

CarveX-BW10

BCA Write System

User's Manual

APPD.	CHKD.	CHKD.	DSGD.

PULSTEC

Pulstec Industrial Co., Ltd.

Carefully read this user's manual prior to using the CarveX-BW10 to ensure proper use.

Store this manual and other specifications/manuals that come with the BW10 in an easily retrievable location close to the device.

Safety Precautions Please Read Carefully

The precautions that must be followed in order to ensure that the product is safely used and to prevent personal injury or damage to your property or the property of others are explained below in the manual. Read the “Safety Precautions” carefully before handling the product.

- This chapter uses the following safety classifications to denote the type of injury or damage that may result from improper operation or failure to follow the safety indication.



Warning

Indicates information that, if ignored, could cause death or severe injury, or that could cause material damage.



Caution

Indicates information that, if ignored, could cause severe injury or material damage.

- The following icons are used to classify and indicate proper usage.

Icon	Explanation
	Indicates a mandatory instruction.
	Prohibition Indicates a generally prohibited action.
	Entanglement danger The danger of entanglement resulting in serious injury exists. Use extreme caution.
	Laser caution The danger of blindness and severe exposure injuries exists. Use caution.
	Pinch caution The danger of injury resulting from fingers being pinched in an opening exists. Use caution.
	Rotating object caution The danger of damage resulting from rotating objects exists. Use caution.
	General caution Pay attention to the indicated content.

Definitions of the terms used in this manual are as follows:

- Severe injury: An injury—such as loss of sight, wound, burn (high or low temperature), electric shock, bone fracture, or poisoning—that has aftereffects or that requires hospitalization or long-term medical treatment.
- Injury: An injury—such as a wound, burn (high or low temperature), or electric shock—that requires hospitalization or long-term medical treatment.
- Material damage: Significant damage to buildings, property, livestock, or pets.
- User: Indicates the person using this system. This may include the original purchaser, the purchaser’s customers, or anyone who has been granted use of the system by the purchaser.



Warning



■ **Do not use excessive force on the device's power cord.**

Doing so may cause fire, electric shock, or damage.



■ **Never change the specifications, modify, or disassemble this product.**

Doing so may cause fire, electric shock, or damage. Additionally, overheating or improper operation could cause severe injury. Consult Pulstec should this occur.



■ **Do not place liquids, such as water, near the device.**

If liquid comes into contact with the device's internal components, fire, electric shock, or damage to the device could occur.



■ **Immediately halt use if a strange odor issues from the device.**

Electrical shock or fire could occur.
Contact Pulstec for inspection and repair.



Caution



■ **Use this device in a proper operating environment.**

Failure to do so could cause fire or damage the machine.
* Use in accordance with operating environment conditions.



■ **Do not dispose of device as general waste.**

Dispose of device in accordance with all applicable local, state, and federal laws.

Pulstec's liability

■ Warranty conditions

The warranty for this device is valid for one year, starting from the date of delivery to the specified destination and continuing up to the same month and date of the following year. Consumables* and item to be supplied are not covered by the warranty.

* See the product specifications or contact a sales representative for further details.

The warranty for any item purchased on the open market shall be as set by that item's manufacturer.

Even if occurring within the warranty period, the user shall be required to pay for servicing and repair of any breakdown caused by the user's attempt to repair or modify this equipment, by the user's operational error, or by natural calamity.

Pulstec shall bear no liability whatsoever for damage, lost profits, or other losses that occur as a result of using this device.

In addition, the user shall be required to pay for any maintenance and repair carried out overseas, even if occurring within the warranty period.

Table of Contents

Safety Precautions Please Read Carefully	1
Pulstec's liability	3
Table of Contents	4
Chapter 1. Device Configuration and Part Names	1-1
1.1 Device Configuration.....	1-2
1.1.1 System Configuration.....	1-2
1.1.2 Operating Environment	1-3
1.1.3 Device Specifications	1-4
1.2 Main Body	1-5
1.2.1 Main Body External Dimensions	1-5
1.2.2 Part Names.....	1-6
1.2.3 Front Section Details	1-7
1.2.4 Operation Panel Details	1-8
1.3 Application Information	1-10
1.3.1 Main Screen	1-10
1.3.2 Parameters.....	1-16
1.3.3 Mode Operations.....	1-20
Chapter 2 BCA File Settings	2-1
2.1 Creating BCA Files	2-2
2.2 Setting BCA Format.....	2-3
2.3 Setting BCA Data	2-4
2.4 Saving BCA Files	2-5
2.5 Reading BCA Files.....	2-6
Chapter 3 Using the Device	3-1
3.1 Manually Starting the Main Unit	3-2
3.2 Starting Up the Application.....	3-3
3.3 Setting BCA Recording Conditions.....	3-4
3.4 Saving BCA Recording Conditions.....	3-5
3.5 Reading BCA Recording Conditions.....	3-6

3.6	Recording to Target Media.....	3-7
3.7	BCA Recording Flowchart	3-8
Chapter 4	Automatic Operations.....	4-1
4.1	Parameter Settings	4-2
4.2	Application Side Operations.....	4-3
4.3	Handler Interface	4-4
4.4	Timing Charts.....	4-5
4.4.1	Chart 1: Normal Operations (BCA Cut OK).....	4-5
4.4.2	Chart 2: Normal Operations (BCA Cut NG).....	4-8
4.4.3	Chart 3: Error Detection (cleared by terminate signal) ...	4-11
4.4.4	Chart 4: Error Detection (cleared by RESET switch) .	4-14
4.4.5	Chart 5: Production Termination (BCA Cut OK).....	4-17
Chapter 5	Maintenance Mode	5-1
5.1	Starting Maintenance Mode	5-2
5.2	Parameters	5-3
Chapter 6	Troubleshooting	6-1
6.1	Troubleshooting.....	6-2
6.2	Error Messages.....	6-3
6.2.1	Sequence Codes	6-4
6.2.2	Error Codes.....	6-5
Chapter 7	About Maintenance	7-1
7.1	Transport/Installation	7-2
7.2	Spare Parts	7-2
7.3	Installing the PUH	7-3
7.4	Removing the PUH	7-6
7.5	Downloading Firmware	7-8



Chapter 1 Device Configuration and Part Names

1.1	Device Configuration	1-2
1.1.1	System Configuration.....	1-2
1.1.2	Operating Environment.....	1-3
1.1.3	Device Specifications.....	1-4
1.2	Main Body.....	1-5
1.2.1	Main Body External Dimensions.....	1-5
1.2.2	Part Names.....	1-6
1.2.3	Front Section Details.....	1-7
1.2.4	Operation Panel Details.....	1-8
1.3	Application Information	1-10
1.3.1	Main Screen.....	1-10
1.3.2	Parameters	1-16
1.3.3	Mode Operations	1-20

1.1 Device Configuration

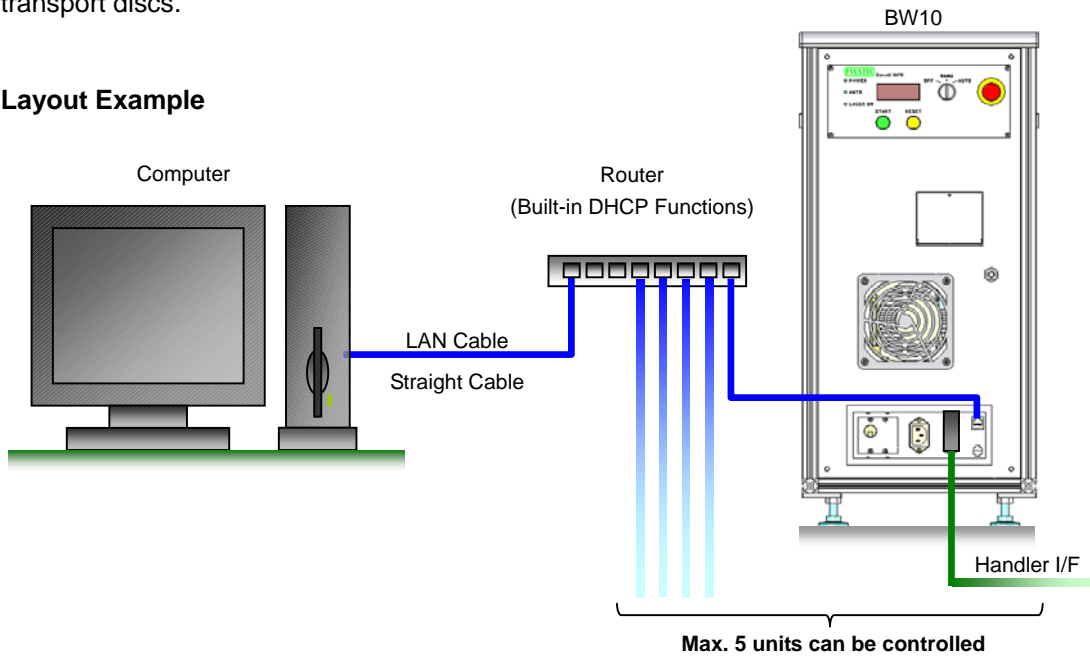
1.1.1 System Configuration

This system consists of the BW10 and a computer for setting control parameters. The BW10 and computer are connected with a LAN cable.

A single computer can control a maximum of 5 units.

A handler interface can also be used to communicate with an external disc handling device to transport discs.

Layout Example



* The computer, LAN cable, and router are optional.

1.1.2 Operating Environment

Follow the conditions indicated in the chart below.

BW10

Item		Specification
Power	Allowable Input Voltage	AC 90 to 230V
	Consumed Current	Idle 1.0A (100V) Operating 3.0A (100V)
Environment	During Use	Temperature 23±5°C Humidity 80% or less (No internal or external condensation)
Air	Air Pressure	0.5±0.05Mpa

Application Operating Environment

Item		Specification
Computer	CPU	Pentium IV 2.4GHz or higher
	RAM	512MB or higher
	HDD	10GB or higher (not including saved data)
	OS	Windows XP Professional
	LAN	IEEE 802.3
Monitor	Number of Pixels	1024×768 (XGA) or higher
	Color	32Bit

* Do not install additional applications or drivers on the control computer. In addition, do not run other applications during operation.

The name Windows® is short for Microsoft® Windows® Operating System. Microsoft and Windows are registered trademarks of the Microsoft Corporation in the USA and other countries. Other company names and product names used herein are trademarks or registered trademarks of their respective owners.

1.1.3 Device Specifications

Recording Side PUH Section (SB-21A:Pulstec)

1) Wavelength	805nm±10nm
2) N.A.	0.62
3) Output Laser Power	4,800mW
4) Laser Form on a Disc	40×1um
5) Etc.	1 Axis Actuator 2LD Type
6) Working Distance	1.56mm
7) Environment Temp.	25±5°C
8) Environment Hum.	No condensation
9) Lifetime	3,000 hr*

* The life of the laser differs depending on the target disc characteristics, read parameters, and operating environment.

Disc Loading Method

1) Disc Loading	Turn Table (Tray type)
-----------------	------------------------

PUH Feeding Section

1) Seeking Part	PUH
2) Motor	Stepping Motor
3) Feeding Mechanism	Ball-screw
4) Feeding Resolution	1um/Step

Spindle Motor Section

1) Motor	DC Brush less motor
2) Output	A,B,Z
3) Index Pulse Resolution	500 pulse/rev
4) Rotation Litter	±0.0003%
5) Spin-up Speed	100±30ms (0→600rpm)

Disc Clamping Section

1) Clamping	Magnetic clamper
2) Clamping Force	2.0±0.5N
3) Tapered Cone Form	40°Tapered Cone Type
4) Radial Run-out	15um(p-p)MAX *

* The radial run-out volume is the maximum value when the disc is clamped.

Interface

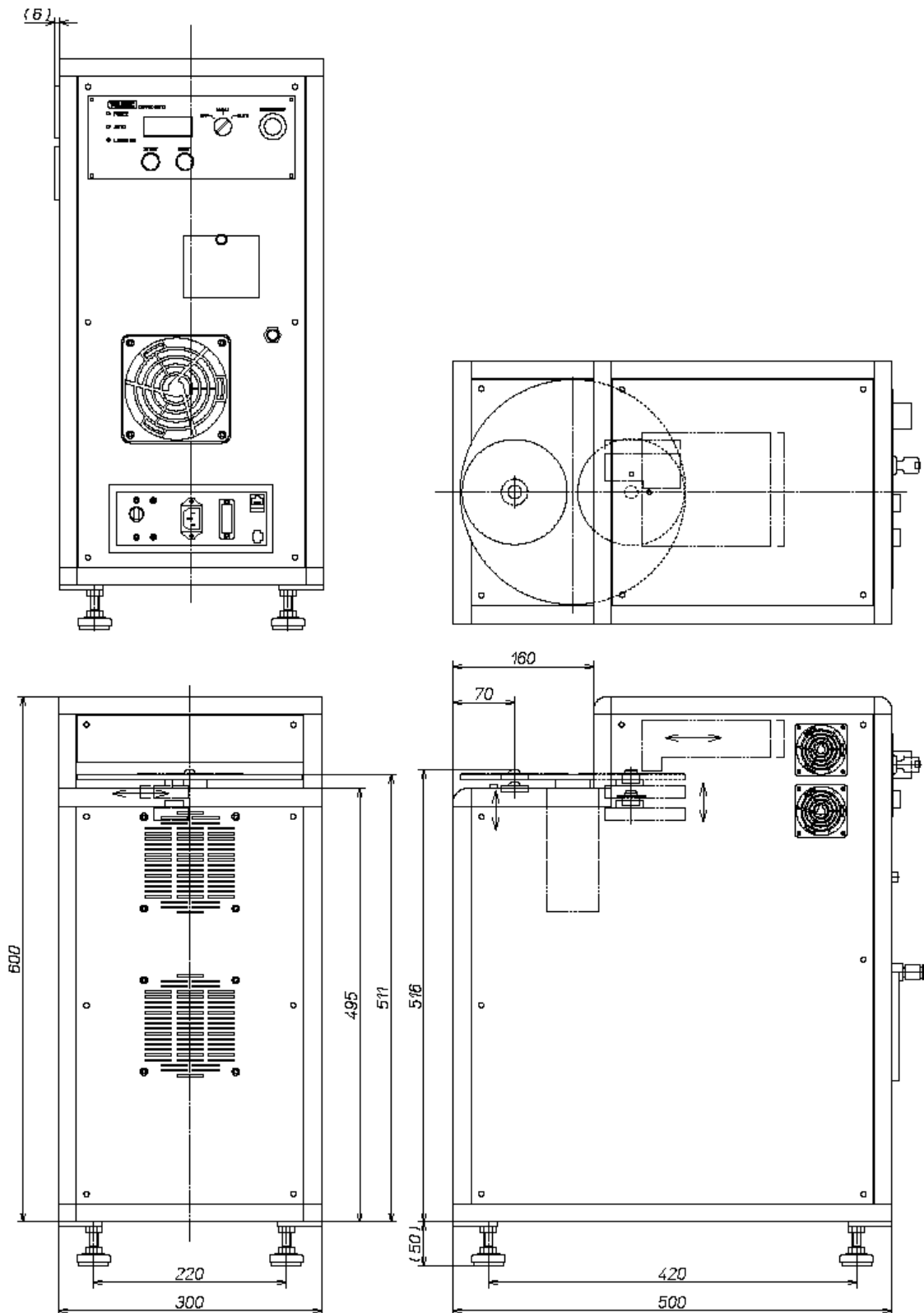
1) Machine Control	LAN Handler I/F(Hirose S-1634) Front Panel SW
--------------------	---

Other

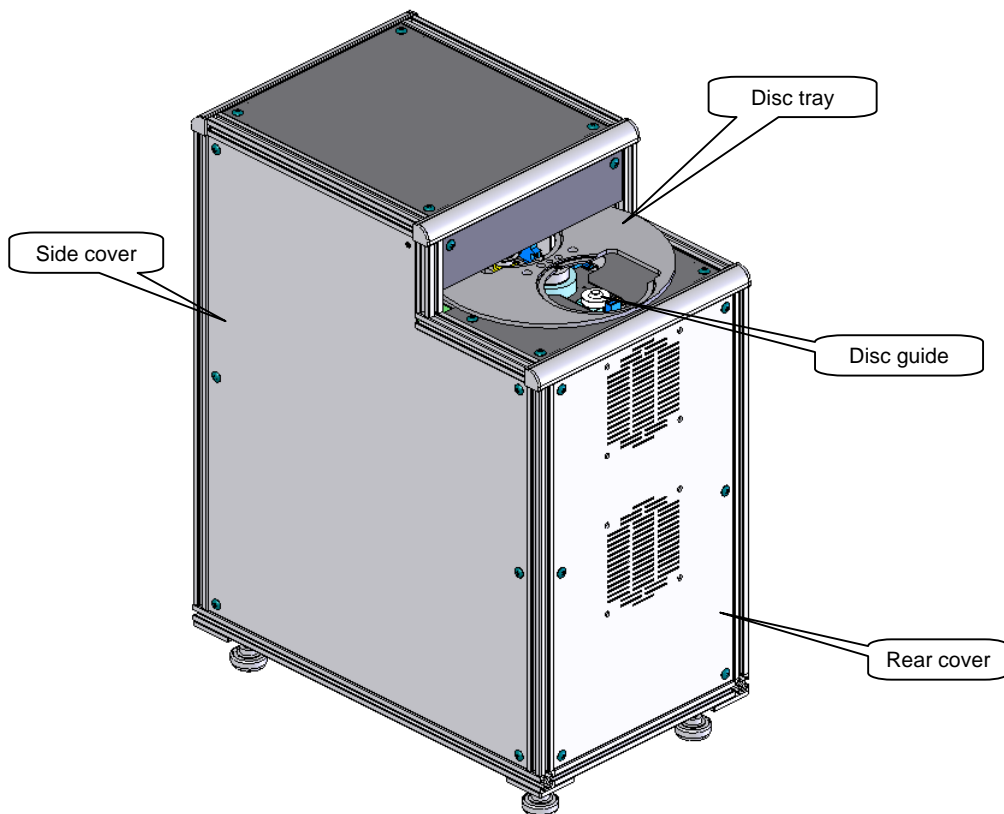
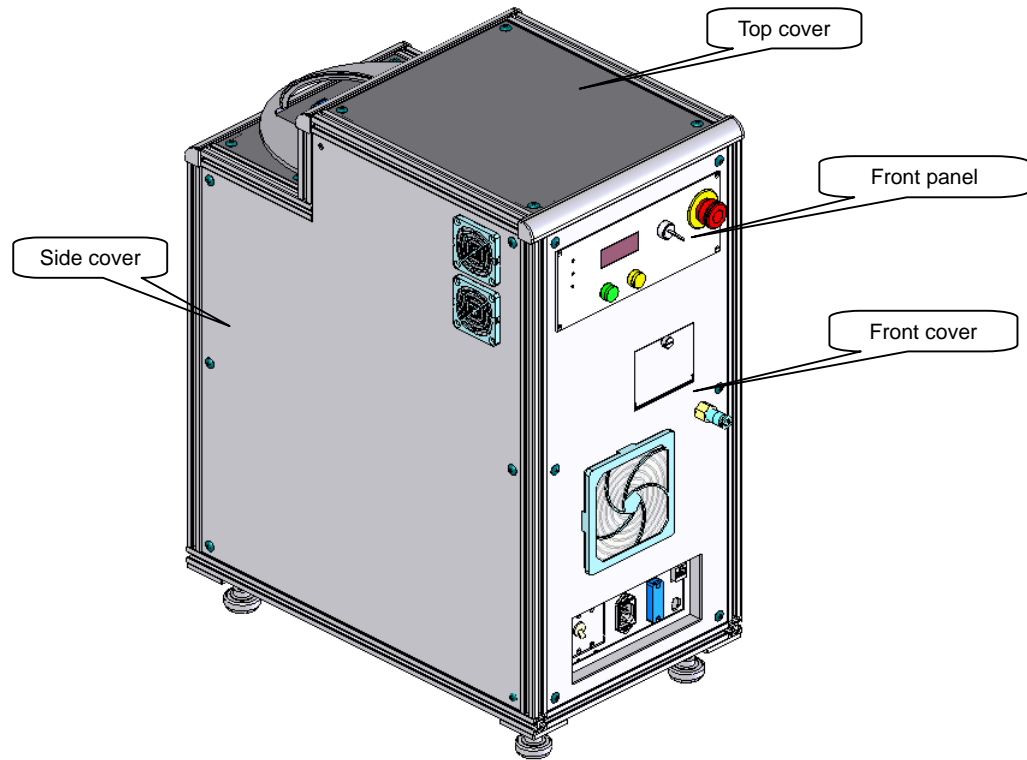
1) Size	W:300mm,H:600mm,D:500mm
2) Weight	40kg
3) Laser Class	Class 1

1.2 Main Body

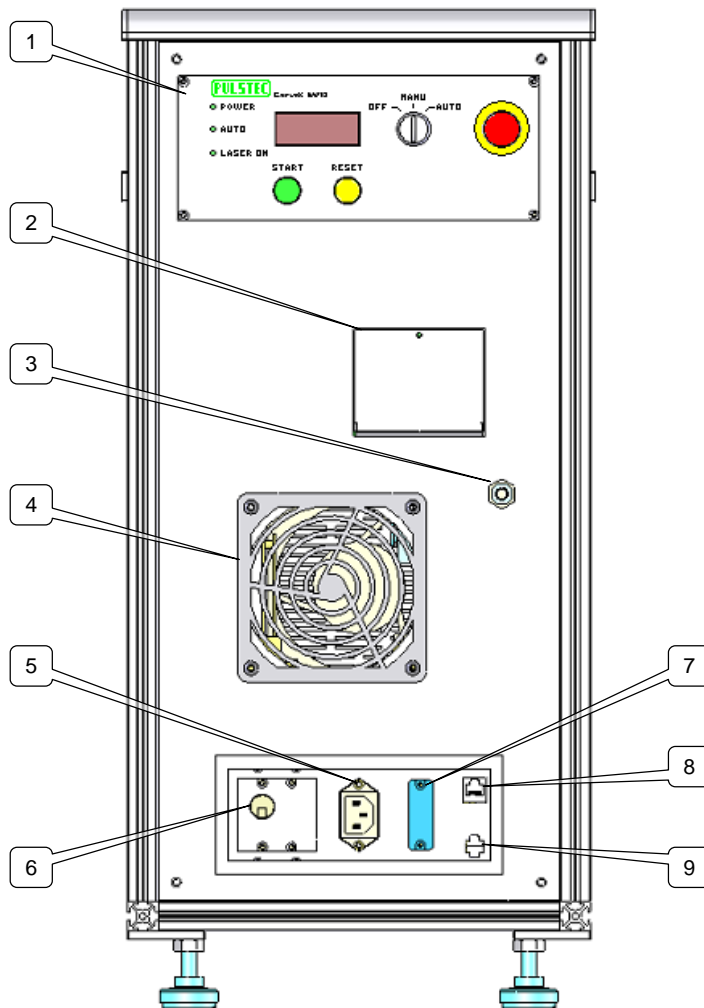
1.2.1 Main Body External Dimensions



1.2.2 Part Names

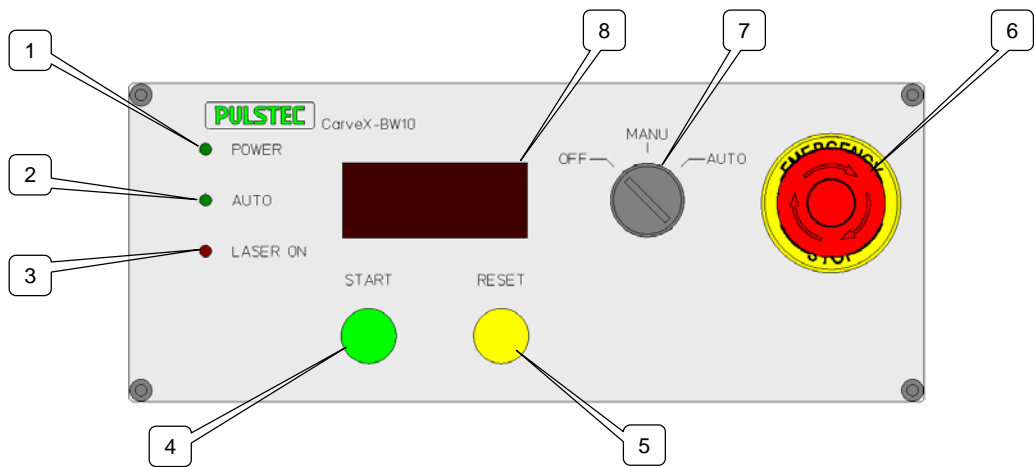


1.2.3 Front Section Details



1. Operation PanelThe panel used to operate the main body. (See Section 1.2.4 for details.)
2. Monitor Board Cover.....When the cover is opened, the monitor pin for confirming the status of the main body and the RS232C connector are visible.
3. Air Supply PortA mechanically controlled air supply port. Use a tube with a $\varnothing 6.0$ external dimension. The supplied air pressure is 0.5 ± 0.05 Mpa.
4. Intake PortAn intake port to internally cool the main body.
5. AC InletAn AC power inlet. Handles AC90–230V.
6. Power BreakerTurns on/shuts off power to the main body.
7. Handler InterfaceUsed to communicate with external disc handling devices.
8. LAN ConnectorConnects to the host computer from the main body via a hub or router.
9. Extension Connector.....Allows the power supply from an external signal to the laser or motor to be cut.

1.2.4 Operation Panel Details



1. POWER LED.....Lights when power is on.
2. AUTO LED.....Lights during automatic operation.
3. LASER ON LED.....Lights when laser is on.
4. START SW.....Used during manual operations to start BCA recording.
5. RESET SW.....Used to recover from errors.
6. EMERGENCY STOP SW.....Used in emergencies. Turn knob to the right to release.
7. Selector SW.....Select a main body operation. Functions when breaker is on.
 - OFF.....Stops main body operations.
 - MANU.....Manual operation. Used during maintenance and condition output.
 - AUTO.....Automatic operation. Used during production.

8. Status Monitor.....Displays the main body operating status in seven segments.
The displays are as indicated in the chart below.

Status Monitor Display	Display Information	Note
	Display during BCA recording. The "□" symbol rotates.	
	Indicates an error. Indicates that Error 255 has occurred.	See Chapter 6 for a detailed chart of error codes.
	Indicates maintenance mode. The bar flashes.	See Chapter 5 for directions on starting maintenance mode.

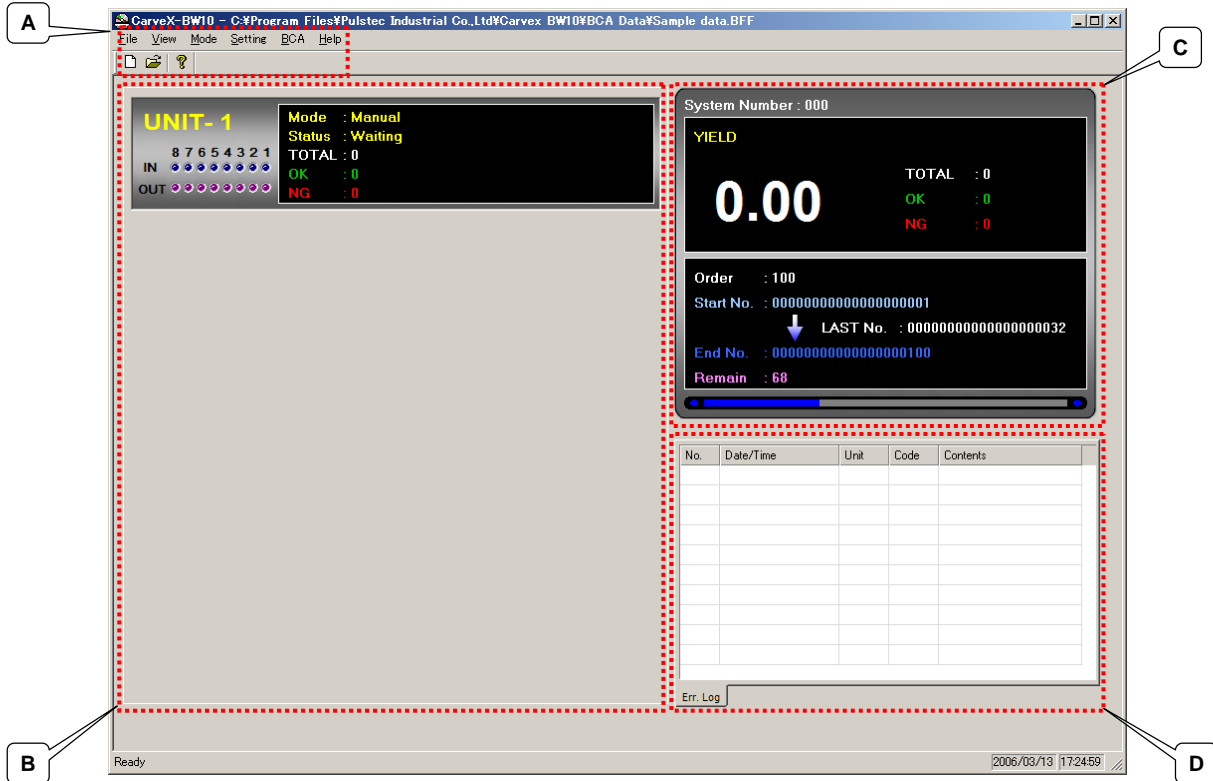
The displays indicated in the chart below can be viewed by switching DIP switch #4 from On to Off. After the 4th time, the display returns to 0 (normal status).

No.	Monitor Display	Display Information		
0		Normal idle status or no display.		
1		Scroll displays the MAC ID. Consists of 2 hexadecimals x 6.		
2		Scroll displays the IP address. Consists of 3 decimal numbers x 4.		
3		Displays the sequence operations during BCA recording in steps.		
4		Displays the status of the conveyer. From the display left: <ul style="list-style-type: none"> • Spindle status • Spindle side tray/disc status • Disc guide side tray/disc status • Disc guide status 		
		Spindle Disc Guide		Raised position
				Middle point
				Lowered position
		Tray Disc		Origin point position
				Rotating
				Origin point: There is a disc on the disc guide side
	Origin point: There is a disc on the spindle side			

1.3 Application Information

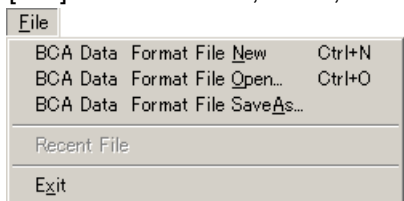
1.3.1 Main Screen

The screen consists of four main sections.



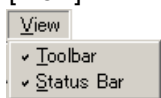
A. Menu Bar

[File] Creates, reads, and saves data in BCA data format.



- BCA Data Format File New Creates new BCA data format file.
- BCA Data Format File Open Opens existing BCA data format file.
- BCA Data Format File Save As Saves the created BCA data format file.
- Exit Exits the application.

[View] Used to change the screen configuration.



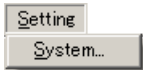
- Toolbar Displays a toolbar beneath the menu bar when checked.
- Status Bar Displays a status bar at the bottom of the screen when checked.

[Mode] Used to switch to the various modes.



- Standard..... The mode used for line production. Various parameters and data cannot be changed in this mode.
- Professional Various parameters and data can be changed, and the maintenance mode can be accessed in this mode. Password input required when selected.
- Change Password..... Changes the currently set password.

[Setting] Used to set communications with BW10.

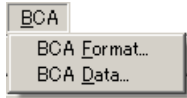


System..... Sets allocation to BW10 units connected to the host PC.

The screenshot shows the 'System Setup' dialog box with the following callouts:

- Lists the MAC ID of communication-ready devices**: Points to the MAC ID list on the left.
- Delete unit button**
Deletes selected MAC ID from registered units.
- Lists the MAC ID of the allocated units.**: Points to the UNIT-1 to UNIT-5 list on the right.
- OK button**
Updates settings and closes window.
Cancel button
Closes window without updating settings.
- Update button**
Searches and updates list of BW10 units connected to the computer
- Unit allocation button**
Displays the units that can be allocated. The grayed-out units are already selected and cannot be allocated.

[BCA] Used to set BCA details.

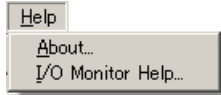


BCA Format Sets BCA format.

BCA Data Sets BCA data.

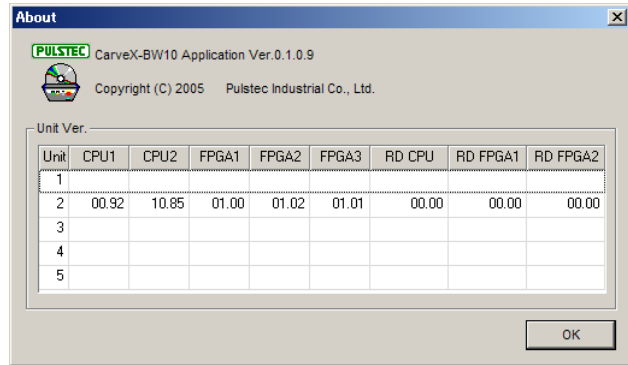
* See Chapter 2 for the setup method.

[Help] Used to check the BW10 status.



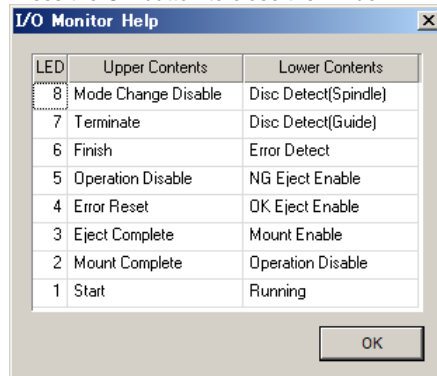
About..... Displays the application/BW10 firmware version.

Press the OK button to close the window.



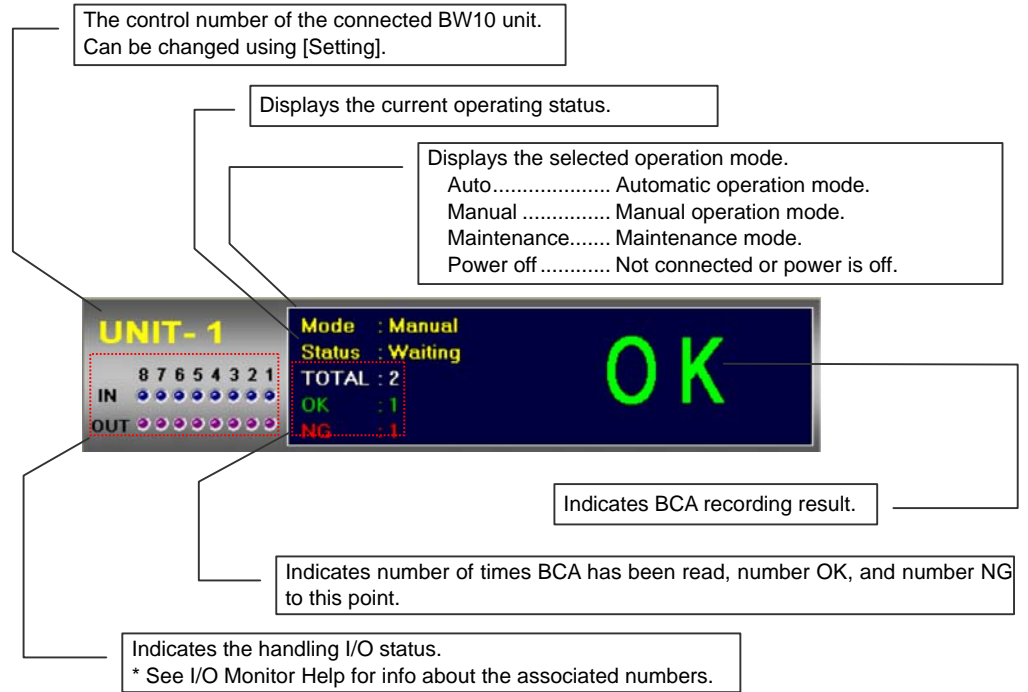
I/O Monitor Help..... Displays a table associated with the handling I/O monitor.

Press the OK button to close the window.



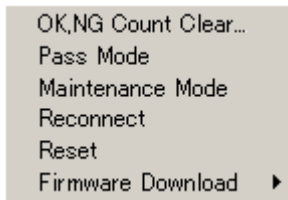
B. Unit Window

Displays the status of BW10 units connected to the host PC.



Right-click menu

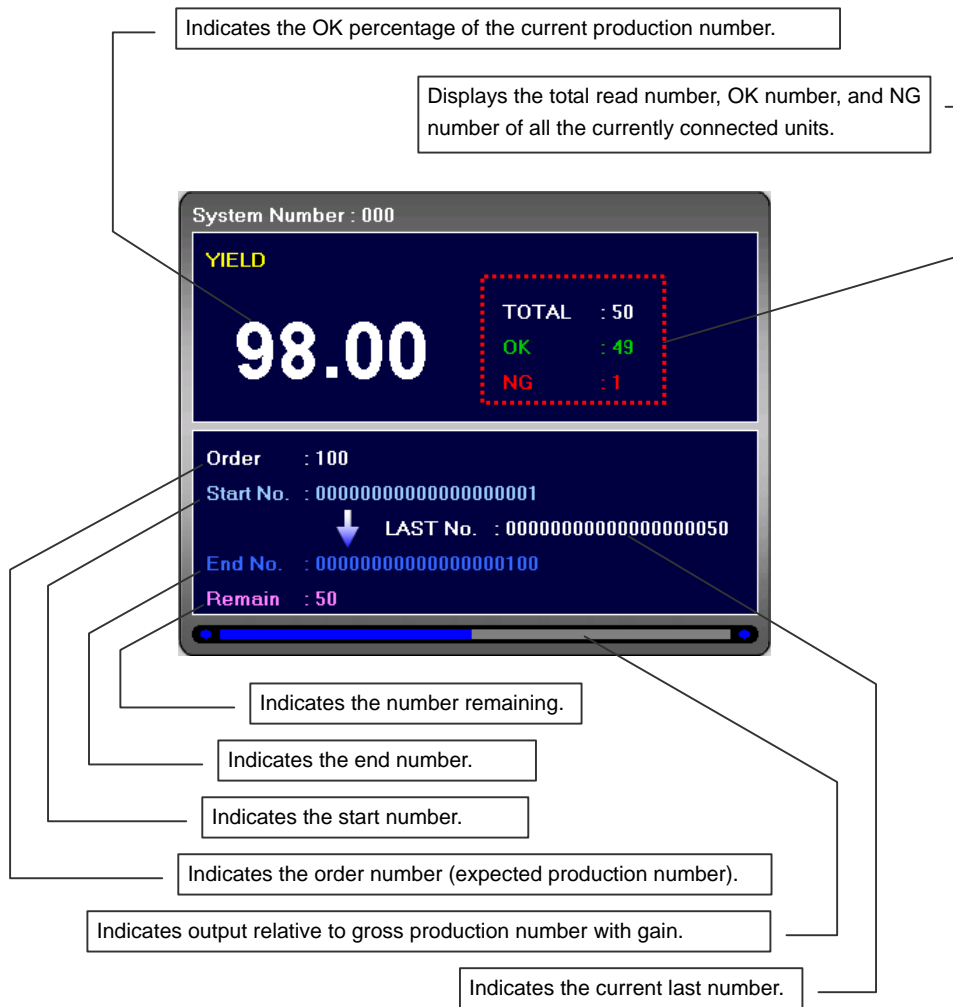
Right-click on the target unit to display the menu indicated below.



- OK,NG Count Clear Zeroes the current counter (Total/OK/NG) count.
- Pass Mode Sets the selected unit to not produce.
- Maintenance Mode Switches to maintenance mode.
- Reconnect..... Not used.
- Reset..... Reboots the main body.
- Firmware Download Downloads firmware to the main unit.
See Chapter 7 for details.

C. System Window

Displays the production results/status of connected BW10 units.



* See Chapter 2, Section 2.3 for setup of items below "Order".

D. Log Window

Indicates the errors that occurred for each unit.

No.	Date/Time	Unit	Code	Contents
0	2005/10/31 11:41	1	90-010	EMERGENCY STOP
1	2005/10/31 16:53	1	90-010	EMERGENCY STOP
2	2005/10/31 18:08	1	00-161	Command Error
3	2005/10/31 18:08	1	05-071	The BCA server is not connect
4	2005/10/31 18:08	1	90-010	EMERGENCY STOP
5	2005/10/31 18:14	1	20-130	Focus Servo Error
6	2005/10/31 18:14	1	20-110	Laser Error
7	2005/10/31 20:08	1	00-161	Command Error

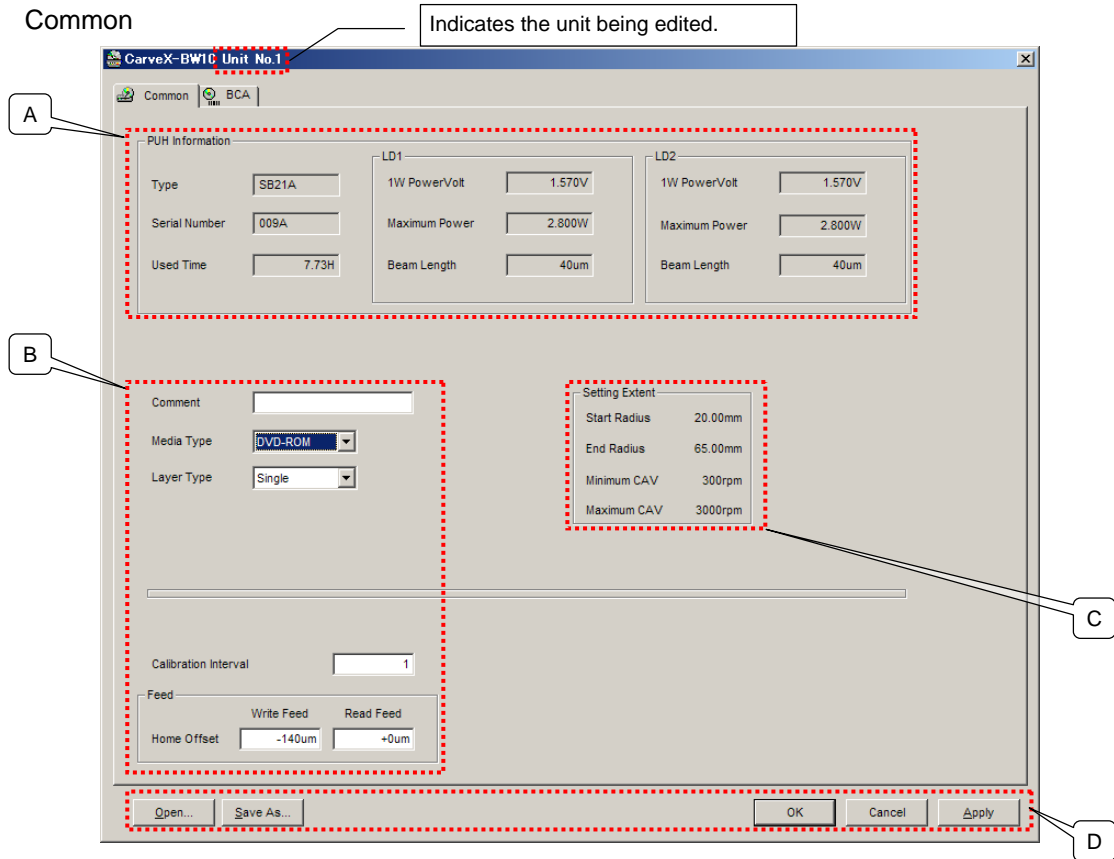
Err. Log

No. Indicates the line number.
 Date/Time..... Date and time the error occurred.
 Unit..... Indicates the unit number of the target main unit.
 Code Indicates the error code.
 Contents..... Indicates the error details.

1.3.2 Parameters

Left-click on each unit on the main screen and input a password to open the sub-windows indicated below.

All selections are masked in standard mode; no settings can be made or edited. The configured information is displayed during startup.



A. PUH Information

Indicates the PUH information being used by the selected unit (main unit).

- Type Indicates the type.
- Serial Number Indicates the serial number.
- Used Time [h] Indicates the time used to this point.
- LD1/LD2 (both)
- 1W PowerVolt [V] D/A value to illuminate with 1W.
- Maximum Power [W] Indicates the maximum outgoing radiation.
- Beam Length [um] Length of the radial direction beam.

B.

- Comment Comments can be added.
- Media Type Select the target media type.
- Layer Type Select the target media layer. * Not currently being used.
- Calibration Interval The laser power is calibrated every nth set disc recording.
- Feed
- Home Offset [um] Sets the feed offset. Normally not to be changed.
 - Write Feed The BCA recording side feed offset.
 - Read Feed The BCA reading side feed offset.

C. Setting Extent

Start Radius [mm]	The start radius position where feed motor writing is possible on the write side.
End Radius [mm]	The end radius position where feed motor writing is possible on the write side.
Minimum CAV [rpm]	Indicates the minimum number of spindle motor rotations.
Maximum CAV [rpm]	Indicates the maximum number of spindle motor rotations.

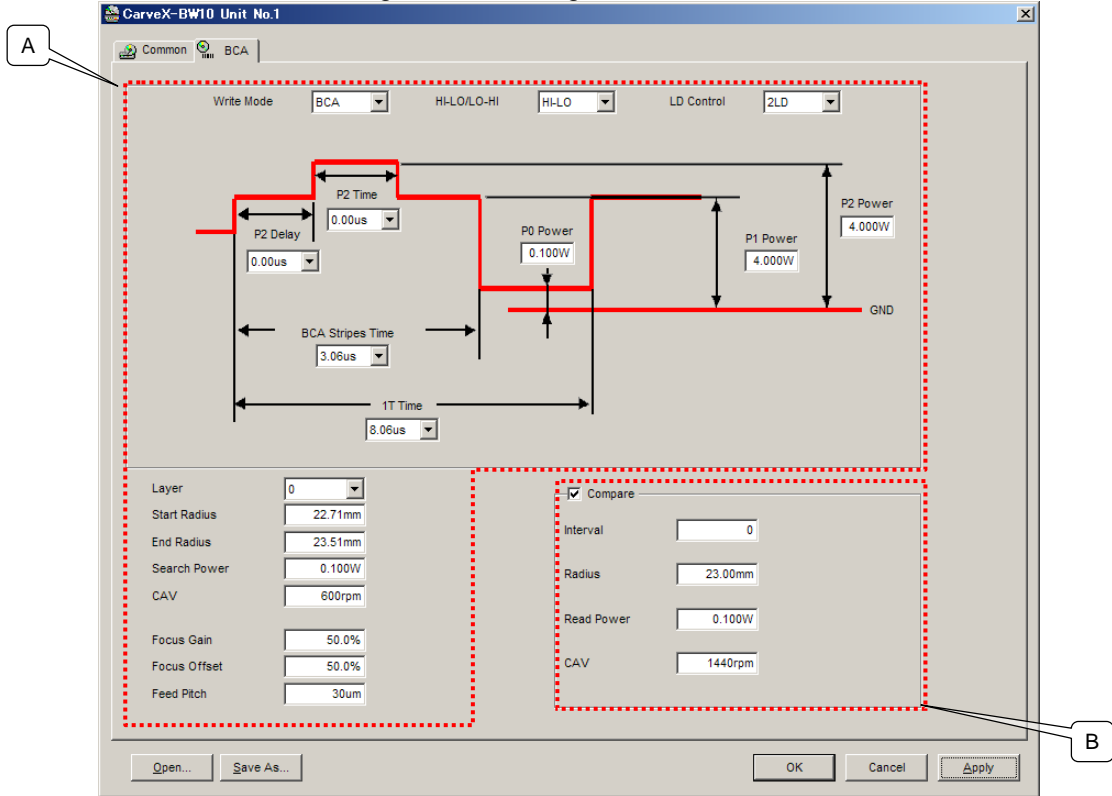
D. Common Buttons

Used in all tabs.

Open	Opens the parameter file.
Save As	Saves the parameter file in the desired folder.
OK	Sends the edited parameters to the main unit and closes the sub-windows.
Cancel	Cancel sending of the edited parameters to the main unit and closes the sub-window. Any changes will not be reflected when the window is next opened. The latest main unit parameters are displayed.
Apply	The edited parameters are sent to the main unit. The sub-window does not close.

BCA

Parameters for recording BCA to the target media.



E. Sets the BCA recording pattern.

- Write Mode..... Specifies the recording pattern.
 - BCA Records the set BCA data. This is the default.
 - 1T to 5T Records 1 to 5 times T for the 1T set in the parameters.
- HI-LO/LO-HI..... Set for the target media.
- LD Control..... Selects the LD to use. When 1LD is set, the maximum power displayed in PUH Information on the Common tab is the maximum value that can be set by P0–P2.
- P0 [W] Sets power not on the stripes section.
- P1,P2 [W]..... Sets power on the stripes section.
- P2 Delay*, P2 Time* [us]..... Allows the P2 irradiation timing delay/illumination time to be set.
- BCA Stripes Time* [us]..... Sets the laser emission time for the BCA stripes section.
- 1T Time* [us]..... Sets the 1T time.
- Layer Comments can be added.
- Start Radius [mm] Sets the BCA recording start position.
- End Radius [mm] Sets the BCA recording end position.
- Search Power [W]..... The power to apply the servo to the target media.
 - Set a power level that will not negatively affect the disc.
- Focus Gain [%] The focus gain. Normally set to 50%
- Focus Offset [%] The focus offset. Normally set to 50%.
- Feed Pitch [um/r]..... The feed pitch during BCA recording. At a maximum, set to 5 um or greater less than the PUH beam length being used (Feed Pitch • PUH beam length-5 um).

* The time that is set here is based on the theoretical (time) value during BCA playback rotation from the media specifications set for Media Type on the Common tab. The actual playback waveform may be before or after the set time due to BCA recording conditions and reflection or recording layer characteristics.

F. Compare (Verify) Function

The PUH used for recording can be used for comparisons (may not apply to all media types).

The timing execution is after BCA recording.

Limited if Wave Check on the Common tab is not checked.

Compare	A comparison is done. Active when checked.
Interval	The comparison is made every nth set disc recording.
Radius [mm].....	Sets the radius position for the comparison.
Read Power [W].....	Sets the emission power during playback.
CAV [rpm].....	Sets the rotation number during comparison.

1.3.3 Mode Operations

The restricted commands for each mode are indicated below.

X: Cannot be used (cannot be edited)/ O: Can be used

Menu Bar		MANU		AUTO	
		Standard	Professional	Standard	Professional
File	BCA Data Format File New	x	O	x	O
	BCA Data Format File Open	x	O	x	O
	BCA Data Format File Save As	x	O	x	O
	Exit	O	O	O	O
View	Toolbar	O	O	O	O
	Status Bar	O	O	O	O
Mode	Standard	O	O	O	O
	Professional	O	O	O	O
	Change Password	x	O	x	O
Setting	System	x	O	x	O
BCA	BCA Format	x	O	x	O
	BCA Data	x	O	x	O
Help	About	O	O	O	O
	I/O Monitor Help	O	O	O	O

Sub-windows	MANU		AUTO	
	Standard	Professional	Standard	Professional
Common	x	O	x	x
BCA	x	O	x	x

Right-click Menus (during normal operation)	MANU		AUTO	
	Standard	Professional	Standard	Professional
OK,NG Count Clear	x	O	x	O
Pass Mode	x	x	O	O
Maintenance Mode	x	O	x	x
Reconnect	-	-	-	-
Reset	x	x	x	x
Firmware Download	x	x	x	x

Right-click Menus (IPL)	MANU		AUTO	
	Standard	Professional	Standard	Professional
OK,NG Count Clear	x	x	x	x
Pass Mode	x	x	x	x
Maintenance Mode	x	x	x	x
Reconnect	-	-	-	-
Reset	x	O	x	x
Firmware Download	x	O	x	x

Chapter 2 BCA File Settings

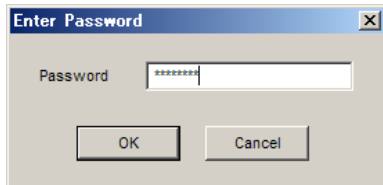
2.1	Creating BCA Files	2-2
2.2	Setting BCA Format	2-3
2.3	Setting BCA Data	2-4
2.4	Saving BCA Files	2-5
2.5	Reading BCA Files.....	2-6

2.1 Creating BCA Files

Follow the operation below to create a new BCA file from the application.

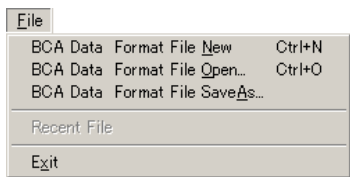
- 1 On the menu bar, select [Mode] → [Professional].

Enter the assigned password.

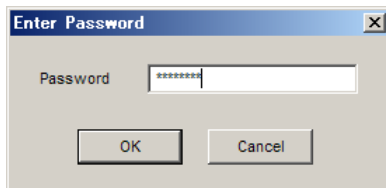


*** This operation is not required if “Professional” is already checked.**

- 2 Select [File] → [BCA Data Format File New].

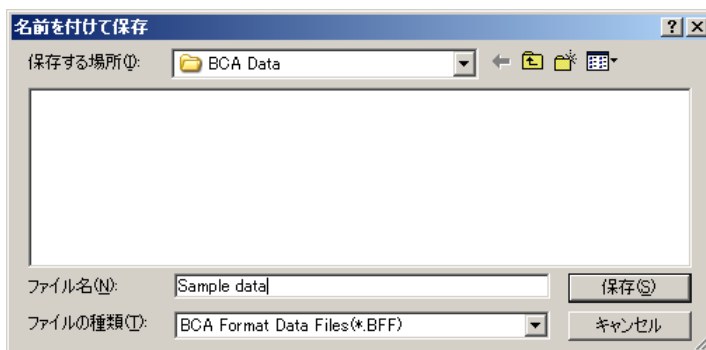


- 3 Enter the assigned password.



- 4 Enter the desired file name and save.

In the example below, “Sample data” is used.



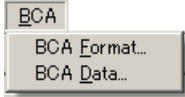
The extension is set as BFF.

The new file has now been prepared.

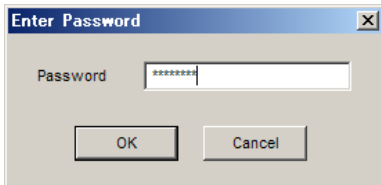
2.2 Setting BCA Format

Follow the operation below to set the BCA format.

- 1 On the menu bar, select [BCA] → [BCA Format].

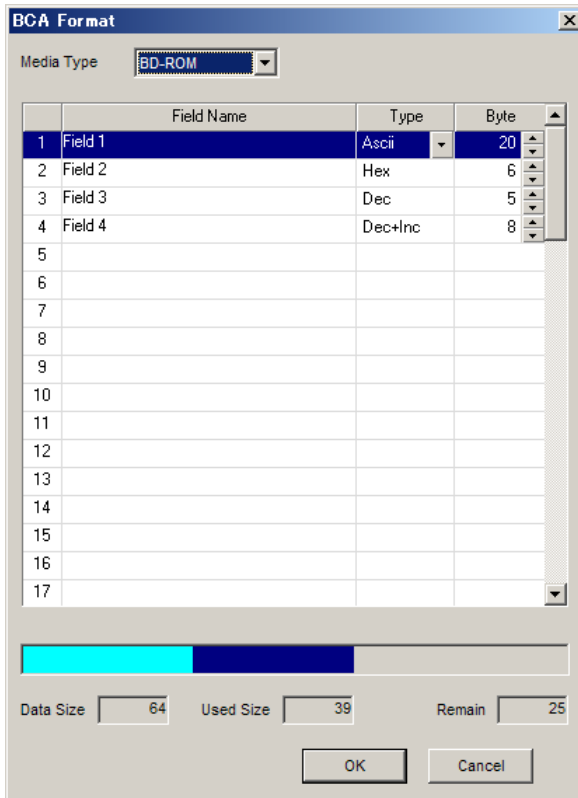


- 2 Enter the assigned password.



- 3 The format for each item is specified on the screen below. (The screen is for reference only.)
Set each item by double-clicking with your mouse or click the control button to operate.
To delete a line, set [Type] to be blank.

Click the [OK] button to update the set files and close the window.

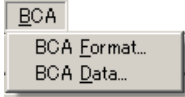


- Media Type
Selects the target media type.
- Field Name
Sets an arbitrary item name.
- Type
Selects the data format.
Ascii Sets using ASCII format.
Hex Sets using hexadecimal.
Dec Sets using decimal.
Dec+Inc..... Increments in decimal.
Hex+Inc..... Increments in hexadecimal.
Dec+Inc Ascii Incremented in Decimal into an ascii form
Hex+Inc Ascii Incremented in Hexadecimal into an ascii form
File Ascii..... Sets using Ascii File
File Bin..... Sets using Binaly File
- Byte
Sets data size of that item.
- Data Size [Byte]
Maximum size set for Media Type.
- Used Size [Byte]
Total size of the format set for each item.
- Remain [Byte]
Remaining data size.
- Status Bar
The ratio held by each item when data size is 1 is displayed as a bar graph.
 - Percentage of items currently selected
 - Currently used percentage (Used Size)
 - Remaining percentage (Remain)

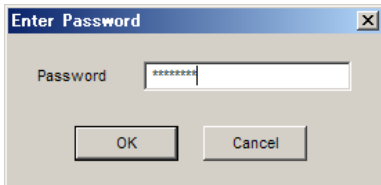
2.3 Setting BCA Data

Follow the operation below to set the BCA format.

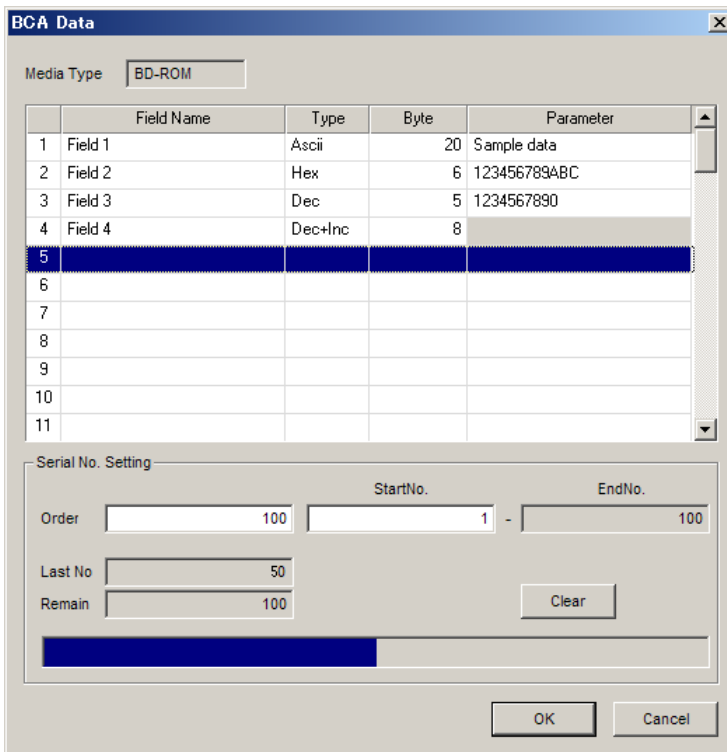
- 1 On the menu bar, select [BCA] → [BCA Data].



- 2 Enter the assigned password.



- 3 The data for each item is specified on the screen below. (The screen is for reference only.)
Enter data into the [Parameter] field using the [Type]·[Byte] specified for each item.



Details for the item specified as [Dec+Inc] in line 4 of the figure above are set in the details section at the bottom part of the screen.

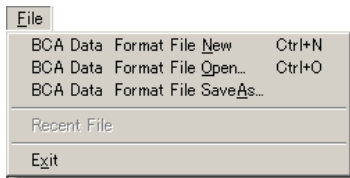
- Order..... Sets the production number (order number) for the target media.
- StartNo. Sets the start number.
- EndNo. Displays the last number that reflects the order number in relation to the start number.
- Last No..... Displays the last used number during production or during a halt in production.
- Remain..... Displays the remaining number of orders.
- Clear Clears the current production process.
- Status Bar Displays as a bar graph the current number of orders with order numbers defined as one.

* The information above operates linked to the main screen system window.

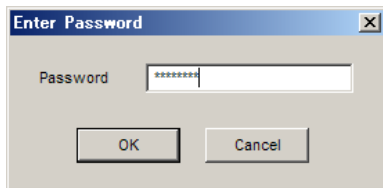
2.4 Saving BCA Files

Follow the operation below to save or overwrite the format/data set in Sections 2.2–2.3 above using the application.

- 1 From the menu bar, select [File] → [BCA Data Format File SaveAs].

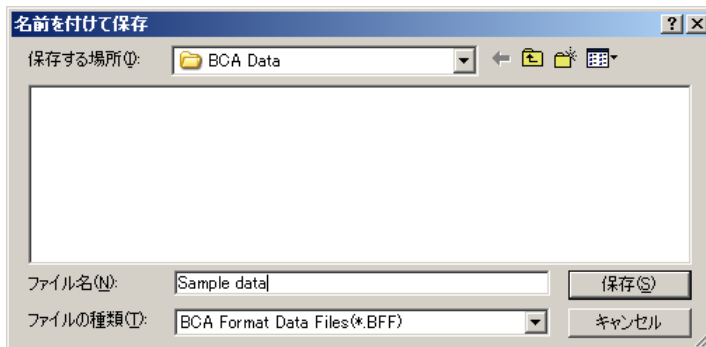


- 2 Enter the assigned password.



- 3 Enter a name and save.

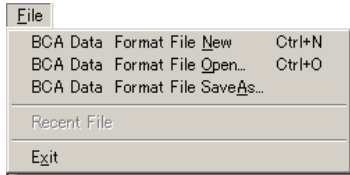
"Sample data" is used in the example below.



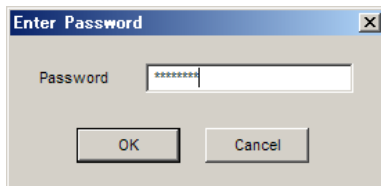
2.5 Reading BCA Files

Follow the operation below to read the current BCA file using the application.

- 1 On the menu bar, select [File] → [BCA Data Format File Open].

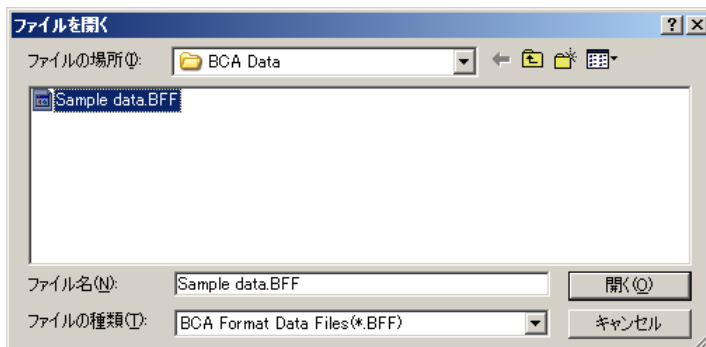


- 2 Enter the assigned password.

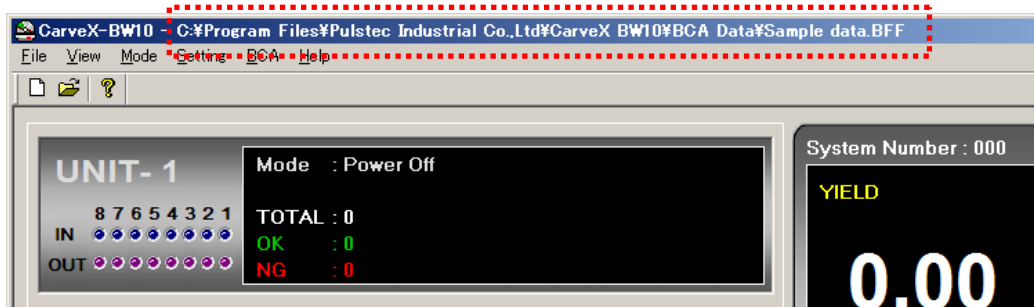


- 3 Select and open the desired file.

In the example below, "Sample data" is used.



After the file is opened, the "Folder Name" and "File Name" are displayed on the main screen title bar.



* If no changes are made in the application, the previously selected file will automatically be opened the next time the program is started.

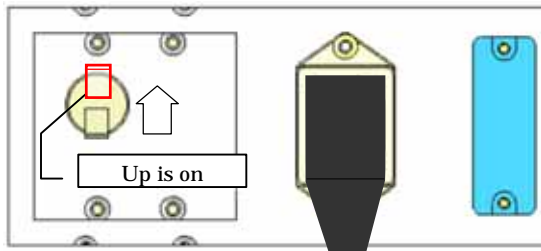
Chapter 3 Using the Device

3.1	Manually Starting the Main Unit	3-2
3.2	Starting Up the Application.....	3-3
3.3	Setting BCA Recording Conditions	3-4
3.4	Saving BCA Recording Conditions	3-5
3.5	Reading BCA Recording Conditions	3-6
3.6	Recording to Target Media.....	3-7
3.7	BCA Recording Flowchart.....	3-8

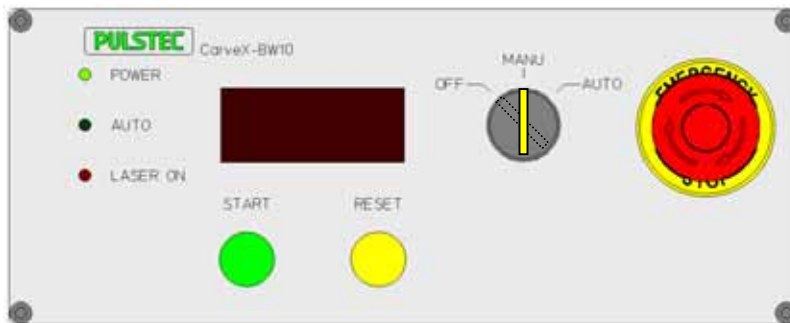
3.1 Manually Starting the Main Unit

Follow the procedure below to start up the main unit.

- 1 Verify that a key is inserted in the selector switch (key switch) on the operation panel.
- 2 Verify that there are no objects that could obstruct operation in the turn tray area.
If a disc is on the tray, manually rotate the tray and remove the disc.
- 3 Turn on the breaker on the front side of the main unit (the knob should move up).



- 4 Move the selector switch on the face of the main unit to "MANU".





Caution



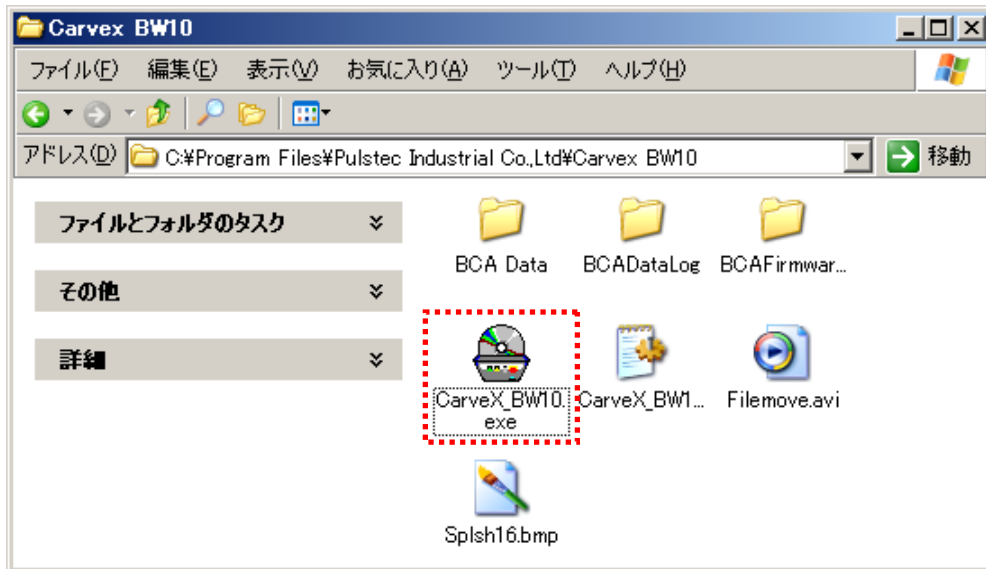
The turn tray returns to its origin point when the main unit is started. Avoid placing hands or objects in the area. Serious injury could result.

- 5 The POWER LED lights and the main unit starts up.
- 6 Once the main unit has completed starting up, a buzzer sounds and operations are possible.

3.2 Starting Up the Application

Follow the procedure below to start up the application.

- 1 Select and start “**CarveX_BW10.exe**” from the file to which the computer installed the program.



Once started, the following startup screen is displayed.



- 2 After the startup screen is displayed, the main screen (see Chapter 1, Section 1.3.1) is displayed.

3.3 Setting BCA Recording Conditions

Follow the operations below to set the BCA recording conditions.

To set the BCA recording conditions, make sure to startup the main unit in “MANU” mode as described in Section 3.1. The parameters cannot be set if “AUTO” mode is used.

In addition, the main unit must be started in order to set the BCA recording conditions.

- 1 On the menu bar, select [Mode] [Professional] to enter Professional mode.
* This operation is not required if “Professional” is already checked.

- 2 Create or open a BCA file for the target media.

See Chapter 2 for details.

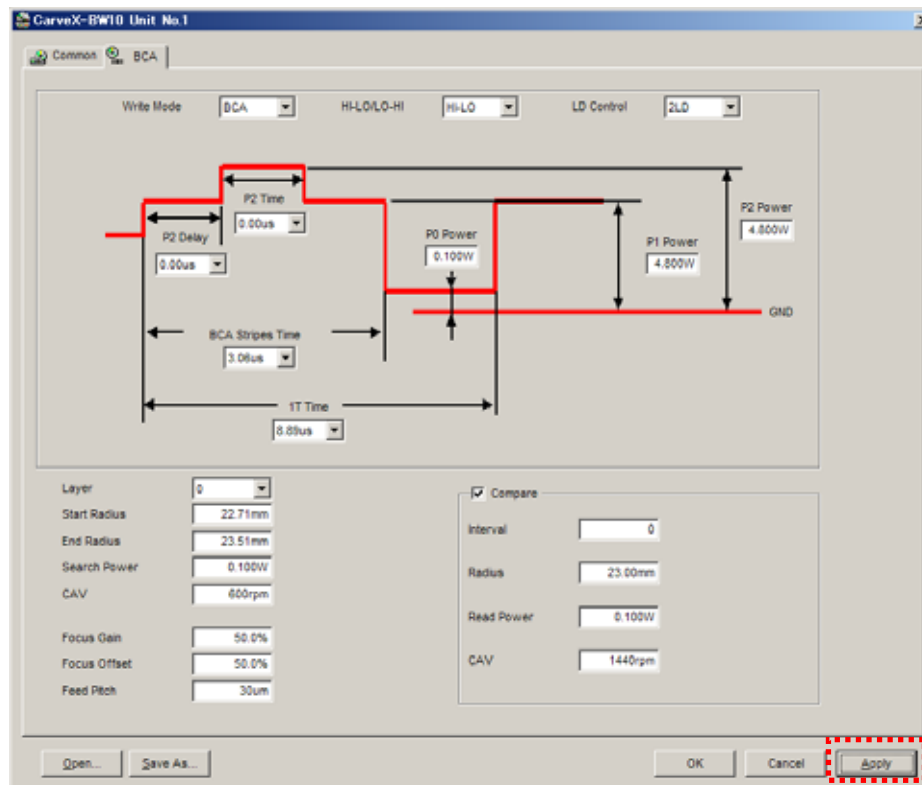
- 3 Point your mouse to the target unit on the main screen and double-click.

Unit 1 is selected below.



- 4 A sub-window (see figure below) opens. See Chapter 1, Section 1.3.2 to set the parameters on the various tabs.

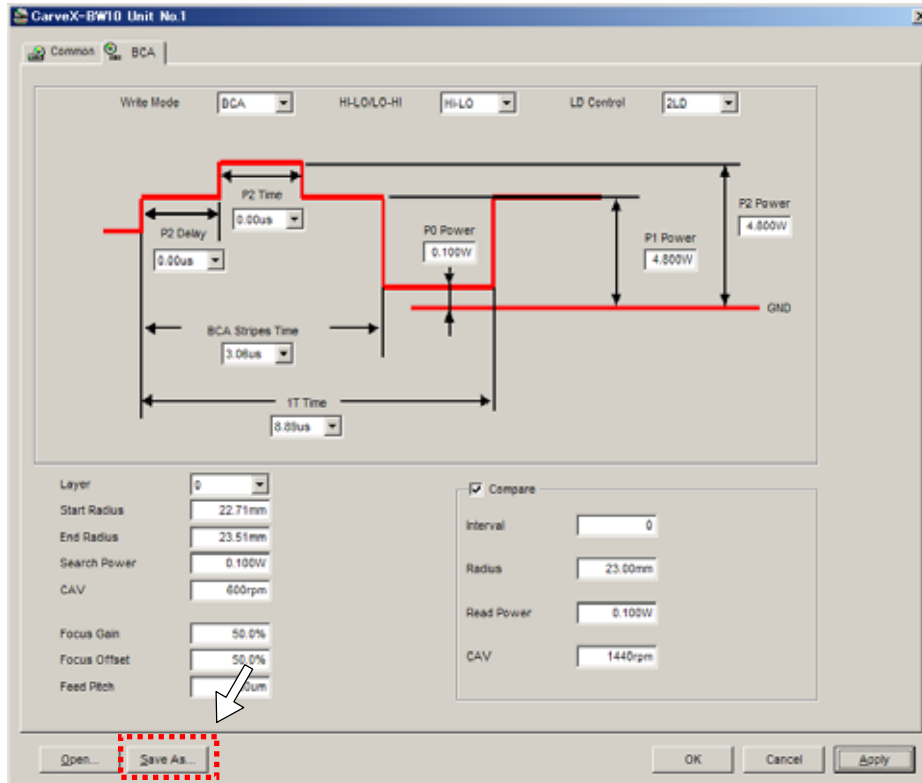
- 5 Once the parameters have been set, click the [Apply] button to send all set parameters to Unit 1.



3.4 Saving BCA Recording Conditions

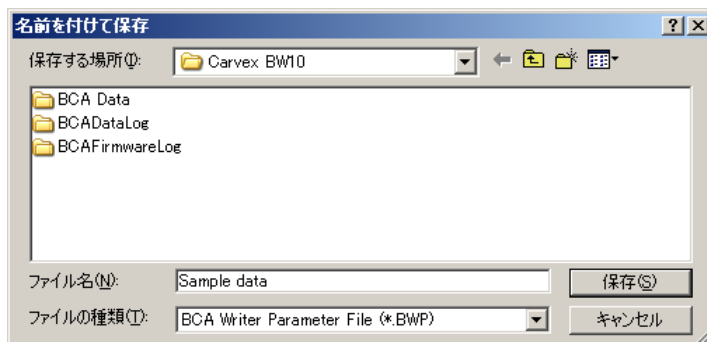
Follow the operations below to save the BCA recording conditions.

- 1 Click the [Save As] button on the sub-window indicated below.



- 2 Enter the desired file name and save.

In the example below, "Sample data" is used.

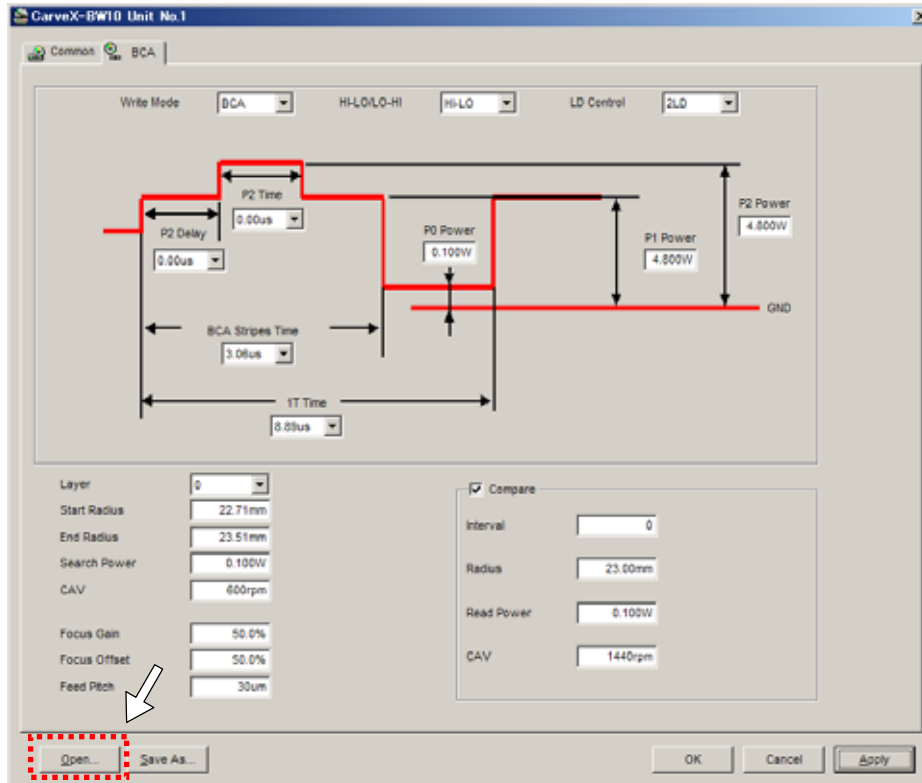


The extension is set as BWP.

3.5 Reading BCA Recording Conditions

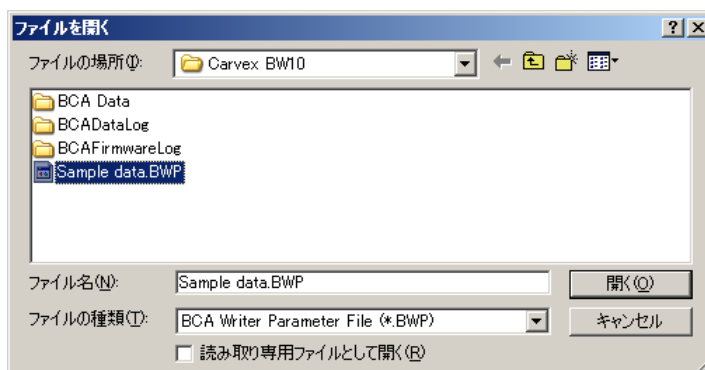
Follow the operations below to read BCA recording conditions.

- 1 Click the [Open] button on the sub-window indicated below.



- 2 Enter the desired file name and save.

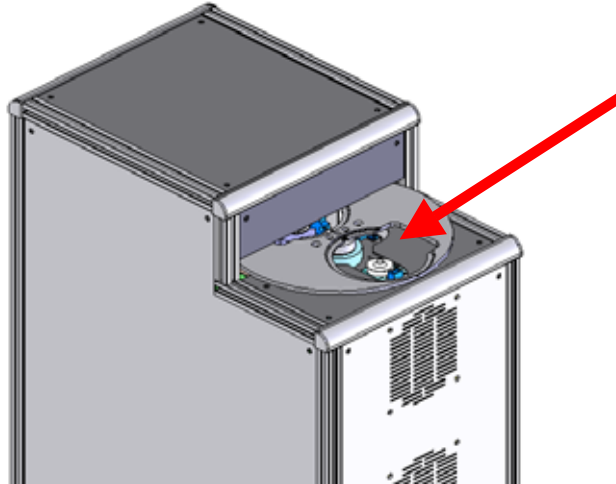
In the example below, "Sample data" is used.



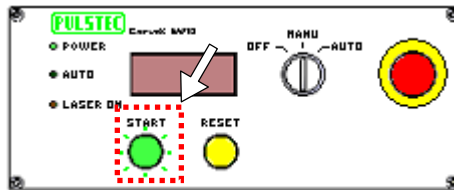
3.6 Recording to Target Media

Configure the settings for items covered under Sections 3.3–3.5 and follow the procedure below to record to the target media.

- 1 Place the target media into the disc guide on the main unit.



- 2 Verify that there is nothing obstructing the disc transporter, verify that the START switch LED on the main unit front panel is blinking, and then press the START switch.



- 3 The tray rotates and BCA recording starts.




Warning








Never touch the transporter from the time that recording begins until it ends. Injury could result. In addition, never place objects in the transporter area.

- 4 Once the recording has successfully finished, the tray rotates and the disc is ejected. Remove the disc using the RESET switch if an error occurs.



Warning

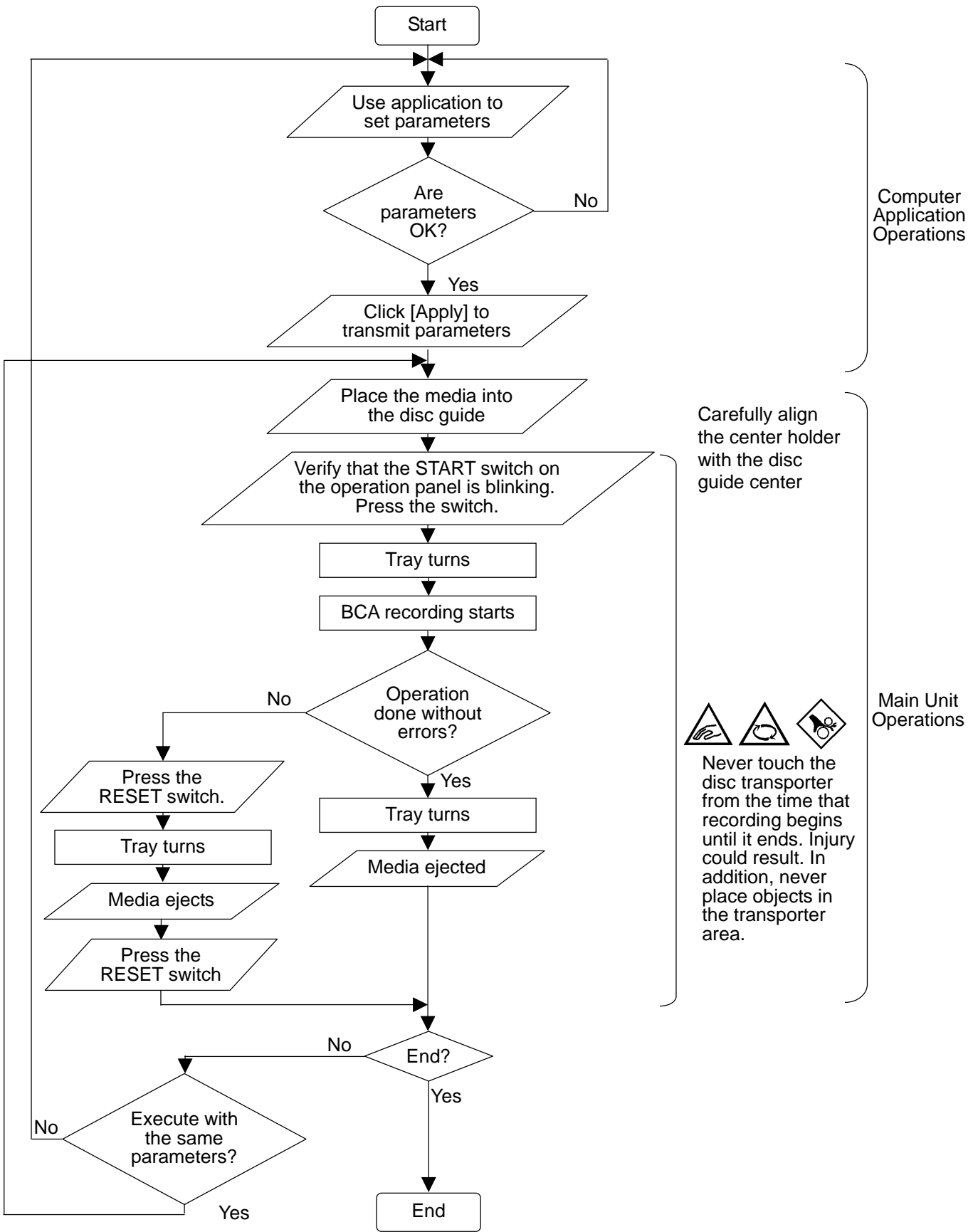




Never touch the transporter after the RESET switch has been pressed until the disc has been ejected. Injury could result.

* See Chapter 6 for information on clearing errors.

3.7 BCA Recording Flowchart

A flowchart explaining the flow of manual operations is indicated below.



Chapter 4 Automatic Operations

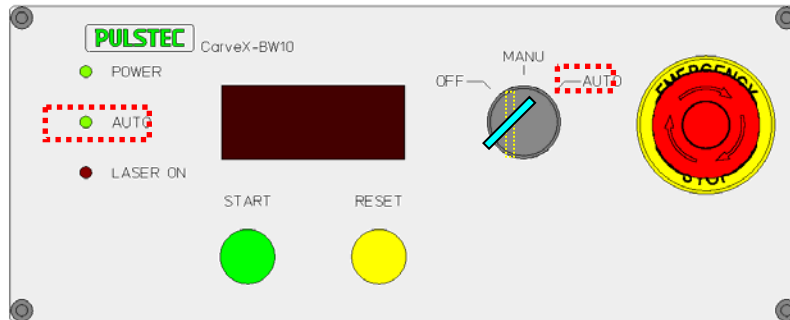
4.1	Parameter Settings	4-2
4.2	Application Side Operations	4-3
4.3	Handler Interface	4-4
4.4	Timing Charts.....	4-5
4.4.1	Chart 1: Normal Operations (BCA Cut OK)	4-5
4.4.2	Chart 2: Normal Operations (BCA Cut NG)	4-8
4.4.3	Chart 3: Error Detection (cleared by terminate signal) ...	4-11
4.4.4	Chart 4: Error Detection (cleared by RESET switch)....	4-14
4.4.5	Chart 5: Production Termination (BCA Cut OK)	4-17

4.1 Parameter Settings

The parameters used during automatic operations must be set beforehand in manual mode.

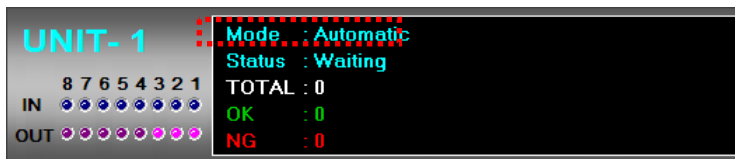
The following settings are made on the main unit and application.

- 1 Refer to Chapter 3, Sections 3.1–3.2 to start the main unit and computer application.
- 2 Refer to Chapter 3, Sections 3.3–3.5 to send BCA recording conditions to the main unit.
- 3 After setting items 1 to 2 above, turn the selector switch on the front of the main unit to “AUTO”.



The AUTO LED lights.

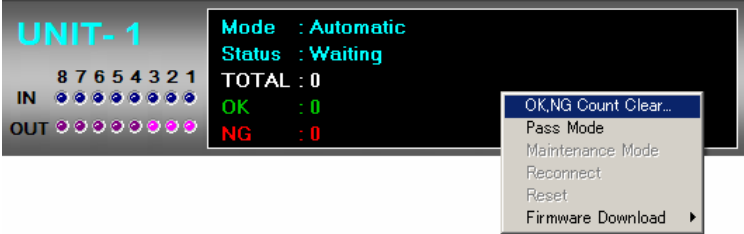
- 4 The unit window displays the mode as “Automatic” and the device changes to automatic operation mode.



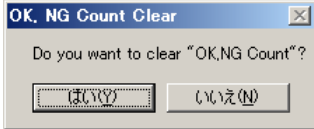
4.2 Application Side Operations

The commands that are possible in automatic mode are as indicated below.

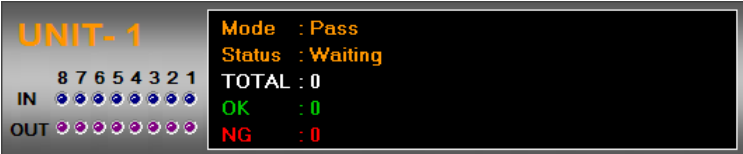
Right-click menu



OK,NG Count Clear Zeroes the current counter (Total/OK/NG) count.
After clicking, read and follow the indicated message.



Pass Mode Sets the selected unit to not produce.
The screen is as indicated below.



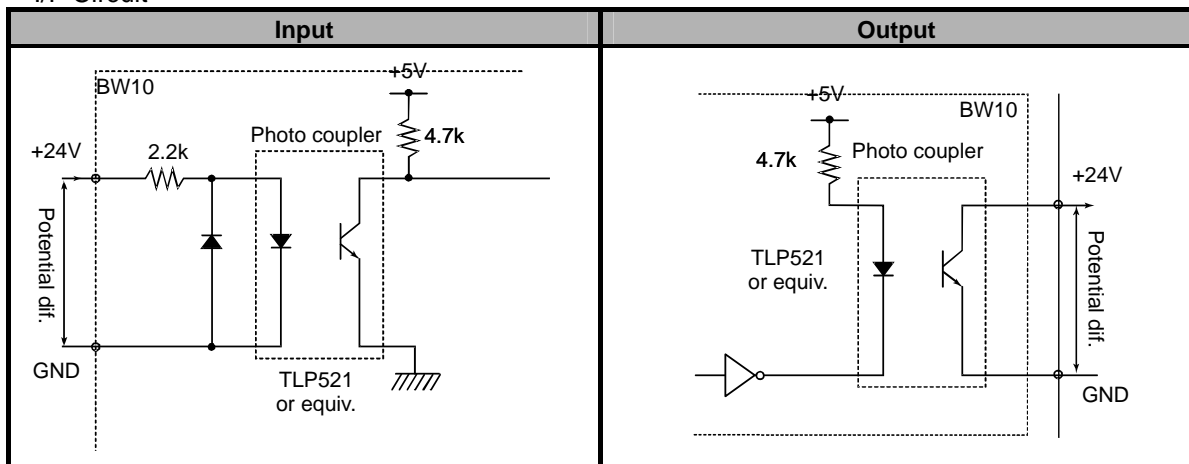
* A sub-window with BCA recording conditions is displayed but the settings cannot be changed.

4.3 Handler Interface

The main unit communicates with external control devices through the handler interface on the front part of the main unit. The parallel control signal port is as indicated below.

Pin Number	Signal Name	I/O	Signal Description	I/O No.
1	Startup signal (+)	IN	Start operation signal of device	DI 0
2	Startup signal (-)			
3	Supply finished signal (+)	IN	Disc supply finished signal	DI 1
4	Supply finished signal (-)			
5	Unload finished signal (+)	IN	Disc unload finished signal	DI 2
6	Unload finished signal (-)			
7	Error reset signal (+)	IN	Error reset signal	DI 3
8	Error reset signal (-)			
9	Prohibit operation signal (+)	IN	Handler operation prohibited	DI 4
10	Prohibit operation signal (-)			
11	Finish signal (+)	IN	Device stopped	DI 5
12	Finish signal (-)			
13	Reserved (+)	IN		DI 6
14	Reserved (-)			
15	Reserved (+)	IN		DI 7
16	Reserved (-)			
17	NC (+)			
18	NC (-)			
19	Running signal (+)	OUT	Device running	DO 0
20	Running signal (-)			
21	Operating signal (+)	OUT	BCA recording	DO 1
22	Operating signal (-)			
23	Prohibit operation signal (+)	OUT	Handler operation prohibited signal	DO 2
24	Prohibit operation signal (-)			
25	Supply possible signal (+)	OUT	Disc reception possible signal	DO 3
26	Supply possible signal (-)			
27	OK disc acquisition possible signal (+)	OUT	OK disc acquisition request signal	DO 4
28	OK disc acquisition possible signal (-)			
29	NG disc acquisition possible signal (+)	OUT	NG disc acquisition request signal	DO 5
30	NG disc acquisition possible signal (-)			
31	Error occurred signal (+)	OUT	Error detected	DO 6
32	Error occurred signal (-)			
33	Disc detection signal (+)	OUT	Disc detection signal	DO 7
34	Disc detection signal (-)			

I/F Circuit



TYPE-1 Timing Chart 1: Normal Operation (BCA Cut OK)

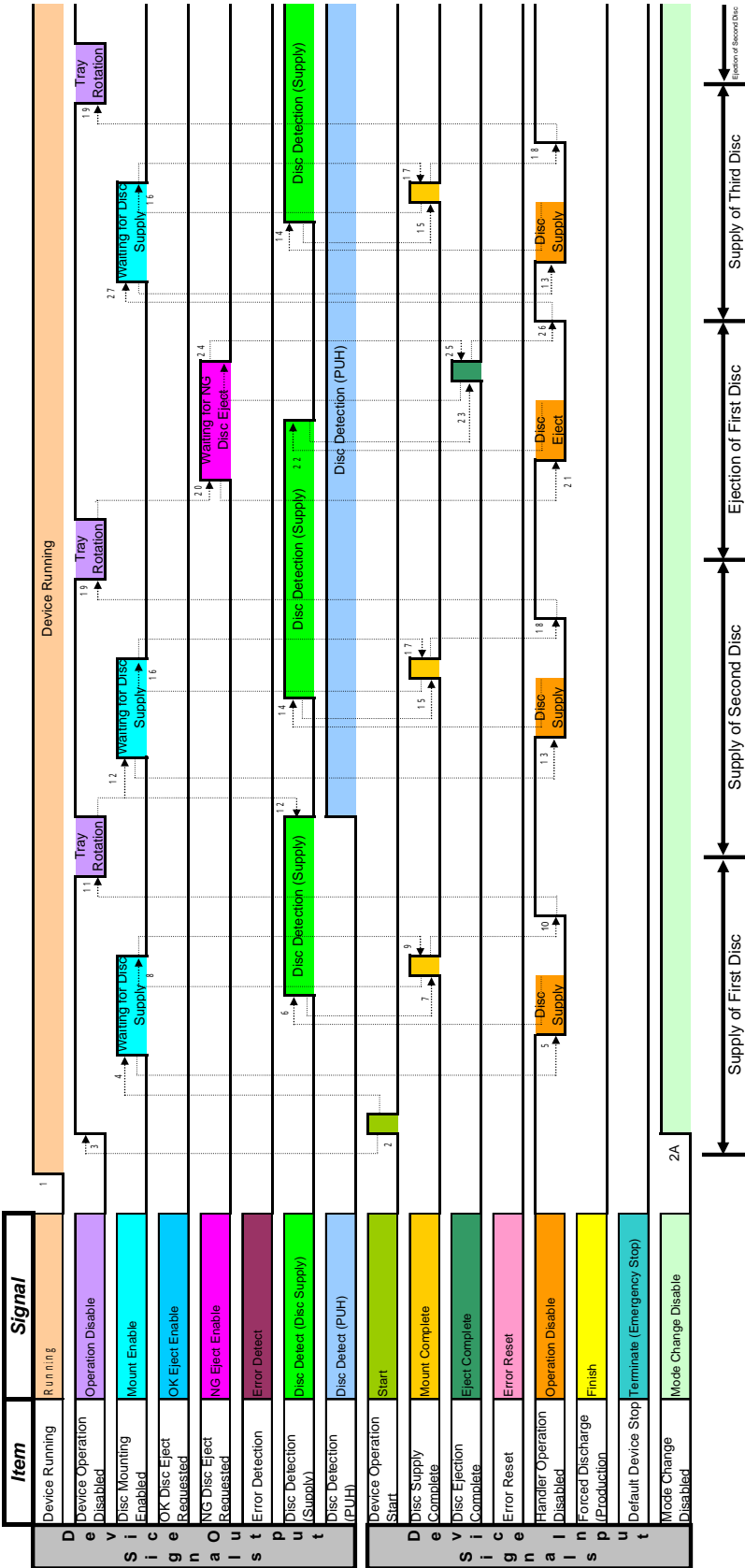
1. The output signal "Running" turns "ON" when the device is turned on.
2. The input signal "Start" is verified as "ON".
 - 2A. "Mode Change Disable" is verified as "ON" and operation of the selector switch is disabled.
3. After the input signal "Start" is verified as "ON", the output signal "Operating" turns "OFF" and the output signal "Operation Disable" turns "ON".
4. After the input signal "Start" is verified as "OFF", the output signal "Mount Enable" turns "ON".
5. After verifying that the output signal "Mount Enable" is "ON", the handler turns the input signal "Operation Disable" to "OFF" and starts disc supply.
6. After discs supplied by the handler are detected by the disc detection sensor, the output signal "Disc Detect" turns "ON".
7. After verifying that the output signal "Disc Detect" is "ON", the handler turns the input signal "Mount Complete" to "ON".
8. After the input signal "Mount Complete" is verified as "ON", the output signal "Mount Enable" turns "OFF".
9. After verifying that the output signal "Mount Enable" is "OFF", the handler turns the input signal "Mount Complete" to "OFF".
10. After verifying that the input signal "Mount Complete" is "OFF", the handler turns the input signal "Operation Disable" to "ON".
11. After the input signal "Mount Complete" is verified as "OFF" and after the input signal "Operation Disable" is verified as "ON", the output signal "Operation Disable" turns "OFF", and if the output signal "Disc Detect (on the disc supply side)" and the BCA cut operation is finished, then the tray rotates.
12. If there are no discs in the disc supply/output sides after the tray finishes rotating, the output signal "Disc Detect" turns "OFF" and "Mount Enable" turns "ON".
13. After verifying that the output signal "Mount Enable" is "ON", the handler turns the input signal "Operation Disable" to "OFF" and starts disc supply.
14. After discs supplied by the handler are detected by the disc detection sensor, the output signal "Disc Detect" turns "ON".
15. After verifying that the output signal "Disc Detect" is "ON", the handler turns the input signal "Mount Complete" to "ON".
16. After the input signal "Mount Complete" is verified as "ON", the output signal "Mount Enable" turns "OFF".
17. After verifying that the output signal "Mount Enable" is "OFF", the handler turns the input signal "Mount Complete" to "OFF".
18. After verifying that the input signal "Mount Complete" is "OFF", the handler turns the input signal "Operation Disable" to "ON".
19. After the input signal "Mount Complete" is verified as "OFF" and after the input signal "Operation Disable" is verified as "ON", the output signal "Operation Disable" turns "OFF", and if the BCA cut operation is finished, then the tray rotates.
20. If there are OK discs on the disc supply/output sides after the tray finishes rotating, the output signal "OK Eject Enable" turns "ON" and a "Get OK Disc" request is output.
21. After verifying that the output signal "OK Eject Enable" is "ON", the handler turns the input signal "Operation Disable" to "OFF" and starts disc transport.
22. Discs are transported by the handler, and when the disc sensor detects that there are no discs present, the output signal "Disc Detect" turns "OFF".
23. After verifying that the output signal "Disc Detect" is "OFF", the handler turns the input signal "Eject Complete" to "ON".
24. After the input signal "Eject Complete" is verified as "ON", the output signal "OK Eject Enable" turns "OFF".
25. After verifying that the output signal "OK Eject Enable" is "OFF", the handler turns the input signal "Eject Complete" to "OFF".
26. After verifying that the input signal "Mount Complete" is "OFF", the handler turns the input signal

“Operation Disable” to “ON”.

27. After the input signal “Operation Disable” is verified as “ON”, the output signal “Mount Enable” turns “ON” and waits for the next disc to be supplied.

This process repeats from step 13. If no disc is detected in step 20, processing repeats from step 12.

4.4.2 Chart 2: Normal Operations (BCA Cut NG)



Timing Chart 2: Normal Operations (BCA Cut NG)

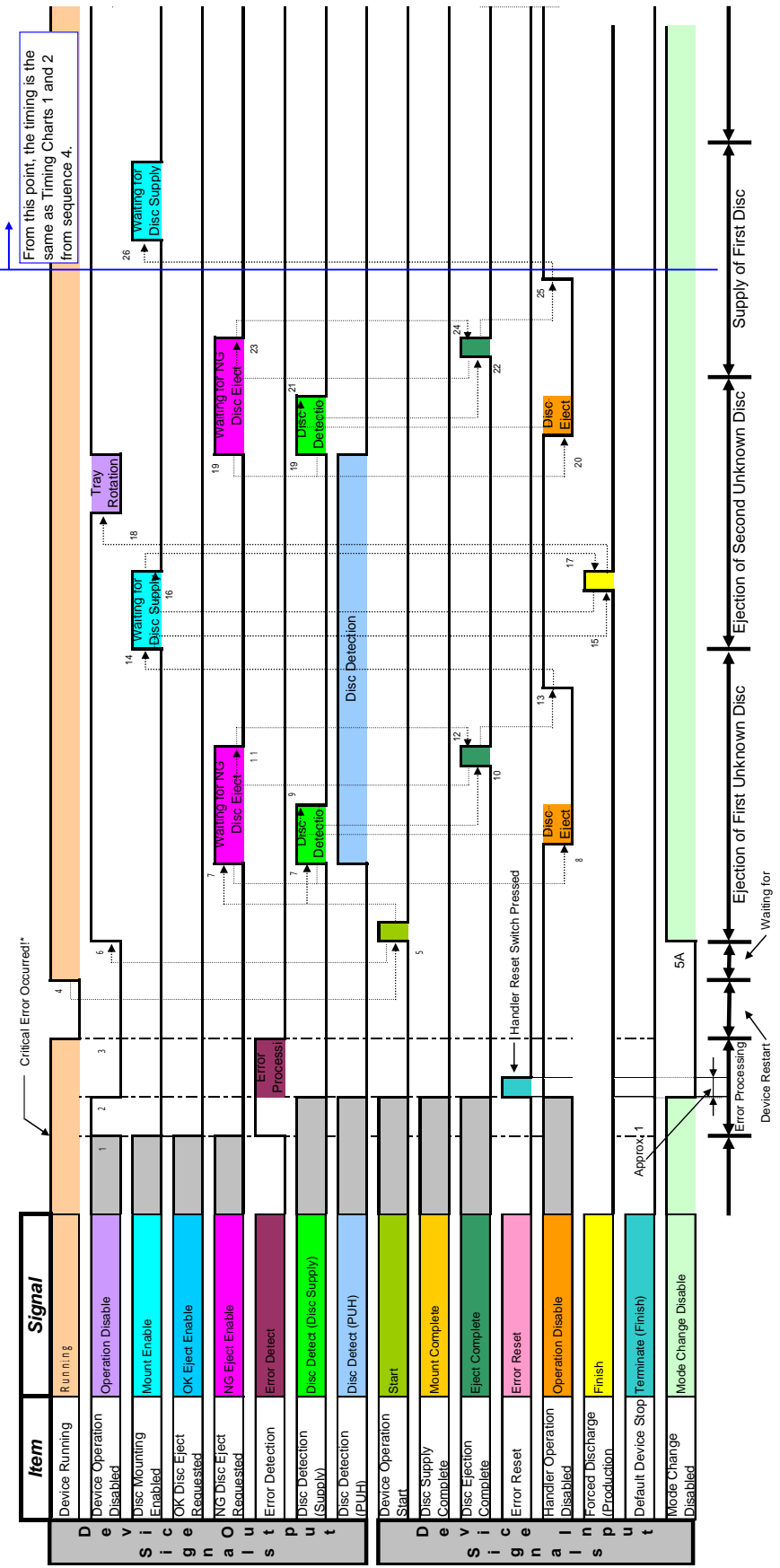
1. The output signal "Running" turns "ON" when the device is turned on.
2. The input signal "Start" is verified as "ON".
2A. "Mode Change Disable" is verified as "ON" and operation of the selector switch is disabled.
3. After the input signal "Start" is verified as "ON", the output signal "Operating" turns "OFF" and the output signal "Operation Disable" turns "ON".
4. After the input signal "Start" is verified as "OFF", the output signal "Mount Enable" turns "ON".
5. After verifying that the output signal "Mount Enable" is "ON", the handler turns the input signal "Operation Disable" to "OFF" and starts disc supply.
6. After discs supplied by the handler are detected by the disc detection sensor, the output signal "Disc Detect" turns "ON".
7. After verifying that the output signal "Disc Detect" is "ON", the handler turns the input signal "Mount Complete" to "ON".
8. After the input signal "Mount Complete" is verified as "ON", the output signal "Mount Enable" turns "OFF".
9. After verifying that the output signal "Mount Enable" is "OFF", the handler turns the input signal "Mount Complete" to "OFF".
10. After verifying that the input signal "Mount Complete" is "OFF", the handler turns the input signal "Operation Disable" to "ON".
11. After the input signal "Mount Complete" is verified as "OFF" and after the input signal "Operation Disable" is verified as "ON", the output signal "Operation Disable" turns "OFF", and if the output signal "Disc Detect (on the disc supply side)" and the BCA cut operation is finished, then the tray rotates.
12. If there are no discs in the disc supply/output sides after the tray finishes rotating, the output signal "Disc Detect" turns "OFF" and "Mount Enable" turns "ON".
13. After verifying that the output signal "Mount Enable" is "ON", the handler turns the input signal "Operation Disable" to "OFF" and starts disc supply.
14. After discs supplied by the handler are detected by the disc detection sensor, the output signal "Disc Detect" turns "ON".
15. After verifying that the output signal "Disc Detect" is "ON", the handler turns the input signal "Mount Complete" to "ON".
16. After the input signal "Mount Complete" is verified as "ON", the output signal "Mount Enable" turns "OFF".
17. After verifying that the output signal "Mount Enable" is "OFF", the handler turns the input signal "Mount Complete" to "OFF".
18. After verifying that the input signal "Mount Complete" is "OFF", the handler turns the input signal "Operation Disable" to "ON".
19. After the input signal "Mount Complete" is verified as "OFF" and after the input signal "Operation Disable" is verified as "ON", the output signal "Operation Disable" turns "OFF", and if the BCA cut operation is finished, then the tray rotates.
20. If there are OK discs on the disc supply/output sides after the tray finishes rotating, the output signal "NG Eject Enable" turns "ON" and a "Get NG Disc" request is output.
21. After verifying that the output signal "NG Eject Enable" is "ON", the handler turns the input signal "Operation Disable" to "OFF" and starts disc transport.
22. Discs are transported by the handler, and when the disc sensor detects that there are no discs present, the output signal "Disc Detect" turns "OFF".
23. After verifying that the output signal "Disc Detect" is "OFF", the handler turns the input signal "Eject Complete" to "ON".
24. After the input signal "Eject Complete" is verified as "ON", the output signal "OK Eject Enable" turns "OFF".
25. After verifying that the output signal "OK Eject Enable" is "OFF", the handler turns the input signal "Eject Complete" to "OFF".
26. After verifying that the input signal "Mount Complete" is "OFF", the handler turns the input signal

“Operation Disable” to “ON”.

27. After the input signal “Operation Disable” is verified as “ON”, the output signal “Mount Enable” turns “ON” and waits for the next disc to be supplied.

This process repeats from step 13. If no disc is detected in step 20, processing repeats from step 12.

4.4.3 Chart 3: Error Detection (cleared by terminate signal)



Timing Chart 3: Error Detection (cleared by terminate signal)

1. When an error* occurs, the output signals "Operation Disable" and "Error Detect" turn "ON", and the output signals "Mount Enable", "OK Eject Enable", "NG Eject Enable", and "Disc Detect" turn "OFF".
2. When the handler reset switch is pressed, the input signals "Error Reset" and "Operation Disable" turn "ON" and other input signals turn "OFF".
The device turns the output signal "Operation Disable" to "OFF" and executes error recovery processing.
(The input signal "Error Reset" turns "OFF" about 1 second later.)
3. Once error recovery processing is finished, all output signals turn "OFF" and the device restarts the automatic execution sequence.
4. Once the automatic execution sequence has restarted, the output signal "Running" turns "ON".
5. The input signal "Start" is verified as "ON".
2A. "Mode Change Disable" is verified as "ON" and operation of the selector switch is disabled.
6. After the input signal "Start" is verified as "ON", the output signal "Operating" turns "OFF" and the output signal "Operation Disable" turns "ON".
7. If there are discs in the disc supply/output trays, the output signals "NG Eject Enable" and "Disc Detect" turn "ON" and "Get disc" is requested. If there are no discs in the disc supply/output trays, processing is executed from step 14.
8. After verifying that the output signal "NG Eject Enable" is "ON", the handler turns the input signal "Operation Disable" to "OFF" and starts disc transport.
9. Discs are transported by the handler, and when the disc sensor detects that there are no discs present, the output signal "Disc Detect" turns "OFF".
10. After verifying that the output signal "Disc Detect" is "OFF", the handler turns the input signal "Eject Complete" to "ON".
11. After the input signal "Eject Complete" is verified as "ON", the output signal "NG Eject Enable" turns "OFF".
12. After verifying that the output signal "NG Eject Enable" is "OFF", the handler turns the input signal "Eject Complete" to "OFF".
13. After verifying that the input signal "Eject Complete" is "OFF", the handler turns the input signal "Operation Disable" to "ON".
14. After verifying that the input signal "Operation Disable" is "ON", the device turns the output signal "Mount Enable" to "ON".
15. After verifying that the output signal "Mount Enable" is "ON", the handler turns the input signal "Finish" to "ON". (Tray rotates without discs being supplied.)
16. After verifying that the input signal "Finish" is "ON", the device turns the output signal "Mount Enable" to "OFF".
17. After verifying that the output signal "Mount Enable" is "OFF", the handler turns the input signal "Finish" to "OFF".
18. After verifying that the input signal "Finish" is "OFF", the device turns the output signal "Operation Disable" to "OFF" and the tray rotates.
19. If there are discs in the disc supply/output trays, the output signals "NG Eject Enable" and "Disc Detect" turn "ON" and "get disc" is requested.
20. If there are no discs in the disc supply/output trays, processing is executed from step 26.
21. After verifying that the output signal "NG Eject Enable" is "ON", the handler turns the input signal "Operation Disable" to "OFF" and starts disc transport.
22. Discs are transported by the handler, and when the disc sensor detects that there are no discs present, the output signal "Disc Detect" turns "OFF".
23. After verifying that the output signal "Disc Detect" is "OFF", the handler turns the input signal "Eject Complete" to "ON".
24. After the input signal "Eject Complete" is verified as "ON", the output signal "NG Eject Enable" turns "OFF".
25. After verifying that the output signal "NG Eject Enable" is "OFF", the handler turns the input signal

“Eject Complete” to “OFF”.

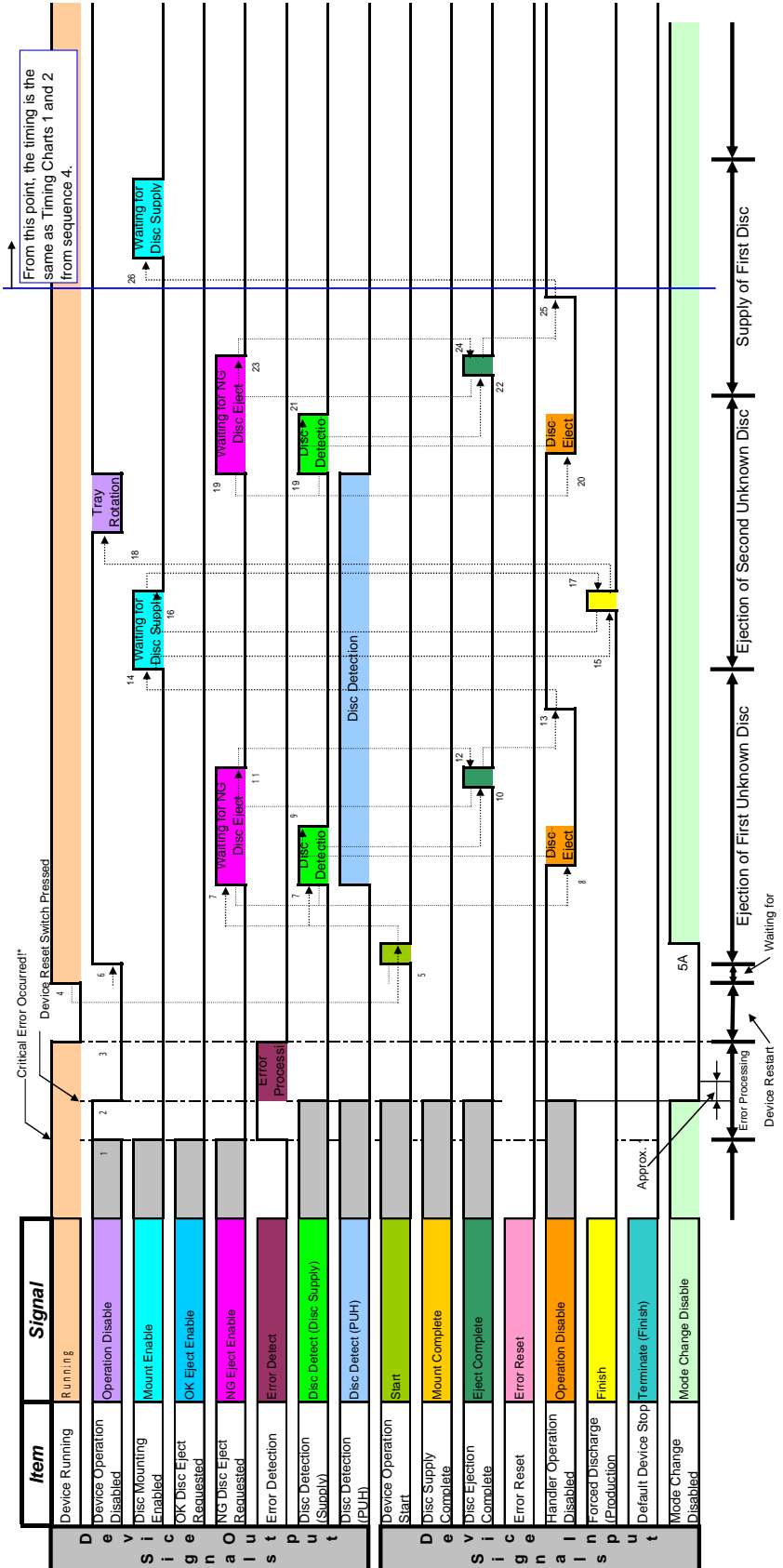
26. After verifying that the input signal “Eject Complete” is “OFF”, the handler turns the input signal “Operation Disable” to “ON”.
27. After verifying that the input signal “Operation Disable” is “ON”, the device turns the output signal “Mount Enable” to “ON”.

* When an error is detected, the errors that can be cleared by pressing the handler’s reset switch are listed below.

- Errors caused by an emergency stop of the handler.
- Errors caused by no discs.

* Because it is not known whether the discs being transported are OK or NG after clearing an error and restarting, the discs are sent as NG discs.

4.4.4 Chart 4: Error Detection (cleared by RESET switch)



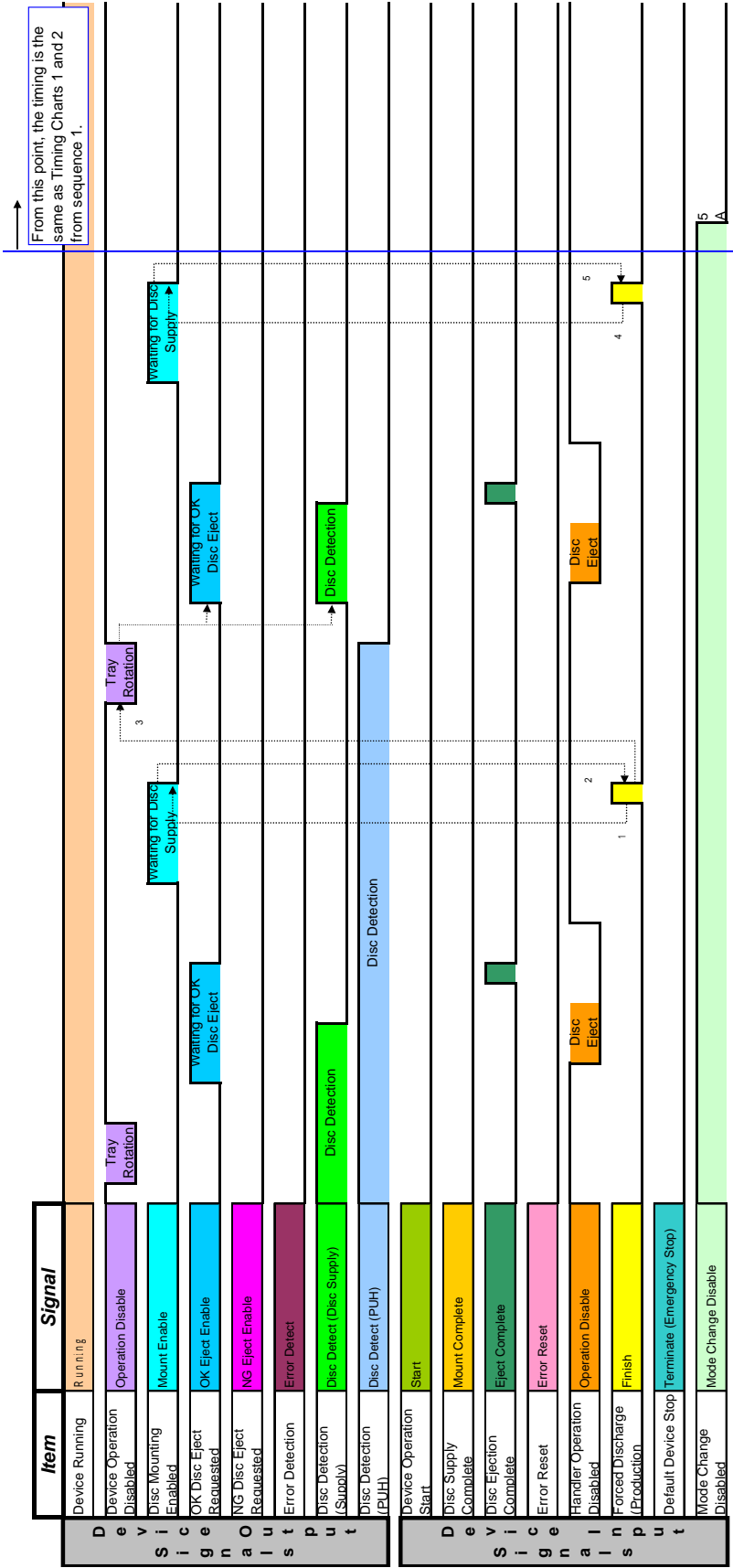
Timing Chart 4: Error Detection (cleared by RESET switch)

1. When an error* occurs, the output signals "Operation Disable" and "Error Detect" turn "ON", and the output signals "Mount Enable", "OK Eject Enable", "NG Eject Enable", and "Disc Detect" turn "OFF".
2. When the device's RESET switch is pressed, the handler turns the input signals "Error Reset" and "Operation Disable" to "ON". After that, if all input signals except for "Reset" are turned "OFF", the device turns the output signal "Operation Disable" to "OFF" and error recovery processing is executed. (The input signal "Error Reset" turns "OFF" about 1 second later.)
3. Once error recovery processing is finished, all output signals turn "OFF" and the device restarts the automatic execution sequence.
4. Once the automatic execution sequence has restarted, the output signal "Running" turns "ON".
5. The input signal "Start" is verified as "ON".
5A. "Mode Change Disable" is verified as "ON" and operation of the selector switch is disabled.
6. After the input signal "Start" is verified as "ON", the output signal "Operating" turns "OFF" and the output signal "Operation Disable" turns "ON".
7. If there are discs in the disc supply/output trays, the output signals "NG Eject Enable" and "Disc Detect" turn "ON" and "get disc" is requested. If there are no discs in the disc supply/output trays, processing is executed from step 14.
8. After verifying that the output signal "NG Eject Enable" is "ON", the handler turns the input signal "Operation Disable" to "OFF" and starts disc transport.
9. Discs are transported by the handler, and when the disc sensor detects that there are no discs present, the output signal "Disc Detect" turns "OFF".
10. After verifying that the output signal "Disc Detect" is "OFF", the handler turns the input signal "Eject Complete" to "ON".
11. After the input signal "Eject Complete" is verified as "ON", the output signal "NG Eject Enable" turns "OFF".
12. After verifying that the output signal "NG Eject Enable" is "OFF", the handler turns the input signal "Eject Complete" to "OFF".
13. After verifying that the input signal "Eject Complete" is "OFF", the handler turns the input signal "Operation Disable" to "ON".
14. After verifying that the input signal "Operation Disable" is "ON", the device turns the output signal "Mount Enable" to "ON".
15. After verifying that the output signal "Mount Enable" is "ON", the handler turns the input signal "Finish" to "ON". (Tray rotates without discs being supplied.)
16. After verifying that the input signal "Finish" is "ON", the device turns the output signal "Mount Enable" to "OFF".
17. After verifying that the output signal "Mount Enable" is "OFF", the handler turns the input signal "Finish" to "OFF".
18. After verifying that the input signal "Finish" is "OFF", the device turns the output signal "Operation Disable" to "OFF" and the tray rotates.
19. If there are discs in the disc supply/output trays, the output signals "NG Eject Enable" and "Disc Detect" turn "ON" and "Get disc" is requested. If there are no discs in the disc supply/output trays, processing is executed from step 26.
20. After verifying that the output signal "NG Eject Enable" is "ON", the handler turns the input signal "Operation Disable" to "OFF" and starts disc transport.
21. Discs are transported by the handler, and when the disc sensor detects that there are no discs present, the output signal "Disc Detect" turns "OFF".
22. After verifying that the output signal "Disc Detect" is "OFF", the handler turns the input signal "Eject Complete" to "ON".
23. After the input signal "Eject Complete" is verified as "ON", the output signal "NG Eject Enable" turns "OFF".
24. After verifying that the output signal "NG Eject Enable" is "OFF", the handler turns the input signal "Eject Complete" to "OFF".

25. After verifying that the input signal "Eject Complete" is "OFF", the handler turns the input signal "Operation Disable" to "ON".
26. After verifying that the input signal "Operation Disable" is "ON", the device turns the output signal "Mount Enable" to "ON".

- * Detected errors that can be cleared by pressing the device's RESET switch are indicated below.
 - Errors caused by an emergency stop of the handler.
 - Errors caused by no discs.
- * Because it is not known whether the discs being transported are OK or NG after clearing an error and restarting, the discs are sent as NG discs.

4.4.5 Chart 5: Production Termination (BCA Cut OK)



Timing Chart 5: Production Termination (BCA Cut OK)

1. If the tray rotates without any disc supply, the handler verifies the output signal "Waiting For Disc" and turns the input signal "Finish" to "ON".
2. After the BCA cut has finished, if the input signal "Finish" is "ON", the device turns the output signal "Mount Enable" to "OFF".
3. After verifying that the input signal "Finish" is "OFF", the device turns the output signal "Operation Disable" to "OFF" and the tray rotates. After the tray rotates, the same processing as the normal disc output sequence is done.
4. If there are no discs on the device and the output signal "Mount Enable" is "ON", the input signal "Finish" is turned "ON" on the handler side.
5. After verifying that the input signal "Finish" is "ON", the device turns the output signal "Mount Enable" to "OFF".
 - 5A. When production is finished, the handler turns "Mode Change Disable" to "OFF".

After that, processing is done from step 1 of Timing Charts 1 and 2.

When an error occurs, the output signals "Operation Disable" and "Error Detect" turn "ON", and the output signals "Mount Enable", "OK Eject Enable", "NG Eject Enable", and "Disc Detect" turn "OFF".

Chapter 5 Maintenance Mode

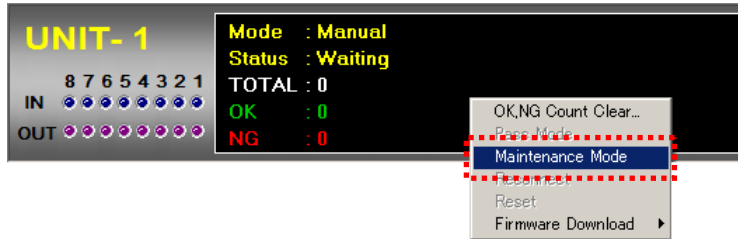
5.1 Starting Maintenance Mode	5-2
5.2 Parameters	5-3

5.1 Starting Maintenance Mode

Follow the steps below to start maintenance mode to check main unit operations.

- 1 Start up the main unit to be checked using “MANU”, or switch to “MANU” mode.
 - 2 On the menu bar, select [Mode] → [Professional]* to enter Professional mode.
- * This operation is not required if “Professional” is already checked.
- 3 Right-click on the target unit and display the right-click menu.

Click “Maintenance Mode”.



- 4 Verify that the mode on the target unit is displayed as “Maintenance”.



- 5 Double-click on the unit to open a sub-window.

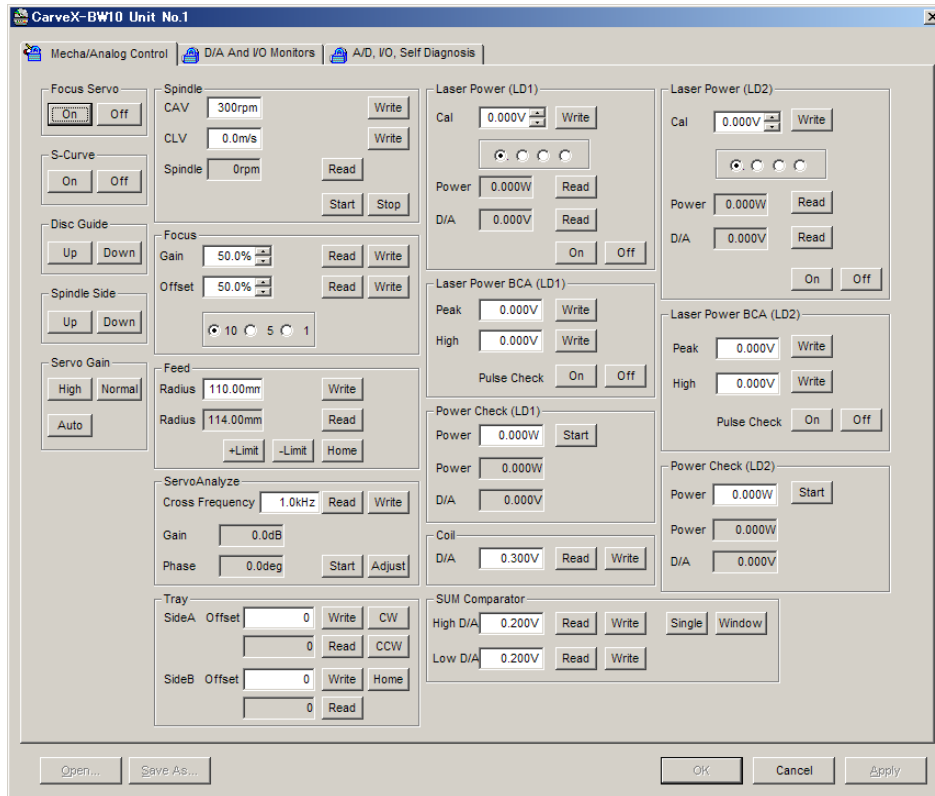
To exit maintenance mode and return to manual mode, right-click on the unit to display the right-click menu and remove the “Maintenance Mode” checkmark.

5.2 Parameters

The maintenance mode screen is made up of 4 tabs.

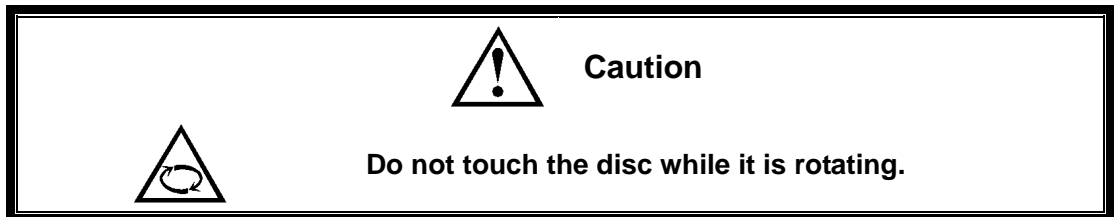
1 Mecha/Analog Control

Mainly used for PUH control on the recording side and to check mechanical operation.



- Focus ServoTurns the focus servo on/off.
- S-CurveMoves the pickup head actuator up and down, allows S-Curve to be checked.
- Disc Guide.....Moves the disc guide side air cylinder up and down.
 UpMoves the disc guide up.
 Down.....Moves the disc guide down.
- Spindle SideMoves the spindle side air cylinder up and down. Used when rotating the spindle motor.
 UpMoves the spindle motor up. Also executes disc chucking.
 Down.....Moves the spindle motor down. Also releases disc chucking.
- Servo GainNot currently being used.

Spindle	Controls the spindle motor at the specified revolution number/linear velocity.
CAV	Rotational speed is specified from 300 to 3,000. Apply the value by pressing the "Write" button.
CLV	Not currently being used.
Spindle	The rotational speed of the spindle motor is displayed/updated with the "Read" button.
Start/Stop.....	Rotates/stops the spindle motor.

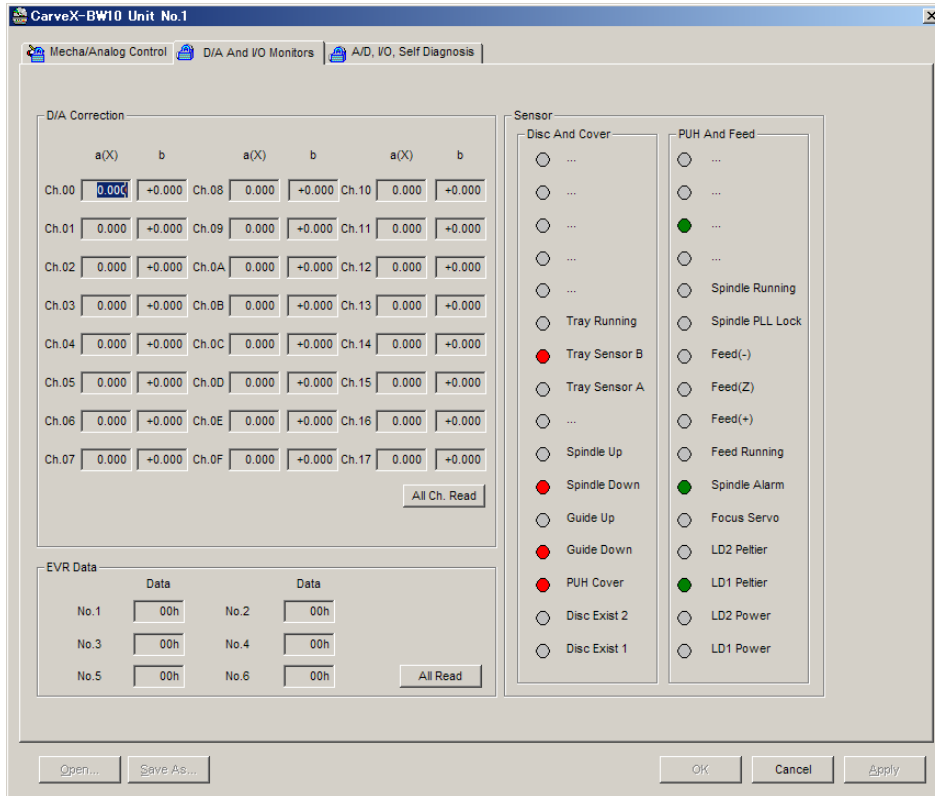


Focus	Changes the focus servo's gain and offset. Each value is specified in a range from 0 to 100%.
Gain	Specifies the gain.
Offset.....	Specifies the offset.
Read	Reads/displays the values set for both the gain and offset.
Write.....	Writes the values set for both the gain and offset.
Feed.....	Used to control the PUH feed motor position for recording.
Radius.....	Specifies the movement radius value or the current radius value.
Write.....	Moves to the specified radius value.
Read	Reads/displays the current radius value.
+Limit	Moves to the farthest outer position.
-Limit	Moves to the closest inner position.
Home	Moves to the home position.
Servo Analyze	A simple servo analyzer.
Cross Frequency ..	Specifies the gain crossover frequency.
Gain	Specifies the gain.
Phase.....	Specifies the phase difference.
Tray.....	Allows control of the transporter rotation tray.
Side A/B Offset....	Specifies the spindle chucking position offset value (pulse no.). Move to the specified location using the "Write" button. The tray moves 0.024° with a single pulse. The offset range is specified between 0 (home position) and +999 (clockwise).
CW	The tray rotates clockwise.
CCW	The tray rotates counterclockwise.
Home	Rotates and returns to the home position.



Laser Power (LD1/LD2).....	The laser can be made to illuminate at the specified D/A value.
Cal.....	The value is specified in a range from 0 to 3,000V.
Power.....	The current laser power is displayed/updated with the "Read" button.
D/A.....	The currently set D/A value is read using the "Read" button.
On/Off.....	The laser is illuminated or turned off with the currently set Cal value.
Laser Power BCA (LD1/2).....	The laser can be made to pulse using the specified D/A value. The pulse pattern is the pattern set in manual mode.
Peak.....	Sets the power.
High.....	Sets the power.
Power Check (LD1/2).....	Checks the D/A value of the specified power.
Power.....	Specifies the laser power to check. Measure with the "Start" button.
Power.....	Displays the actual measurement value of the laser power as it illuminates.
D/A.....	Displays the D/A value as the laser illuminates.
Coil.....	Controls the pickup head actuator offset.
D/A.....	Specifies the offset value. Set with the "Write" button.
Sum Comparator.....	Checks the comparator level to turn the servo on.
High D/A.....	Not currently being used.
Low D/A.....	Specifies the low side D/A.
Write.....	Sets the specified D/A.
Read.....	Reads the current value with the "Read" button.

2 D/A And I/O Monitors



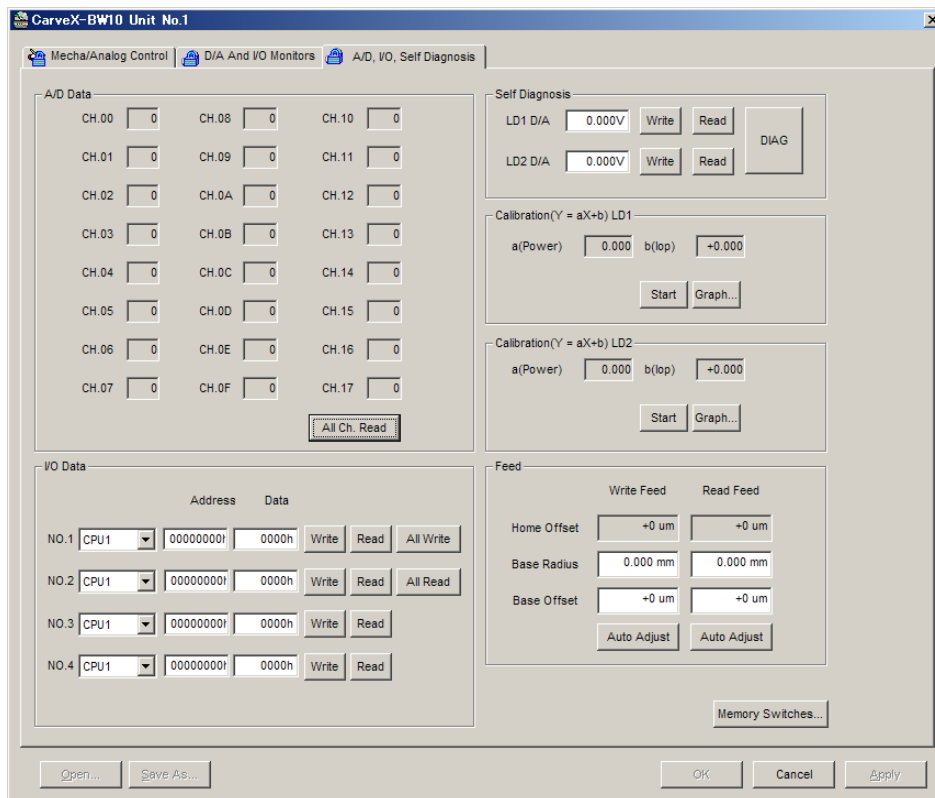
D/A Correction.....Displays the correction coefficient set for each channel. The “All Read” button is used to read the currently set D/A of all channels.

EVR DataDisplays the values set for each electrical volume. The “All Read” button is used to read all numbers.

Sensor.....Monitors the main unit sensors. Gray is off, red and green are on.

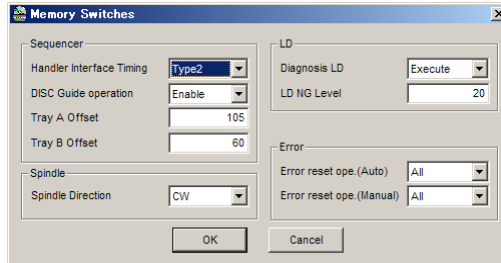
Disc and Cover		PUH and Feed	
Sensor	Comments	Sensor	Comments
Not Used		Not Used	
Not Used		Not Used	
Not Used		Not Used	
Not Used		Not Used	
Not Used		Spindle Running	Spindle motor is running
Tray Running	Tray is turning	Spindle PLL Lock	Spindle motor PLL
Tray Sensor A	Tray sensor A is ON	Feed(-)	Feed (-) is ON
Tray Sensor B	Tray sensor B is ON	Feed(Z)	Feed (Z) is ON
Not Used		Feed(+)	Feed (+) is ON
Spindle Up	Spindle up position	Feed Running	Feed motor is running
Spindle Down	Spindle down position	Spindle Alarm	Spindle motor alarm
Guide Up	Disc guide up position	Focus Servo	Focus servo is ON
Guide Down	Disc guide down position	LD2 Peltier	LD2 Peltier is running
PUH Cover	PUH cover opening	LD1 Peltier	LD1 Peltier is running
Disc Exist 2	Mount side disc exists	LD2 Power	LD2 laser is operating
Disc Exist 1	Spindle side disc exists	LD1 Power	LD1 laser is operating

3 A/D,I/O,Self Diagnosis



- A/D Data.....Displays A/D of CH. 00–17. The “ALL Ch. Read” button reads and displays all A/D.
- I/O Data.....Reads/writes data directly to the control board.
- Self DiagnosisRuns a main unit self-diagnosis.
- LD1/2 D/A.....Checks the D/A read. Written with “Write”, read with “Read”.
- DIAGA self-diagnosis is done.
- Calibration LD1/2.....Displays the correction coefficient and the Y slice of the currently mounted pickup head.
- Start.....A calculation is done.
- GraphAfter the calculation, a graph is displayed.
- Feed.....Corrects the pickup head stage.
- Home offset ...Not currently being used.
- Base Radius....Not currently being used.
- Base OffsetNot currently being used.
- Auto Adjust.....Not currently being used.

Memory Switches Press the button to open a window and set the memory switches.
The settings are applied at startup.



Handler Interface Timing Two types (Type1/2*) can be selected.

* Currently only Type1 is being used. Do not change unless specified.


Disc Guide operation Disc guide can be enabled or disabled.

Tray A/B Offset Sets the rotation tray offset. Do not change unless specified.

Spindle Direction The spindle direction can be selected as clockwise (CW) or counterclockwise (CCW).

Diagnosis LD Diagnoses laser degradation.

LD NG Level[%] Sets the specification when laser degradation is unacceptable.

Error reset ope.(Auto/Manual) ... Sets whether to clear the error with the st switch[r1] or automatically.

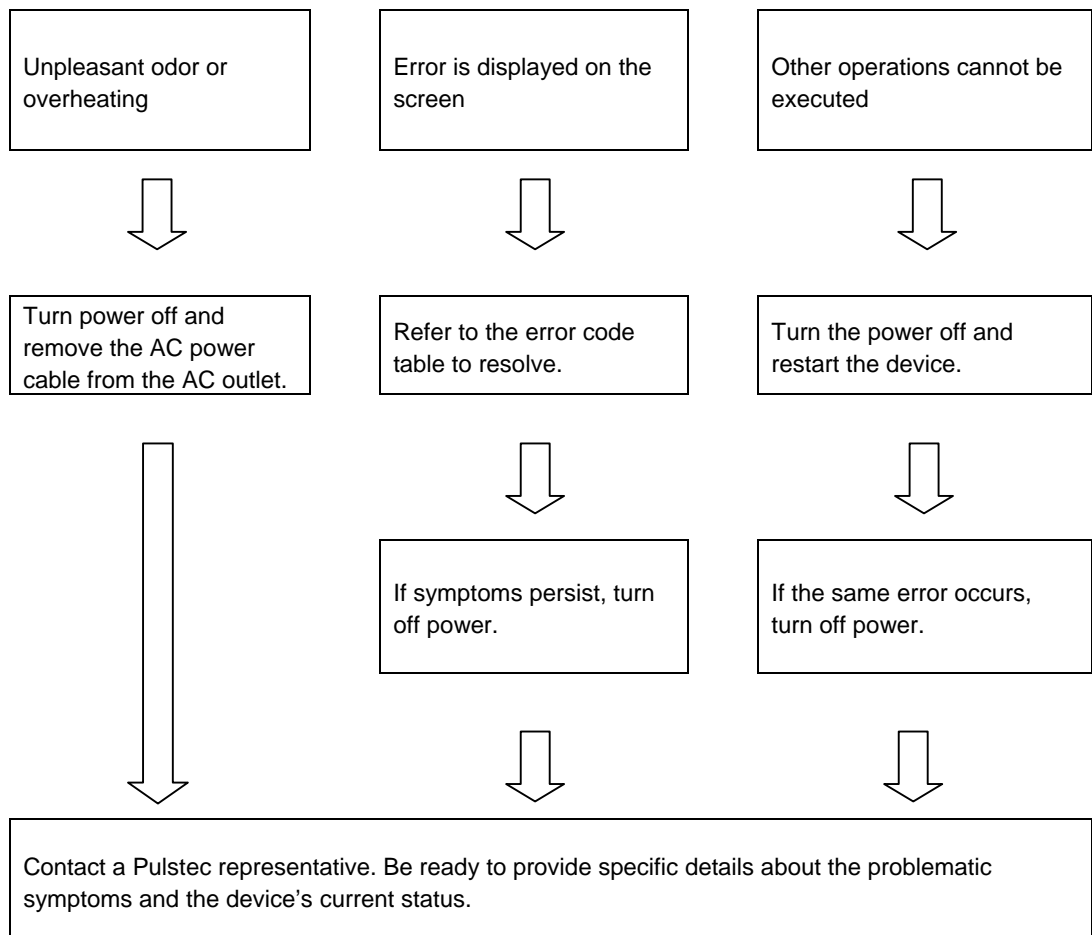
Chapter 6 Troubleshooting

6.1 Troubleshooting	6-2
6.2 Error Messages.....	6-3
6.2.1 Sequence Codes.....	6-4
6.2.2 Error Codes	6-5

6.1 Troubleshooting

If symptoms indicative of device problems occur during use, follow the flowchart below for the proper solution.

Refer to the relevant pages of the respective user's manuals to troubleshoot problems on other devices.



6.2 Error Messages

The error messages are displayed as indicated in the chart below.

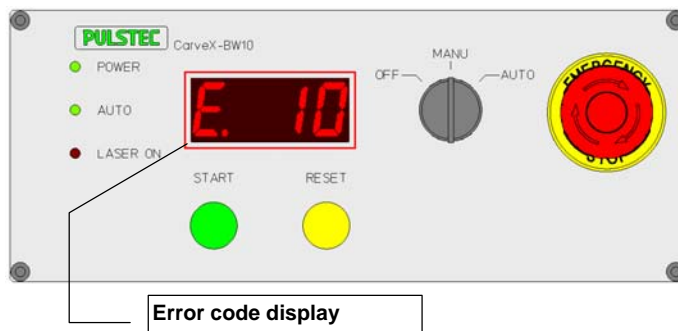
1 Application display

No.	Date/Time	Unit	Code	Contents
0	2005/10/31 11:41	1	90-010	EMERGENCY STOP
1	2005/10/31 16:53	1	90-010	EMERGENCY STOP

The last three digits indicate the error code.

The first two digits indicate the sequence code.

2 Main unit display



The “sequence code” and “error code” displayed in the application can be used to determine the device status when the error occurred.

6.2.1 Sequence Codes

The sequence code is the first digits of the code in the log window.

Code	Explanation
0	Waiting
5	Preparing to start
10	LD calibration underway
15	ECC measurement (radial run-out volume) underway
20	Waiting to receive BCA data
40	Recording BCA data
45	Comparing BCA data (signal processing measurement underway)
80	Beam profile measurement underway
90	Finish processing underway
98	Stopping due to error
99	Stopping due to emergency
100	Executing maintenance command

6.2.2 Error Codes

The error code is the last three digits of the code in the log window. This code is also displayed on the main unit.

Code	Contents	Explanation	Resolution
5	Unknown Error ???	Number substituting for an undefined error number	Contact a Pulstec representative.
6	Unknown Message ???	Number substituting for an undefined message	
10	EMERGENCY STOP	Emergency stop has occurred	After resolving the problem, clear the emergency stop on the relevant unit and press the reset switch.
11	Terminate Stop	Stopped with a terminate signal	Contact a Pulstec representative if the problem occurs multiple times.
13	Disc Nothing	No disc to record	Could be caused by a transport malfunction within the unit or a sensor malfunction. Contact a Pulstec representative.
14	Disc Exist Error	No disc released	Could be caused by a transport malfunction. Turn power off and remove the discs from within the main unit.
30	Spindle malposition	Spindle position error	Check that air is being properly supplied. If the problem occurs frequently, a sensor malfunction could be at fault. Contact a Pulstec representative.
31	Spindle status error	Spindle operation error	The motor or driver could be malfunctioning. Contact a Pulstec representative if the problem occurs multiple times.
32	Disc guide malposition	Disc guide position error	Check that air is being properly supplied.
33	Disc guide status error	Disc guide operation error	If the problem occurs frequently, a sensor malfunction could be at fault. Contact a Pulstec representative.
34	Disc tray malposition	Disc tray position error	Check to make sure nothing is impeding tray rotation.
35	Disc tray status error	Disc tray operation error	Contact a Pulstec representative if the problem occurs multiple times.
50	Communication error between application	Error communicating with application	Check that the LAN cable is securely connected.
51	Communication error between BCA server	Error communicating with BCA server	Contact a Pulstec representative if the problem occurs multiple times.
52	Communication error between devices CPU	Error communicating with control board	Contact a Pulstec representative if the problem occurs multiple times.
53	Communication error between analyzer	Error communicating with signal processing device	
54	Communication command format error	Control command format error	
55	Communication command that doesn't exist	No control command number	
60	Memory write error	Data cannot be written to memory	The control board may be malfunctioning.
61	Memory read error	Data cannot be read from memory	Contact a Pulstec representative.

Code	Contents	Explanation	Resolution
62	Parameter format error	Parameter formats differ	Check the set BCA format and the media tab.
63	Parameter read error	Parameters cannot be read	The control board may be malfunctioning. Contact a Pulstec representative.
64	Parameter write error	Parameters cannot be written	
65	The parameter was initialized	Parameter was initialized	
71	The BCA server is not connected	BCA server not connected	Check that the LAN cable is securely connected.
72	The BCA data cannot be acquired	BCA recording data cannot be acquired	Contact a Pulstec representative if the problem occurs multiple times.
73	The BCA data format is abnormal	BCA recording data abnormal	Check the BCA format, data, media type.
74	Media information is abnormal of the BCA data	BCA recording data media information does not match	
75	There is no serial number of the BCA data	No BCA recording data serial number	
76	BCA data writing error	BCA recording NG	Check the set parameters. Contact a Pulstec representative if the problem occurs multiple times.
77	BCA data reading error	BCA read NG	Check the set parameters.
78	BCA data comparison error	BCA comparison NG	
90	The DISC control parameter is abnormal.	Automatic mode cannot be launched (DISC control parameter is abnormal)	If the problem occurs frequently, the control board could be at fault. Contact a Pulstec representative.
91	The CarveX-BW setting parameter is abnormal.	BCA recording/comparison/signal processing control not possible (device control parameter error)	Check the set parameters. If the problem occurs frequently, the control board could be at fault. Contact a Pulstec representative.
100	Feed In Limit Error (Writer)	Record side feed internal sensor error	Turn the power off and restart the main unit. If the problem occurs frequently, the feed unit could be at fault. Contact a Pulstec representative.
101	Feed Out Limit Error (Writer)	Record side feed external sensor error	
102	Feed Z Sensor Error (Writer)	Record side Z sensor error	
103	Feed Home Error (Writer)	Failed to return to record side feed home position	
104	Feed Inner Error (Writer)	Failed to move to record side feed inner periphery	
105	Feed Outer Error (Writer)	Failed to move to record side feed outer periphery	
106	Feed Position Error (Writer)	Failed to move to record side feed position	
107	LD Temperature Error (Writer)	LD1 Peltier control error	Turn the power off, wait for approximately 30 minutes, and then restart the main unit. If the problem occurs frequently, the control board could be at fault. Contact a Pulstec representative.
108	LD2 Temperature Error (Writer)	LD2 Peltier control error	
110	LD Limit Error (Writer)	Over LD1 limit	The control board may be malfunctioning. Contact a Pulstec representative.
111	LD2 Limit Error (Writer)	Over LD2 limit	
112	LD Deter Error (Writer)	LD1 laser deterioration	1) The laser may have deteriorated. Replace the PUH. 2) The laser may be malfunctioning. 3) The control board may be malfunctioning. Contact a Pulstec representative.
113	LD2 Deter Error (Writer)	LD2 laser deterioration	
114	LD Calibration Error (Writer)	LD1 laser calibration failed	
115	LD2 Calibration Error (Writer)	LD2 laser calibration failed	

Code	Contents	Explanation	Resolution
116	DA Write Error (Writer)	LD1 side D/A write error	The control board may be malfunctioning. Contact a Pulstec representative.
117	DA2 Write Error (Writer)	LD2 side D/A write error	
118	AD Read Error (Writer)	LD1 side A/D read error	
119	AD2 Read Error (Writer)	LD2 side A/D read error	
120	LD On Error (Writer)	Laser is on	Immediately halt use and turn power off. Contact a Pulstec representative.
121	SERIAL D/A A/D Error (Writer)	Serial D/A A/D control failed	The control board may be malfunctioning. Contact a Pulstec representative.
122	Spindle Alarm Error (Writer)	Driver error	Turn the power off and restart the main unit. If the problem occurs frequently, the motor or control board could be at fault. Contact a Pulstec representative.
123	Spindle Stop Error (Writer)	Could not be stopped	
124	Spindle CAV Error (Writer)	CAV rotation control failed	
125	Spindle Data Error (Writer)	Rotation control value error	
126	Spindle Range Error (Writer)	Specified rotation number range exceeded	
127	Spindle Rotation Error (Writer)	Specified rotation number not achieved	Check the set parameters.
130	Focus Servo Error (Writer)	Focus servo could not be turned on	
131	Focus Change Error (Writer)	Focus servo change failed	
132	Servo Analysis Error (Writer)	Simple servo analysis adjustment failed	Contact a Pulstec representative.
140	BCA Data Set Error (Writer)	BCA data was not set	Set the BCA data.
141	BCA Data Compare Error (Writer)	BCA comparison NG	Check the set parameters.
150	Application BCA License Nothing	No BCA license exists	
151	Application is different	Different application was started	Contact a Pulstec representative.
160	Receive Timeout	Network timed out	Check that the LAN cable is securely connected.
161	Command Error	Network command error	Contact a Pulstec representative if the problem occurs multiple times.
162	Not Enough Memory	Memory error	Contact a Pulstec representative.
163	File Open Error	File open error	The computer may be malfunctioning. Check the computer.
164	File Read Error	File read error	
165	File Write Error	File write error	
166	Communication Port Busy	Command attempting to be sent even though communication port is different	Contact a Pulstec representative.
167	BCA Data File Error	BCA data file content incorrect	The file may be corrupted. Set again.
250	Can't Process	Processing that should be executed does not exist	Contact a Pulstec representative.
255	Abnormal Error	No error definition	

* Contact a Pulstec representative if an error other than those described above is displayed.

Chapter 7 About Maintenance

7.1	Transport/Installation	7-2
7.2	Spare Parts	7-2
7.3	Installing the PUH	7-3
7.4	Removing the PUH	7-6
7.5	Downloading Firmware	7-8

7.1 Transport/Installation

Keep the following points in mind when transporting or installing this device in a different location.



Caution

- In order to reduce the danger of injury or electrical shock, unplug all devices that make up the system.
- Transport or move the device once all the cables used by the device have been unplugged.
- Use the packaging materials that came with the device to secure it before transport.
- Transporting or moving this device could damage it, causing improper operation.
- The devices that make up this system are all precision instruments. Handle with care and be sure not to drop or shake.
- Avoid placing in a location that does not meet the operating environment conditions.
See the usage environment conditions and specifications for details.
- Place this device on a flat and stable area that will support the system's total weight. Failure to do so could cause the device to fall over and cause injury.

7.2 Spare Parts

The spare parts used by this system are indicated in the chart below.

Name	Model Number	Manufacturer
PUH	SB21A or Pulstec-specified model number	Pulstec Industrial Co., Ltd.
Safety relay	G7S-4A2B-E	Omron Corporation
Front filter	FLM12	Oriental Motor Co., Ltd.
Side filter	FLM6	Oriental Motor Co., Ltd.



Caution

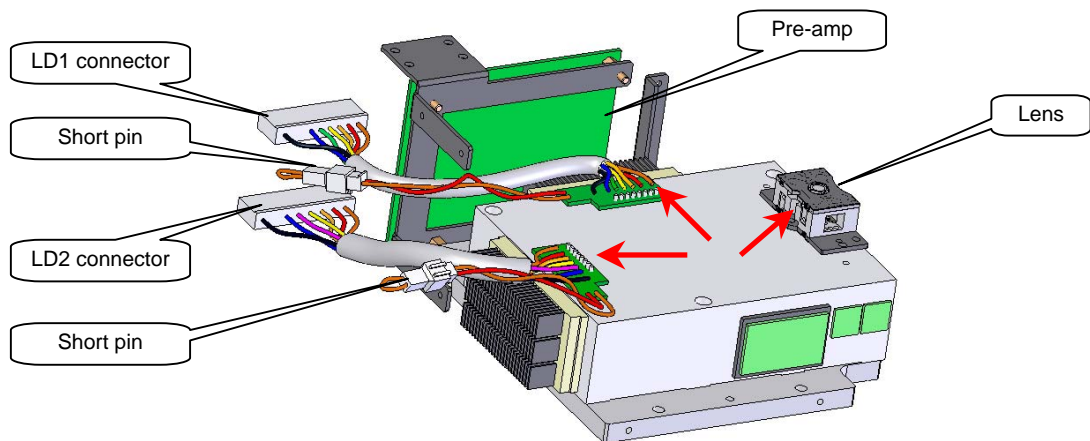
Always use spare parts specified by Pulstec.

7.3 Installing the PUH

Follow the procedure below to install the PUH.

For the tools, use an M4 hex wrench and Phillips head screwdriver.

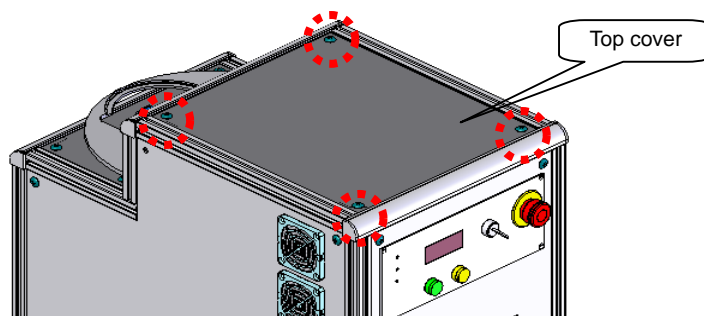
- 1 Remove the PUH from its case.



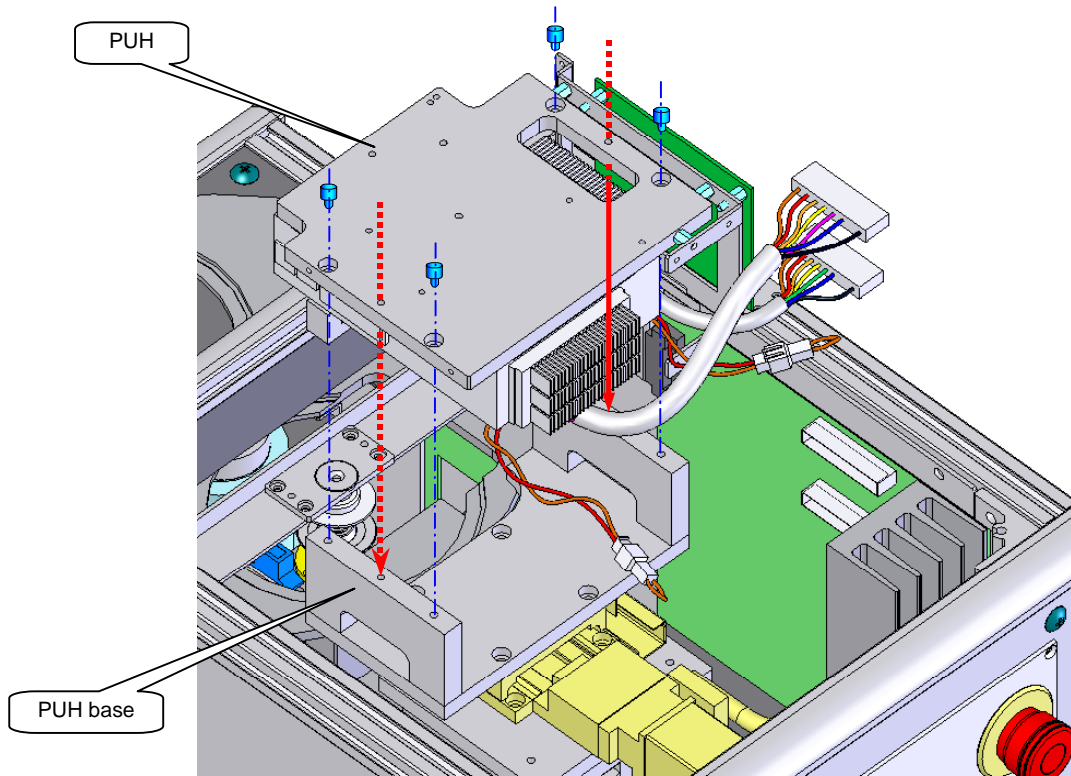
Caution

The PUH is a precision instrument, handle with extreme care. Do not touch the parts indicated with a red arrow in the figure above when handling the PUH. In addition, do not place the lens facedown on a table or similar surface.

- 2 Use the screwdriver to loosen the 4 screws indicated below and remove the top cover.



- 3 Install so that the PUH side holes can receive the positioning pins indicated by the red arrows below.

**Caution**

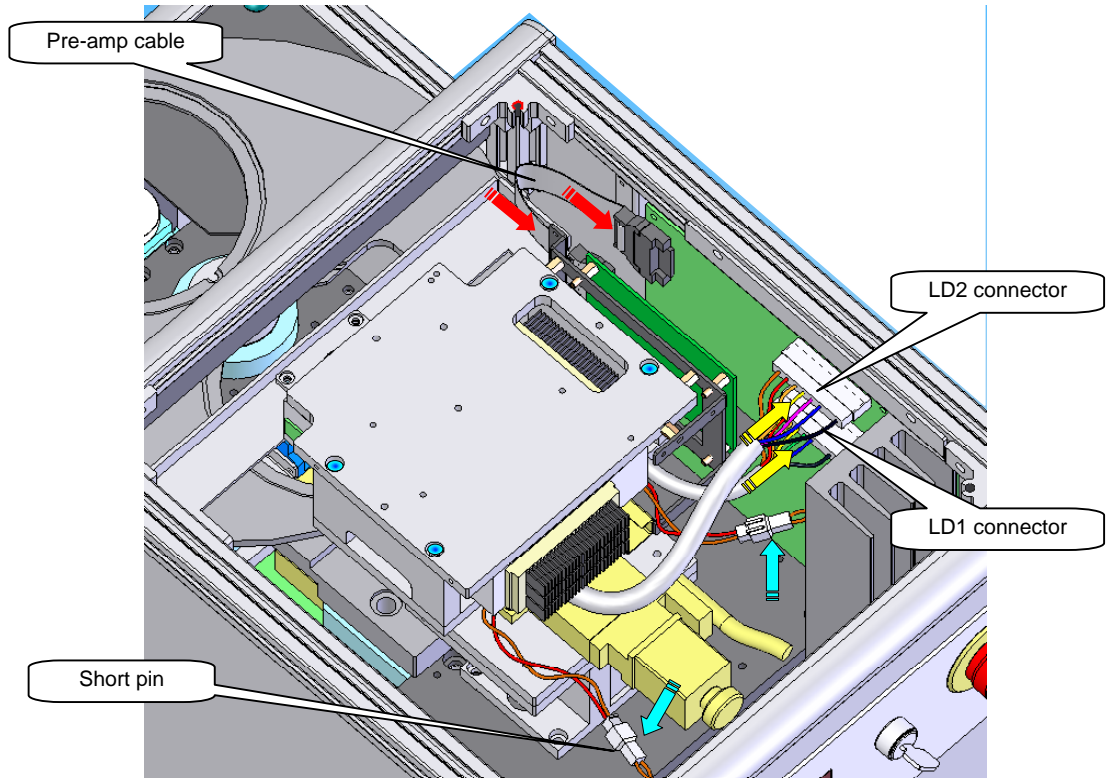
During PUH installation, make sure that no other parts interfere with the lens or LD. Take care not to pinch fingers while installing the PUH.

- 4 Affix the PUH to the PUH base using the included cap screws (M4 x 15, 4 locations). Use an M4 hex wrench to tighten. Tighten the cap screws in a crisscross pattern.

**Caution**

Take care not to drop the cap bolts into the main unit during installation. Operating the main unit with the bolts inside could cause damage.

- 5 Connect the pre-amp cables (red arrows) and connect the LD1/2 connectors (yellow arrows) to the opposite-side connectors as indicated in the figure below.



- 6 Remove the LD protective short pins (light blue arrows) indicated in the figure above. Store in a safe place after removal to avoid losing them.



Caution

Do not remove the short pins without connecting the LD connectors. Doing so could cause LD damage. In addition, do not start up the main unit while the short pins are connected.

- 7 Attach the top cover removed in step "1".



Do not start up the device without attaching the top cover.

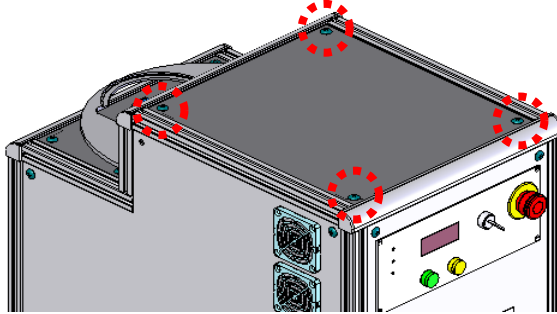
- 8 Start up the main unit. After it is started, check that the PUH information exchanged by the PUH information (see 1.3.2) of the target unit is displayed.

7.4 Removing the PUH

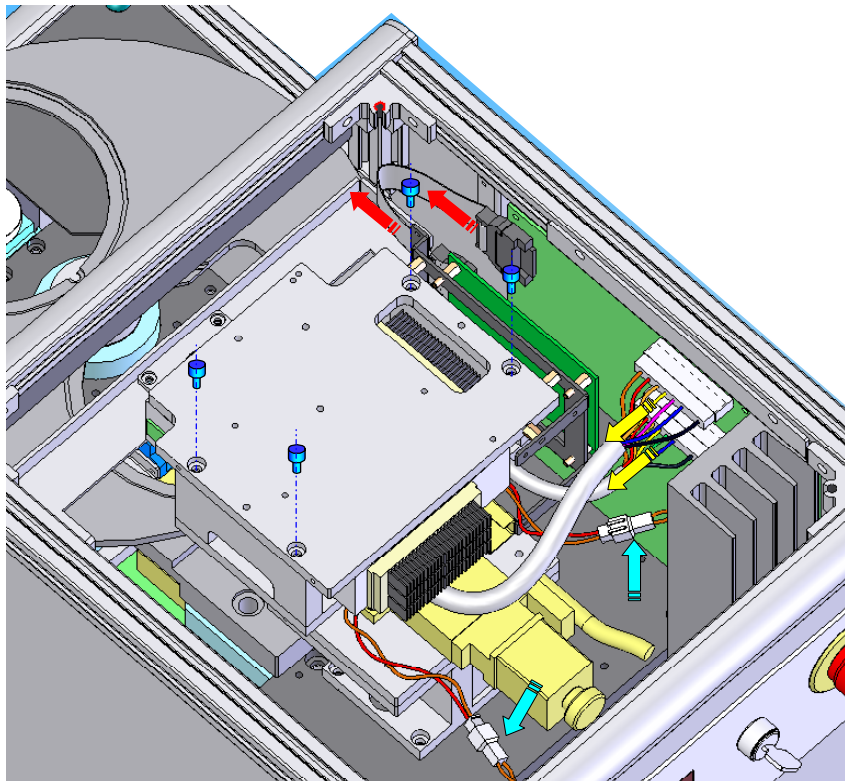
Follow the procedure below to remove the PUH.

For the tools, use an M4 hex wrench and Phillips head screwdriver. The procedure is the reverse of Section 7.3.

- 1 Use the screwdriver to loosen the 4 screws indicated below and remove the top cover.



- 2 Connect the LD protective short pins (light blue arrows, two locations).



- 3 Remove the pre-amp cables (red arrows) and LD1/2 connectors (yellow arrows).



Caution

Do not remove the LD connectors without connecting the short pins.
Doing so could cause LD damage.

- 4 Remove the cap screws attaching the PUH.

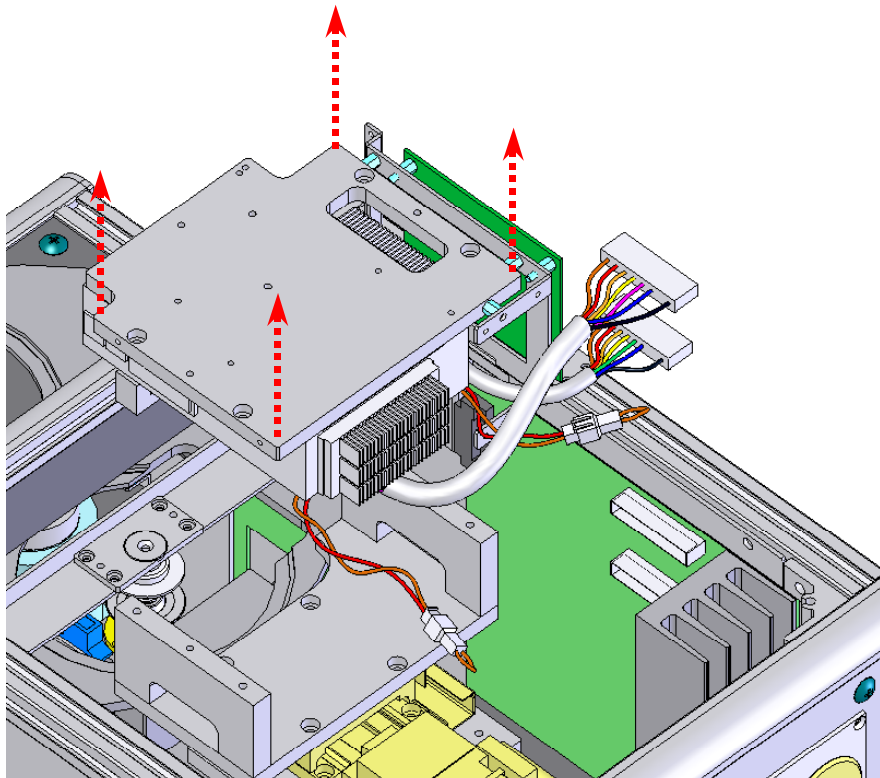


Caution

Take care not to drop the cap bolts into the main unit during removal. Operating the main unit with the bolts inside could cause damage.

- 5 Refer to the figure below to remove the PUH from the main unit.

Lift up to remove.



- 6 Place the removed PUH into its case.

- 7 Attach the top cover removed in step "1".

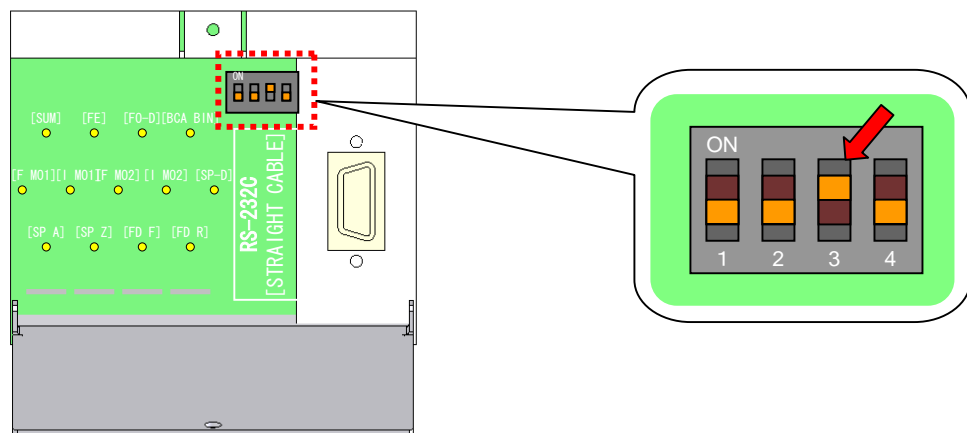


**Do not start up the device without installing the PUH.
Do not start up the main unit without attaching the top cover.**

7.5 Downloading Firmware

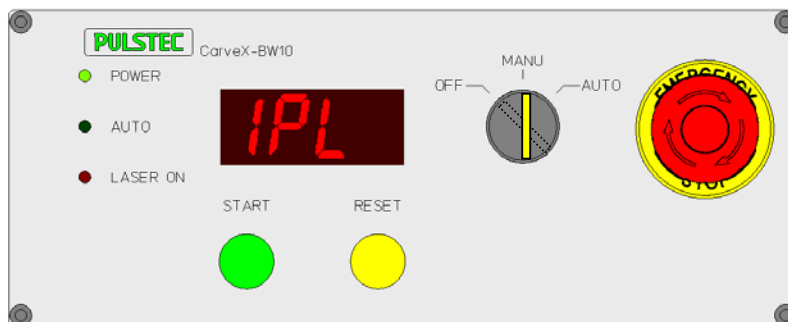
Firmware upgrades are used to add functionality and upgrades, and to resolve problems. The procedure for updating firmware is indicated below. See Chapter 1, Section 1.2.1 for information on displaying the firmware version information.

- 1 Turn the BW10 selector switch to the “OFF” position and turn off the main unit power.
- 2 Open the cover over the monitor board on the front side of the main unit. (See Chapter 1, Section 1.1.3.) Switch DIP switch #3 to the “ON”



- 3 Turn the selector switch to the “MANU” position.

The device starts up in IPL mode.



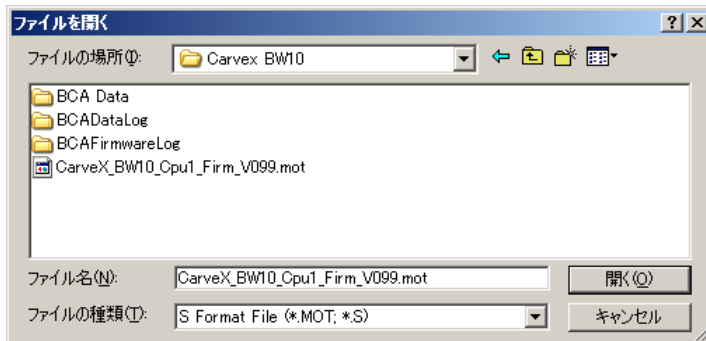
* IPL → MAC ID → IP Address are displayed repeatedly in the 7-segment display.

- From the application, right-click on the target unit and display the right-click menu.
From “Firm Download” indicated in the figure below, select the downloaded file.

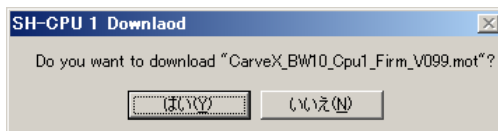


* “SH-CPU 1” is downloaded as an example here.

- Select the firmware file and click “Open”.

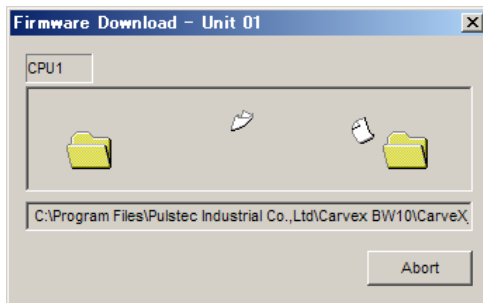


- A dialog box is displayed. To download, click “Yes”.



- 7 The file download starts.

The following screen is displayed in the application during download.



The START LED flashes when the BW10 is receiving data. The RESET LED flashes when it is writing data.



Caution

Never turn the main unit power off when updating firmware. In a worst case scenario, the device could fail to start and become unusable.

- 8 When the download is finished, turn the BW10 selector switch to the "OFF" position and turn off the main unit power. Return DIP switch #3 to the "OFF".
- 9 Wait for 10 seconds or more and start up the main unit. Once the main unit has been started, check that the desired firmware has been updated by selecting [Help] → [About]. (See Section 1.3.1 for details.)

CarveX-BW10 User's Manual

First Edition Published: 02/06/2006

Issued by **Pulstec Industrial Co., Ltd.**
7000-35 Technoland, Hosoe-cho, Inasagun, Shizuoka 431-1304
TEL 053-522-3611 FAX 053-522-5622

- No part of this document may be reprinted in any form or by any means.
- This manual is subject to change without notice.
- The authors have made every effort to ensure the accuracy and pertinence of the content herein, but errors may remain. If you notice any error, omission, or other problem with the explanations herein, please contact us and let us know.

-
- The name Windows[®] is short for Microsoft[®] Windows[®] Operating System.
 - Microsoft and Windows are registered trademarks of the Microsoft Corporation in the USA and other countries.
 - Other company names and product names used herein are trademarks or registered trademarks of their respective owners.