTION

Do not apply excessive force to the cable wires and the circuit board when connecting or disconnecting the connectors. Connect the correct polarity.



7.3.4C Drive Installation and Removal [with CSL model]

NOTE

The installation and removal of the CSL is the same as this procedure.

§ Drive removal

- 1) Remove the cover, the front chassis top and the rear chassis top. (Refer to section 7.3.1C.)
- 2) Remove the SCSI panel. (Refer to section 7.3.3.)
- 3) Disconnect connectors J1, J2 and J4 from the mother circuit board in the rear side of the drive.
- 4) Remove the M3 screws in 4 locations to remove the rear panel assembly.
- 5) Pull out the cable which was removed in item 3) from the hole in the bottom side of the drive.
- 6) Open the front door and remove the magazine. (Refer to section 2.4.2.)
- 7) Move the CSL tray to the lowest position. (Refer to section 6.7.2.)
- 8) Unlock the cable clamp in the front of the drive to disconnect the flat cable connector.
- 9) Remove the fixing screws A in 4 locations on the side of the drive.
- 10) Loosen the fixing screws B in 2 locations on the side of the drive.
- 11) Pull out and remove the drive from the side chassis.

§ Drive installation

Perform the reverse order of procedure described above to install this drive. Install the drive while placing it to the front side.

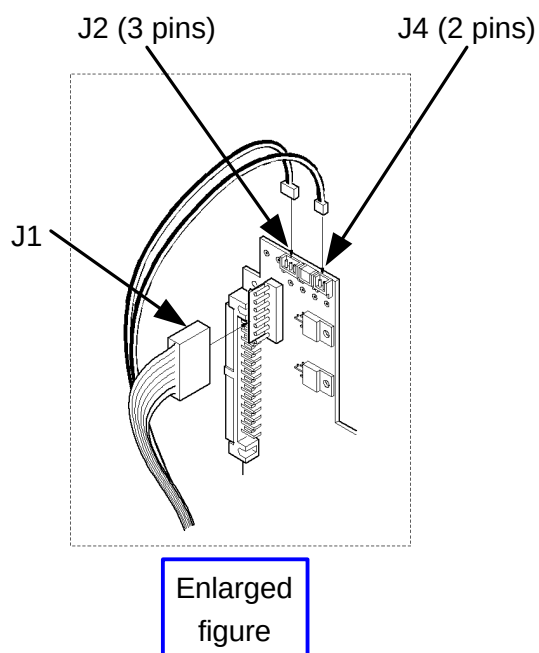
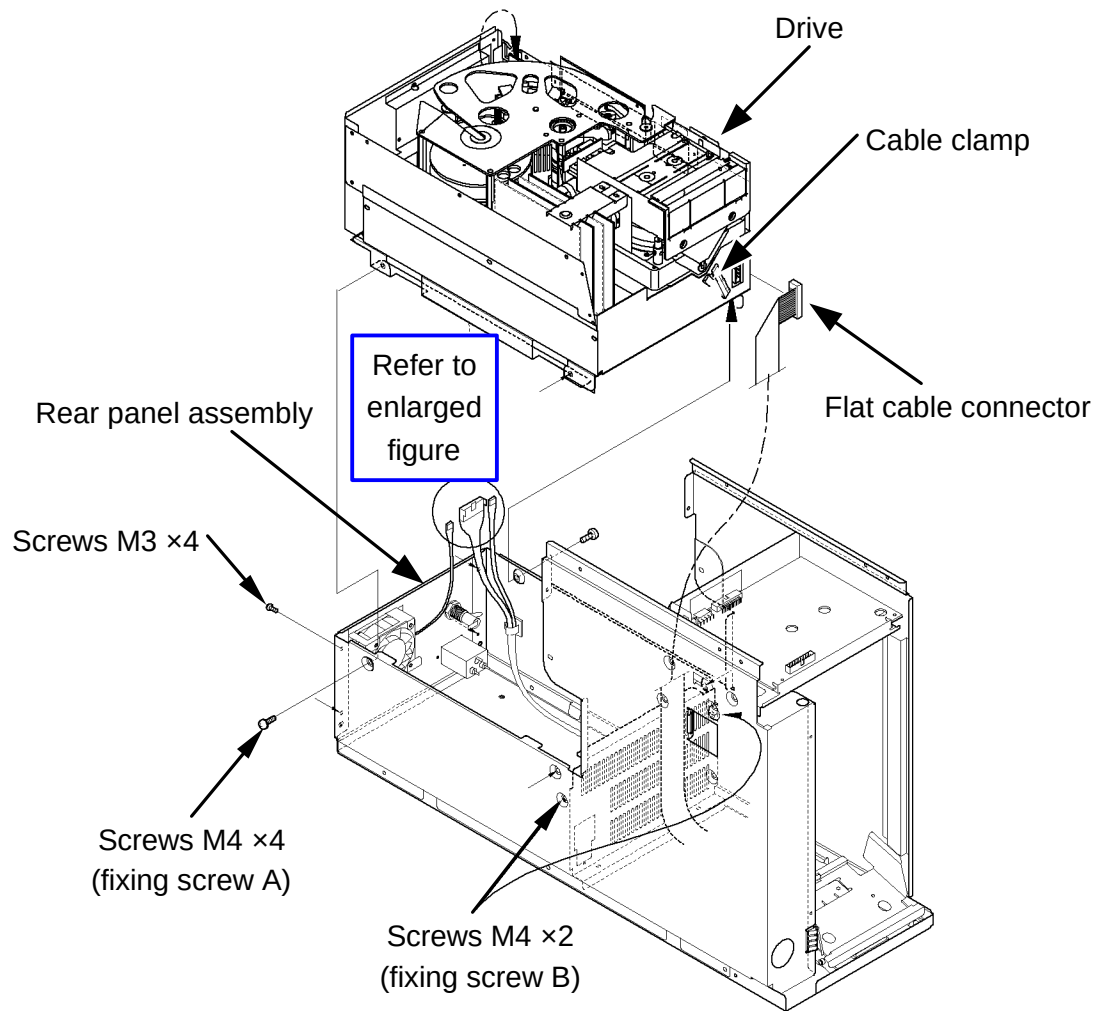
CAUTION

Do not apply excessive force to the cable wires and the circuit board when connecting or disconnecting the connectors. Connect the correct polarity.

§ Adjustment

Perform the following adjustments.

- 1) Adjustment of the CSL Tray Home Position. (Refer to section 6.6.1.)
- 2) Adjustment of the Drive Horizontal Position. (Refer to section 6.6.2.)



7.3.5 Thread Plate Assembly Installation and Removal

§ Thread plate assembly removal

- 1) Remove the cover and the chassis tops. (Refer to section 7.3.1.)
- 2) Remove the M4 screws in 4 locations that secure the thread plate assembly.
- 3) Disconnect the connector(J16) of the motor wire while slightly raising the assembly.

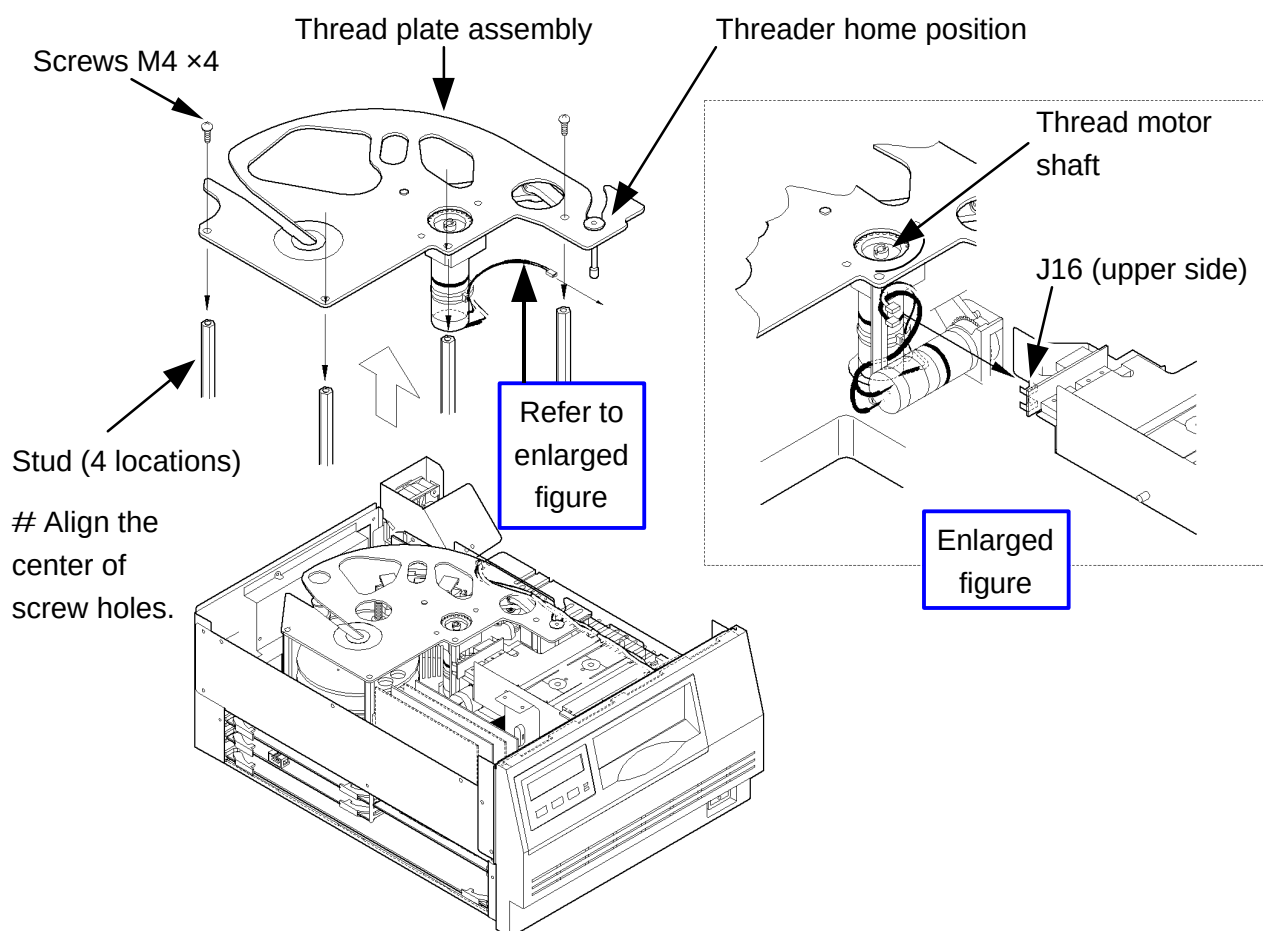
§ Thread plate assembly installation

Perform the reverse order of procedure described above to install this assembly.

- # Align the center of screw holes of the stud and holes of the thread plate assembly and tighten them with screws (4 locations).
- # When the threader home position is not set, turn the thread motor shaft counter-clockwise to return the position using a screwdriver. (Refer to section 6.5.4.)

CAUTION

Do not apply excessive force to the cable wire and the circuit board when connecting or disconnecting the connector. Connect the correct polarity.



7.3.6 FRU Installation and Removal

CAUTION

Perform the operation of the connection and disconnection of the connectors when the anti-electrostatics is excused. The parts may be damaged if it is not executed.

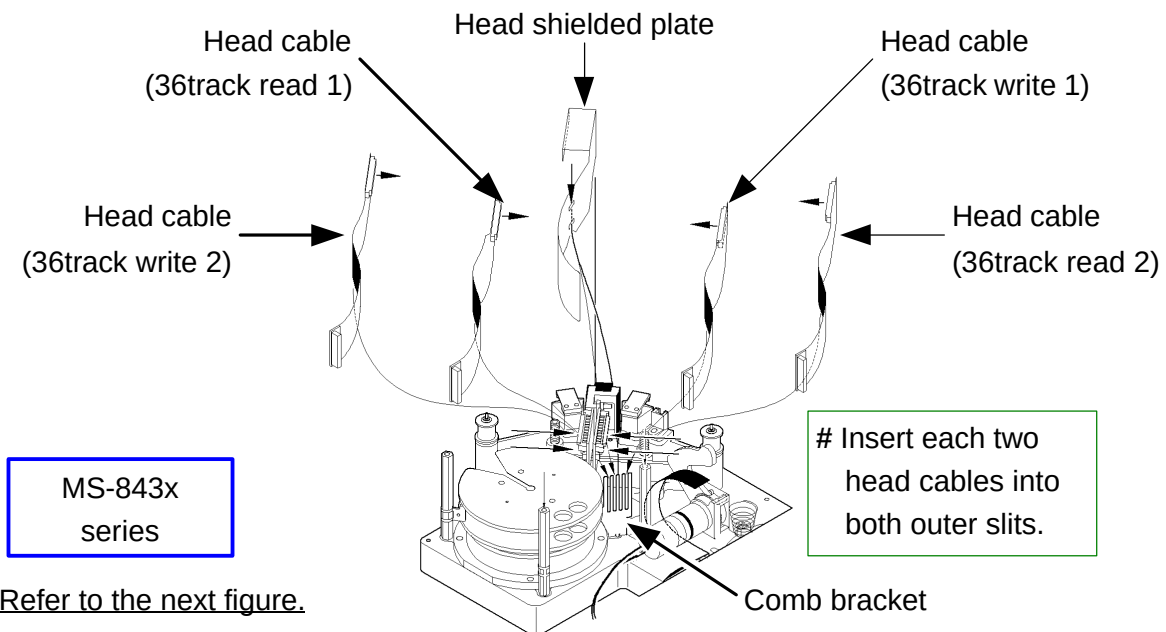
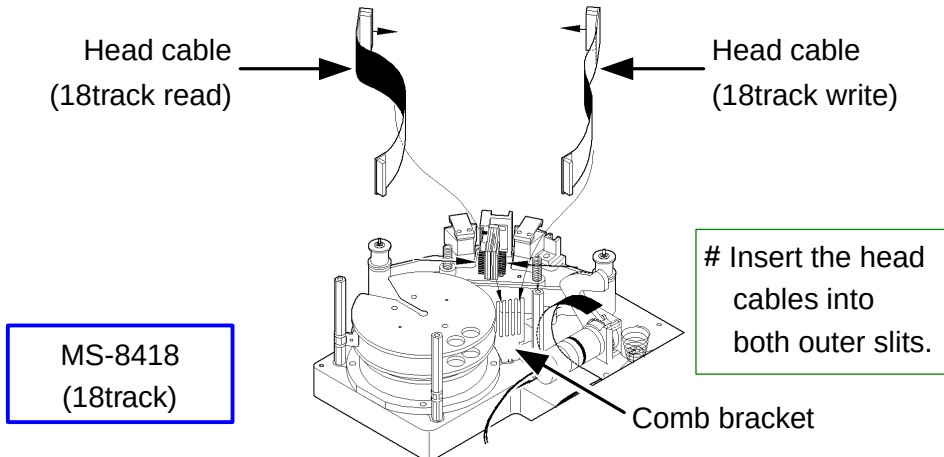
Do not apply excessive force to the cable wires and the circuit boards. Connect the correct polarity.

Never touch or strike the tape head surface and the tape traveling parts.

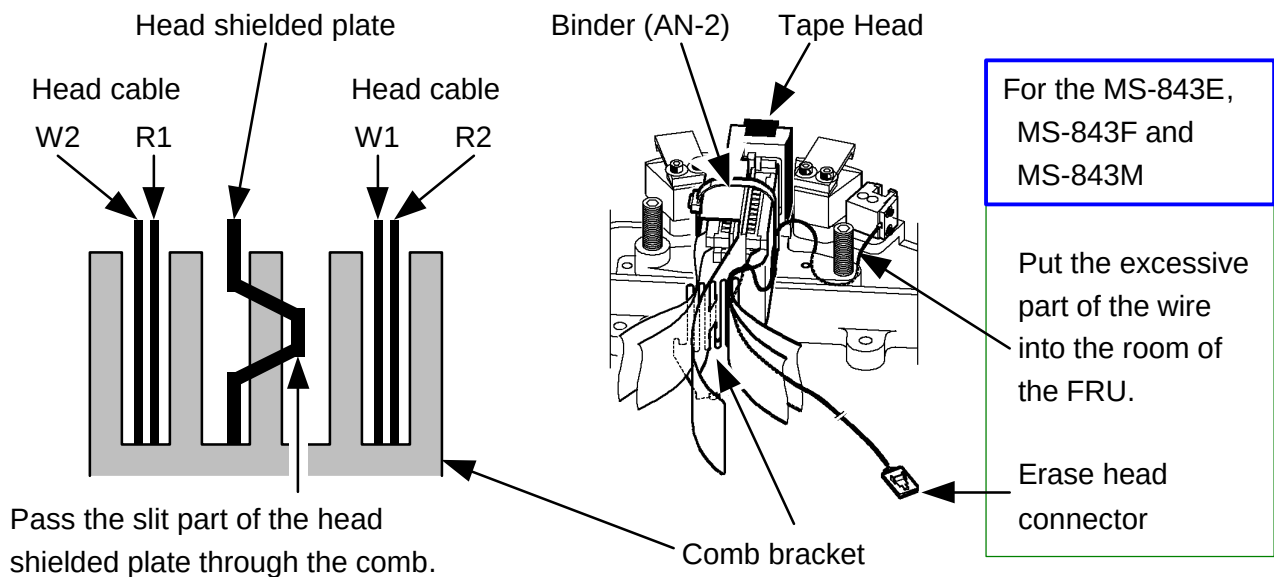
The FRU is different for each model. (Refer to Table 7-2A.) When removing or installation a FRU, use caution to avoid mistaking the type.

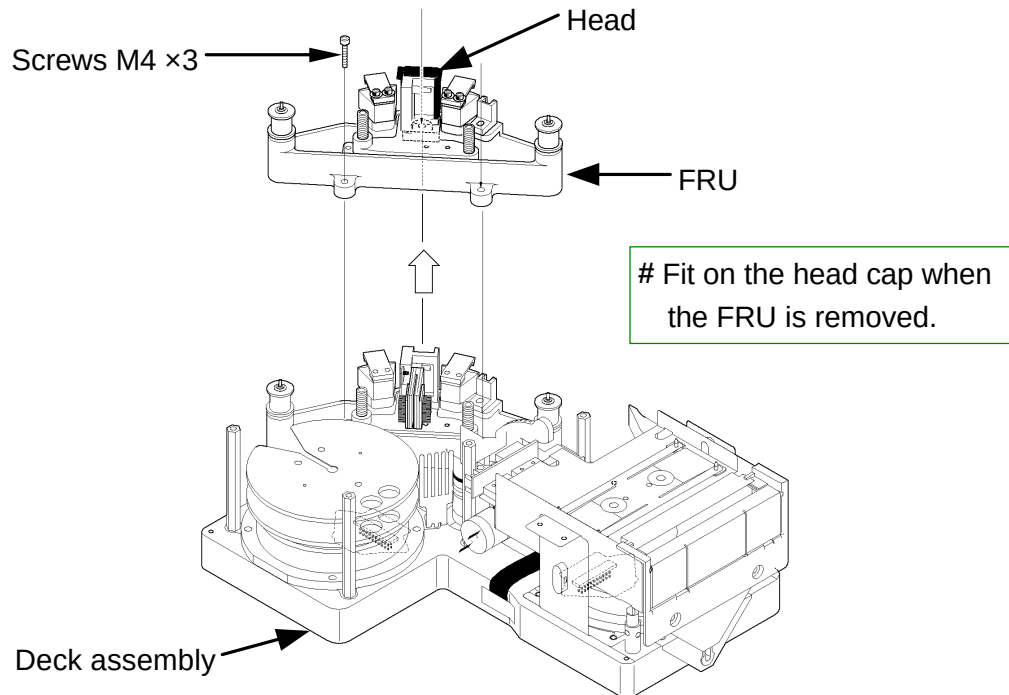
§ FRU removal

- 1) Remove the thread plate assembly. (Refer to section 7.3.5.)
- 2) Fit on the head cap for the exclusive use to the tape head.
- 3) For the MS-843E, MS-843F and MS-843M, disconnect the erase head connector which is connected to the analog write circuit board.
- 4) Disconnect the head cables which are connected to the analog read circuit board and analog write circuit board. There are 2 locations for the MS-8418 and 4 locations for the MS-843x series.
Be careful so the stress is not applied to the soldered part of the connector. Should be supported pinching the connector stiffening plate with pliers or any others.
- 5) For the MS-843x series, cut the binder (AN-2) of the tape head and remove the head shielded plate.
- 6) Use a hexagon wrench to remove M4 screws in 3 locations that secure the FRU.
- 7) Pull out the head cables from the slits of the comb bracket and remove the FRU.
- 8) Remove the head cables from the tape head.



Refer to the next figure.





CAUTION

Never touch or strike the tape head surface and the tape traveling parts.

Fit on the head cap for the exclusive use to the tape head while removal, installation and traveling.

§ FRU installation

- 1) Connect the head cables to the connectors of the tape head.
- 2) Insert the head cables into the slits of the comb bracket and place the FRU on the deck assembly.
- 3) Tighten M4 screws in 3 locations using a hexagonal wrench to secure the FRU.
- 4) For the MS-843x series, place the head shielded plate between the head cables and pass the slit part through the comb in the center of the comb bracket.
- 5) Connect the head cables to the connectors of the analog read circuit board and the analog write circuit board. There are 2 locations for the MS-8418 and 4 locations for the MS-843x series.
- 6) For the MS-843E, MS-843F and MS-843M, connect the erase head connector to the connector of the analog write circuit board.
- 7) Lightly bind the tape head, head cables and head shielded plate with a binder (AN-2).
Do not bind them tightly at this time. Cut off the excessive end part of the binder.
- 8) Remove the head cap.
- 9) Install the thread plate assembly. (Refer to section 7.3.5.)

7.3.7 Major Circuit Boards Installation and Removal

CAUTION

Perform the operation of the connection and disconnection of the connectors when the anti-electrostatics is executed. The parts may be damaged if it is not executed.

Do not apply excessive force to the cable wires and the circuit boards. Connect the correct polarity.

The combination of the circuit boards is different for each model. When removing or installation circuit boards, use caution to avoid mistaking the type or location. Refer to Table 7-2B for combination of the circuit boards.

§ Analog read circuit board and Analog write circuit board removal

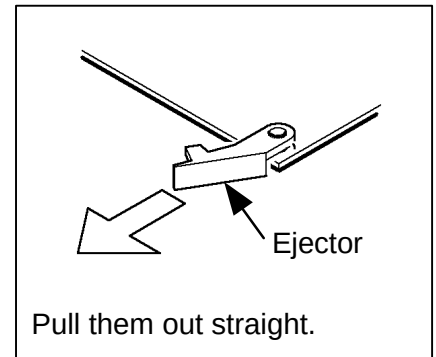
- 1) Remove the cover and the chassis tops. (Refer to section 7.3.1.)
- 2) Remove the M3 screws in 2 locations to remove the PWB bracket.
- 3) For the MS-843x series, remove the PWB shielded plate.
- 4) For the MS-843E, MS-843F and MS-843M, disconnect the erase head connector which is connected to the analog write circuit board.
- 5) Disconnect the head cables which are connected to the analog read circuit board and analog write circuit board. There are 2 locations for the MS-8418 and 4 locations for the MS-843x series.
Be careful so the stress is not applied to the soldered part of the connector. Should be supported pinching the connector stiffening plate with pliers or any others.
- 6) Pull out the analog read circuit boards and analog write circuit boards. There are 2 locations for the MS-8418 and 4 locations for the MS-843x series.
Check the location of each circuit board.

§ Digital read circuit board removal

- 1) First, remove the analog read circuit boards and analog write circuit boards. (Refer to the above procedures.)
- 2) Remove the chassis cover on the left side of the drive. (Refer to section 7.3.1.)
- 3) Pull out digital read circuit board straight.

§ Control circuit board, servo circuit board and SCSI circuit board removal

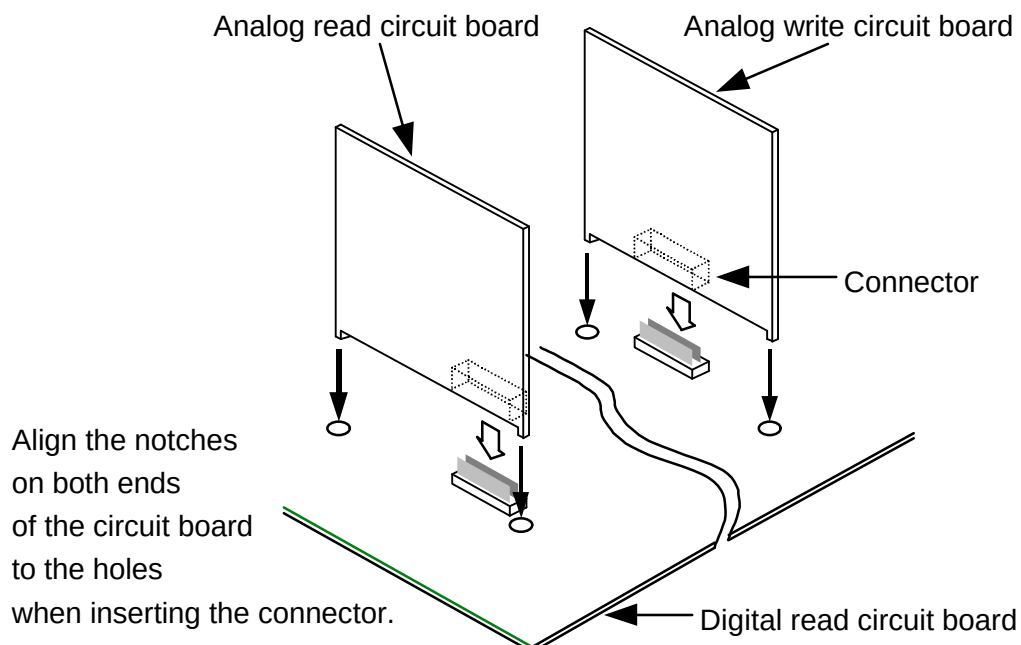
- 1) Remove the chassis cover on the left side of the drive.
(Refer to section 7.3.1.)
- 2) Pull out the control circuit board, servo circuit board and SCSI circuit board straight while holding the edge of the ejectors.
If the ejector is spread out by force when removing these circuit boards, it may cause damage.

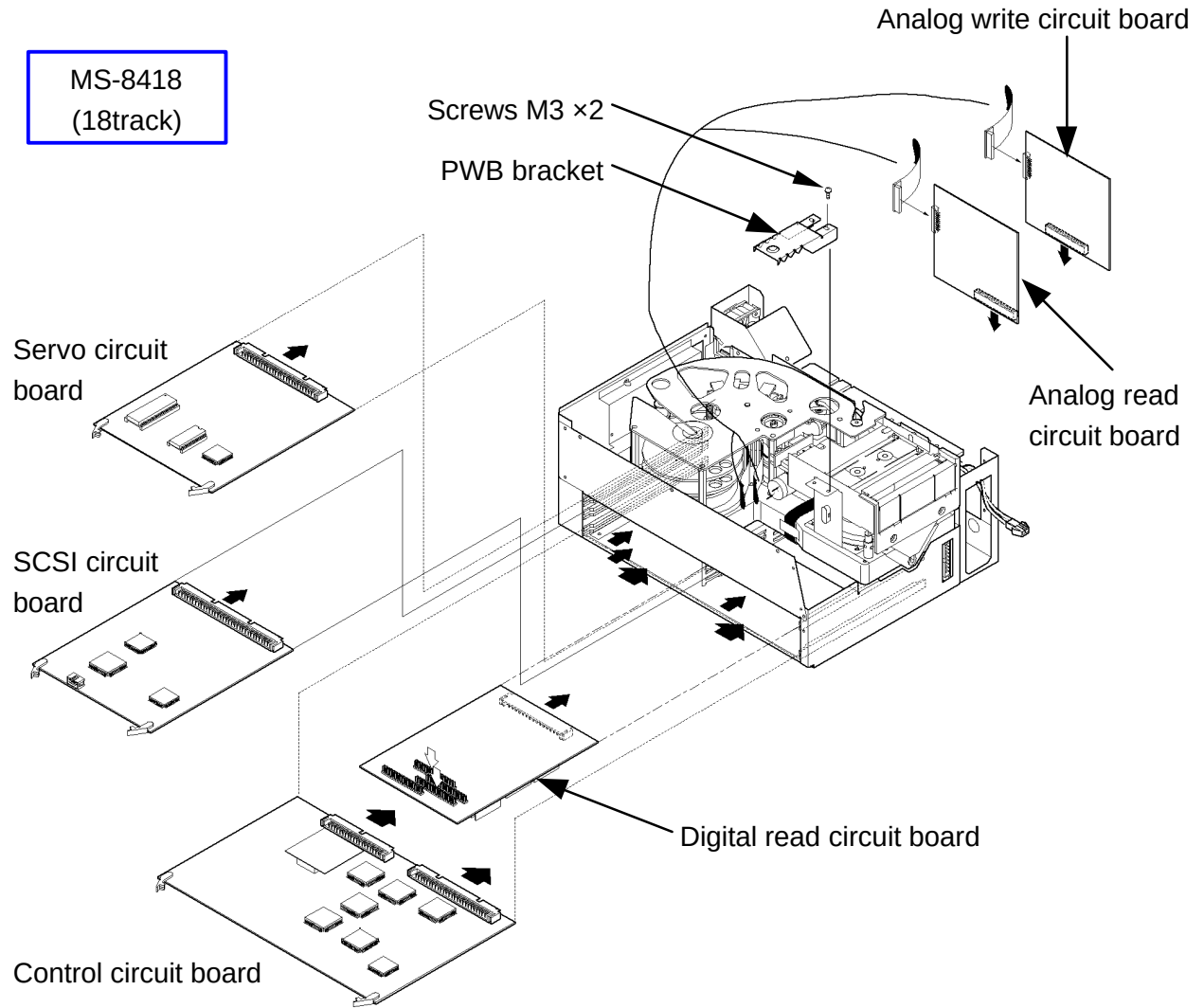


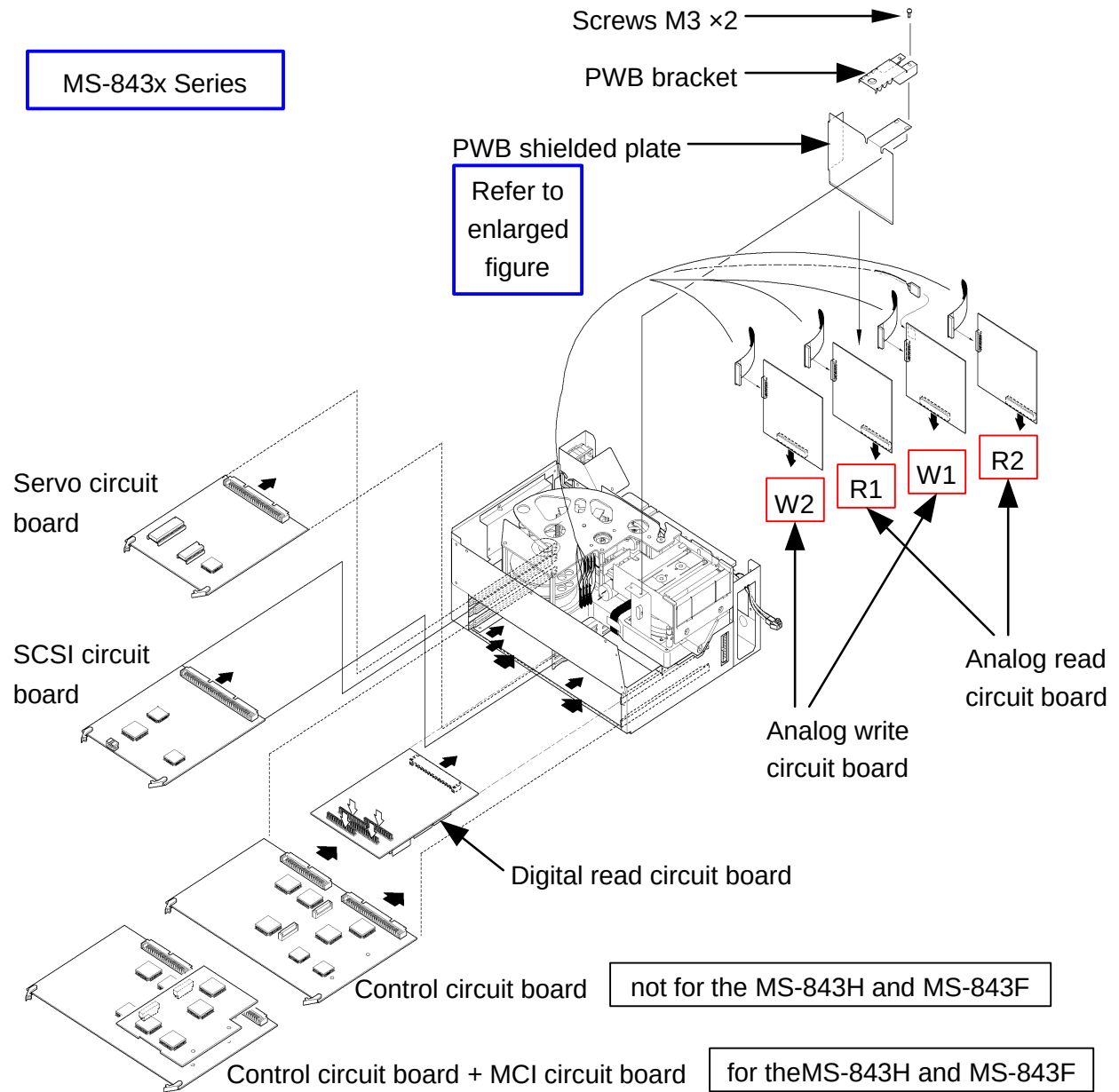
§ Circuit boards installation

Perform the reverse order of procedure described above to install these boards. Refer to Table 7-2B for combination of the circuit boards.

- # There are 1 analog read circuit board and 1 analog write circuit board for the MS-8418, and 2 analog read circuit boards and 2 analog write circuit boards for the MS-843x series. Make sure the correct locations of these boards.
- # For the MS-843x series, first connect the head cables to the circuit boards and then insert the PWB shielded plate in the location shown in the figure. (Use caution to prevent the end of the PWB shielded plate catching on the circuit board components.)
- # It is easy to position the connectors of digital read circuit board, control circuit board, servo circuit board and SCSI circuit board if the drive stands on the side.
- # Be sure that the connectors are inserted all the way to the end when connecting the circuit boards.

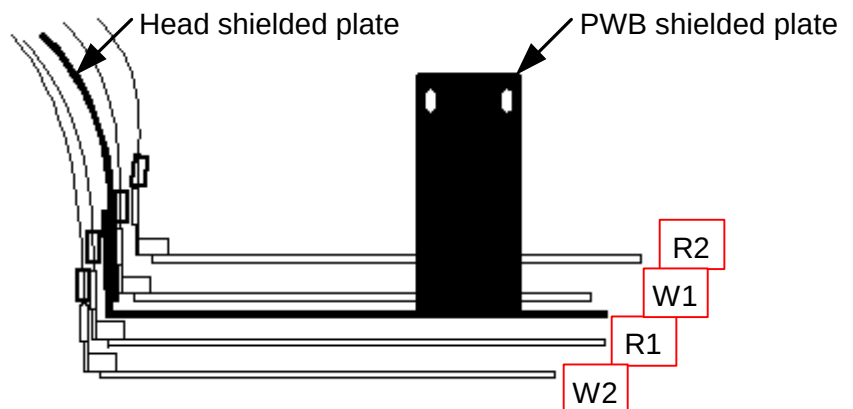






Detail of shielded plates installation

Enlarged figure (top view)



7.3.8 Fuse Replacement

- 1) Turn the cap of the fuse holder in the rear side of the drive counterclockwise using a 6mm-screwdriver to remove it.
- 2) Pull out the fuse that is inserted in the cap.
- 3) Insert the new fuse in the cap and set it while pressing in the fuse holder and turn it clockwise to secure it.

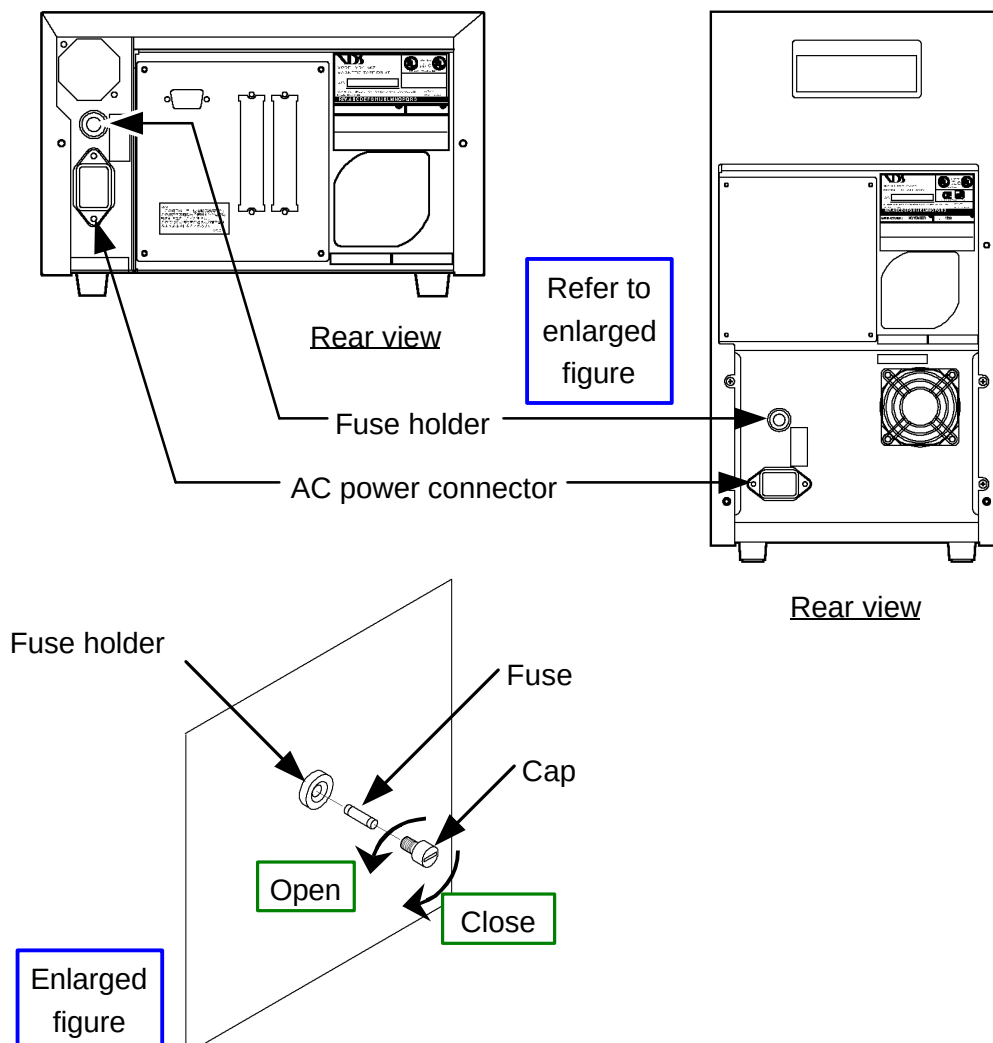
CAUTION

Always replace the fuse with the correctly rated fuse.



WARNING!

Be sure to pull out the AC power cord from the AC power connector (inlet). It may cause a electric shock if the cord is not pulled out.



7.3.9 Power Supply Unit Installation and Removal [with CSL model]

§ Power supply unit removal

- 1) Remove the cover and the chassis tops. (Refer to section 7.3.1C.)
- 2) Pull up the drive and remove it. (Refer to section 7.3.4C.)
- 3) Disconnect 4 connectors (CN1, CN2, CN3 and CN4) which are connected to the power supply unit.
- 4) Remove the M4 screws in 4 locations that secure the power supply unit.

§ Power supply unit installation

Perform the reverse order procedure described above to install this unit.

Perform the adjustments. (Refer to section 6.6.1 and 6.6.2.)

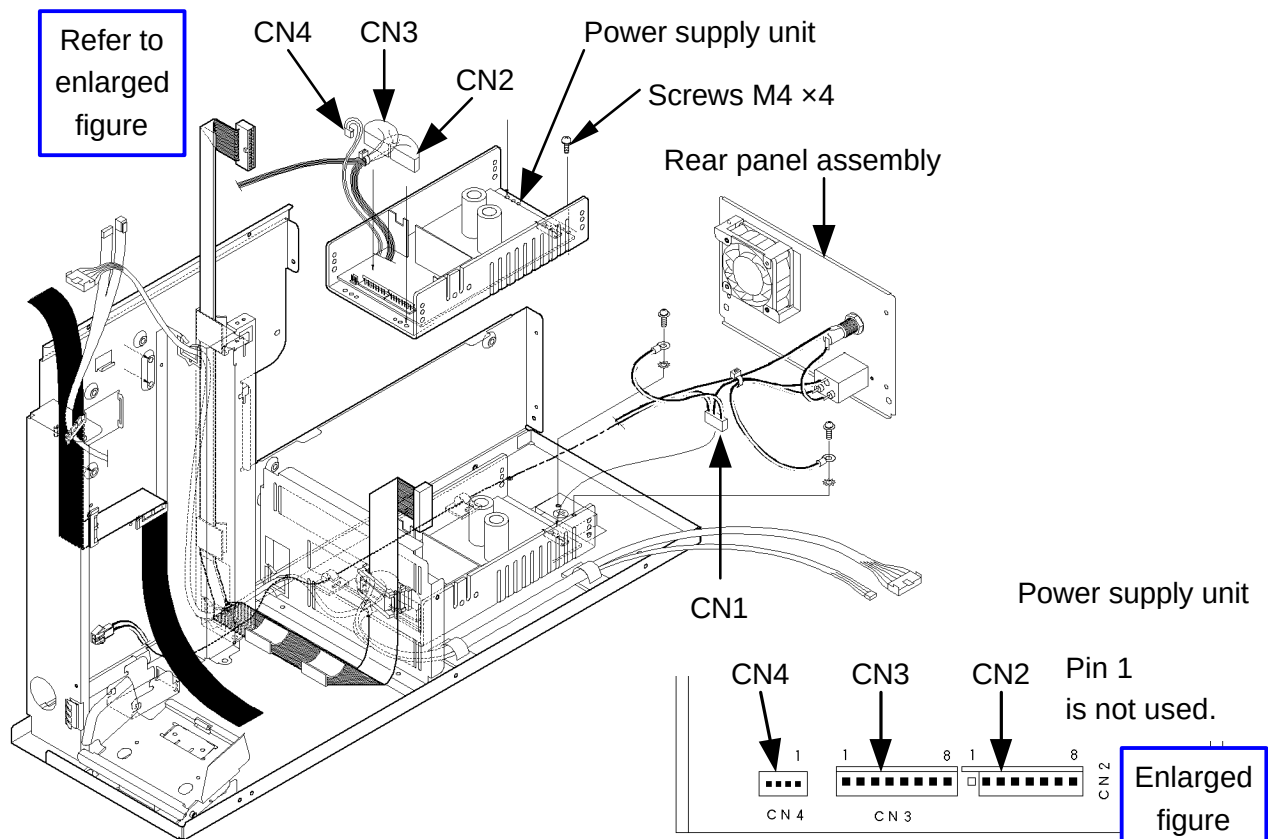
CAUTION

Do not apply excessive force to the cable wire and the circuit board when connecting or disconnecting the connector. Connect the correct polarity.



WARNING!

Be sure to pull out the AC power cord from the AC power connector (inlet). It may cause a electric shock if the cord is not pulled out.



[Notes]

