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A BELDEN BRAND

# T2 Elite 2/Pro 2/Express 2
# T2 Elite/Pro/Express

## INTELLIGENT DIGITAL DISK RECORDER

Service Manual

Version 2.3.0

www.grassvalley.com

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## Manual Explanation

- If there are any variations between the explanation in this manual and the actual application method, priority is given to the actual application method.
- This manual is a common manual for T2 Elite 2, T2 Pro 2, T2 Express 2, T2 Elite, T2 Pro and T2 Express. Screenshots and illustrations in this manual may vary from those of the actual product.
- The screenshots used as examples in this manual are those of the development stage, so they may vary from those in the final product.
- This manual is written for users who have a basic knowledge of how to use a computer.
- If there are no special instructions, perform the same operation as a normal computer operation.
- The contents of this product may modify without prior notice.

T2 Elite 2/Pro 2/Express 2/Elite/Pro/Express Service Manual
Version 2.3.0
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# *Safety Summaries*

## General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

While using this product, you may need to access other parts of the system. Read the *General Safety Summary* in other system manuals for warnings and cautions related to operating the system.

### Injury Precautions

#### Use Proper Power Cord

To avoid fire hazard, use only the power cord specified for this product.

#### Ground the Product

This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

#### Do Not Operate Without Covers

To avoid electric shock or fire hazard, do not operate this product with covers or panels removed.

#### Do Not Operate in Wet/Damp Conditions

To avoid electric shock, do not operate this product in wet or damp conditions.

#### Do Not Operate in an Explosive Atmosphere

To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.

#### Avoid Exposed Circuitry

To avoid injury, remove jewelry such as rings, watches, and other metallic objects. Do not touch exposed connections and components when power is present.

### Product Damage Precautions

#### Use Proper Power Source

Do not operate this product from a power source that applies more than the voltage specified.

#### Provide Proper Ventilation

To prevent product overheating, provide proper ventilation.

#### Do Not Operate With Suspected Failures

If you suspect there is damage to this product, have it inspected by qualified service personnel.

### Battery Replacement

To avoid damage, a battery must be replaced once every five years. Please contact Grass Valley Product Support to replace the battery.

# Safety Terms and Symbols

### Terms in This Manual

These terms may appear in this manual:

***WARNING: Warning statements identify conditions or practices that can result in personal injury or loss of life.***

***CAUTION: Caution statements identify conditions or practices that may result in damage to equipment or other property, or which may cause equipment crucial to your business environment to become temporarily non-operational.***

### Terms on the Product

These terms may appear on the product:

DANGER indicates a personal injury hazard immediately accessible as one reads the marking.

WARNING indicates a personal injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

### Symbols on the Product

The following symbols may appear on the product:

DANGER high voltage

Protective ground (earth) terminal

ATTENTION – refer to manual

# Service Safety Summary

⚠ ***WARNING: The service instructions in this manual are intended for use by qualified service personnel only. To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to all safety summaries before performing service.***

### Do Not Service Alone

Do not perform internal service or adjustment of this product unless another person capable of rendering first aid and resuscitation is present.

### Disconnect Power

To avoid electric shock, disconnect the main power by means of the power cord or, if provided, the power switch.

### Use Care When Servicing With Power On

Dangerous voltages or currents may exist in this product. Disconnect power and remove battery (if applicable) before removing protective panels, soldering, or replacing components.

To avoid electric shock, do not touch exposed connections.

# Certifications and Compliances

### Canadian Certified Power Cords

Products that are relocated to other countries should use nationally certified power cords and plugs to ensure safe operation of the product.

### FCC Emission Control

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. Changes or modifications not expressly approved by Grass Valley can affect emission compliance and could void the user's authority to operate this equipment.

### Canadian EMC Notice of Compliance

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

This product must not be used in residential areas.

### EMC Directive
### Class A Warning

This product must not be used in residential areas.

### FCC Emission Limits

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesirable operation.

# Safety Certification

This product has been evaluated and meets the following Safety Certification Standards:

| Standard | Designed/tested for compliance with: |
|---|---|
| IEC 60950-1 | Information technology equipment - Safety - (2nd:2005) |
| EN 60950-1 | Information technology equipment - Safety - (2006) |
| J60950 (H22) | Electrical Appliance and Material Safety Law |

# Finding Information

This Service Manual provides procedures for assessing and solving technical problems and performing routine maintenance on your T2.

The T2 has two types of operation: Front Panel Mode and Workstation Mode. Front panel mode allows you to operate the T2 using the touch screen or a mouse while looking at the touch screen LCD. Workstation Mode allows you to operate the T2 using a mouse or keyboard while looking at PC monitor connected to the T2.

This service manual mainly documents procedures of the Front Panel Mode using a mouse unless otherwise documented, procedures for operations with the Workstation Mode are also the same as for the Front Panel Mode.

## How this manual is organized

This Service Manual consists of the following:

Chapter 1, *Product Description*:

Describes the key features, system components, locations and functions of the Field Replaceable Units (FRUs), and status indicators of the T2.

Chapter 2, *Maintenance Procedures*:

Contains procedures for periodic maintenance.

Chapter 3, *Troubleshooting Problems*:

Contains problem descriptions with steps for diagnosing and correcting the cause of the problem. Use this information if you are having trouble with your T2.

Chapter 4, *Removing and Replacing FRUs*:

Contains procedures for removing and replacing the Field Replaceable Units (FRUs).

Chapter 1

# Product Description

This chapter consists of the following:


- "Overview Description" on page 14
- "System Description" on page 15
  - "PC Subsystem" on page 16
  - "Codec Subsystem" on page 16
  - "Front Subsystem" on page 17
  - "XLR board" on page 17
  - "Fuse board" on page 17
- "T2 orientation" on page 18
  - "FRU locations (T2 Elite/Pro/Express)" on page 18
  - "FRU locations (T2 Elite 2/Pro 2/Express 2)" on page 19
- "FRU functional descriptions" on page 20
  - "Touch screen LCD" on page 20
  - "JOG/Shuttle knob" on page 20
  - "Button kit" on page 20
  - "Front USB group unit" on page 20
  - "Recovery UFD (USB Flash Drive)" on page 20
  - "Fan (Center/Rear)" on page 20
  - "Power supply unit" on page 20
  - "2.5 inch removable SSD bay" on page 21
  - "SSD (for the system)" on page 21
  - "HDD/SSD (for data)" on page 21
  - "I/O board unit" on page 21
  - "XLR×6 unit" on page 21
  - "SATA card unit" on page 21
  - "Memory (RAM)" on page 22
  - "Fuse board unit" on page 22
  - "Front USB 3.0 board" on page 22
  - "USB 3.0 cable" on page 22
  - "PCI-e USB 3.0 card" on page 22
  - "Rear USB 3.0 port" on page 22
  - "Media Card Reader Assy" on page 22
- "Status indicators" on page 23
  - "Power LED" on page 23
  - "LAN port indicator codes" on page 23

# Overview Description

The T2 is a multi-channel video disk recorder that allows simultaneous record and playback of media stored on internal data drives. The T2 features a single record channel (R1) and 2 play channels (P1/P2). Hours of storage depends on the video compression settings selected.

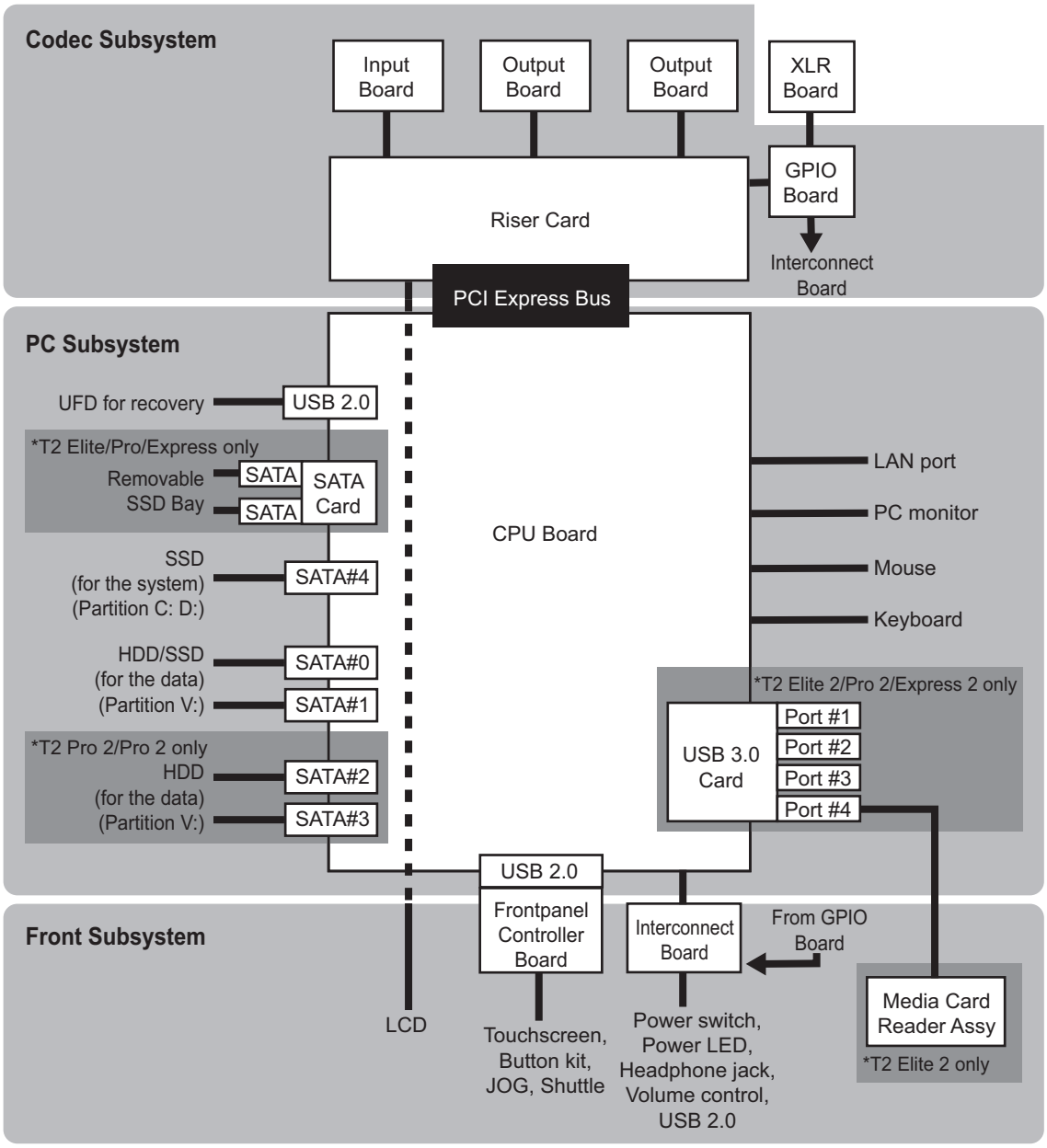
The T2 includes a built in disk recorder application that tasks − record, edit, play, and create/play Playlists. The front panel includes the touch screen LCD and transport controls to allow easy operation with minimal external connections.

Refer to the T2 User Manual for other high-level descriptions of features, controls, and applications.

# System Description

The T2 is a video disk recorder based an a standard Windows computer with extensive enhancements.

This section explains the major architectural blocks.



## PC Subsystem

The PC subsystem is intended to run application software running on top of a Windows OS.
This subsystem includes the following components:

- Mechanical Chassis
- Industry micro ATX motherboard
- Core i7 class processor
- 4GB DDR 3 memory
- 2 LAN ports
- 8 rear panel / 2 front panel accessible USB 2.0 ports
- SATA ports (6 on the motherboard, 2 on the SATA card)
- Monitor ports (VGA/DVI-D)
- Power supply unit
- Windows 7 Embedded (64 bit)
- USB 3.0 ports (1 rear panel , 2 front panel) (T2 Elite 2/Pro 2/Express 2 only)

## Codec Subsystem

Codec Subsystem is composed of one Input board, two Output boards, and one GPIO board. It is connected to the motherboard via the riser card. These boards are interconnected. For example, the Input/Output boards process the command from the GPIO board, and synchronize the clocks on Output boards.
Codec Subsystem includes the following components:

- Riser card
  The riser card just bridges PCI express bus and passes communication signals between boards.
- Input board
  This board provides the video input and is responsible for encoding Grass Valley HQ.
- Output board
  This board provides the video output.
- GPIO board
  This board has the GPIO interface, analog audio interface, and reference input.
- RS422

## Front Subsystem

The front subsystem provides user interfaces such as LCD, touch screen, JOG/Shuttle switch and control buttons.

This subsystem includes the following components:

- Interconnect board
  The interconnect board interconnects power switch, power LED, headphone jack, volume dial, two USB 2.0 ports.
- Frontpanel Controller board
  This board has USB-interface, adjusts LCD backlight/illuminated buttons, and detects the touch screen/illuminated buttons/rotary encoder.

## XLR board

The XLR board provides XLR audio connectors.

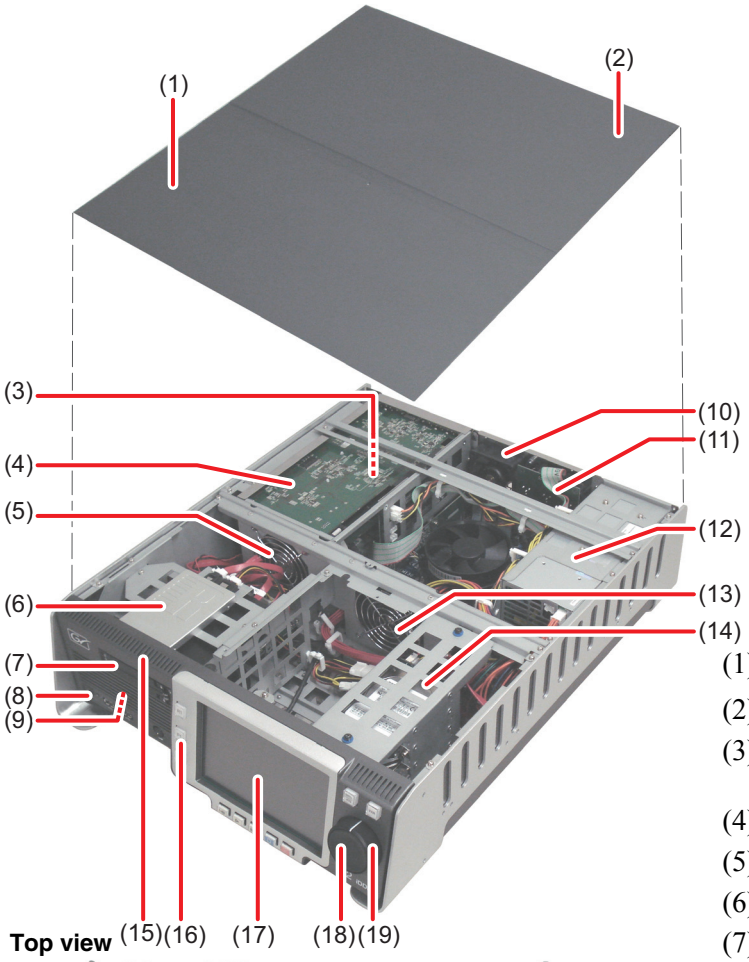
## Fuse board

It provides power to each module from the power supply unit.

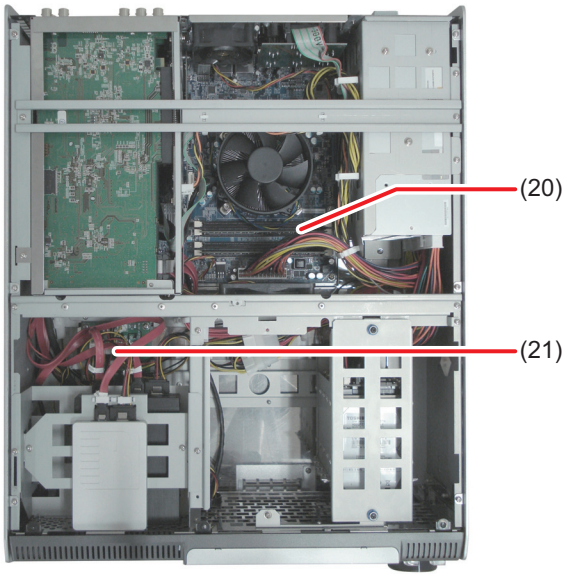
# T2 orientation

## FRU locations (T2 Elite/Pro/Express)

The following illustration shows the location of Field Replaceable Units (FRUs) and other components in the T2.



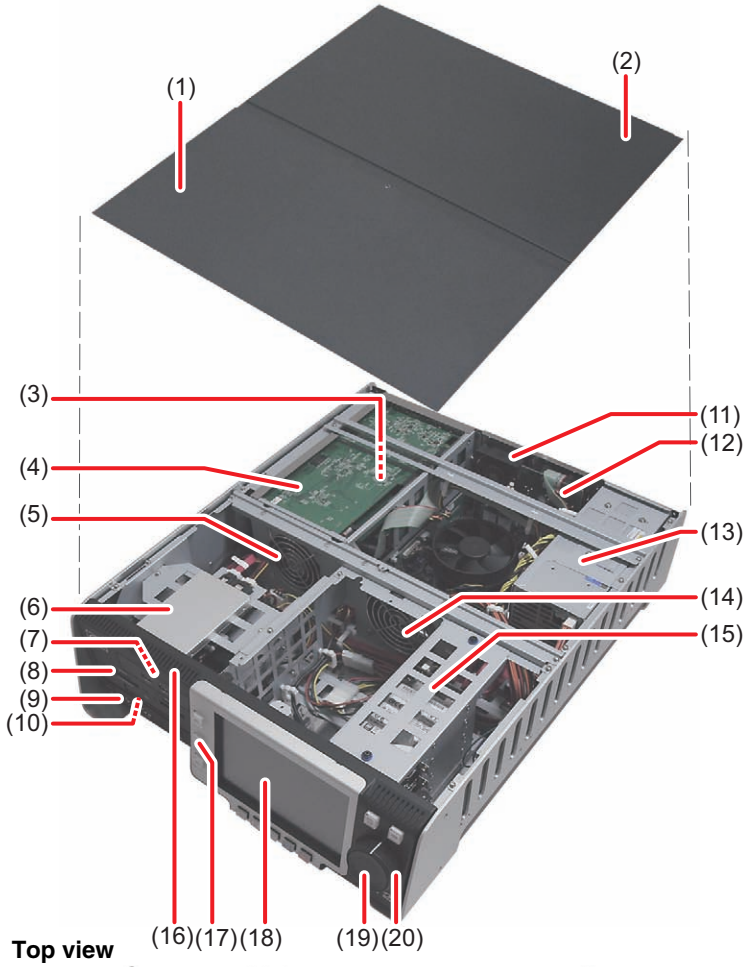

Top view



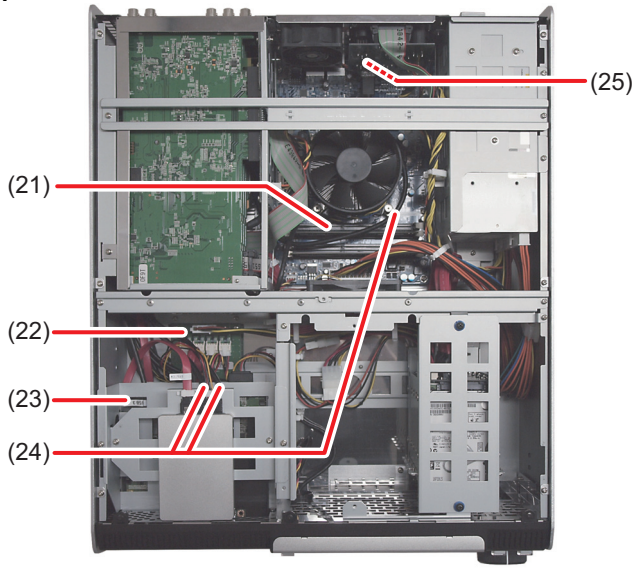

(1) Top cover (front)
(2) Top cover (rear)
(3) SATA card unit
*Placed under the I/O board unit.
(4) I/O board unit
(5) Center fan (80 mm)
(6) SSD (for the system)
(7) 2.5 inch removable SSD bay
(8) Front USB group unit
(9) Recovery UFD (USB Flash Drive)
*Mounted on the front USB group unit
(10) Rear fan (60 mm)
(11) XLR×6 unit
(12) Power supply unit
(13) Center fan (92 mm)
(14) HDD / SSD (for data)
(15) Front panel
(16) Button kit
(17) Touch screen LCD
(18) JOG knob
(19) Shuttle knob
(20) Memory (RAM)
(21) Fuse board unit

## FRU locations (T2 Elite 2/Pro 2/Express 2)

The following illustration shows the location of Field Replaceable Units (FRUs) and other components in the T2.




**Top view**




(1) Top cover (front)
(2) Top cover (rear)
(3) PCI-e USB 3.0 card
*Placed under the I/O board unit.
(4) I/O board unit
(5) Center fan (80 mm)
(6) SSD (for the system)
(7) Front USB 3.0 board
(8) Media Card Reader Assy
(T2 Elite 2 only)
(9) Front USB group unit
(10) Recovery UFD
(USB Flash Drive)
*Mounted on the front USB group unit.
(11) Rear fan (60 mm)
(12) XLR×6 unit
(13) Power supply unit
(14) Center fan (92 mm)
(15) HDD / SSD (for data)
(16) Front panel
(17) Button kit
(18) Touch screen LCD
(19) JOG knob
(20) Shuttle knob
(21) Memory (RAM)
(22) Fuse board unit
(23) USB 3.0 cable (T2 Elite 2 only)
(24) USB 3.0 cable ×3
(25) Rear USB 3.0 port

# FRU functional descriptions

The Field Replaceable Units (FRUs) described in this section are as follows:

For procedures, refer to "Removing and Replacing FRUs" on page 89.

## Touch screen LCD

On the touch screen LCD, touch the screen displayed on the LCD to perform operations in T2.

Refer to "Touch screen LCD removal" on page 113 for procedures.

## JOG/Shuttle knob

The multi-function knob provides control for JOG, shuttle and variable speed play.

Refer to "Jog knob removal" on page 109 and "Shuttle knob removal" on page 109 for procedures.

## Button kit

Button kit consists of control buttons and Frontpanel Controller board.

Control buttons are provided for transport controls, edit controls, display controls, and JOG/shuttle controls and a variable speed play control.

Refer to "Button kit removal" on page 116 for procedures.

## Front USB group unit

Front USB unit provides an Interconnect board, a power switch, a power on indicator, a headphone jack, volume control, two USB 2.0 port.

Refer to "Front USB group unit removal" on page 110 for procedures.

## Recovery UFD (USB Flash Drive)

The recovery UFD contains recovery data to be restored to the factory default condition.

For replacement instructions, refer to "Recovery UFD (USB Flash Drive) removal" on page 112.

## Fan (Center/Rear)

The fan module provides cooling for the T2 chassis.

Refer to "Center fan (92 mm) removal" on page 123, "Center fan (80 mm) removal" on page 125 and "Rear fan (60 mm) removal" on page 126 for procedures.

## Power supply unit

Power supply has a fan with automatic speed control. The power supply unit has protection for over voltage, over current, over temperature, and short circuits.

Refer to "Power supply unit removal" on page 136 for procedures.

## 2.5 inch removable SSD bay

2.5 inch removable SSD bay is equipped on T2 Elite/Pro/Express.

The SSD is inserted into the 2.5 inch removable SSD bay to input or output video and audio data.

Refer to"2.5 inch removable SSD bay removal" on page 99 for procedures.

## SSD (for the system)

The SSD (for the system) consists of the C: drive with Windows OS and the D: drive for the database, configuration settings, and logs.

Refer to "SSD (for the system) removal" on page 97 for procedures.

## HDD/SSD (for data)

They are independent drives exclusively for media storage. For the T2 Elite 2/ Express 2/Elite/Express, the media is written or "striped" across the drives in a continuous fashion, which makes the 2 drives a "stripe group". For the T2 Pro 2/Pro, the media is striped across 4 drives (2 pairs of mirrored drives). These 4 drives are recognized as one striped set.
The media stripe group appears as the V: drive to the Windows operating system.

Refer to "HDD/SSD (for data) removal" on page 94 for procedures.

## I/O board unit

I/O board unit consists of Input board, Output board, GPIO board, and riser card. It provides the majority of the T2's media-related input and output connectors on the rear panel. This board hosts the circuits responsible for encoding/decoding video and processing audio and timecode. It is connected to the motherboard via the riser card. The riser card is connected to the touch screen LCD to display images on the touch screen LCD.

Refer to "I/O board unit removal" on page 128 for procedures.

## XLR×6 unit

XLR×6 unit is a primarily an extension of the I/O board unit and consists of an XLR board and XLR audio connectors.

Refer to "XLR×6 unit removal" on page 120 for procedures.

## SATA card unit

SATA card unit is equipped on T2 Elite/Pro/Express.

The 2.5 inch removable SSD bay is connected to the motherboard via the SATA card unit.

Refer to "SATA card unit removal" on page 130 for procedures.

## Memory (RAM)

The T2 has a 4GB DDR 3 memory.

Refer to "Memory (RAM) removal" on page 119 for procedures.

## Fuse board unit

It provides power to each module from the power supply unit.

Refer to "Fuse board unit removal" on page 105 for procedures.

## Front USB 3.0 board

Front USB 3.0 board is equipped on T2 Elite 2/Pro 2/Express 2.

Front USB 3.0 board includes USB 3.0 port x 2.

For replacement instructions, refer to "Front USB 3.0 board removal" on page 102.

## USB 3.0 cable

T2 Elite 2 is equipped with four USB 3.0 cables, and T2 Pro 2/Express 2 is equipped with three USB 3.0 cables.

For replacement instructions, refer to "USB 3.0 cable disconnection" on page 135.

## PCI-e USB 3.0 card

PCI-e USB 3.0 card is equipped on T2 Elite 2/Pro 2/Express 2.

PCI-e USB 3.0 card includes USB 3.0 port x 3 and a power cable.

For replacement instructions, refer to "PCI-e USB 3.0 card removal" on page 131.

## Rear USB 3.0 port

Rear USB 3.0 port is equipped on T2 Elite 2/Pro 2/Express 2.

Rear USB 3.0 port includes USB 3.0 port x 1.

For replacement instructions, refer to "Rear USB 3.0 port removal" on page 121.

## Media Card Reader Assy

Media Card Reader Assy is equipped on T2 Elite 2.

It is to be used for reading and writing data in an inserted SSD, Compact Flash card, SD card, or SxS memory card.

For replacement instructions, refer to "Media Card Reader Assy removal" on page 103.

# Status indicators

The following sections describe the visual indicators that communicate the current operating status and system health of the T2.

## Power LED

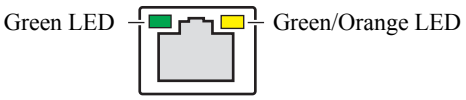
The Power LED indicates status as follows:

| LED behavior | Status Condition |
|---|---|
| Off | The power is set to Off and the T2 is not operational. |
| Green steady on | The power is set to On and the T2 is operational. |

⚠ ***WARNING: The power switch does not turn off power to the system. To turn power off, the system must be disconnected from the power source.***

## LAN port indicator codes

The RJ-45 LAN port includes integrated status LEDs. The LEDs oriented as follows:




The meanings of the LED states are described in the following table:

| LED | Color | LED state | Status Condition |
|---|---|---|---|
| Left | Green | Off | LAN link is not established. |
| | | On | LAN link is established. |
| | | Flashing | The computer is communicating with another computer on the LAN. |
| Right | Green | Off | 10 Mbit/sec data rate is selected. |
| | | On | 100 Mbit/sec data rate is selected. |
| | Orange | On | 1000 Mbit/sec data rate is selected. |

If the LAN is faulty, you must replace the motherboard.

Chapter 2

# Maintenance Procedures

This chapter consists of the following:


- "Cleaning the touch screen LCD" on page 26
- "Starting and exiting the maintenance mode" on page 26
  - "Starting the maintenance mode" on page 27
  - "Exiting the maintenance mode" on page 28
- "Using the Maintenance Tools" on page 30
  - "Launching the Maintenance Tools" on page 30
  - "Closing the Maintenance Tools" on page 30
  - "Media drive maintenance" on page 31
  - "Data maintenance" on page 34
  - "System related maintenance" on page 40
- "Using the Windows desktop" on page 44
- "Verifying, building, and rebuilding a RAID volume" on page 44
  - "Verifying the RAID volume" on page 44
  - "Building the RAID volume" on page 47
  - "Rebuilding the RAID volume (for only the T2 Pro 2/Pro)" on page 54
- "Restoring to the factory default condition" on page 59
  - "Recovery procedure for T2 Elite/Pro/Express" on page 59
  - "Recovery procedure for T2 Elite 2/Pro 2/Express 2" on page 66
  - "T2 Recovery Utility for T2 Elite 2/Pro 2/Express 2" on page 68

# Cleaning the touch screen LCD

Build up of foreign objects such as soil and dust or dirt such as fingerprints on the touch screen LCD may cause malfunction. Perform cleaning of the touch screen LCD periodically, noting the following points:

- The surface of the touch screen LCD must be wiped with a clean cloth dampened with a mild detergent. Do not apply a detergent directly onto the touch screen LCD.
- Do not use any detergent containing abrasives. Abrasives may scratch the surface of the display and decrease its visibility.
- Avoid getting water on the surface of the touch screen LCD. Moisture entered into the system will cause a failure.

# Starting and exiting the maintenance mode

The T2 has the following startup modes: normal and maintenance modes. Start up your system in the appropriate mode depending on the purpose of use.

- Normal mode
  The CommandCenter is launched automatically allowing you to perform operations such as recording, playback, or editing.
- Maintenance mode
  The Maintenance Tools is launched automatically allowing you to perform maintenance operations of the T2. In the maintenance mode, you can also perform operations such as using the Windows OS (such as configuring the Date/Time) or building/rebuilding a RAID volume.

⚠ ***CAUTION: The T2 is not a general purpose Windows workstation. The T2 is designed so that a user can start it up without an administrator privilege to log on to the system automatically. Do not modify any system settings unless approved by Grass Valley. A partial or total system failure may result.***

- Do not use the User Accounts on the T2.
- Do not install any third party software not provided by Grass Valley on the T2.
- Do not install any Windows updates on the T2.

## Starting the maintenance mode

Restart the T2 in the maintenance mode from CommandCenter to run the maintenance mode. This section mainly describes the procedures using the touch screen LCD.

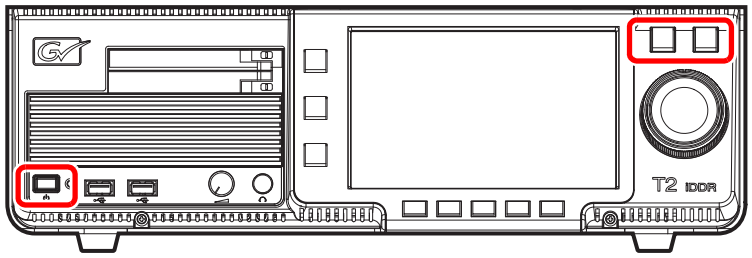
⚠ ***CAUTION: You must finish all of the playback and recording operations to stop the media access prior to performing operations.***

1. Switch to **1ch View**, touch **Menu**, and then touch **Tools** → **Maintenance**.
   - When operating in the workstation mode, click **System** from the menu bar and then click **Maintenance...**.
2. Touch the entry field on the password entry screen.
3. Enter "admin", and touch **OK**.
4. Touch **OK**.
5. Touch **Yes** when the confirmation message is displayed.
   - The CommandCenter is closed and the system restarts in the maintenance mode.
   - Connect a mouse or keyboard, if necessary.
   - After the restart, the Maintenance Tools is launched automatically.

### Forcing startup of the maintenance mode

If you cannot start the maintenance mode with procedures above, perform the following steps.

1. Turn on the power of the T2 while pressing the **Shuttle/Jog** and **VAR** buttons at the same time.
   - Keep pressing the **Shuttle/Jog** and **VAR** buttons until a message "Now switching to Maintenance mode. The system is rebooting..." is displayed in the touch screen LCD.




   - The T2 will start in the maintenance mode.

## Exiting the maintenance mode

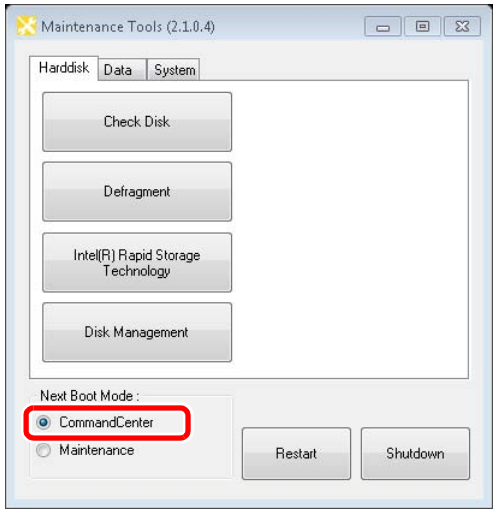
⚠ ***CAUTION: You must finish a diagnosis using the Maintenance Tools prior to exiting the maintenance mode.***

### Restarting from the maintenance mode to the normal mode

The operation to switch from the maintenance mode to the normal mode is performed from the Maintenance Tools main screen.

***NOTE: You need to launch the Maintenance Tools beforehand. For more information, refer to "Launching the Maintenance Tools" on page 30.***

1. In the Maintenance Tools main screen, select **CommandCenter** under "Next Boot Mode".



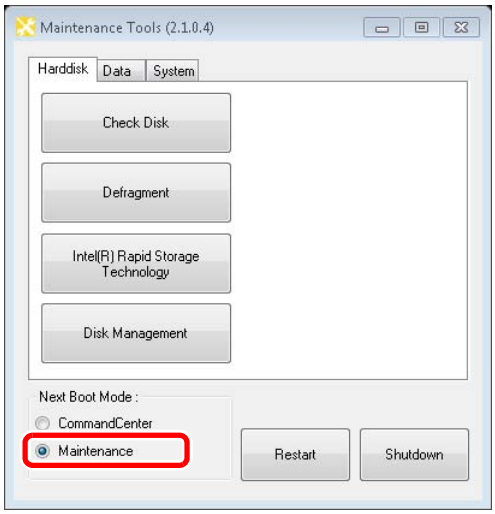

2. Click **Restart**.
   - After the restart, the CommandCenter is launched automatically.

### Starting up the system without exiting the maintenance mode

This section describes the procedure to restart your system in the maintenance mode from the Maintenance Tools main screen.

***NOTE: If the Maintenance Tools is not running in the maintenance mode, performing the normal restart operation from the Windows desktop will restart your system without exiting the maintenance mode.***

1. In the Maintenance Tools main screen, select **Maintenance** under "Next Boot Mode".



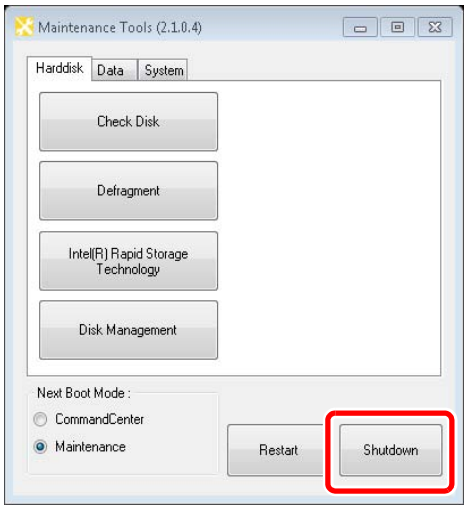

2. Click **Restart**.
   - After the restart, the Maintenance Tools is launched automatically.

## Exiting the maintenance mode to shut down

You can exit the maintenance mode from the Maintenance Tools main screen to shut down the T2.

***NOTE: If the Maintenance Tools is not running in the maintenance mode, performing the normal shutdown operation from the Windows desktop will shut down your system. The T2 will restart in the maintenance mode.***

1. In the Maintenance Tools main screen, click **Shutdown**.
   - You can select the next boot mode. Select **CommandCenter** to startup the T2 in the normal mode. Select **Maintenance** to startup the T2 in the maintenance mode.



# Using the Maintenance Tools

The Maintenance Tools is software for performing maintenance procedures such as running a failure diagnosis on the T2 or backing up data.
You can perform the following procedures using the Maintenance Tools. Refer to the specific topics for more information.

- Media drive maintenance
  - "Media disk error checks" on page 31
  - "Defragmentation of media disk" on page 32
- Data maintenance
  - "Checking the data consistency" on page 34
  - "Initializing the data" on page 36
  - "Backing up the data" on page 37
  - "Restoring the data" on page 39
- System related maintenance
  - "Acquiring the system information" on page 40
  - "Exporting log files" on page 42
  - "Date and Time" on page 43

## Launching the Maintenance Tools

The Maintenance Tools is launched automatically when you start the maintenance mode. This section describes the procedure to the launch the Maintenance Tools again when the Maintenance Tools is closed in the maintenance mode (from the Windows desktop).

For more information on how to start the maintenance mode, refer to "Starting the maintenance mode" on page 27.

***NOTE: A mouse must be connected to your T2 beforehand.***

1. Double-click the Maintenance Tools icon on the Windows desktop.

***NOTE: You can also launch the Maintenance Tools by double-clicking C:/Eiger/Eiger.Mainte.ToolMain.exe.***

- The Maintenance Tools is launched.

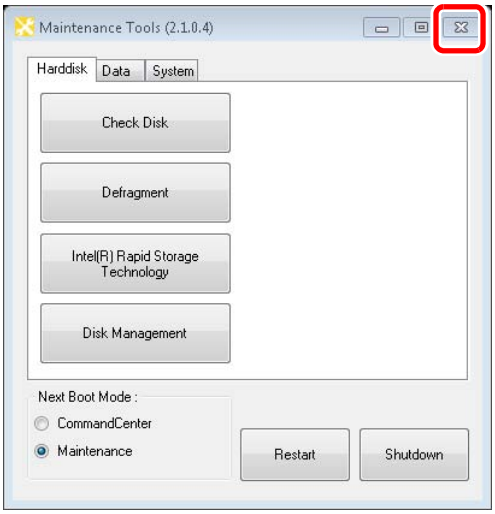
## Closing the Maintenance Tools

This section describes the procedure to close the Maintenance Tools and to display the Windows desktop.

For more information on how to exit the maintenance mode, refer to "Exiting the maintenance mode" on page 28.

⚠ ***CAUTION: You must finish a diagnosis using the Maintenance Tools prior to closing the Maintenance Tools.***

1. In the Maintenance Tools main screen, click **X**.
   - The Maintenance Tools is closed and the Windows desktop appears.

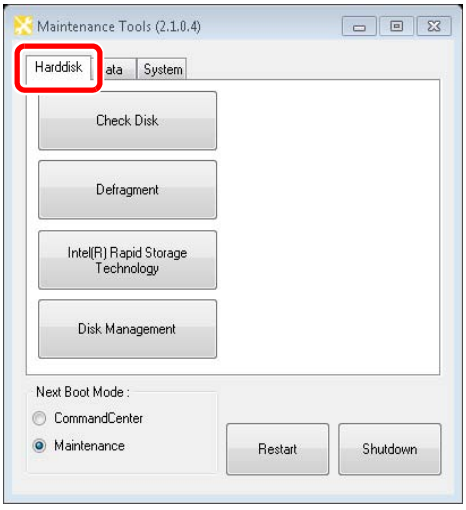



## Media drive maintenance

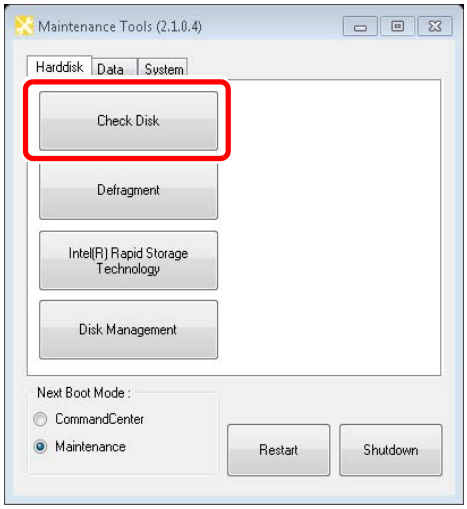
### Media disk error checks

You can scan the media disk to check it for any file system errors and bad sectors, targeting the data drive (V: drive). If any error is found, the system attempts to fix the media disk.

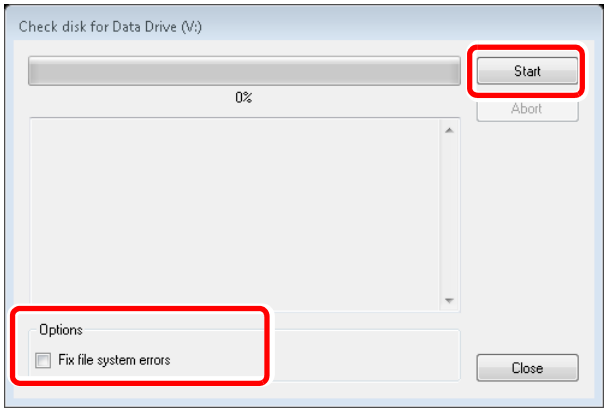
1. In the Maintenance Tools main screen, click the **Harddisk** tab.



2. Click **Check Disk**.




3. Check the items under "Options" as necessary, and then click **Start**.




- If **Fix file system errors** is checked, the system fixes errors automatically without scanning for bad sectors.
- To abort a check in the middle of performing it, click **Abort**.

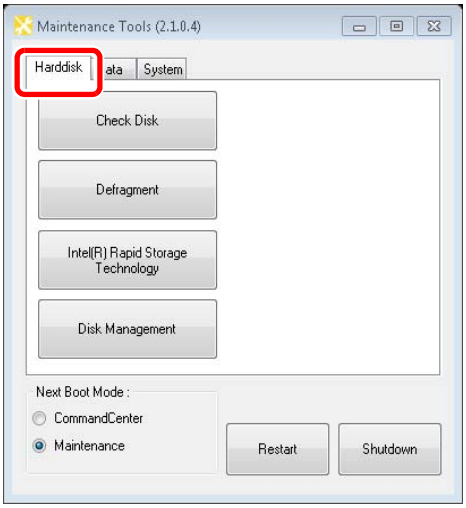
4. When you see the completion message, click **Close**.
   - "Check disk for Data Drive" screen is closed.

### Defragmentation of media disk

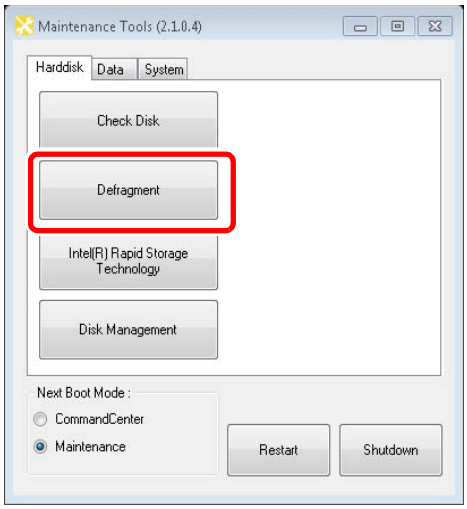
You can defragment the media disk, targeting the data drive (V drive).

⚠ ***CAUTION: Do not defragment the media disk of the T2 Elite 2/Elite model. Defragmentation could shorten the life of an SSD.***

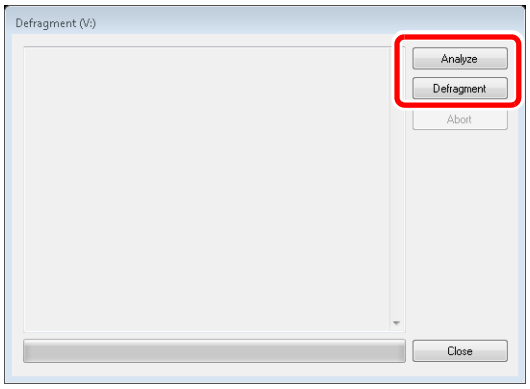
1. In the Maintenance Tools main screen, click the **Harddisk** tab.




2. Click **Defragment**.




3. Click either **Analyze** or **Defragment**.



- Clicking **Analyze** performs only a defragmentation analysis. The analysis result is displayed on the screen.
- Clicking **Defragment** performs defragmentation. The progress of defragmentation is displayed on the screen.
- To abort a process in the middle of performing it, click **Abort**.

4. When you see the completion message, click **Close**.
   - "Defragment" screen is closed.

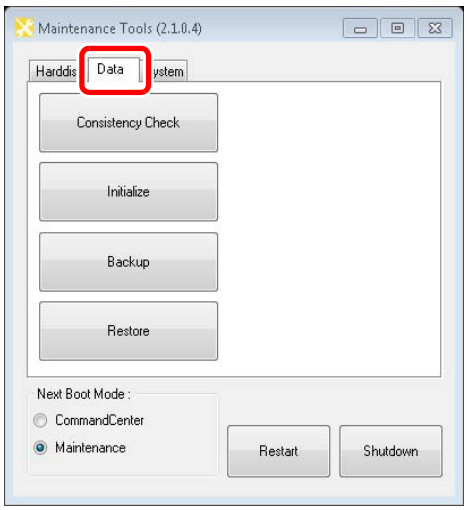
## Data maintenance

### Checking the data consistency

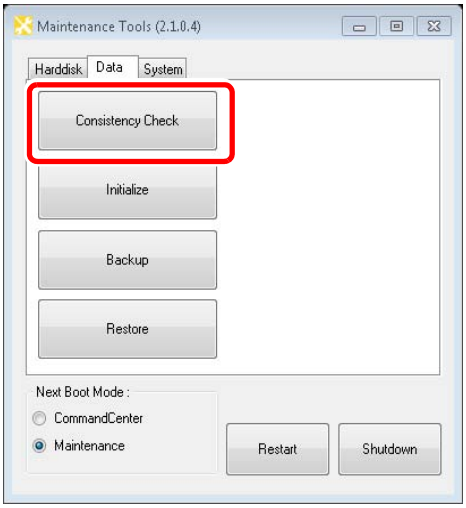
You can check the consistency between the database information and the actual media files. This allows you to list information or media files that exist in only either of them and to delete them.

***NOTE: Data in the Recycle Bin is not subject to this data consistency check.***

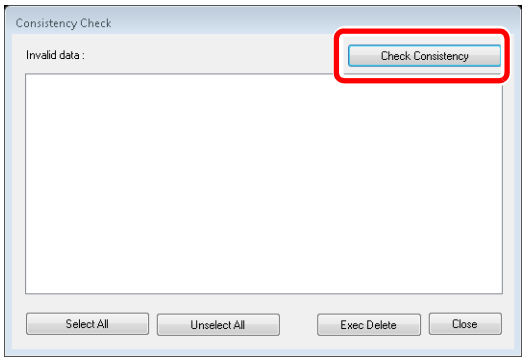
1. In the Maintenance Tools main screen, click the **Data** tab.



2. Click **Consistency Check**.

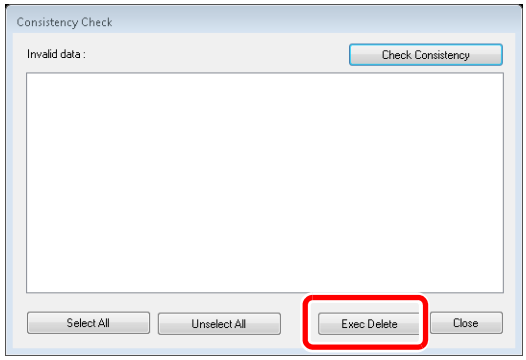



3. Click **Check Consistency**.




- A data consistency check begins and any inconsistent information is listed on the screen.

4. Check the inconsistent information you want to delete, and then click **Exec Delete**.




- You can select all of the listed information by clicking **Select All**.
- You can deselect all of the listed information by clicking **Unselect All**.

5. Click **Close**.

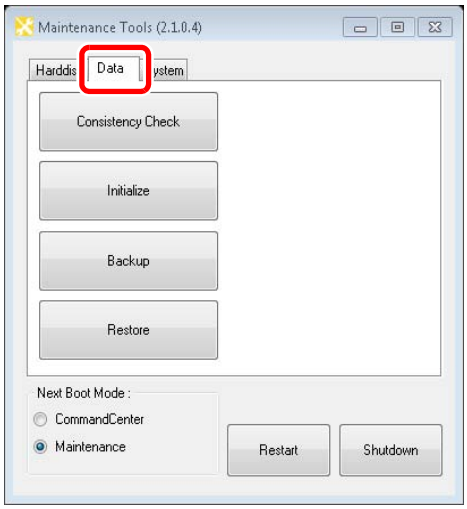
- "Consistency Check" screen is closed.

### Initializing the data

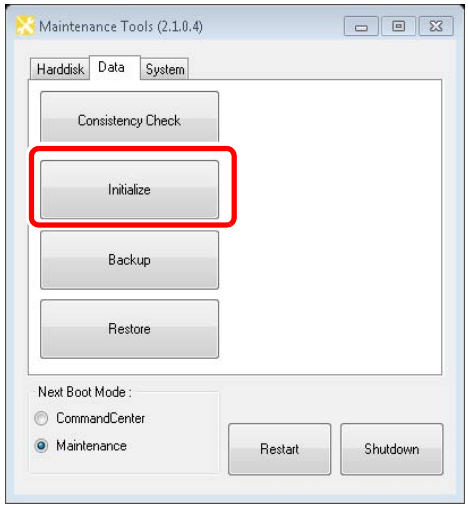
You can initialize the database, the data drive (V: drive), and the Config settings.

⚠ ***CAUTION: Initializing your data will delete all of the current data. You should back up your data beforehand as necessary.***

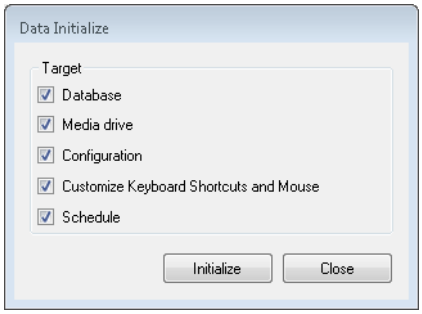
1. In the Maintenance Tools main screen, click the **Data** tab.




2. Click **Initialize**.




3. Check the items you want to initialize under "Target".



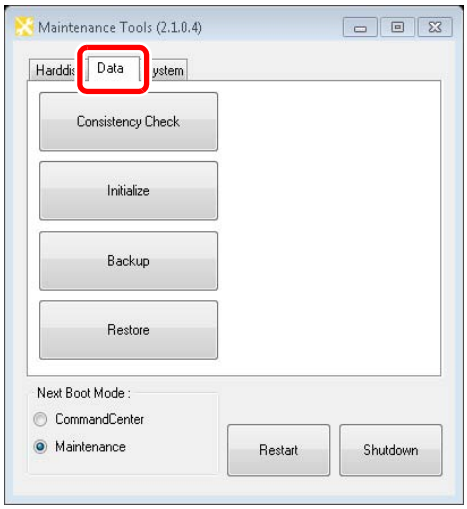
- Check **Database** to delete the contents of the database.
- Check **Media drive** to format the data drive and initialize the folder structure.
- Check **Configuration** to initialize the settings of Config.
- Check **Customize Keyboard Shortcuts and Mouse** to initialize the settings of the keyboard shortcuts and mouse customization.
- Check **Schedule** to initialize the settings of Schedule Recording. Schedule Recording function automatically starts capturing operation at a specified time, and ends it at a specified time in the R1-live mode. For more information, refer to the T2 User Manual.
- Multiple items can be selected.

4. Click **Initialize**.
5. Click **Yes** when the confirmation message is displayed.
   - The initialization is performed.
6. When you see the completion message, click **OK**.
7. Click **Close**.
   - "Data Initialize" screen is closed.

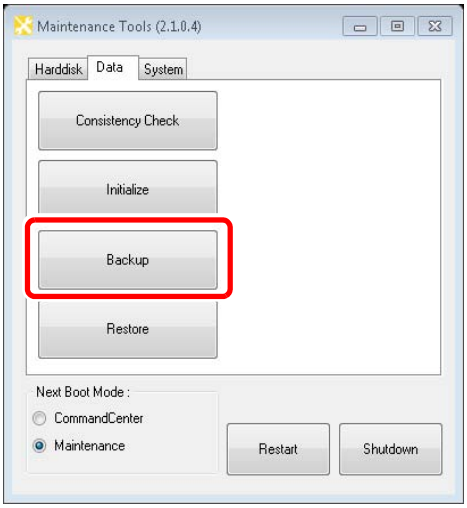
### Backing up the data

You can back up the database, the media files in the data drive (V: drive), and the Config settings.

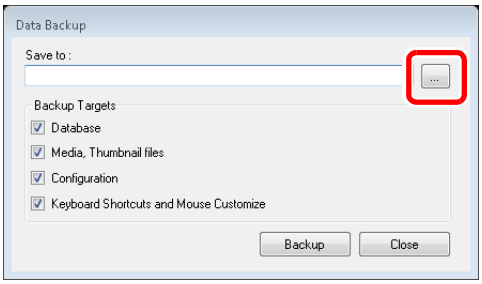
1. In the Maintenance Tools main screen, click the **Data** tab.



2. Click **Backup**.




3. Click **...** to specify the destination to save your backup data.



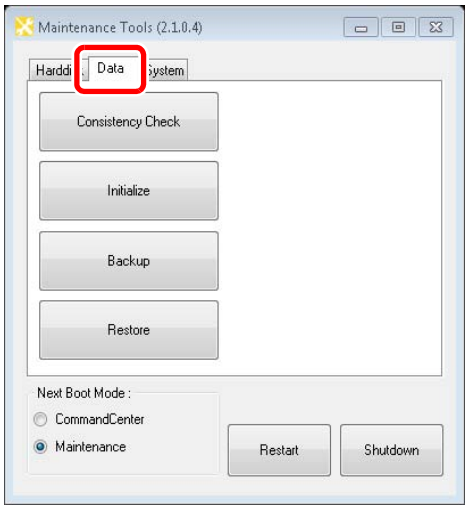

4. Check the target item(s) you want to back up under "Backup Targets".
   - Checking **Database** will back up the database.
   - Checking **Media, Thumbnail files** will back up the media files including the thumbnails.
   - Checking **Configuration** will back up the Config settings.
   - Check **Keyboard Shortcuts and Mouse Customize** to back up the settings of the keyboard shortcuts and mouse customization.
   - Multiple items can be selected.
5. Click **Backup**.
6. Click **Yes** when the confirmation message is displayed.
   - The backup begins and the progress is displayed.
7. When you see the completion message, click **OK**.
   - A folder, that stores an XML file containing the backup information and the backup data, is created in the specified destination. The folder name will be the saved date (yyyymmdd).
8. Click **Close**.
   - "Data Backup" screen is closed.

### Restoring the data

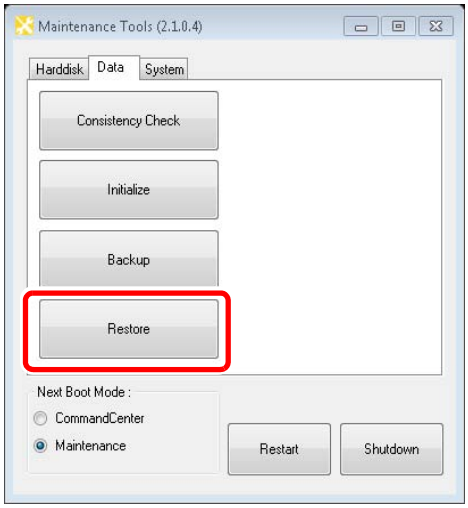
You can restore the data of your backed up database, media files, and Config settings.

⚠ ***CAUTION: Restoring your data will delete all of the current data overwriting it with the source data for the restore.***

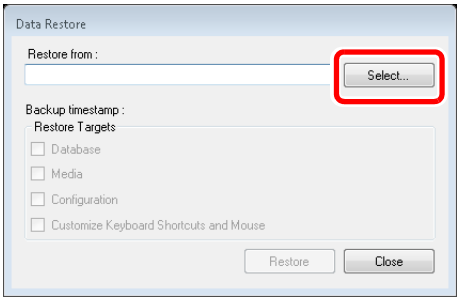
1. In the Maintenance Tools main screen, click the **Data** tab.




2. Click **Restore**.




3. Click **Select** to specify the XML file created upon the backup.



- "Backup timestamp" shows the backup date.
- Among the items under "Restore Targets", any item(s) that exist in the same folder where the XML file is located will be checked.

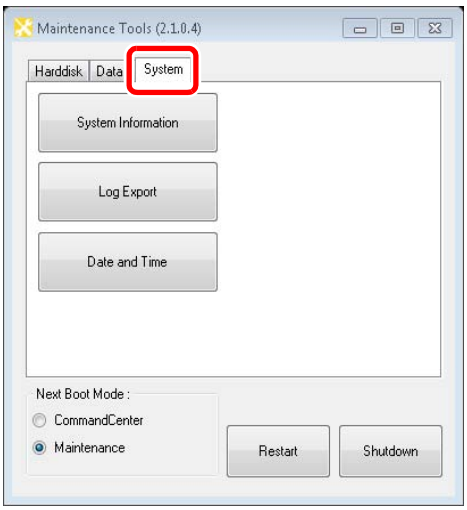
4. Make sure that the data you want to restore are checked under "Restore Targets".
   - Uncheck any item that does not need to be restored.
5. Click **Restore**.
6. Click **Yes** when the confirmation message is displayed.
   - The restore begins.
7. When you see the completion message, click **OK**.
8. Click **Close**.
   - "Data Restore" screen is closed.

## System related maintenance

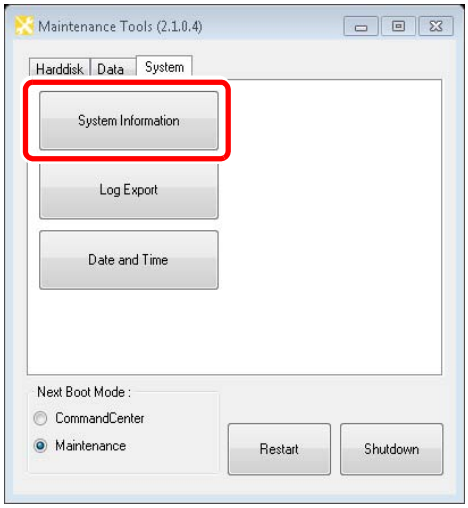
### Acquiring the system information

You can acquire the system information of the Windows OS (such as the hardware information, components, and software environment) and save it in text format.

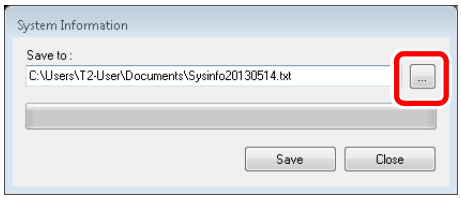
1. In the Maintenance Tools main screen, click the **System** tab.



2. Click **System Information**.




3. Click **...** to specify the destination to save the system information and a file name.

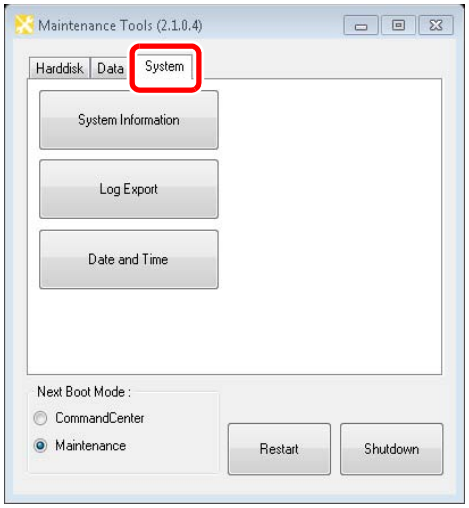



4. Click **Save**.
   - The progress bar shows the status of the system information acquirement.
5. When you see the completion message, click **OK**.
   - A text format file containing the system information is created in the specified destination.
6. Click **Close**.
   - "System Information" screen is closed.

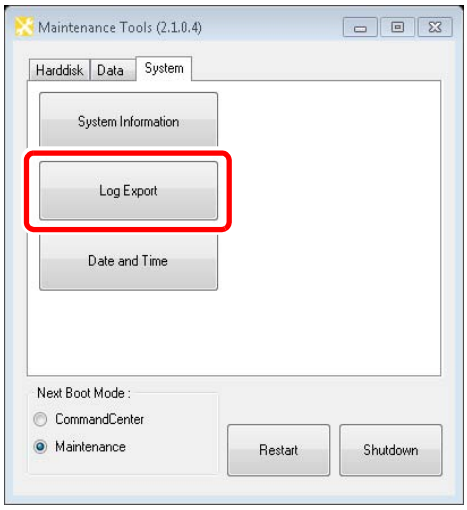
### Exporting log files

You can export an operation log, Windows OS internal event log, database log, and crash dumps message log.

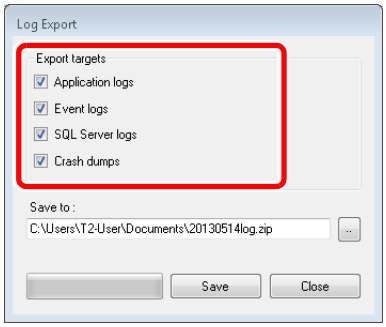
1. In the Maintenance Tools main screen, click the **System** tab.




2. Click **Log Export**.




3. Check the log(s) you want to export under "Export targets".




- Checking **Application logs** will export an operation log.

- Checking **Event logs** will export a Windows OS internal event log.
- Checking **SQL Server logs** will export a database log.
- Checking **Crash dumps** will export a crash dumps message log.
- Multiple items can be selected.

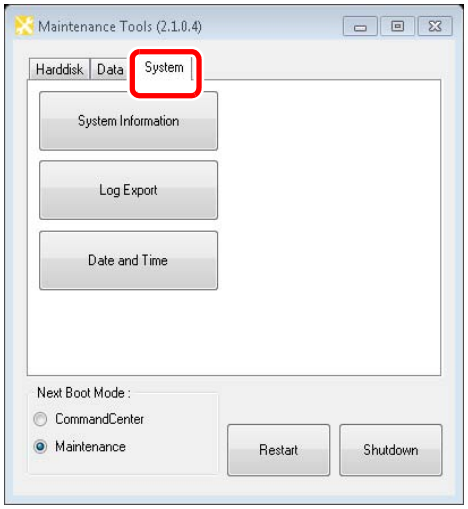
4. Click **...** to specify the destination to save the log and a file name.
5. Click **Save**.
   - The progress bar shows the exporting status.
6. When you see the completion message, click **OK**.
   - A ZIP file containing the log files is created in the specified destination.
7. Click **Close**.
   - "Log Export" screen is closed.

***NOTE: You can check the operation log while the T2 is running in the workstation mode. Click Option from the menu bar, and then click Log → Show Log....Once the "Log Viewer" screen appears, select the desired log file to view the operation log.***

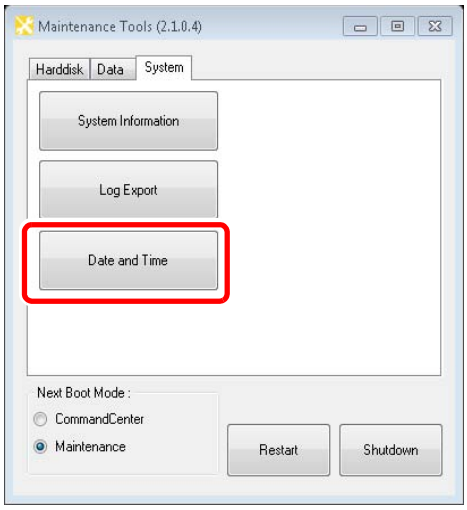
### Date and Time

You can set the date and time of T2 built-in clock.

1. In the Maintenance Tools main screen, click the **System** tab.



2. Click **Date and Time**.




- On the "Date and Time" screen of the Windows OS that appears, change the date and time, and TimeZone.

3. Click **OK**.

- "Date and Time" screen is closed.

# Using the Windows desktop

In the maintenance mode, you can use the standard Windows OS functions, using the Windows desktop.

The Windows desktop will become available when the Maintenance Tools is closed after starting up the system in the maintenance mode. For more information, refer to "Starting the maintenance mode" on page 27 and "Closing the Maintenance Tools" on page 30.

# Verifying, building, and rebuilding a RAID volume

The T2 has a function to monitor the RAID volume and monitors it all the time while the CommandCenter is running. If any problem occurs on the RAID volume, the icon ( ) is displayed at the right of the screen for the Front Panel Mode or on the status bar of the Workstation Mode to notify that a part of the drive that configures the RAID volume is not recognized. If multiple drives cannot be recognized and the RAID volume cannot be configured, the T2 starts up in the maintenance mode even when starting up in the normal mode. Following the procedure described below, you can verify the RAID volume to identify any failed drive(s) and build or rebuild the RAID volume after replacing the failed drive.

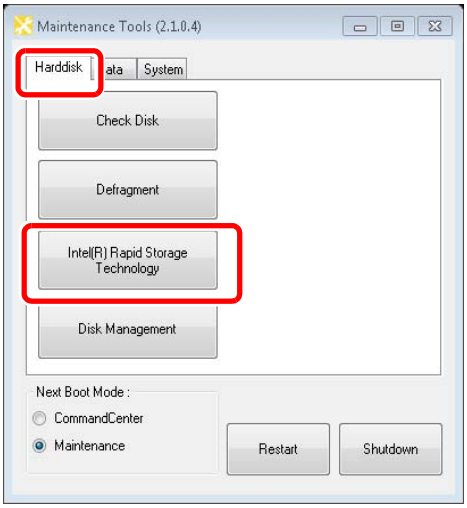
## Verifying the RAID volume

You can verify the current condition of the RAID volume to identify the failed drive(s).

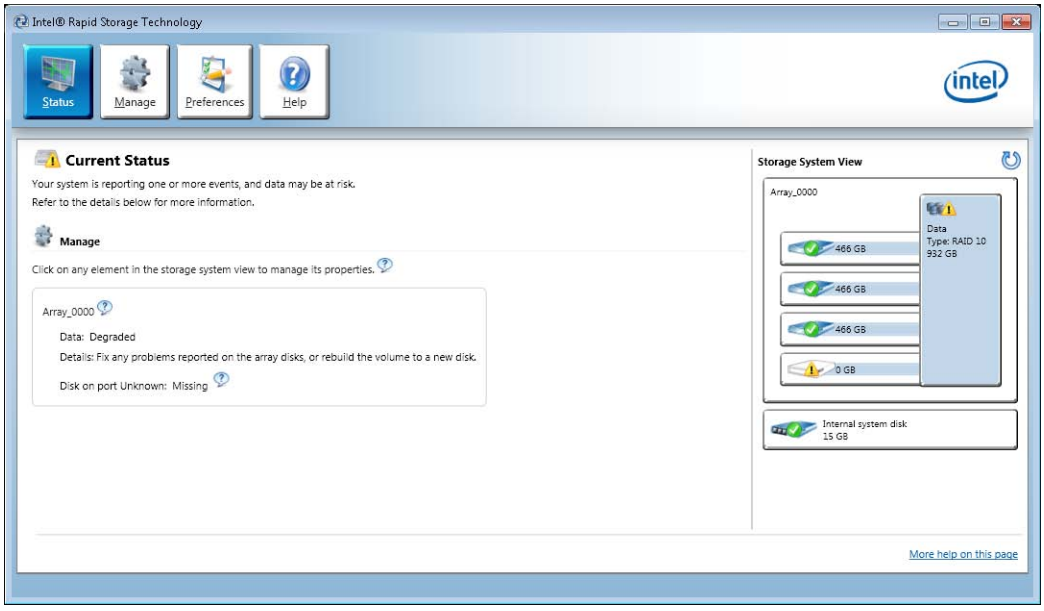
This section describes an example of the procedure for T2 Pro, which also applies to other models.

***NOTE: A mouse must be connected to your T2 beforehand.***

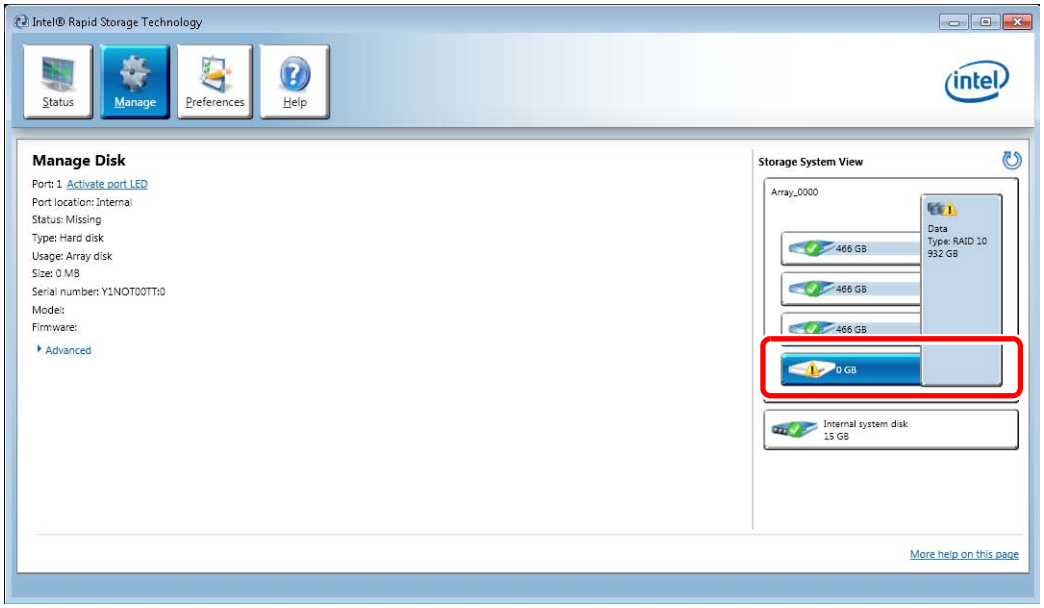
1. Start up the T2 in the maintenance mode.
   - For more information, refer to "Starting the maintenance mode" on page 27.
2. In the Maintenance Tools main screen, click the **Harddisk** tab, and then click **Intel(R) Rapid Storage Technology**.




   - The Intel(R) Rapid Storage Technology is launched.



3. Click the device with the "!" mark in "Storage System View" at the right of the screen.
   - The numbers in "Port 1", "Port 2"...etc. are their drive numbers. The drives are sorted in the order of "SATA 0", "SATA 1" ...
   - For a drive running normally, "Normal" is shown for "Status" of "Manage Disk" at the left of the screen, and for a failed drive, "Missing" is shown. In this example, the drive 1 (Port 1) is failed.




   - If there is any failed drive, shut down the T2 as described in "Exiting the maintenance mode to shut down" on page 29, then replace the failed drive as described in "HDD/SSD (for data) removal" on page 94. For the T2 Elite 2/ Express 2/Elite/Express, build the RAID volume after the drive replacement as described in "Building the RAID volume" on page 47. For the T2 Pro 2/Pro, rebuild the RAID volume as described in "Rebuilding the RAID volume (for only the T2 Pro 2/Pro)" on page 54.

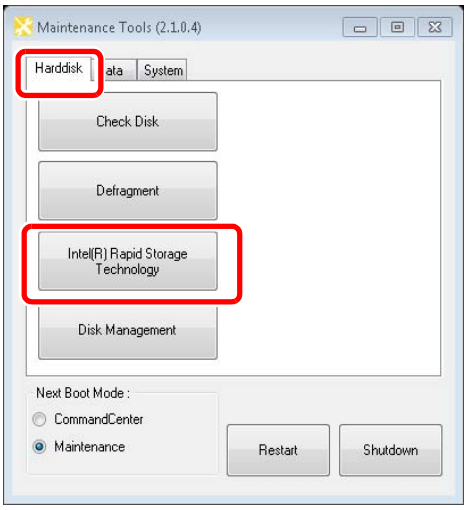
## Building the RAID volume

For the T2 Elite 2/Express 2/Elite/Express, rebuild the RAID volume after the drive replacement.

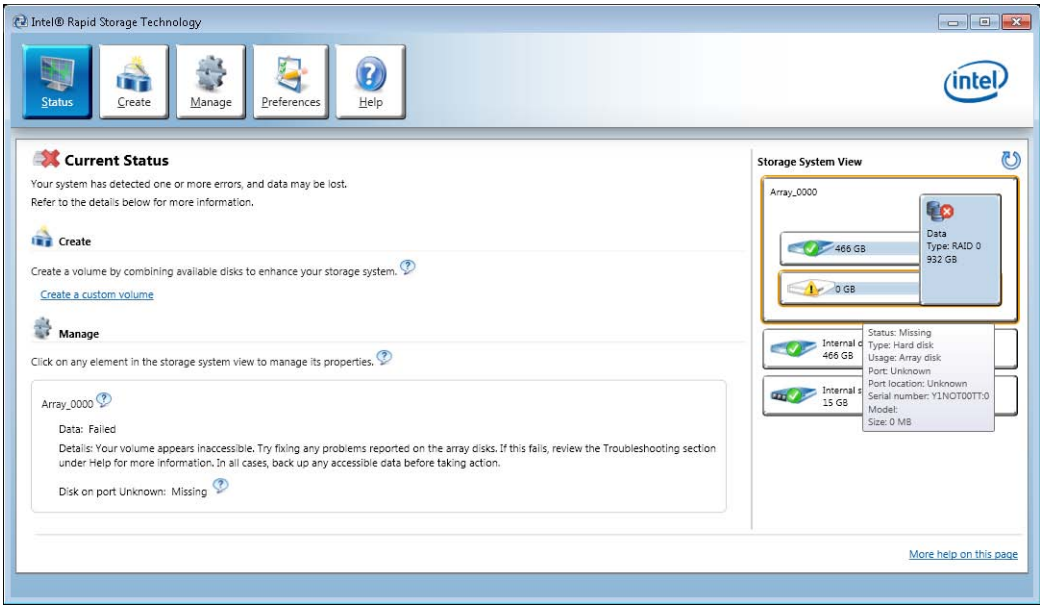
This section describes the procedure for the T2 Express as an example, but the procedure for the T2 Elite 2/Express 2/Elite is the same.

***NOTE: A mouse and keyboard must be connected to your T2 beforehand.***

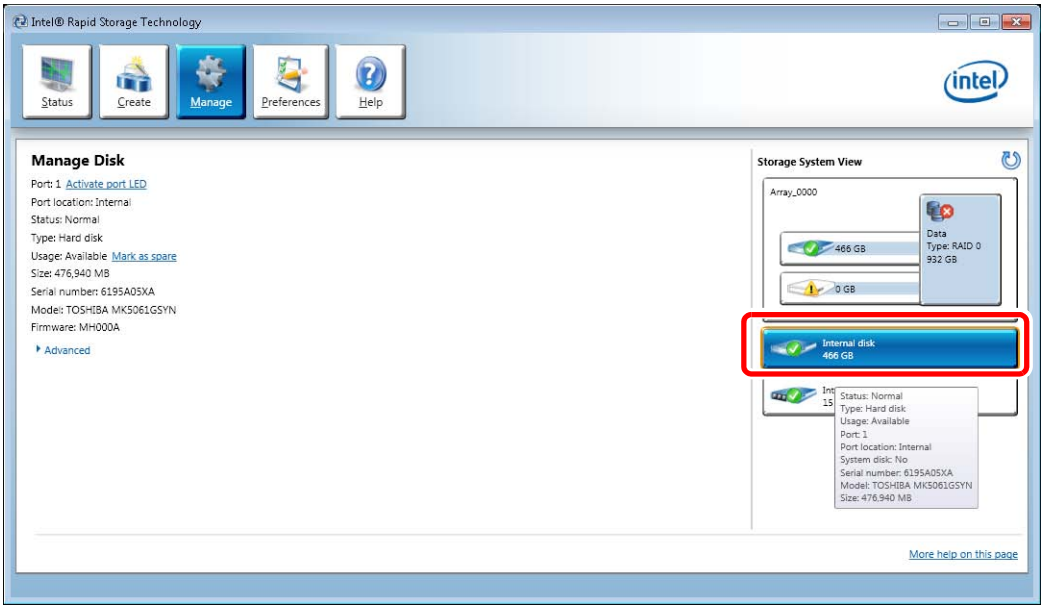
1. Start up the T2 in the maintenance mode.
   - For more information, refer to"Starting the maintenance mode" on page 27.
2. In the Maintenance Tools main screen, click the **Harddisk** tab, and then click **Intel(R) Rapid Storage Technology**.



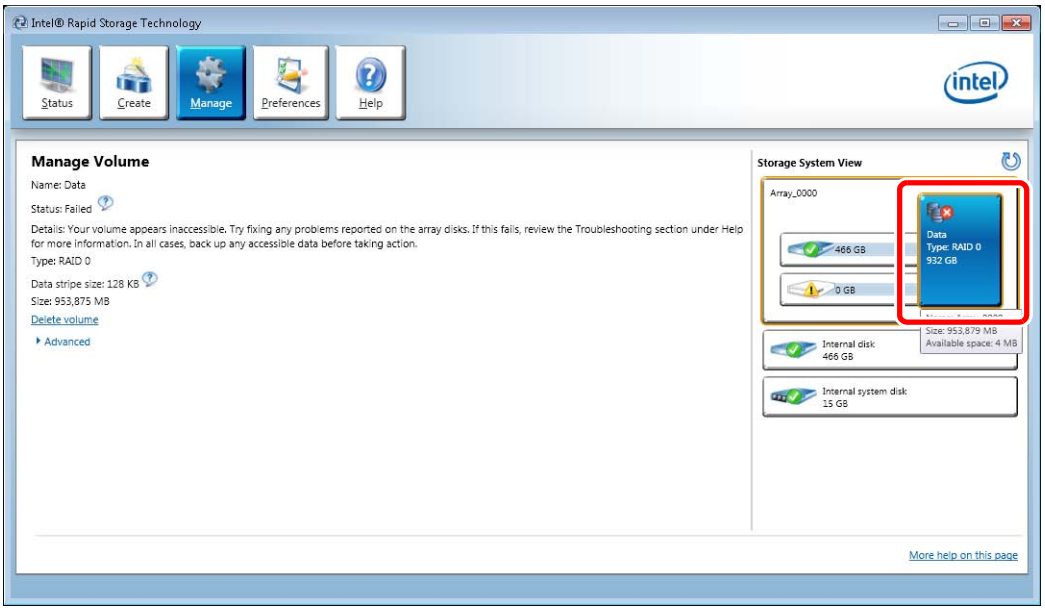

   - The Intel(R) Rapid Storage Technology is launched.



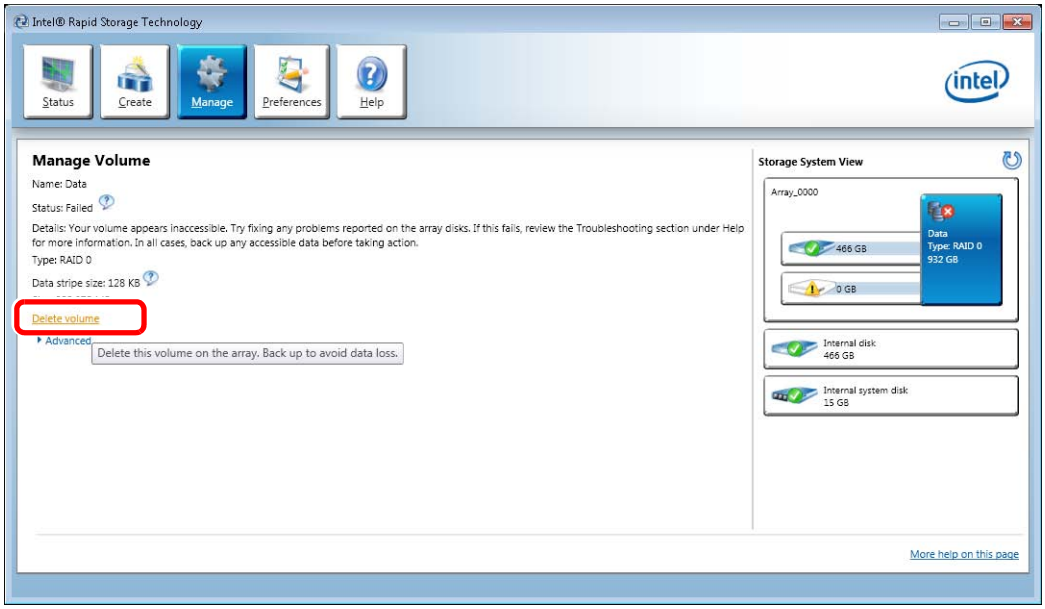
3. Click the device with "Internal disk" in "Storage System View" at the right of the screen.
   - Check whether the replaced drive is recognized.



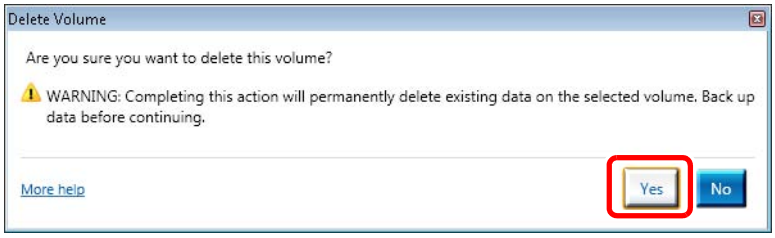

4. Click the "Data Type: RAID 0" section in "Storage System View" at the right of the screen.



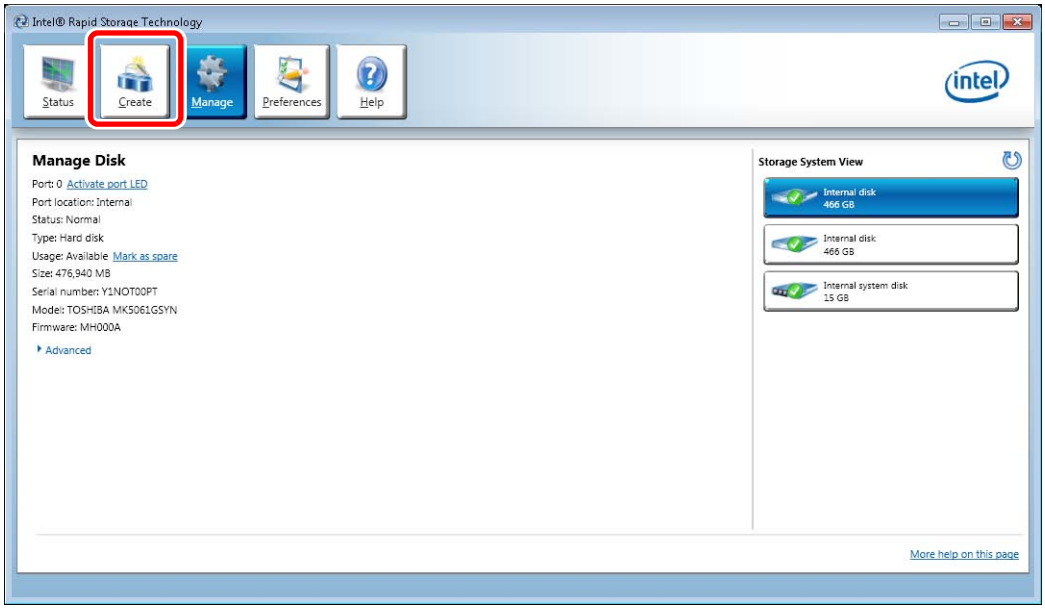
5. Click **Delete volume** in "Manage Volume" at the left of the screen.



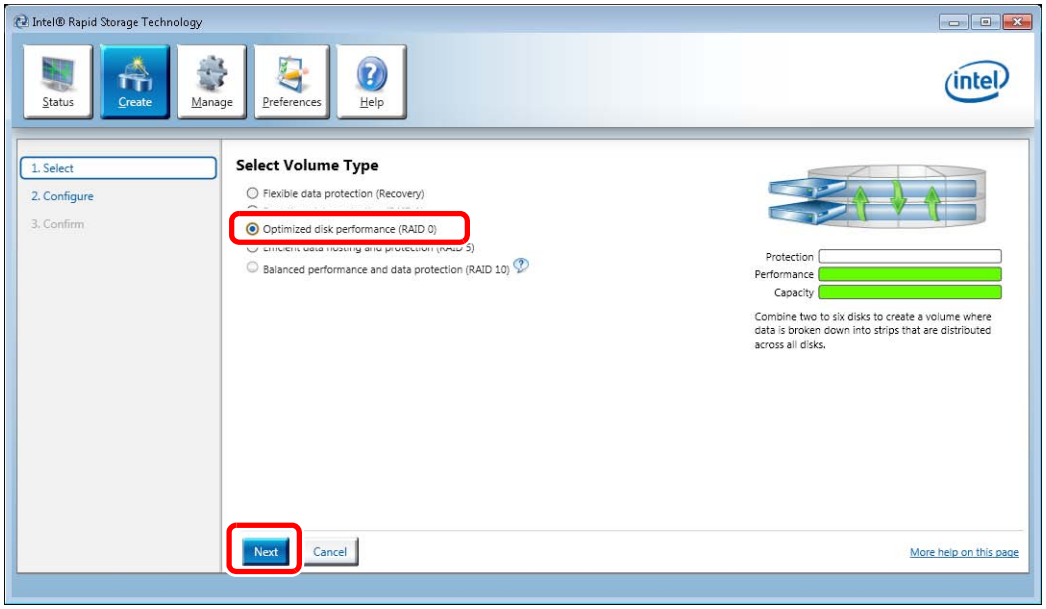

6. Click **Yes** when the confirmation message is displayed.



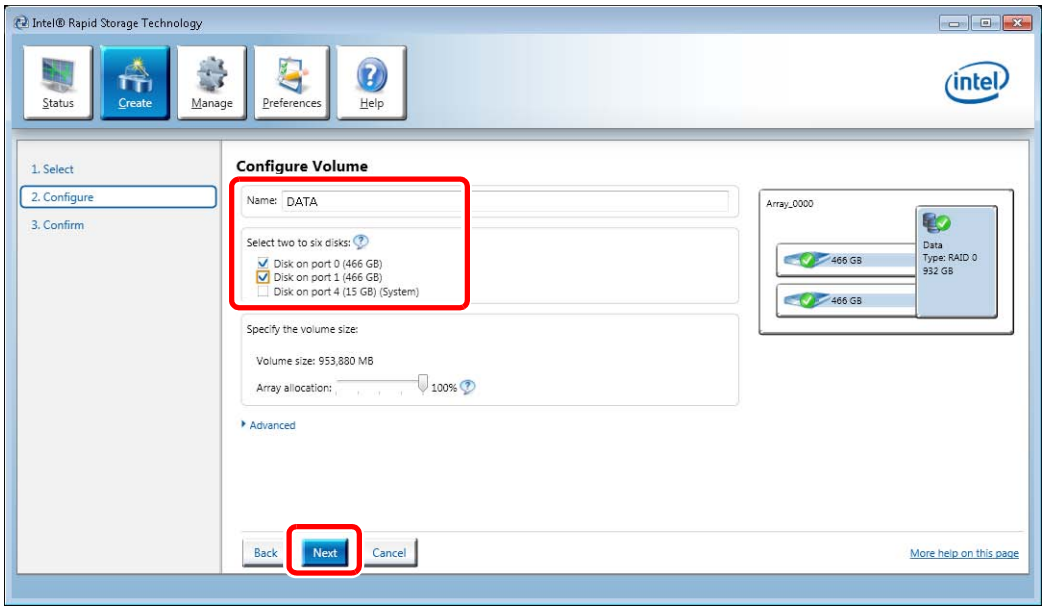

7. Click **Create**.



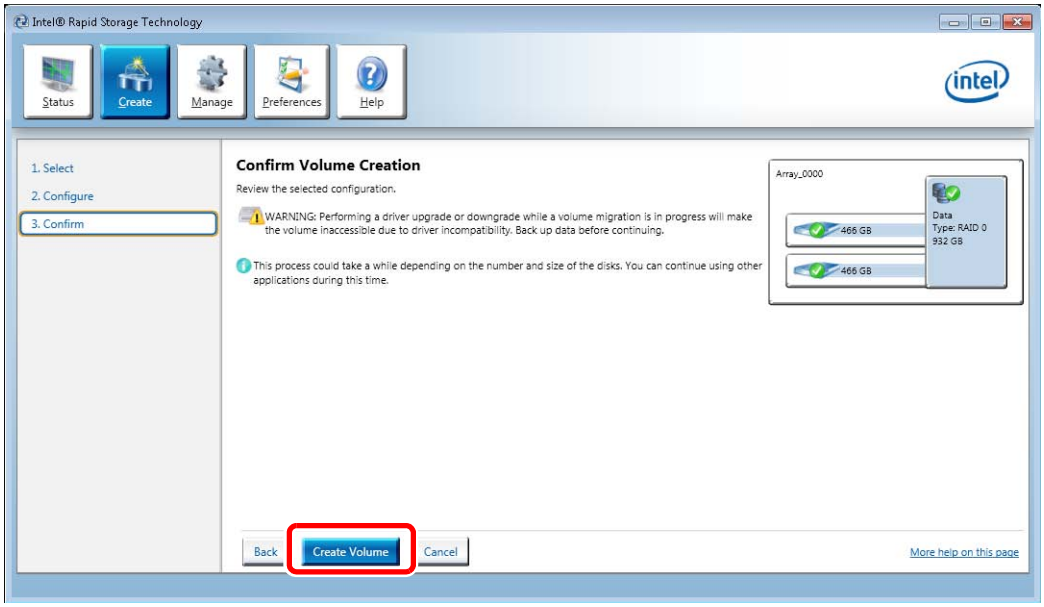
8. Select **Optimized disk performance (RAID 0)**, and click **Next**..
   - For the T2 Pro 2/Pro, select **Balanced performance and data protection (RAID 10)**.




9. Enter "DATA" in "Name", and check **Disk on port 0** and **Disk on port 1** in "Select two to six disks:", and then click **Next**.
   - For the T2 Pro 2/Pro, check **Disk on port 0**, **Disk on port 1**, **Disk on port 2**, and **Disk on port 3** in "Select two to six disks:".

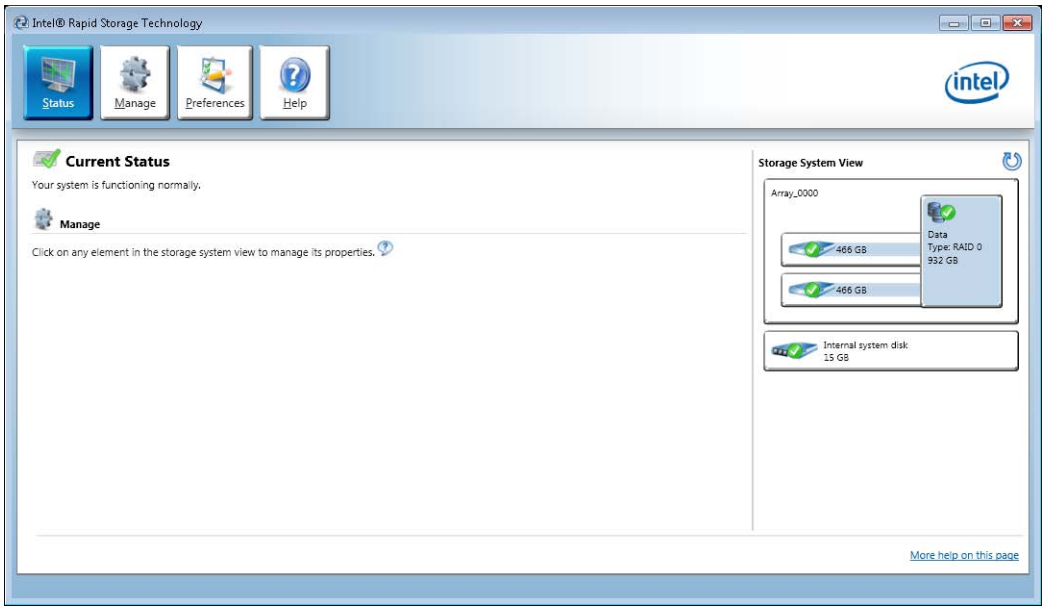


10. Click **Create Volume**.



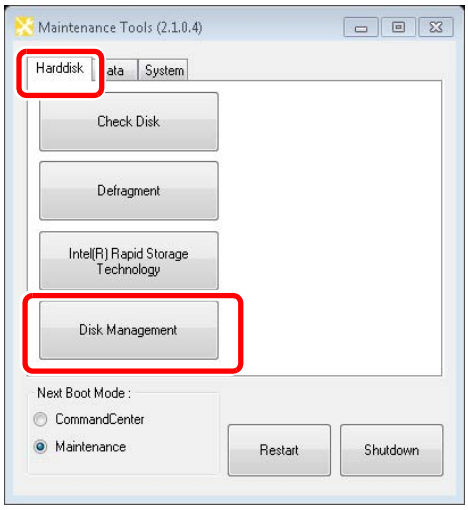

11. Click **OK**.

12. Confirm the RAID is rebuilt.



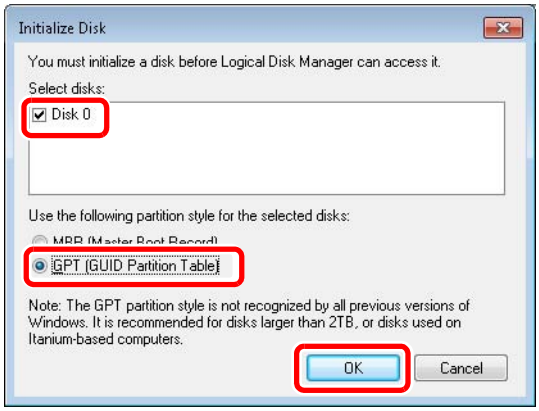

- Rebuilding of the RAID is completed. Next, allocate the drive.

13. In the Maintenance Tools main screen, click the **Harddisk** tab, and then click **Disk Management**.

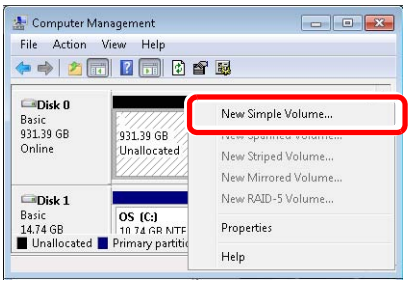



14. Check **Disk 0**, and select **GPT (GUID Partition Table)**, and then click **OK**.

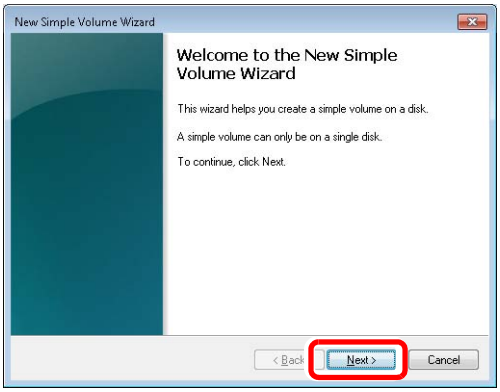
- If the "Initialize Disk" dialog box does not appear, click **Disk 0**, select **Initialize Disk** from the right-click menu.



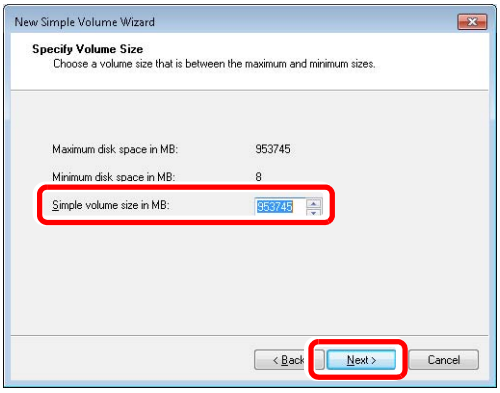

15. Right-click the unallocated space, and click **New Simple Volume...**.



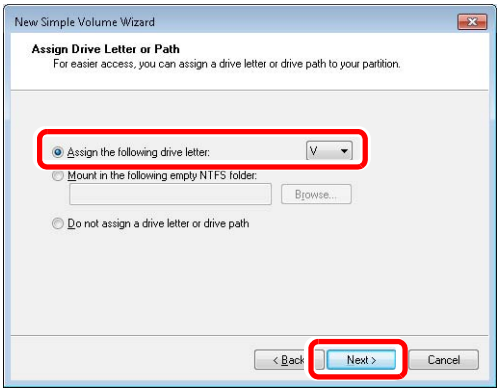
16. Click **Next**.



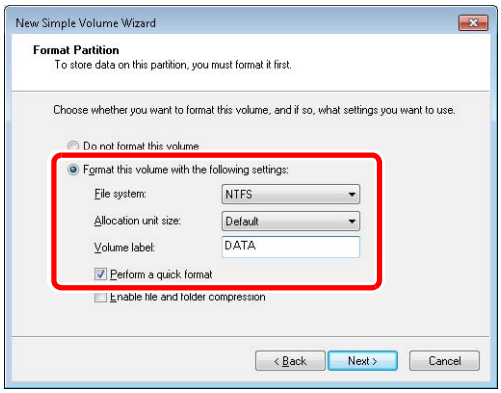

17. Enter the maximum value of the drive space in "Simple volume size in MB:", and enter **Next**.



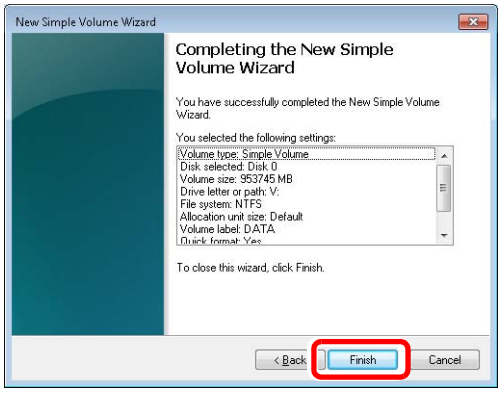

18. Select **Assign the following drive letter:** , and select "V" from the list, and then click **Next**.



19. Select **Format this volume with the following settings**, and set the items as follows.
    - Select "NTFS" from the "File system:" list, and select "Default" from the "Allocation unit size:" list.
    - Enter "DATA" in "Volume label:".
    - Check **Perform a quick format**.




20. Click **Next**.
21. Click **Finish**.




- When formatting is finished, the drive allocation is completed.

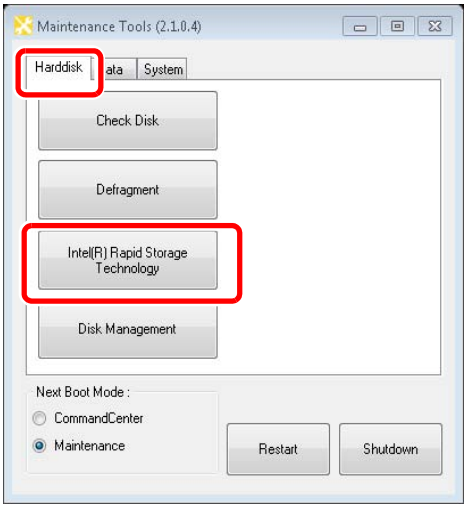
## Rebuilding the RAID volume (for only the T2 Pro 2/Pro)

For the T2 Pro 2/Pro, the drives with drive numbers "0" and "1" and the drives with drive numbers "2" and "3" are paired respectively, which allows you to rebuild the RAID volume using another paired drive even if one of the paired drives fails. This section describes the procedure to rebuild the RAID volume after drive replacement.

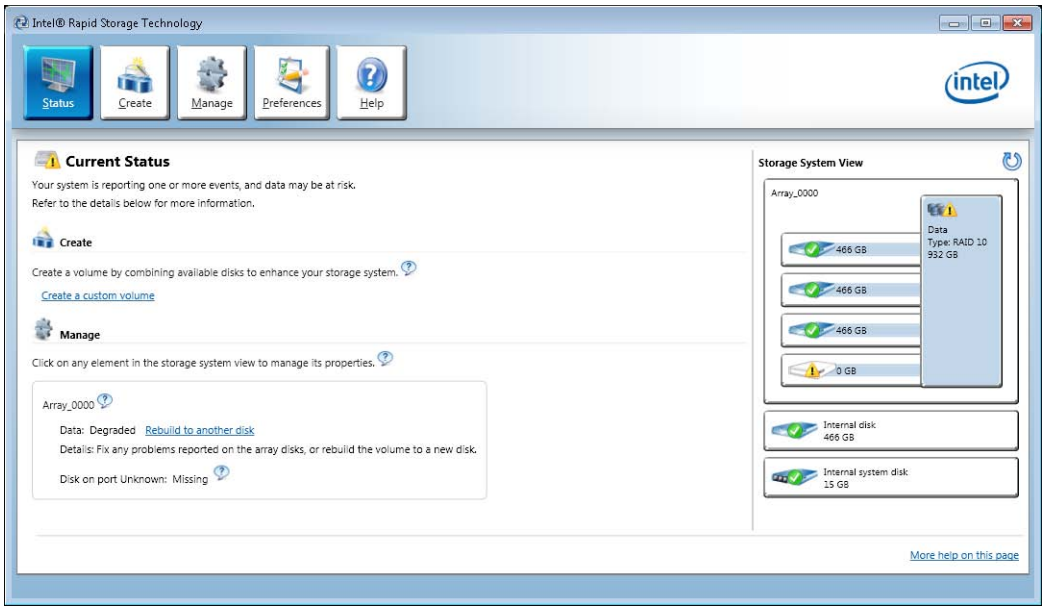
***NOTE: A mouse must be connected to your T2 beforehand.***

⚠ ***CAUTION: If a failure occurs on both of the drives with drive numbers "0" and "1" or the drives with drive numbers "2" and "3" at the same time, it is impossible to repair the RAID volume. You need to build a RAID volume as described in "Building the RAID volume" on page 47.***

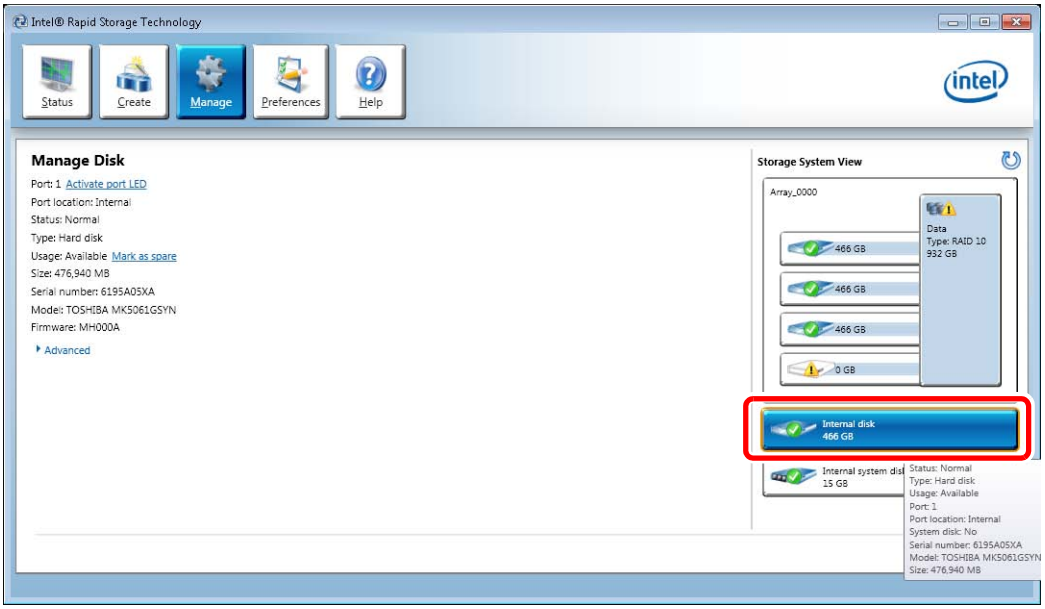
1. Start up the T2 in the maintenance mode.
   - For more information, refer to "Starting the maintenance mode" on page 27.
2. In the Maintenance Tools main screen, click the **Harddisk** tab, and then click **Intel(R) Rapid Storage Technology**.



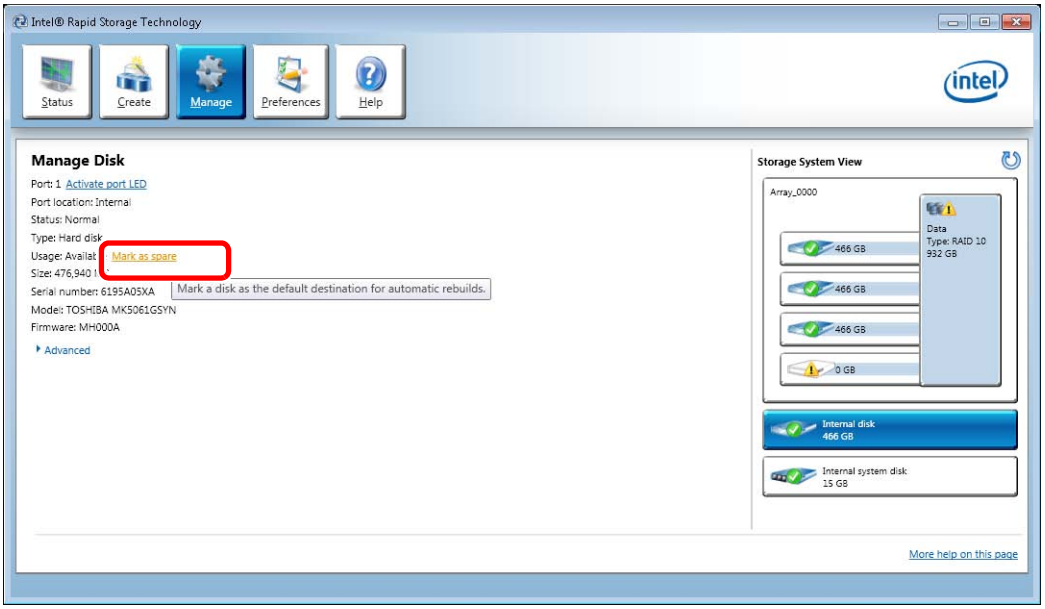

   - The Intel(R) Rapid Storage Technology is launched.



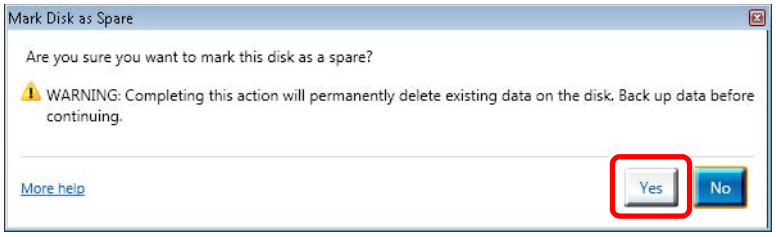
3. Click the device with "Internal disk" in "Storage System View" at the right of the screen.




4. Click **Mark as spare** for "Usage: Available" in "Manage Disk" at the left of the screen.

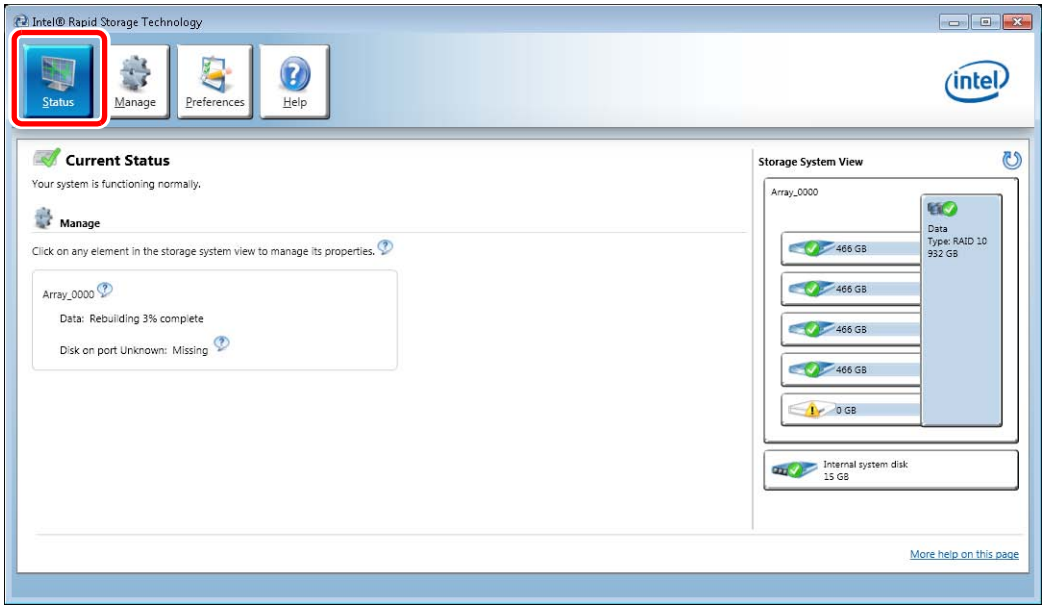



5. Click **Yes**.

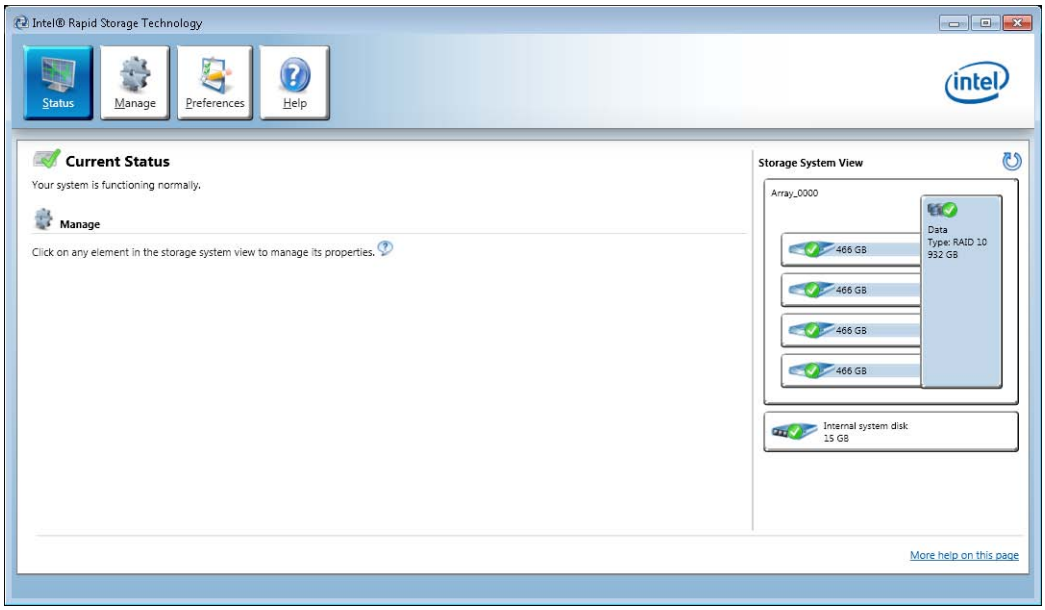


- The rebuild of the RAID drive begins.
- The rebuild of the RAID takes about two hours for replacement of a HDD (500 GB).

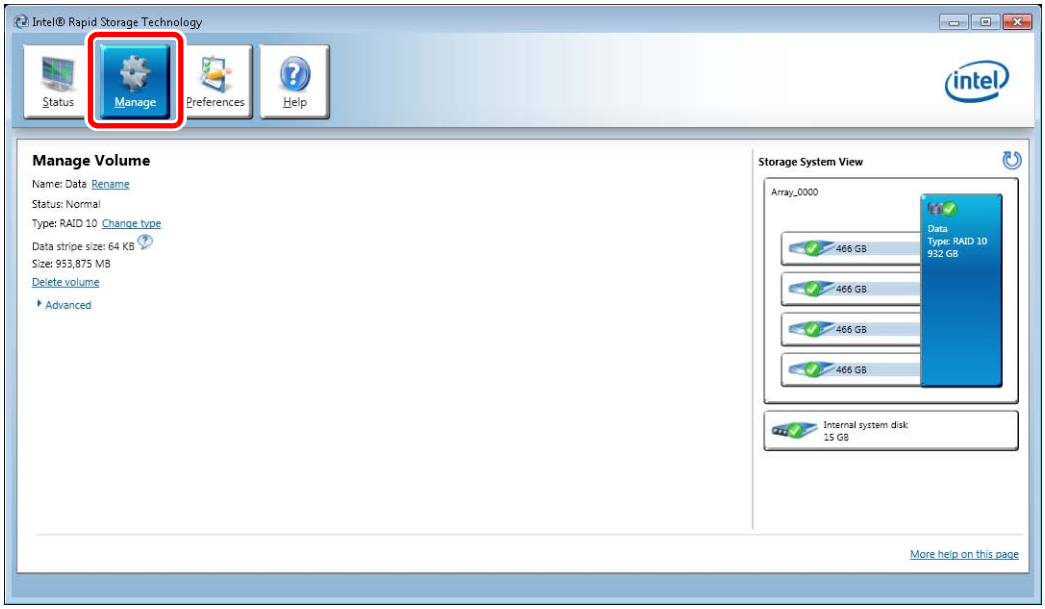
6. Click **Status**.
   - The rebuild progress appears.



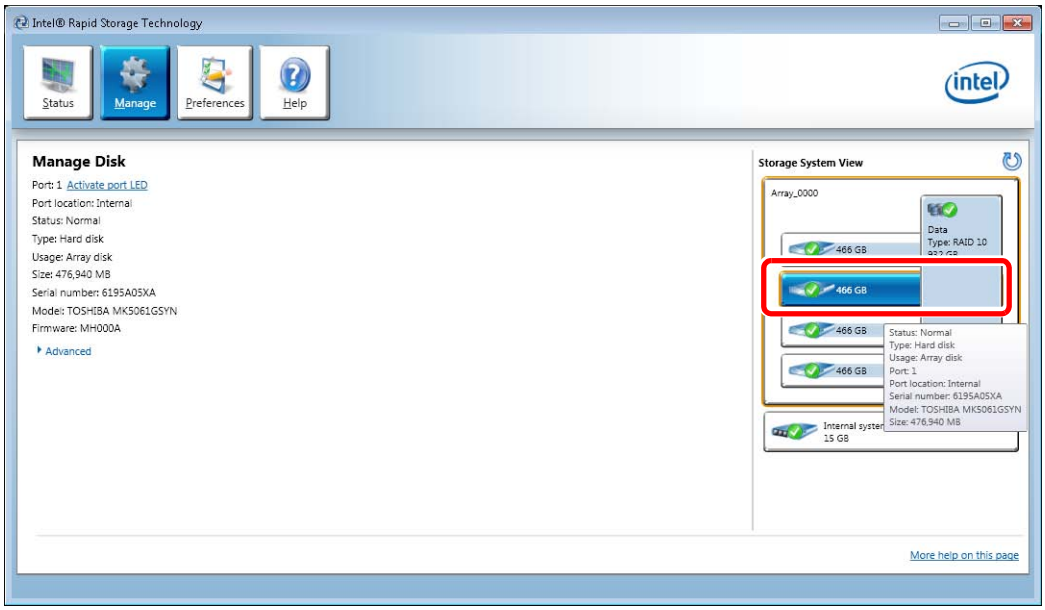

7. Confirm the rebuild is completed.
   - The device where the "!" mark is displayed in "Storage System View" disappears.



8. Click **Manage**.




9. Click the device of the replaced drive number from "Storage System View" at the right of the screen.
   - Confirm "Status" is "Normal" in "Manage Disk" at the left of the screen.



# Restoring to the factory default condition

This section describes the procedure to restore (or recover) the T2 to the factory default condition using the recovery UFD (USB Flash Drive).

The recovery UFD is built in T2.

***NOTE: A mouse and keyboard must be connected to your T2 beforehand.***

***NOTE: A recovery does not initialize the contents of the data drive (V: drive). If you want to initialize the data drive, refer to "Initializing the data" on page 36.***

⚠ ***CAUTION: Do not connect any external storage device via USB, 2.5 inch removable SSD bay, or the media card reader when restoring to the factory default condition.***

⚠ ***CAUTION: A recovery will initialize all of the data below. You should back up your data to an external storage device beforehand as necessary.***

- Database
- Config settings
- Logs (the operation log, Windows OS internal event log, database log, and crash dumps)

The recovery procedure differs depending on the model. For more information, see the reference.

- "Recovery procedure for T2 Elite/Pro/Express" on page 59
- "Recovery procedure for T2 Elite 2/Pro 2/Express 2" on page 66

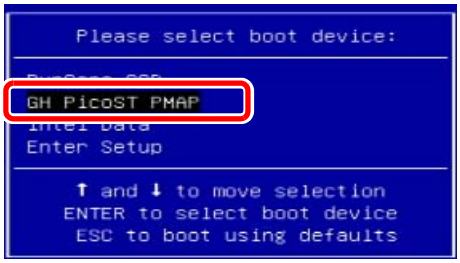
## Recovery procedure for T2 Elite/Pro/Express

1. Turn the T2 on.
   - Turn on the power switch of the front panel.

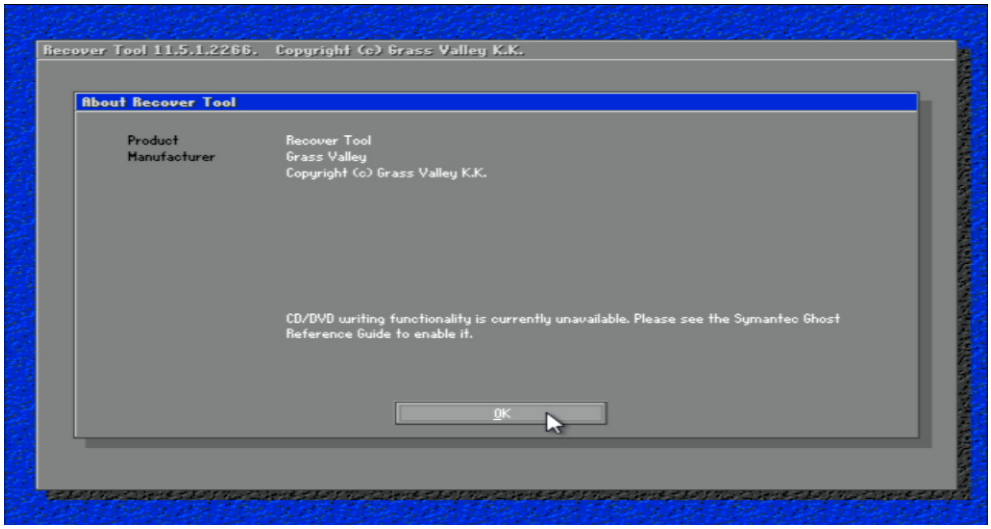
***NOTE: Make sure that no media is inserted in the 2.5 inch removable SSD bay.***

***NOTE: Make sure that any device other than the keyboard and mouse is not connected to the USB port.***

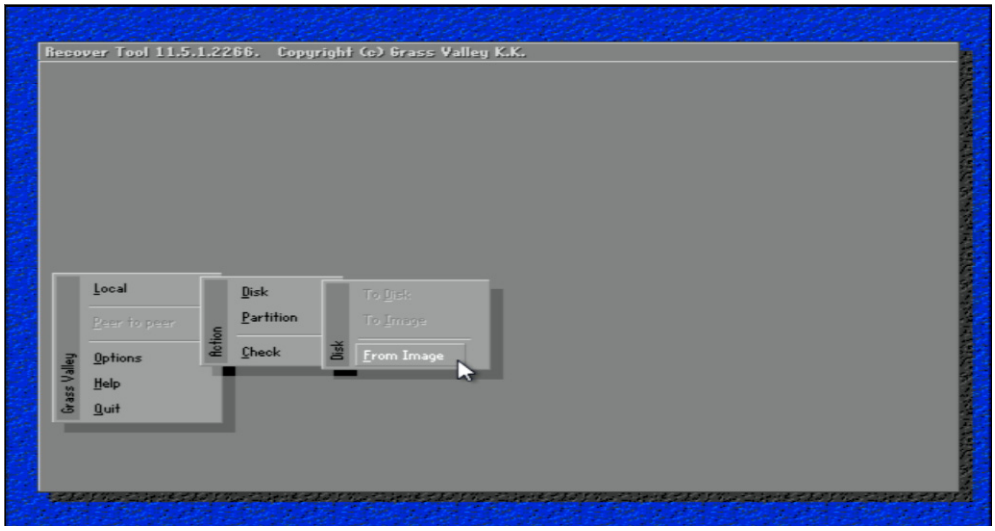
2. Press the [F7] key on the keyboard a few times when POST screen is displayed.
   - The Boot Menu (Please select boot device:) appears.
3. Select the recovery UFD using the [↑] or [↓] key, and then press the [Enter] key.



4. When "About Recover Tool" screen is displayed, click **OK**.

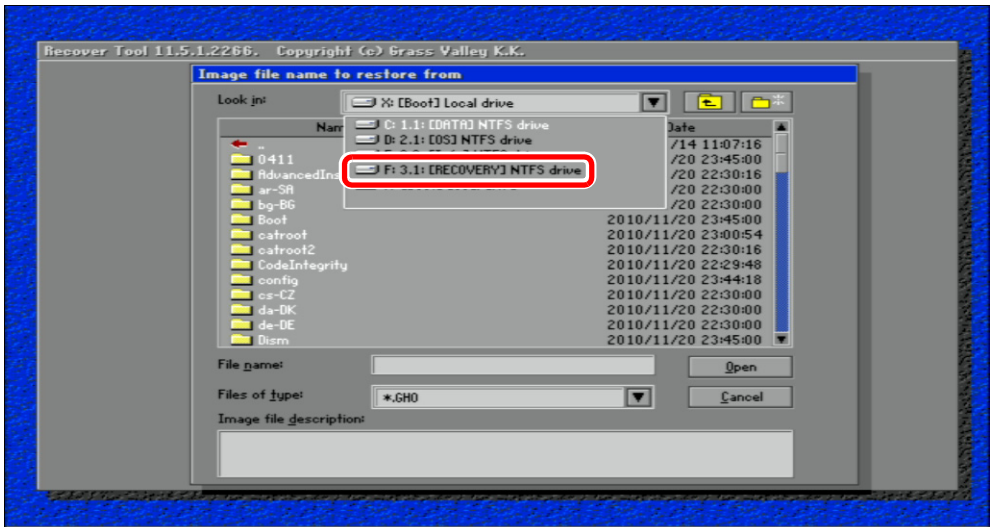



5. Click **Local**, and then click **Disk → From Image**.

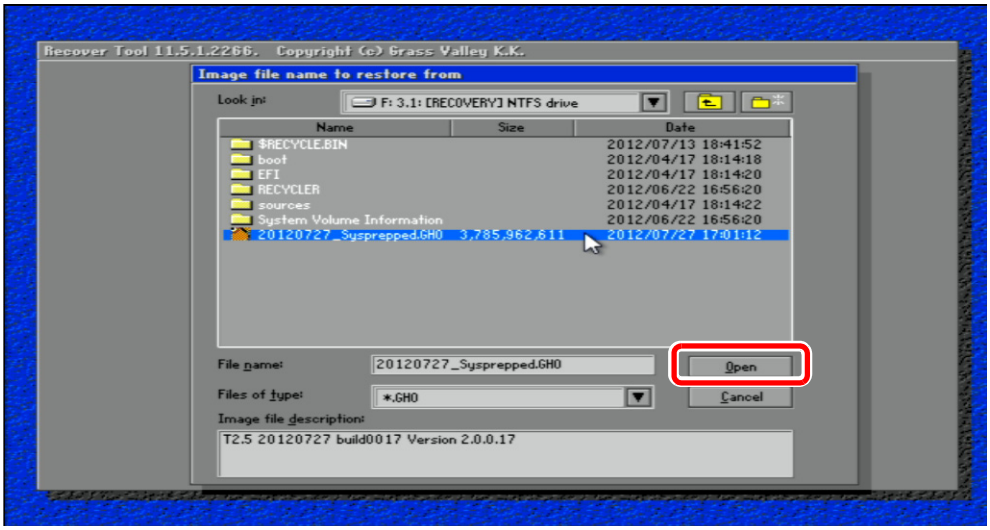



- "Image file name to restore from" screen appears.

6. Choose the drive "F: 3.1[: RECOVERY] NTFS drive" that contains the recovery image.

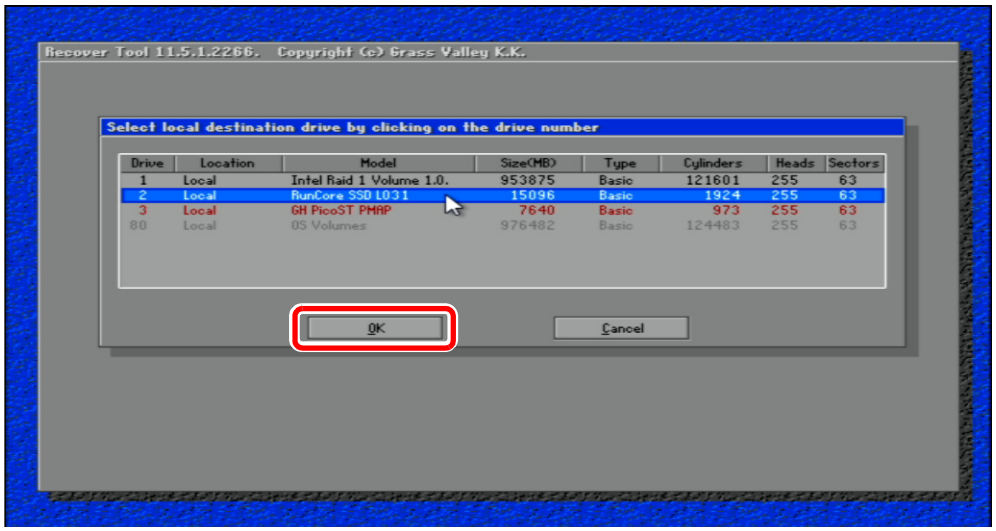



7. Select a GHO format file located directly under the F: drive, and then click **Open**.




- "Select local destination drive by clicking on the drive number" screen appears.

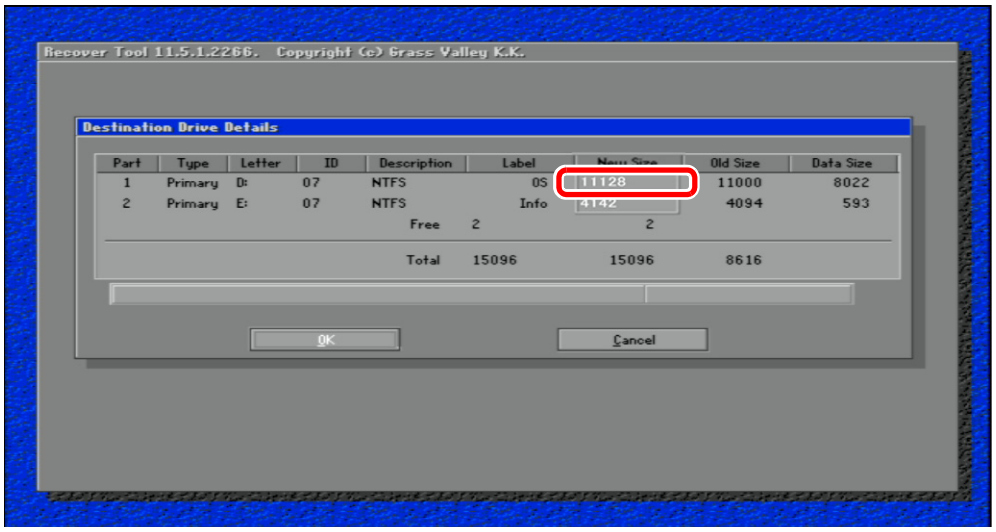
8. Select the SSD (for the system), and then click **OK**.



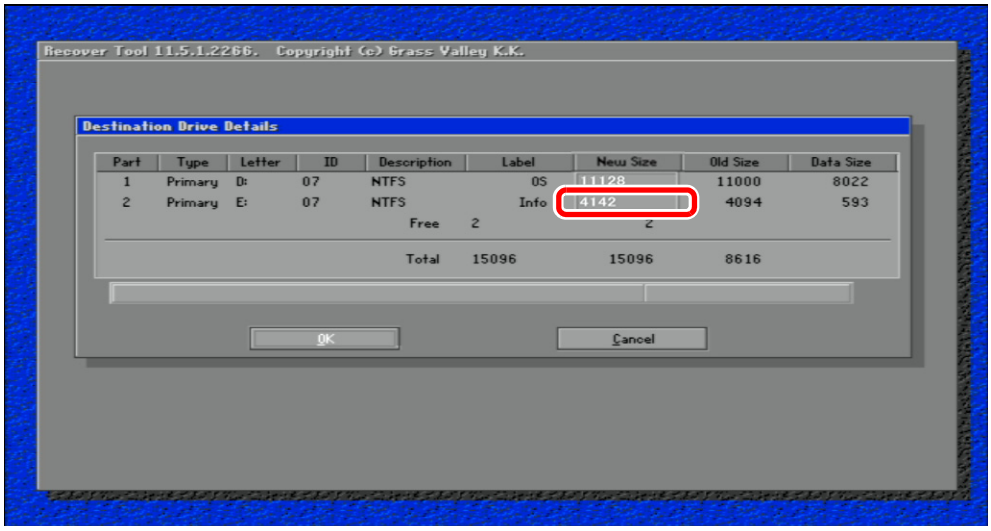

- "Destination Drive Details" screen appears.

⚠ ***CAUTION: Be sure to select SSD (for the system) as the recovery destination as in the screen above. If a wrong recovery destination is selected, the system may not be able to be restored.***

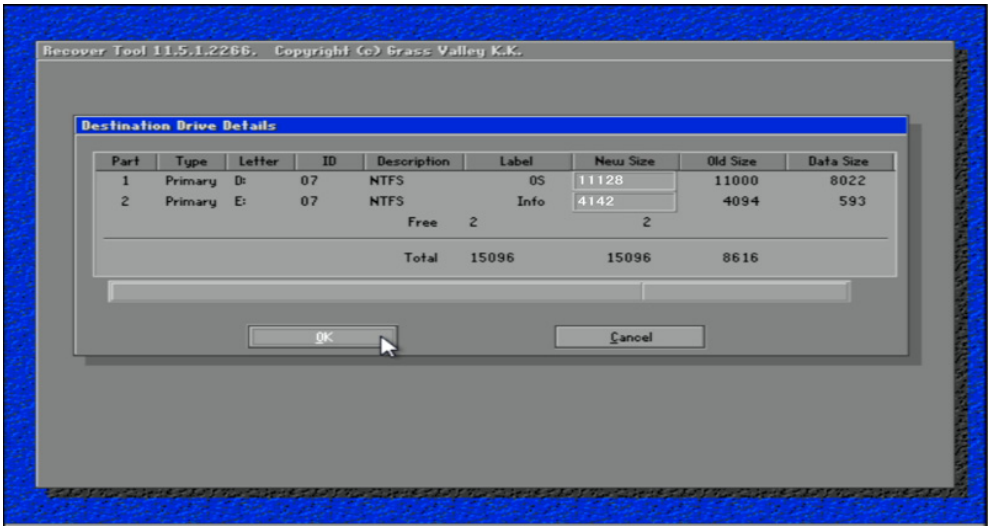
9. Confirm that the value in the "New Size" for the D: drive is larger than that of the "Old Size" for the D: drive.



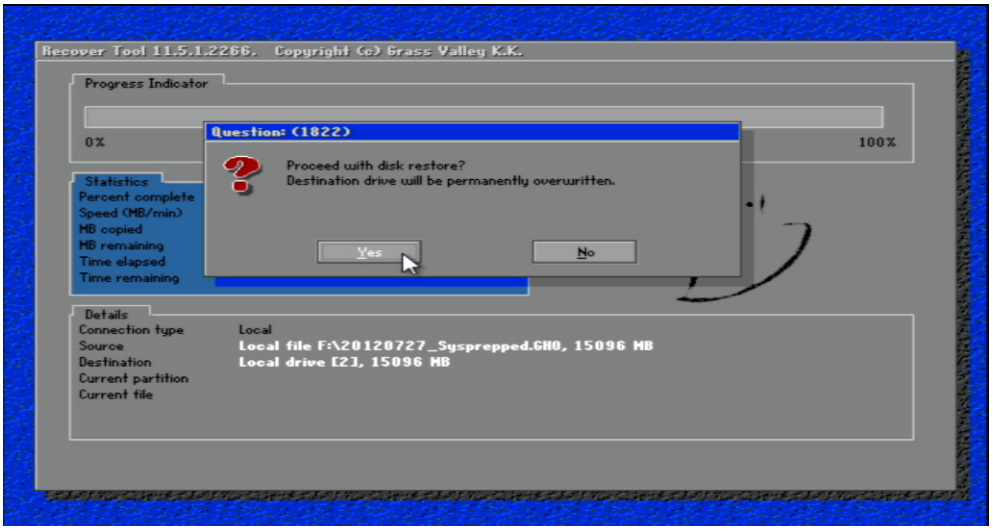
10. Confirm that the value in the "New Size" for the E: drive is larger than that of the "Old Size" for the E: drive.



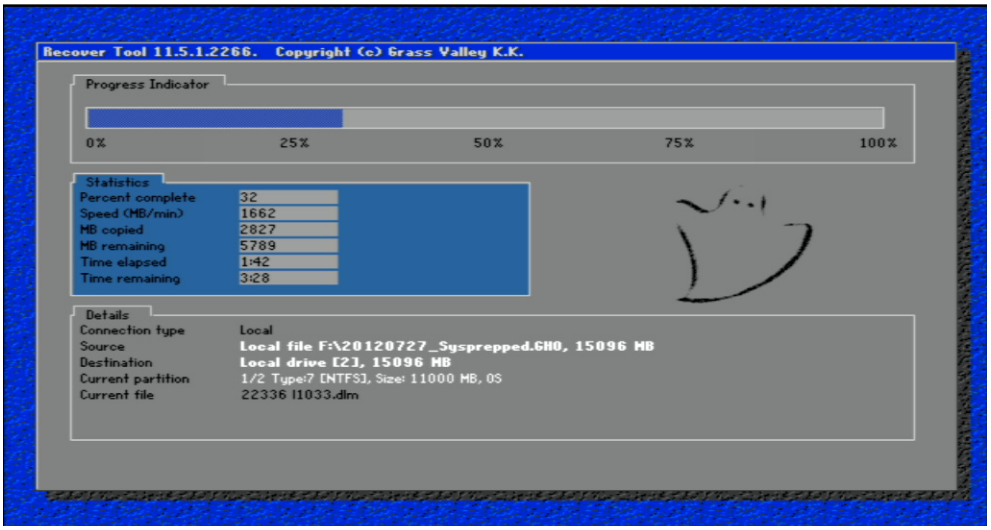

11. Click **OK**.



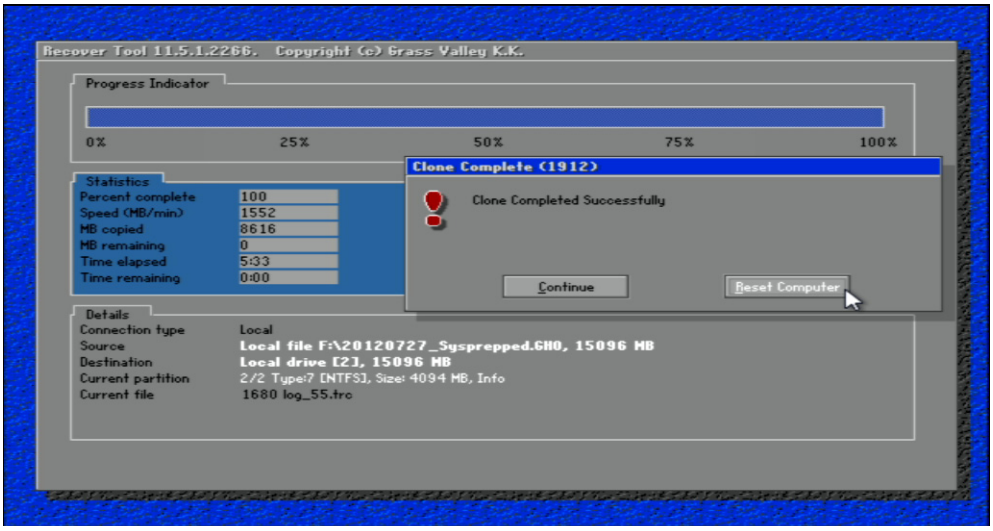
12. Click **Yes** when the confirmation message is displayed.




- The writing process of the recovery image is performed. This process will take a while.

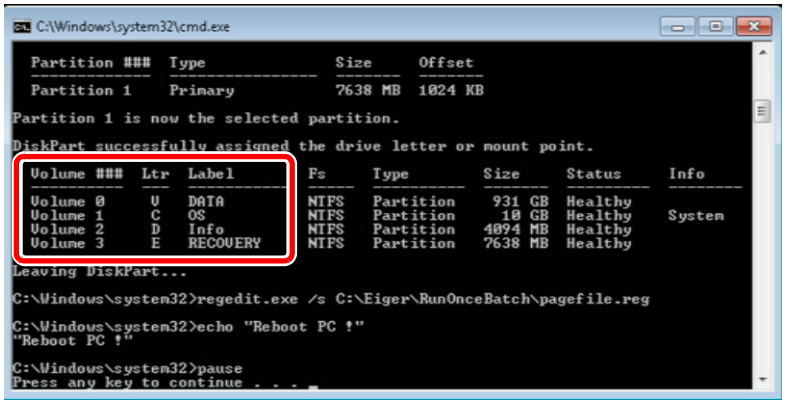


13. Click **Reset Computer**.




- The T2 restarts and a batch process for SID generation, the drive letter assignment, and virtual memory allocation will run.

14. When you see the message "Press any key to continue...", confirm the drive structure is the following.




15. Press any key on the keyboard and restart the T2.

- The T2 will restart in the maintenance mode.
- If you want to start up the T2 system in the normal mode, switch to the normal mode after starting up the maintenance mode. For detailed instructions, refer to "Restarting from the maintenance mode to the normal mode" on page 28.

***NOTE: It is recommended to initialize the data after the recovery is completed. For detailed instructions, refer to "Initializing the data" on page 36.***

***NOTE: Media files in the data drive (V: drive) cannot be used as they are even after the recovery is completed. Copy the media files to the external storage device, and then import them using the CommandCenter. For detailed instructions, refer to the T2 User Manual.***

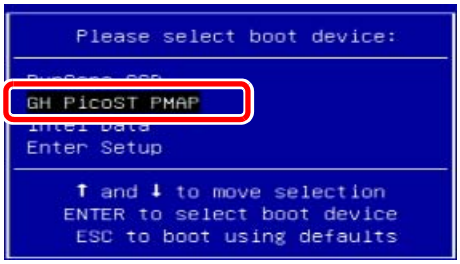
## Recovery procedure for T2 Elite 2/Pro 2/Express 2

1. Turn the T2 on.
   - Turn on the power switch of the front panel.

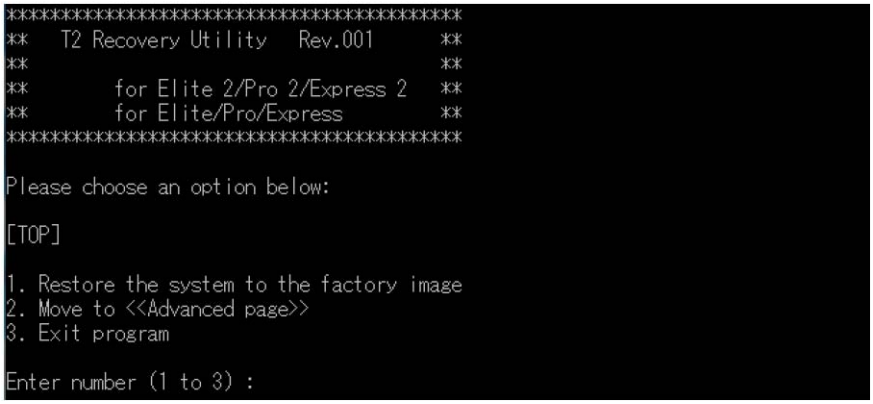
***NOTE: For T2 Elite 2, make sure that no media is inserted in the media card reader.***

***NOTE: Make sure that any device other than the keyboard and mouse is not connected to the USB port.***

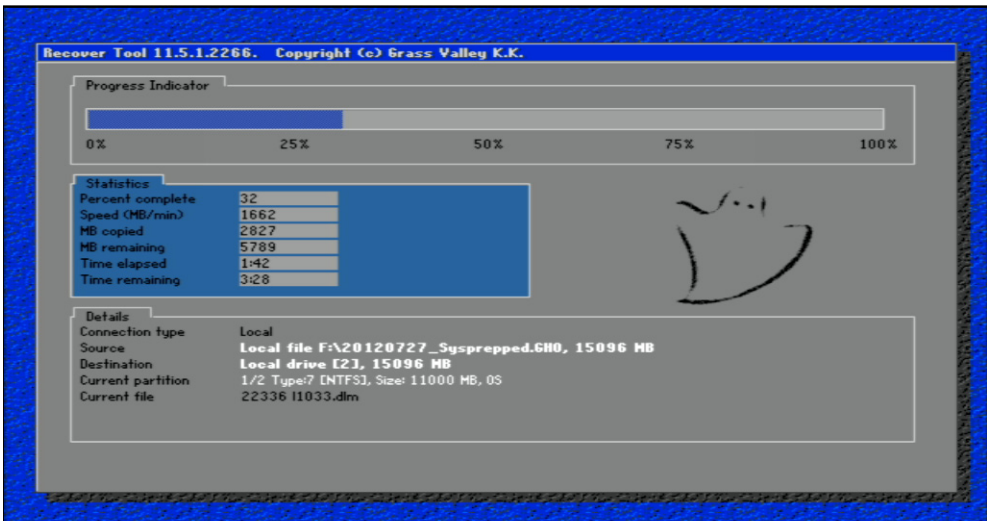
2. When the POST screen appears, hold down the [F7] key on the keyboard.
   - The Boot Menu (Please select boot device:) appears.
3. Select the recovery UFD using the [↑] or [↓] key, and then press the [Enter] key.




4. On the "TOP" page, press the [1] key and then press the [Enter] key on the keyboard.

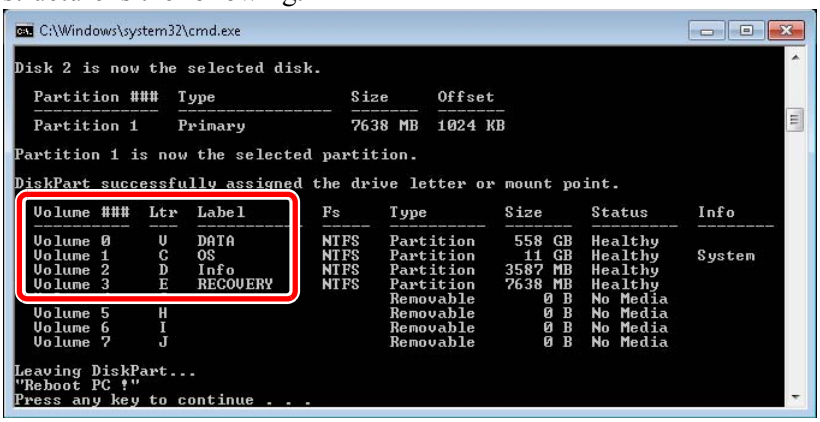


5. When the message "Are you sure you want to restore?" appears, press the [y] key and then press the [Enter] key on the keyboard.
   - The write-back process of the recovery image is performed. This process will take a while.




   - When the write-back process of the recovery image is completed, T2 will be restarted a few times.

6. When you see the message "Press any key to continue...", confirm the drive structure is the following.




7. Press any key on the keyboard and restart the T2.
   - The T2 will restart in the maintenance mode.
   - If you want to start up the T2 system in the normal mode, switch to the normal mode after starting up the maintenance mode. For detailed instructions, refer to "Restarting from the maintenance mode to the normal mode" on page 28.

***NOTE: It is recommended to initialize the data after the recovery is completed. For detailed instructions, refer to "Initializing the data" on page 36.***

***NOTE: Media files in the data drive (V: drive) cannot be used as they are even after the recovery is completed. Copy the media files to the external storage device, and then import them using the CommandCenter. For detailed instructions, refer to the T2 User Manual.***

## T2 Recovery Utility for T2 Elite 2/Pro 2/Express 2

T2 Recovery Utility is included in the recovery UFD for T2 Elite 2/Pro 2/Express 2.

The following operations can be performed with T2 Recovery Utility. For more information, see the reference.

- Automatic recovery (⇢ page 66)
- Manual recovery (⇢ page 69)
- Command prompt execution (⇢ page 70)
- Disk formatting (⇢ page 71)

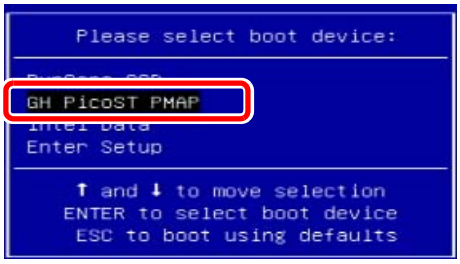
### Starting up T2 Recovery Utility

1. Turn the T2 on.
   - Turn on the power switch of the front panel.

***NOTE: For T2 Elite 2, make sure that no media is inserted in the media card reader.***

***NOTE: Make sure that any device other than the keyboard and mouse is not connected to the USB port.***

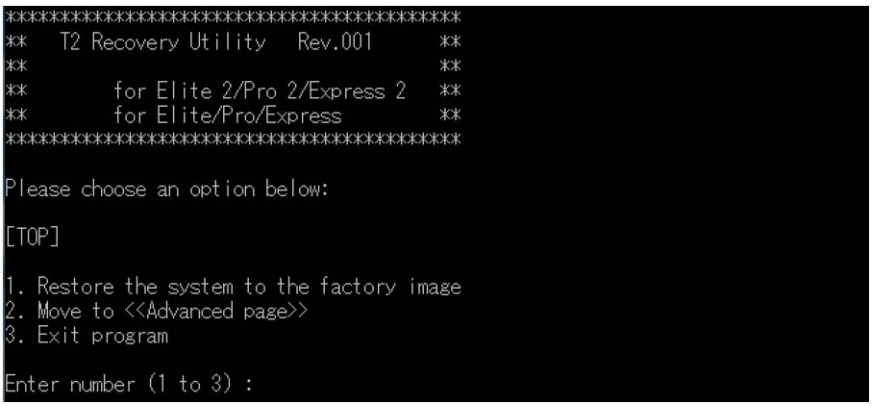
2. When the POST screen appears, hold down the [F7] key on the keyboard.
   - The Boot Menu (Please select boot device:) appears.
3. Select the recovery UFD using the [↑] or [↓] key, and then press the [Enter] key.




   - The "TOP" page of the "T2 Recovery Utility" screen appears.

### Exiting T2 Recovery Utility

1. On the "TOP" page of the "T2 Recovery Utility" screen, press the [3] key and then press the [Enter] key on the keyboard.




2. When the message "Please press any key to exit." appears, press any key on the keyboard.
   - T2 will shut down automatically.

### Manual recovery

You can select the recovery image and recovery destination manually to restore the factory default condition.

Normally, follow the procedure "Recovery procedure for T2 Elite 2/Pro 2/Express 2" on page 66 to restore the factory default condition.

1. Start up T2 Recovery Utility.
   - For more information, see "Starting up T2 Recovery Utility" on page 68.
2. On the "TOP" page, press the [2] key and then press the [Enter] key on the keyboard.

3. On the "Advanced" page, press the [1] key and then press the [Enter] key on the keyboard.

   - Press the [4] key on the "Advanced" page to go back to the "TOP" page.

4. Perform steps 4 and later in "Recovery procedure for T2 Elite/Pro/Express" on page 59.

⚠ ***CAUTION: If recovery has been performed on the SSD/HDD for data by accident, try reformatting of the data disk. For more information, see "Disk formatting" on page 71.***

### Executing command prompt

1. Start up T2 Recovery Utility.

   - For more information, see "Starting up T2 Recovery Utility" on page 68.

2. On the "TOP" page, press the [2] key and then press the [Enter] key on the keyboard.

3. On the "Advanced" page, press the [3] key and then press the [Enter] key on the keyboard.

   - A new window appears to allow various Windows command prompt operations.
   - To go back to the "Advanced" page, execute the "exit" command.
   - Press the [4] key on the "Advanced" page to go back to the "TOP" page.

### Disk formatting

1. Start up T2 Recovery Utility.
   - For more information, see "Starting up T2 Recovery Utility" on page 68.
2. On the "TOP" page, press the [2] key and then press the [Enter] key on the keyboard.

3. On the "Advanced" page, press the [2] key and then press the [Enter] key on the keyboard.

   - Press the [4] key on the "Advanced" page to go back to the "TOP" page.

4. On the "Drive Utility" page, press one of the [1] to [3] keys and then press the [Enter] key on the keyboard.

   - The operations executed by the [1] to [3] keys are as follows.

     -[1]: Displays the list of the disks of T2. You can see the status, size, volume letter and label of each disk.

     -[2]: Executes quick formatting of the system drive (Disk 1).

     -[3]: Executes quick formatting of the data drive (Disk 0) in the GPT format.

   - Press the [4] key on the "Drive Utility" page to go back to the "Advanced" page. Press the [5] key to go back to the "TOP" page.

Chapter 3

# Troubleshooting Problems

If you think there is something wrong (broken) with your T2, go through the following preliminary steps:


- "Step 1: Check configurations" on page 74
- "Step 2: Check connections and external equipment" on page 74


Then use the following topics to troubleshoot specific problem areas:


- "Shutdown/restart problems" on page 74
- "Checking external equipment" on page 75
  - "PC monitor problems" on page 75
  - "Keyboard problems" on page 75
  - "Mouse problems" on page 76
- "Motherboard/BIOS startup" on page 76
- "Windows startup" on page 78
- "T2 system startup" on page 78
- "Thermal problems" on page 78
- "I/O board unit problems" on page 79
- "Power supply problems" on page 80
- "Front panel problems" on page 80
  - "Touch screen LCD and control buttons problems" on page 80
  - "Interconnect board problems" on page 81
- "2.5 inch removable SSD bay problems" on page 82
- "Media card reader problems" on page 83
- "Video problems" on page 83
- "Audio problems" on page 84
- "Timecode problems" on page 84
- "Operational problems" on page 85
- "System problems" on page 85
- "Storage problems" on page 86
  - "Media File System problems" on page 86
  - "Media disk problems" on page 86
  - "Checking the storage system" on page 88

## Step 1: Check configurations

Many times what appears to be a T2 fault is actually an easy-to-fix configuration problem. Refer to the *T2 User Manual* for operator tips that help you verify basic configuration and correct common record/play problems.

## Step 2: Check connections and external equipment

Loose or improperly connected cables are the most likely source of problems for the system, monitor, or other external equipment. A quick check of all the cable connections can easily solve these problems. Refer to the *T2 User Manual* for help with making connections. Refer to the troubleshooting topic "Checking external equipment" on page 75 if you suspect a failure in a device connected to the T2.

## Shutdown/restart problems

If the T2 is inoperable due to a software error it can effect the operation of the power switch. If pressing the power switch does not shut down the T2, press and hold the switch for 10 seconds. This forces the T2 to execute a hard power down. If that does not work, turn off the main power switch on the rear panel and disconnect the power cord.

# Checking external equipment

This section provides troubleshooting procedures for external devices that connect to the T2.

## PC monitor problems

The BIOS startup screen is displayed with VGA resolution.

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| Screen turns on, but nothing from the T2 is displayed. | The monitor ports (VGA/ DVI-D) are faulty, or the cable is broken. | Replace the PC monitor cable. Make sure, the PC monitor can display at least SXGA resolution. |
| | BIOS settings have been tampered with. | Enter the BIOS setting menu. And run "Load Setup Default". |
| | The T2 system settings have been tampered with. | Restore default settings using the recovery UFD. Refer to "Restoring to the factory default condition" on page 59. |
| The dual monitor cannot be used. | The monitor ports (VGA/ DVI-D) cannot be connected simultaneously. (Exclusive use only) | — |

## Keyboard problems

The keyboard is detected during BIOS startup. The USB keyboard is detected with plug-and-play.

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| The T2 does not respond correctly when one or more of the keys on the keyboard are pressed. | • The keyboard is faulty.<br>• The motherboard level problem. | 1. Try another USB port.<br>2. If the problem persists, proceed with the next step.<br>3. If the problem persists, the motherboard is faulty. |
| | The T2 system settings have been tampered with. | Restore default settings using the recovery UFD. Refer to "Restoring to the factory default condition" on page 59. |

## Mouse problems

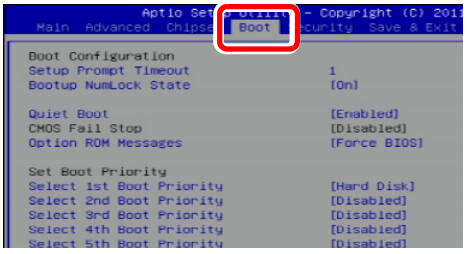
The mouse is detected during BIOS startup. The USB mouse is detected with plug-and-play.

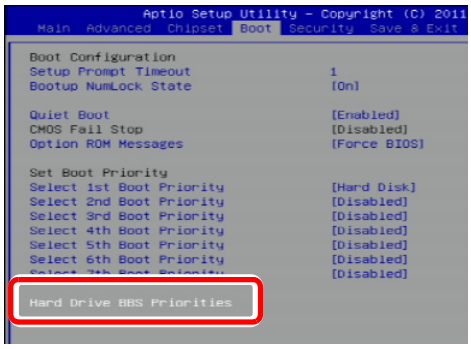
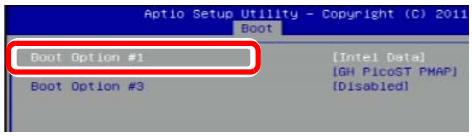
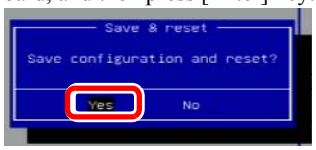
| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| The T2 does not respond correctly when one or more of the buttons on the mouse are clicked. | • The mouse is faulty.<br>• The motherboard level problem. | 1. Try another USB port.<br>2. If the problem persists, replace a mouse.<br>3. If the problem persists, the motherboard is faulty. |
| | The T2 system settings have been tampered with. | Restore default settings using the recovery UFD. Refer to "Restoring to the factory default condition" on page 59. |

# Motherboard/BIOS startup

A few seconds after startup, on the PC monitor a black screen is displayed with system information messages. This is the BIOS Power On Self Test (POST). Press the [F2] key on the keyboard during this time to enter the BIOS settings pages. When the BIOS POST completes, the Grass Valley Logo appeared on the screen. At that point the Windows operating system begins to load.

If during the BIOS POST time a message appears that requires your input or if the T2 does not progress to Windows startup, it indicates a problem at the BIOS settings, the SSD (for the system) or the motherboard level. To correct problems of this nature, please try the followings.

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| After the Grass Valley logo is displayed second time during T2 startup, "_" is displayed at the left of the screen and the system stops.<br><br>After the Grass Valley logo is displayed during T2 startup, a message "Reboot and Select proper Boot device or Insert Boot Media in selected Boot device and press a key" is displayed and the system stops. | The startup priority of the SSD (for the system) and the HDD/SSD (for the data) is in reverse order. | Use the following procedures to change the BIOS settings.<br>1. Press the [F2] key on the keyboard to display the BIOS screen.<br>2. Press the [F9] key on the keyboard.<br>The "Load Optimized Defaults" screen appears.<br>3. Select [Yes] using the [←] or [→] key on the keyboard, and then press the [Enter] key.<br>4. Move to the "Boot" tab using the [←] or [→] key on the keyboard.<br>  |

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| | | 5. Select "Hard Drive BBS Priorities" using the [↑] or [↓] key on the keyboard, and then press the [Enter] key.<br>  <br>6. Select "Boot Option #1" using the [↑] or [↓] key on the keyboard, and then press the [Enter] key.<br>  <br>7. Select the SSD (for the system) using the [↑] or [↓] key on the keyboard, and then press the [Enter] key.<br>8. Select "Boot Option #2" using the [↑] or [↓] key on the keyboard, and then press the [Enter] key.<br>9. Select the recovery UFD using the [↑] or [↓] key on the keyboard, and then press the [Enter] key.<br>10. Make sure that "Boot Option #3" is set to "Disabled". If "Disabled" is not set, set it to "Disabled".<br>11. Press the [F10] key on the keyboard.<br>The "Save & reset" screen appears.<br>12. Select [Yes] using the [←] or [→] key on the keyboard, and then press [Enter] key.<br>  <br>The T2 restarts. |

When the names of HDD or SSD (for data) are displayed in POST screen after restart, check the RAID status. Refer to "Verifying, building, and rebuilding a RAID volume" on page 44. Replace a HDD/SSD, or build/rebuild a RAID volume, if necessary.

When the names of HDD or SSD (for data) are not displayed in POST screen, check a status. Refer to "Media disk problems" on page 86.

# Windows startup

After the motherboard startup processes complete the Windows operating system starts up. Normally the Windows operating system completes its processes automatically without the need to press keys or respond to messages. The T2 is set to automatically log on without any input.

If the Windows startup screen does not proceed automatically or if a message appears that requires your input, it indicates a problem at the operating system level. If the problem cannot be corrected with a supported procedure (such as networking), the Windows operating system is not operating as it should. To correct problems of this nature, restore your system software. Refer to "Restoring to the factory default condition" on page 59.

# T2 system startup

After the Windows operating system startup processes complete, the T2 system startup processes begin. After the T2 logo appears, CommandCenter is launched in the case of normal mode.

These startup processes will take about 50 seconds.

If the system does not startup correctly, restore default settings using the recovery UFD. Refer to "Restoring to the factory default condition" on page 59.

# Thermal problems

⚠ ***WARNING: Be sure to turn off the system and disconnect the power plug prior to checking the cabling and connections inside the T2, or removing/replacing any parts of the T2. Otherwise, electric shock or product failure may result.***

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| The fans are noisy or otherwise run erratically. The T2 overheats. | Airflow is blocked. | Ensure adequate airflow around the T2. |
| | The fan module is not operating correctly. | Inspect the fan module and its connections for proper operation. The fan gets its power from the motherboard, the riser card, or the power supply unit, so make sure they are not faulty as well. If the fans are not operating correctly, replace the fan module as explained in "Center fan (92 mm) removal" on page 123, "Center fan (80 mm) removal" on page 125 and "Rear fan (60 mm) removal" on page 126. |

# I/O board unit problems

To test the I/O board unit, do the following:

1. Configure an output (P1/P2 channel) and input (R1 channel) to the same video and audio type.
2. Load a correct clip to P1 or P2 channel.
3. Start the loop play of this clip.
4. Connect (loop) the configured output channel of the loop play directly to the configured input.
   - So this for both video and audio. This provides a verified good signal to the inputs.
5. Record a short clip.
6. Verify the I/O board unit's recording functionality as follows:
   (1) Check the thumbnail of the recording clip.
   (2) Listen to the clip's audio with headphones from the front panel headphone output.
7. Using the other play channel, play back the clip.
8. Verify the I/O board unit's play out functionality as follows:
   (1) Check the video on a verified good output device.
   (2) Listen to the audio output.
9. Repeat this procedure for each video and audio type.

If you get the expected results, the I/O board unit is good and any problems you are experiencing are due to some other cause.

If you get faulty results it indicates a problem with the I/O board unit. Investigate the problem further as described in the following table.

⚠ ***WARNING: Be sure to turn off the system and disconnect the power plug prior to checking the cabling and connections inside the T2, or removing/replacing any parts of the T2. Otherwise, electric shock or product failure may result.***

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| A message "Board not found" appears in the preview area. | The I/O board unit and/or riser card are not connected properly or are faulty. | Visually inspect the I/O board unit and cables. Make sure they are connected properly and there is no sign of physical damage. Restart the T2. If the problem persists, replace the I/O board unit. Refer to "I/O board unit removal" on page 128. |
| | The device driver is not working properly. | Restore default settings using the recovery UFD. Refer to "Restoring to the factory default condition" on page 59. |

# Power supply problems

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| The T2 will not power on or power fails while the T2 is in operation. | The power source is faulty. | Make sure your power source is reliable. |
| | The power cord is faulty. | Try another power cord. |
| | The T2 is too hot. The built-in overtemperature protection can shut down the power supply. | Cool the T2. Refer to "Thermal problems" on page 78. |
| | The power supply unit is faulty. This is indicated if the touch screen LCD and Power LED does not come on. | Replace the power supply unit. Refer to "Power supply unit removal" on page 136. |

If the power source and the power cord are OK, replace the power supply unit. Refer to "Power supply unit removal" on page 136.

# Front panel problems

⚠ ***WARNING: Be sure to turn off the system and disconnect the power plug prior to checking the cabling and connections inside the T2, or removing/replacing any parts of the T2. Otherwise, electric shock or product failure may result.***

## Touch screen LCD and control buttons problems

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| Nothing is displayed on the touch screen LCD. | • The power cable to the button kit is disconnected or broken.<br>• The fuse on the fuse board is cut.<br>• The touch screen LCD is broken. | 1. Inspect power cable and connection to the button kit and fuse board. Try another power socket of the fuse board.<br>2. If the problem persists, replace the fuse board. Refer to "Fuse board unit removal" on page 105.<br>3. If the problem persists, replace the touch screen LCD. Refer to "Touch screen LCD removal" on page 113. |

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| The touch screen LCD image is faulty.<br><br>No response against touch control. | • There is a connection failure between the touch screen LCD and the motherboard.<br>• The software or operating system on the T2 has a fault.<br>• The touch screen LCD itself is faulty. | 1. Make sure CommandCenter is up and running.<br>2. When the touch screen LCD is faulty with the CommandCenter launched, remove the top cover and front panel and, check the button kit cable connections. Refer to "Button kit removal" on page 116. If the problem persists, replace the button kit.<br>3. If the problem persists, connect a mouse, keyboard, and PC monitor to the T2 and test functionality. Compare this functionality to that of the touch screen LCD. If everything works fine with the PC monitor but not the front panel, there could be a software problem on the touch screen LCD. Restore the T2 system. Refer to "Restoring to the factory default condition" on page 59.<br>4. If after system install the touch screen LCD still does not operate, replace the touch screen LCD. Refer to "Touch screen LCD removal" on page 113. |
| The JOG/Shuttle knob operates poorly or not at all. | The JOG/Shuttle knob is bent or broken. | Inspect the JOG/Shuttle knob to confirm that there is a mechanical problem with the knob. If so, replace the JOG/Shuttle knob. Refer to "Jog knob removal" on page 109 or "Shuttle knob removal" on page 109. |
| The control buttons operates not at all. | • The control buttons or front board are broken.<br>• The software or operating system on the T2 has a fault. | 1. Make sure CommandCenter is up and running.<br>2. When the control buttons do not operate with CommandCenter launched, make sure the button kit device is present. Enter the maintenance mode. Open the device manager. And confirm "HID-compliant game controller" is present under the "Human Interface Devices" category.<br>If not present, inspect the cable and connections. If the problem persists, replace the button kit. Refer to "Button kit removal" on page 116.<br>3. Restore default settings using the recovery UFD. Refer to "Restoring to the factory default condition" on page 59. |

## Interconnect board problems

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| The front headphone jack or volume control does not operate properly. | The cable to the I/O board unit is disconnected or faulty. | Make sure that the I/O board unit and cables are connected properly and there is no sign of physical damage. Restart the T2. If the problem persists, replace the I/O board unit. Refer to "I/O board unit removal" on page 128. |
| | The interconnect board is faulty. | Replace the front USB group unit. Refer to "Front USB group unit removal" on page 110. |

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| The power switch and/ or power indicator LED are not functioning. | The cable to the motherboard is disconnected or faulty. | Make sure that the motherboard and cables are connected properly and there is no sign of physical damage. Restart the T2. If the problem persists, refer to "Motherboard/BIOS startup" on page 76. |
| | The power supply unit is faulty. | Refer to "Power supply problems" on page 80. |
| | The interconnect board is faulty. | Replace the front USB group unit. Refer to "Front USB group unit removal" on page 110. |
| The front USB port does not connect properly. | The cable to the motherboard is disconnected or faulty. | Make sure that the motherboard and cables are connected properly and there is no sign of physical damage. Restart the T2. If the problem persists, refer to "Motherboard/BIOS startup" on page 76. |
| | The interconnect board is faulty. | Replace the front USB group unit. Refer to "Front USB group unit removal" on page 110. |
| | The front USB 3.0 board of T2 Elite 2/T2 Pro 2/T2 Express 2 is faulty. | Refer to "Front USB 3.0 board removal" on page 102 to replace the front USB 3.0 board. |

# 2.5 inch removable SSD bay problems

The descriptions in this section only apply to T2 Elite/T2 Pro/T2 Express.

⚠ ***WARNING: Be sure to turn off the system and disconnect the power plug prior to checking the cabling and connections inside the T2, or removing/replacing any parts of the T2. Otherwise, electric shock or product failure may result.***

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| There is no access to a drive in the removable SSD bay. This can be accompanied by an error message from the Windows operating system. | There is a problem with the SSD currently inserted in the drive, or the drive bay itself is faulty. | 1. Unlock the lock switch and remove the SSD. Insert it again and lock the lock switch. Watch the drive lights turned on.<br>2. Try another SSD and watch the drive lights turned on.<br>3. If the problem persists, inspect the power cable and SATA cables and those connections.<br>4. If the problem persists, replace the 2.5 inch removable SSD bay as explained in "2.5 inch removable SSD bay removal" on page 99. |

# Media card reader problems

The descriptions in this section only apply to T2 Elite 2.

⚠ ***WARNING: Be sure to turn off the system and disconnect the power plug prior to checking the cabling and connections inside the T2, or removing/replacing any parts of the T2. Otherwise, electric shock or product failure may result.***

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| There is no access to a drive in the media card reader. This can be accompanied by an error message from the Windows operating system. | There is a problem with the media currently inserted in the media card reader, or the card reader itself is faulty. | 1. Insert media and watch the access light on the left of the card turned on.<br>2. Try another media and watch the access light turned on.<br>3. If the problem persists, inspect the power cable and USB 3.0 cable and those connections.<br>4. If the problem persists, replace the Media Card Reader Assy as explained in "Media Card Reader Assy removal" on page 103. |

# Video problems

For the corrective actions in this section, refer to the T2 User Manual for detailed instructions.

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| A channel displays black at the end of the clip. | The channel is in E to E mode and there is no video signal present at the input. | Verify that you have a valid input signal. |
| P1/P2 channels have a dissimilar video display when no clip is playing. | One channel is in E to E and the other channel is not. | If similar display is required, configure P1/P2 channels the same. |
| The picture level modulates at a particular frequency. | There is excessive hum riding on the video input signal. The automatic gain control (AGC) circuits will tend to modulate the picture level at that frequency in an attempt to compensate for the problem. | Check the video input signal for excessive hum. |

# Audio problems

For the corrective actions in this section, refer to the T2 User Manual for detailed instructions.

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| No audio. | Wrong audio input set. | Set the correct audio input. |
| Both E to E and playback audio output are distorted. | Audio input signal clipping caused by excessive audio input level. | Check for input audio clipping. Adjust the audio input trim. Adjust the P1/P2 channel audio level. Reduce the source audio input level. |
| Analog audio level is too low. | Audio level needs to be adjusted. | Adjust the audio input trim. Adjust the P1/P2 channel or R1 channel audio level. Increase the source audio input level. |
| Audio level is too low. | Audio level needs to be adjusted. | Adjust the P1/P2 channel or R1 channel audio level. Increase the source audio input level in the workstation mode. |
| Audio level meters do not display the correct reference level used in my system. | Incorrect audio reference level. | Select the correct audio reference level. |
| R1 audio via the MONITOR port or the headphone jack has periodic noise. | Video input signal is out of sync with the audio clock. | Check the current setting of R1 channel for video standard. Verify that the video input signal is the correct standard. |

# Timecode problems

For the corrective actions in this section, refer to the T2 User Manual for detailed instructions.

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| Recorded timecode reads --:--:--;--. | No timecode source for the channel. | Set the timecode source. |
| A clip shows no mark-in/mark-out timecode, the current timecode display shows --:--:--;--, or the last valid timecode is displayed. | The selected timecode source was missing or intermittent during recording. | Check that you have the right R1 channel timecode source selected, verify that timecode is present in the source, and record the clip again. You can also stripe the timecode on an existing clip. |

# Operational problems

For the corrective actions in this section, refer to the T2 User Manual for detailed instructions.

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| A clip does not play, even though similar clips play on the same channel. | The clip does not match current channel settings or the clip is corrupt. | If the clip appears grayed-out it means it does not match current channel settings. Check the clip's properties and verify they are correct for the video standard, and other current settings. Compare properties with those of a clip that plays correctly. If properties are correct the clip is corrupt. Delete and re-record the clip. |
| A clip can not be edited. | The clip is locked. | Unlock the clip. |
| Cannot load and play a list. | The playlist does not match current channel settings or the playlist is corrupt. | If the playlist appears grayed-out it means it does not match current channel settings. Check the video standard in the property of the source clip for each event in the playlist. Compare properties with those of a playlist that plays correctly. If properties are correct the playlist is corrupt. Delete and re-make the playlist. |
| Cannot control a channel from the local T2. Controls are disabled. | The channel and the channel's control mode is set to Remote. | Turn off the Remote mode. Or alternatively, enable local operations while being remote controlled. |

# System problems

For the corrective actions in this section, refer to the T2 User Manual for detailed instructions.

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| R1 channels does not record. | R1 channel is configured for incorrect video standard. | Check the current setting of R1 channel for video standard. Verify that the video input signal is the correct standard. |

# Storage problems

Use the following sections if you suspect problems with your T2's storage system.

## Media File System problems

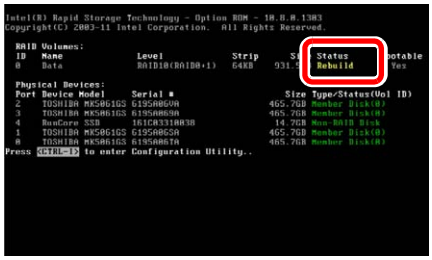
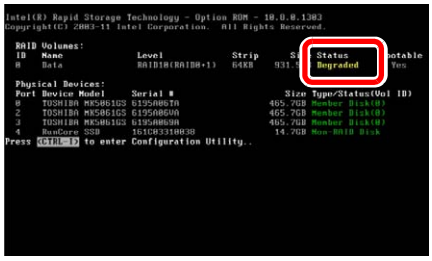
| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| One or more clips do not play or record correctly. | The media database is out of sync with the media files or there is a corrupt media file. Also see "Checking the storage system" on page 88 for causes related to certain usage patterns. | 1. If the problem is only associated with a specific clip or clips, delete the problem clips.<br>2. If the problem persists, run the Maintenance Tools and check disk error. Refer to "Media disk error checks" on page 31. If the problem persists, run the database consistency check. Refer to "Checking the data consistency" on page 34.<br>3. If the problem persists, check the RAID status. Refer to "Verifying, building, and rebuilding a RAID volume" on page 44. |

## Media disk problems

To check the SATA drives quickly, open **My Computer** from the **Start** menu, and check C:, D:, and V: drives. The C: and D: drives are in the SSD (for the system) above the 2.5 inch removable SSD bay. The V: drive is striped back of the touch screen LCD.

⚠ ***WARNING: Be sure to turn off the system and disconnect the power plug prior to checking the cabling and connections inside the T2, or removing/replacing any parts of the T2. Otherwise, electric shock or product failure may result.***

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| On startup the VGA startup sequence stalls at the black screen with a "Operating System not found" message. | There is a problem with SSD (for the system). This is the system boot disk. | Check the power cable and SATA cable of the SSD (for the system). If connections are OK, the SSD (for the system) is faulty. When the SSD (for the system) fails, the database, Config settings, and logs are lost. Replace the SSD (for the system). Refer to "SSD (for the system) removal" on page 97. If you want to use the media files of the data drive (V: drive) with the CommandCenter after replacement, copy the media files into the external storage device and then import them into V: drive. For detailed instructions, refer to the T2 User Manual. |

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| The message "Media disks getting full..." appears. | The media disks are reaching maximum capacity. | Delete unused clips and empty the Recycled Bin to make space on the media drives. |
| "Rebuild" appears in "Status" on the BIOS screen during T2 startup.<br>  <br>Playback/Record stops. The performance is low.<br>The icon ( ) is displayed at the right of the screen for the Front Panel Mode or on the status bar of the Workstation Mode. | Running RAID re-building.<br>The RAID rebuild function is automatically executed if the T2 comes to an abnormal end (such as if the main power fails or if you hold down the power switch to terminate the T2 forcefully) when used the T2 last time. | Wait until the RAID rebuild completes (until 100% appears on the screen). |
| "Degraded" or "Failed" appears in "Status" on the BIOS screen during T2 startup.<br>  <br>The icon ( ) appears at the right of the screen for the Front Panel Mode or on the status bar of the Workstation Mode.<br>The T2 starts up in the maintenance mode even when starting up in the normal mode. | RAID system has some problem. | Verify the RAID system, replace faulty storage unit, and build/rebuild a RAID volume. Refer to "Verifying, building, and rebuilding a RAID volume" on page 44. |

## Checking the storage system

The following section provides guideline for investigating problem areas related to the storage system. Use this section if you have problems with media input and/or output that are intermittent or seem to be related to certain usage patterns.

| Problem | Possible Causes | Corrective Actions |
|---|---|---|
| Symptoms can include the video recording stop or black video at playout, frozen video, slow performance, or inconsistent media access. | The following causes can occur on their own or in combination to produce the problem:<br>• Disk oversubscription - This occurs when requests to the media disk exceed the disk's bandwidth capabilities. This generally occur in extreme cases when a combination of high-bandwidth operations are taking place, such as JOG/shuttle, record/play on multiple channels.<br>• High CPU activity in Windows - This occurs when activities on the Windows operating system over-tax the capabilities of the motherboard processor. This commonly happens when unsupported software has been installed that competes with the T2 applications. Virus scanners and screen savers can cause this type of problem, since they can start automatically and consume system resources.<br>• Disk faults - This occurs when a media disk is severely fragmented or has a bad blocks that interfere with some, but not all, media operations. For example, a particular clip can be written on a bad block, so the problem occurs only on that clip. | 1. When you install the unsupported application software, uninstall them.<br>2. If the problem persists, try to re-create the problem. Identify all the interactions that affected the system and run all the same operations as when the error occurred. Investigate the functions that seem to push the system into the error state. If you determine that certain simultaneous operations cause the problem, re-order your workflow to avoid those situations. If you determine that the problem is only on certain clips, investigate disk faults. |

Chapter 4

# Removing and Replacing FRUs

This chapter consists of the following:


- "Precautions before operations" on page 90
  - "Required tools" on page 90
  - "Turning off the system and disconnecting the power cord from T2" on page 90
- "Top cover (front) removal" on page 92
- "Top cover (rear) removal" on page 93
- "HDD/SSD (for data) removal" on page 94
- "SSD (for the system) removal" on page 97
- "2.5 inch removable SSD bay removal" on page 99
- "Front USB 3.0 board removal" on page 102
- "Media Card Reader Assy removal" on page 103
- "Fuse board unit removal" on page 105
- "Front panel removal" on page 107
- "Jog knob removal" on page 109
- "Shuttle knob removal" on page 109
- "Front USB group unit removal" on page 110
- "Recovery UFD (USB Flash Drive) removal" on page 112
- "Touch screen LCD removal" on page 113
- "Button kit removal" on page 116
- "Memory (RAM) removal" on page 119
- "XLR×6 unit removal" on page 120
- "Rear USB 3.0 port removal" on page 121
- "Center fan (92 mm) removal" on page 123
- "Center fan (80 mm) removal" on page 125
- "Rear fan (60 mm) removal" on page 126
- "I/O board unit removal" on page 128
- "SATA card unit removal" on page 130
- "PCI-e USB 3.0 card removal" on page 131
- "USB 3.0 cable disconnection" on page 135
- "Power supply unit removal" on page 136

# Precautions before operations

FRUs (Field Replaceable Units) are components or parts that can be replaced while making repairs. If a partial failure occurs in your T2 and the failed part is included in any FRU, you can repair it by replacing the FRU without disturbing other components in the system.

This chapter mainly describes removal procedures of FRUs. Unless otherwise documented, installation procedures will be in reverse order of removals. If any installation instructions are documented, be sure to follow them.

The procedures described in this chapter are examples for T2 Pro, which also applies to other models unless otherwise mentioned.

For the list of replaceable FRUs and locations of each FRU, see "FRU functional descriptions" on page 20, "FRU locations (T2 Elite/Pro/Express)" on page 18 and "FRU locations (T2 Elite 2/Pro 2/Express 2)" on page 19.

***NOTE: Only Grass Valley products and components are supported. Do not install any non-Grass Valley parts.***

***NOTE: Do not discard any parts such as screws, metal supports, or frames.***

⚠ ***WARNING: Be sure to turn off the system and disconnect the power cord from the T2 prior to removing or replacing any parts. Otherwise, electric shock or product failure may result.***

⚠ ***WARNING: When you replace the parts of the T2, be sure to use exactly the same screws as were originally used on the parts.***

⚠ ***CAUTION: A part of the T2 may be damaged by electrostatic discharge or physical impacts. When you work on your system, be sure to wear a wrist strap for preventing electrostatic discharge (ESD) and provide grounding.***

## Required tools

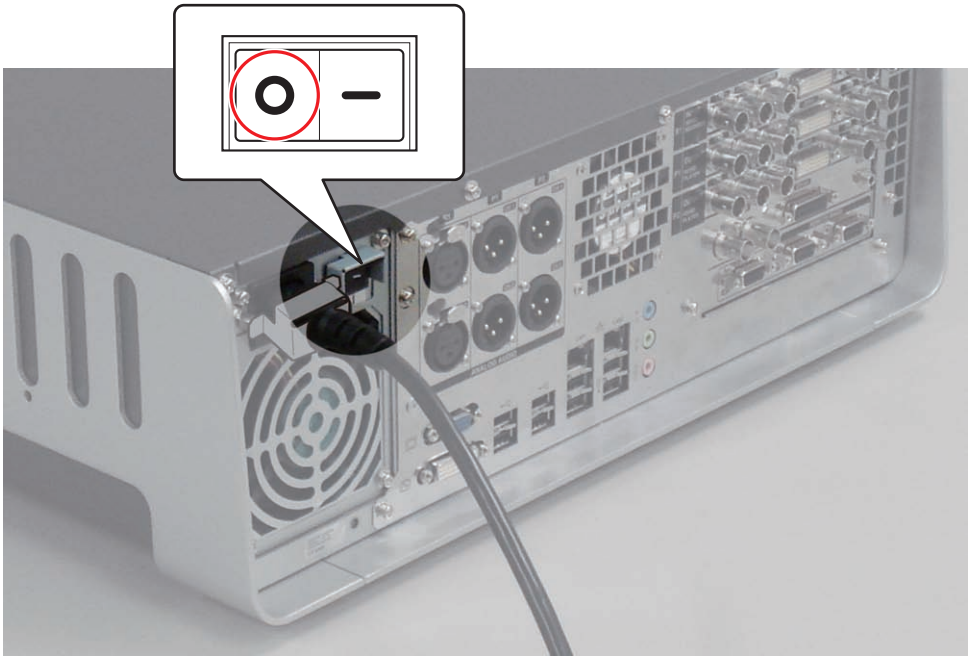
Phillips screwdriver #1 or #2, precision screwdriver

## Turning off the system and disconnecting the power cord from T2

You must always turn off your T2 system and disconnect the power cord from the T2 prior to removing or replacing FRUs (Field Replaceable Units).

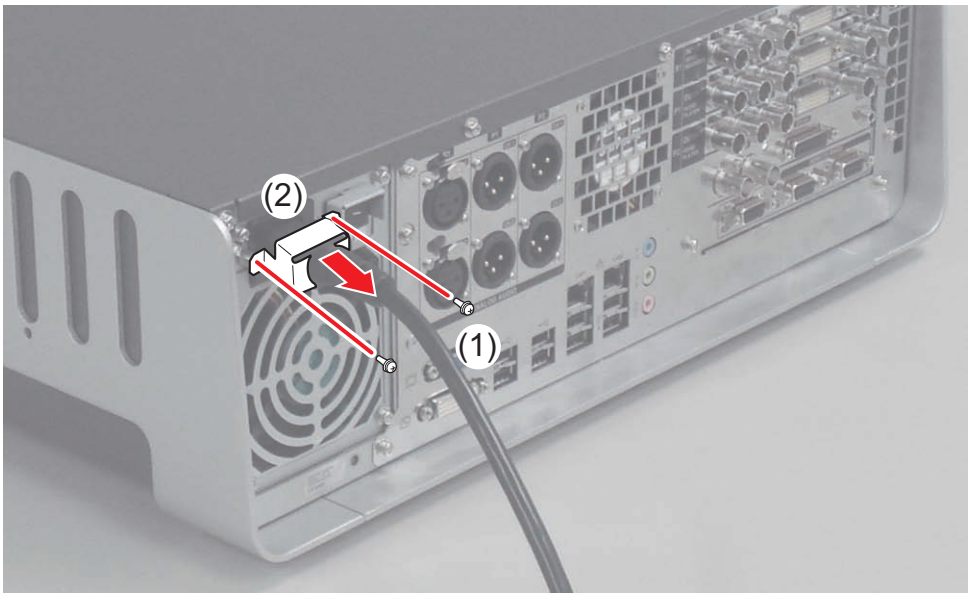
⚠ ***CAUTION: Be sure to shut down the T2 with a proper procedure prior to turning off the system. For instructions on how to shut down the system from the maintenance mode, see "Exiting the maintenance mode to shut down" on page 29. To shut down the system from the normal mode, refer to the T2 User Manual.***

1. Turn off the system with the main power switch.



2. Remove the power cord cover.
   (1) Remove two screws (with springs and small washers).
   (2) Remove the power cord cover.

⚠ ***CAUTION: When removing the power cord cover, do not loosen any screws of the power supply unit fan by mistake.***



3. Disconnect the power cord.

# Top cover (front) removal

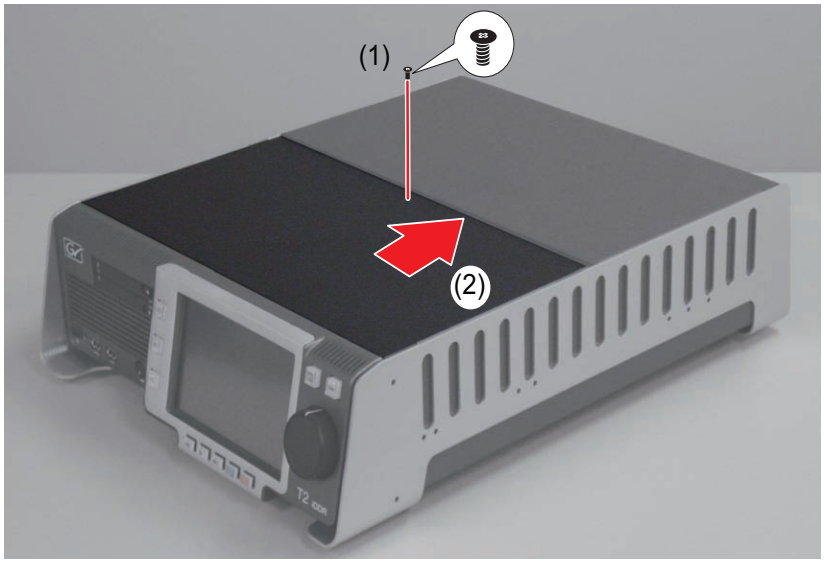
⚠ ***WARNING: Be sure to turn off the system and disconnect the power cord from the T2 prior to removing or replacing any parts. For detailed instructions, see "Turning off the system and disconnecting the power cord from T2" on page 90.***

⚠ ***CAUTION: Be sure to read "Precautions before operations" on page 90 prior to removing or replacing any T2 parts.***

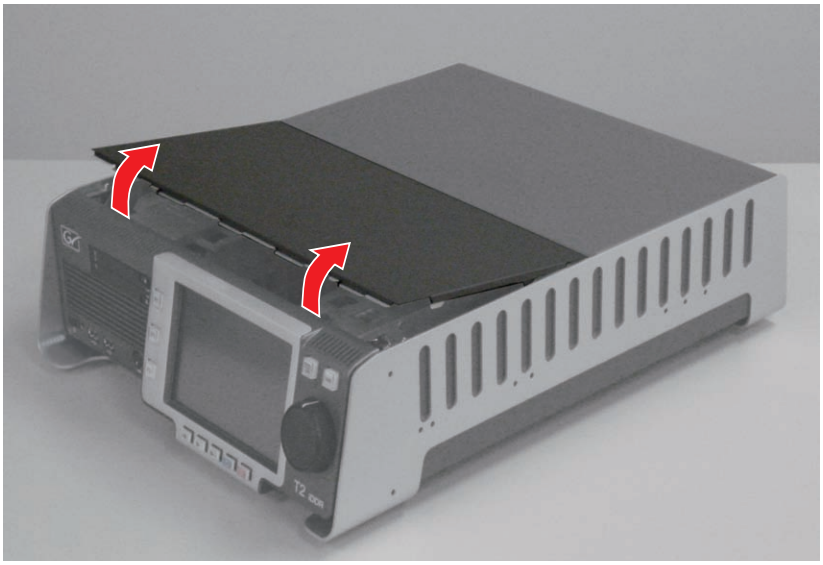
1. Remove the top cover (front).
   (1) Remove the flat screw (black).

***NOTE: Ensure that the screw type is correct when you install the flat screw (black).***

   (2) Slide the top cover (front side) in the direction of the arrow.

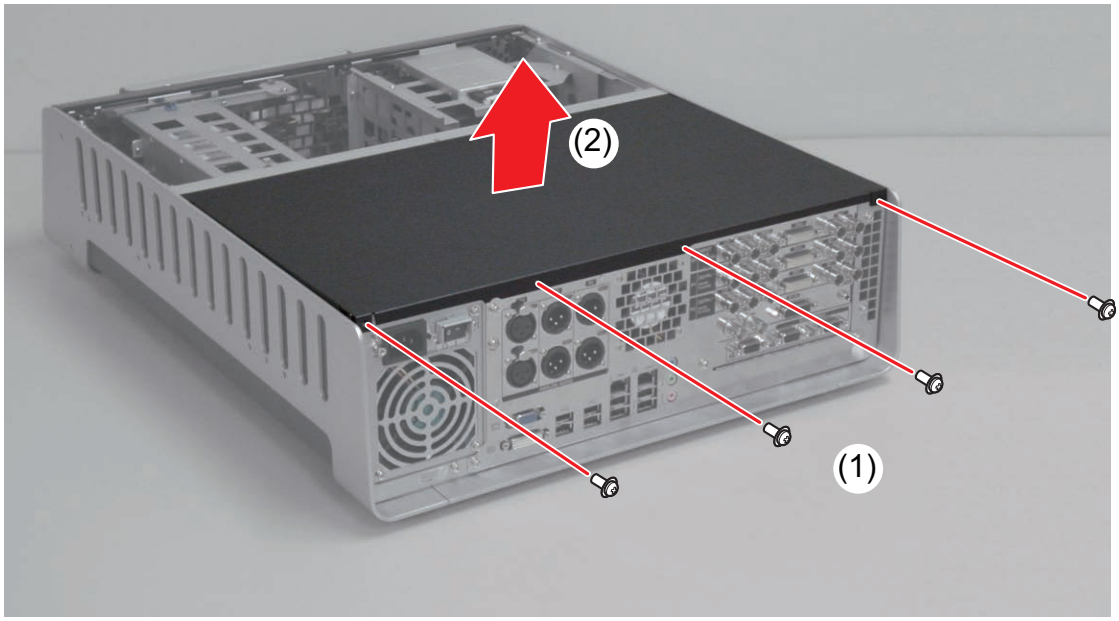


(3) Hold the slit and open the cover in the direction of the arrow.



# Top cover (rear) removal

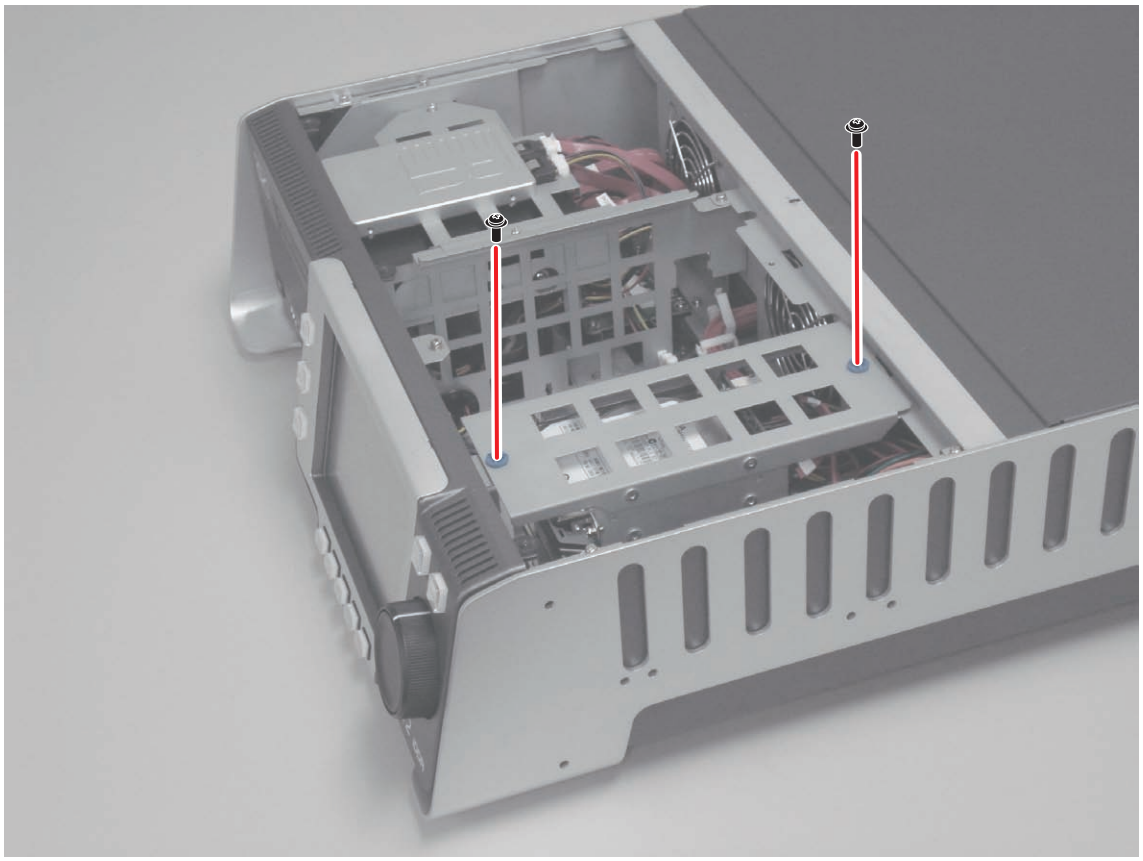
1. Remove the top cover (front).
   - For more information, see "Top cover (front) removal" on page 92.
2. Remove the top cover (rear).
   (1) Remove four screws (with springs and large washers) on the rear side.
   (2) Remove the top cover (rear).



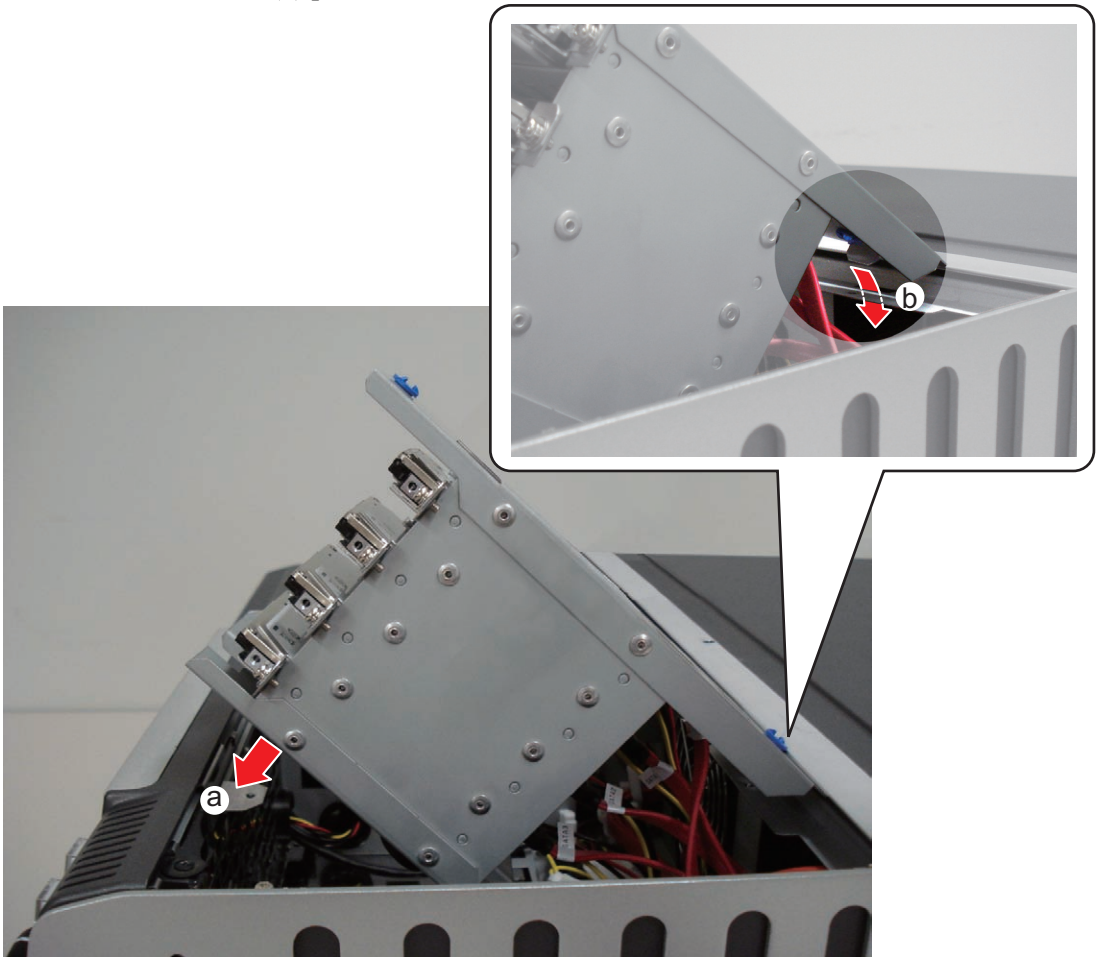
# HDD/SSD (for data) removal

This section describes the procedure to remove the HDD or SSD (for data). The T2 Elite 2/Elite has two SSDs, the T2 Pro 2/Pro has four HDDs, and the T2 Express 2/ Express has two HDDs.

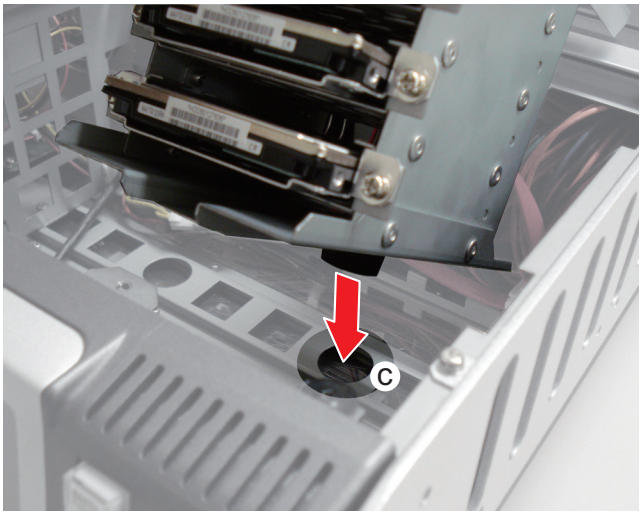
1. Remove the top cover (front).
   - For more information, see "Top cover (front) removal" on page 92.
2. Remove two HDD unit fixing screws.



3. Lift the HDD (or SSD) unit, place it onto the (a) part in the illustration, and insert it to the (b) part.

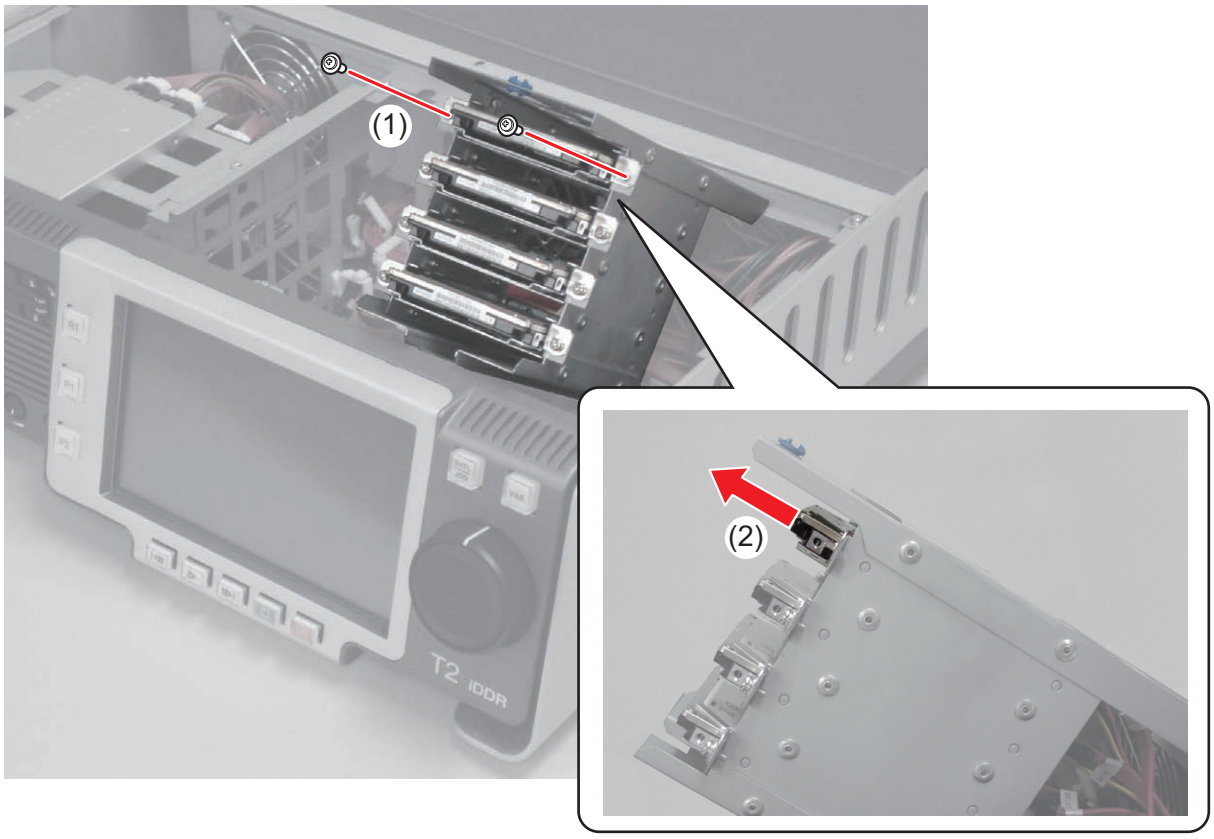



***NOTE: When you install the HDD (or SSD) unit onto the T2, insert the rubber foot on the bottom of the HDD (or SSD) unit into the (c) part of the T2 body, and then insert it into the (b) part in the illustration of step 3.***

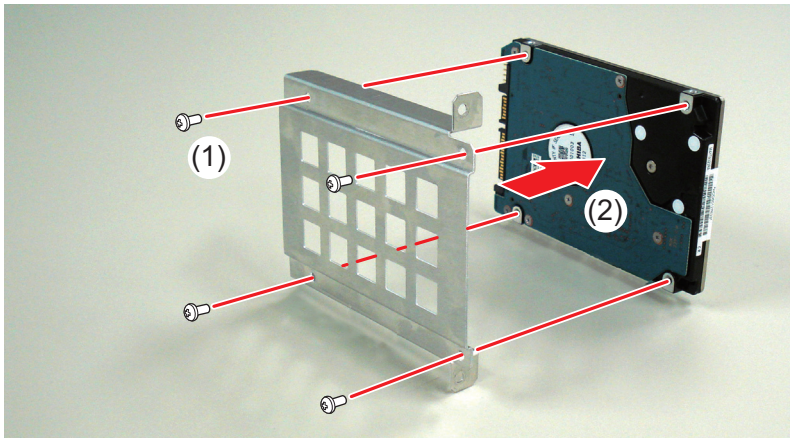


4. Remove the HDD (or SSD) from the HDD (or SSD) unit.
   (1) Check the drive number of the HDD (or SSD) and remove two screws (with springs and large washers).
   - Drive numbers for the T2 Pro 2/Pro are "1", "2", "3", and "4" from the top. (For the T2 Elite 2/Elite and the T2 Express 2/Express, "1" and "2" from the top.) The following illustration describes the procedure of the HDD in the drive number "1". The procedure for removing other drives is the same.

   (2) Remove the HDD (or SSD) from the HDD (or SSD) unit.

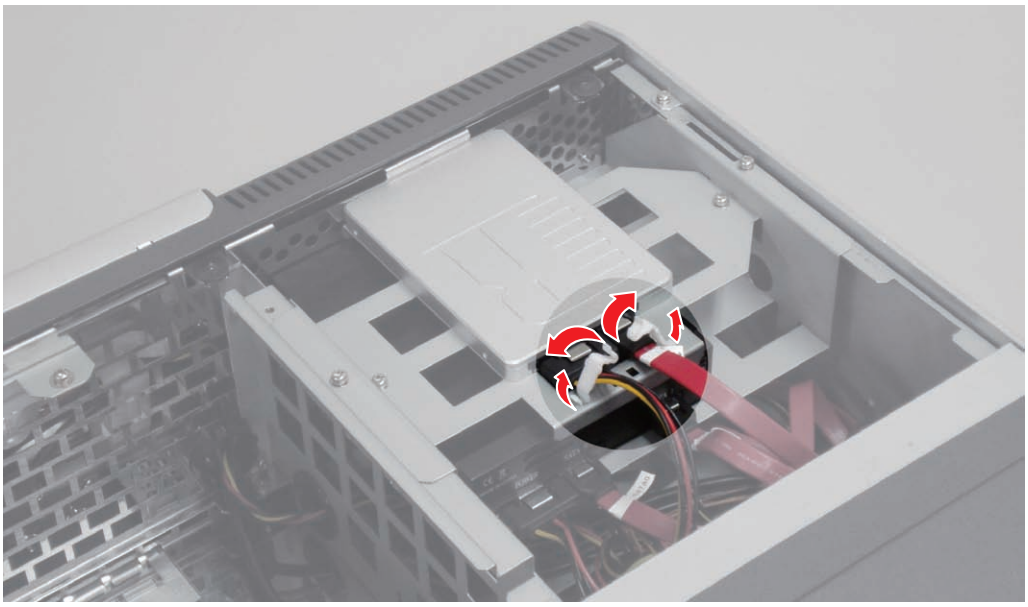



5. Remove the HDD (or SSD) from the storage mount frame.
   (1) Remove four round screws.
   (2) Remove the HDD (or SSD) from the storage mount frame.

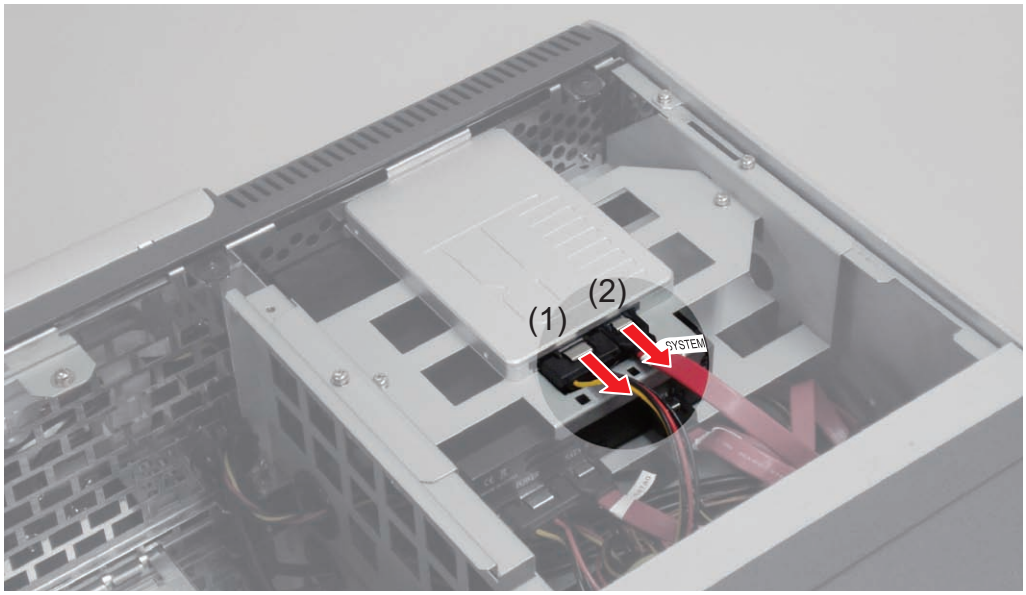


# SSD (for the system) removal

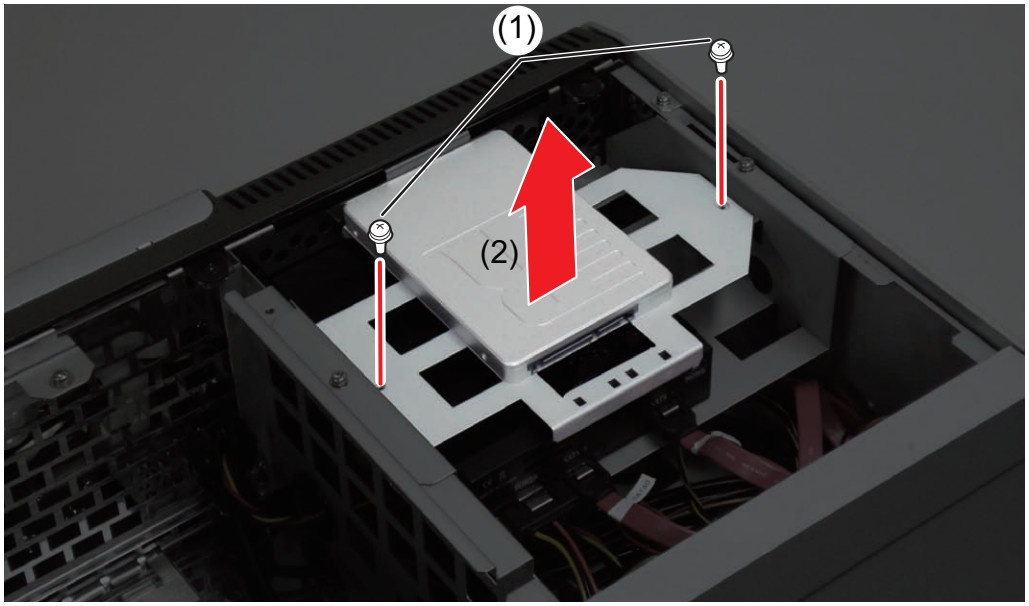
1. Remove the top cover (front).
   - For more information, see "Top cover (front) removal" on page 92.
2. Remove two cable clips.



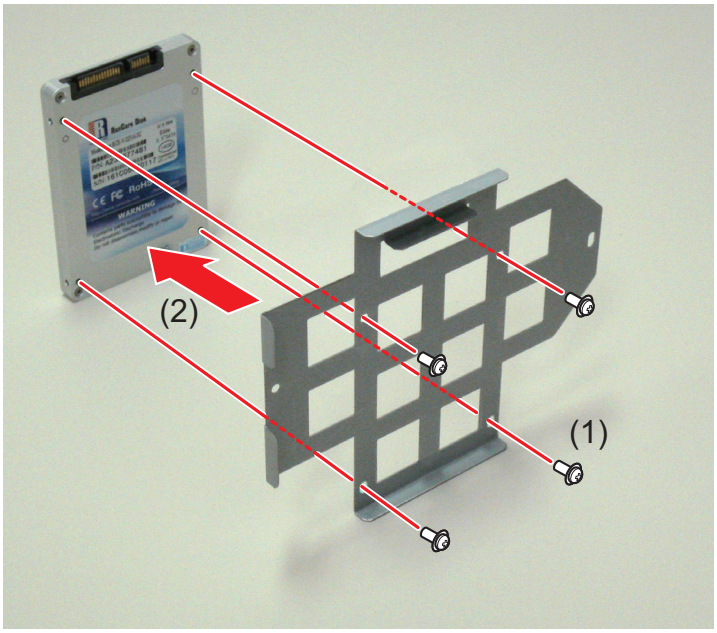
3. Disconnect the cables.
   (1) Disconnect the power cable while holding the latch.
   (2) Disconnect the SATA cable while holding the latch.
   - The cable is labeled as “SYSTEM”.



4. Remove the SSD (for the system) from the T2.
   (1) Remove two screws (with springs and small washers).
   (2) Remove the system SSD support frame in the direction of the arrow.




5. Remove the SSD (for the system) from the support frame.
   (1) Remove four screws (with springs and large washers).
   (2) Remove the SSD (for the system) from the support frame.

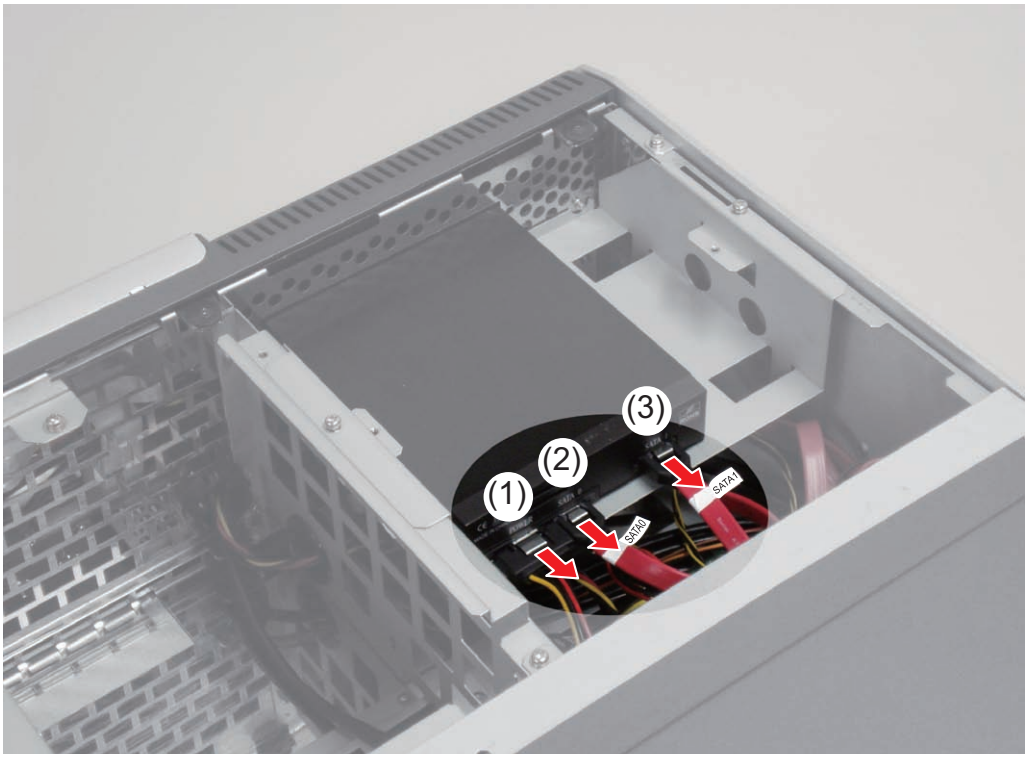


# 2.5 inch removable SSD bay removal

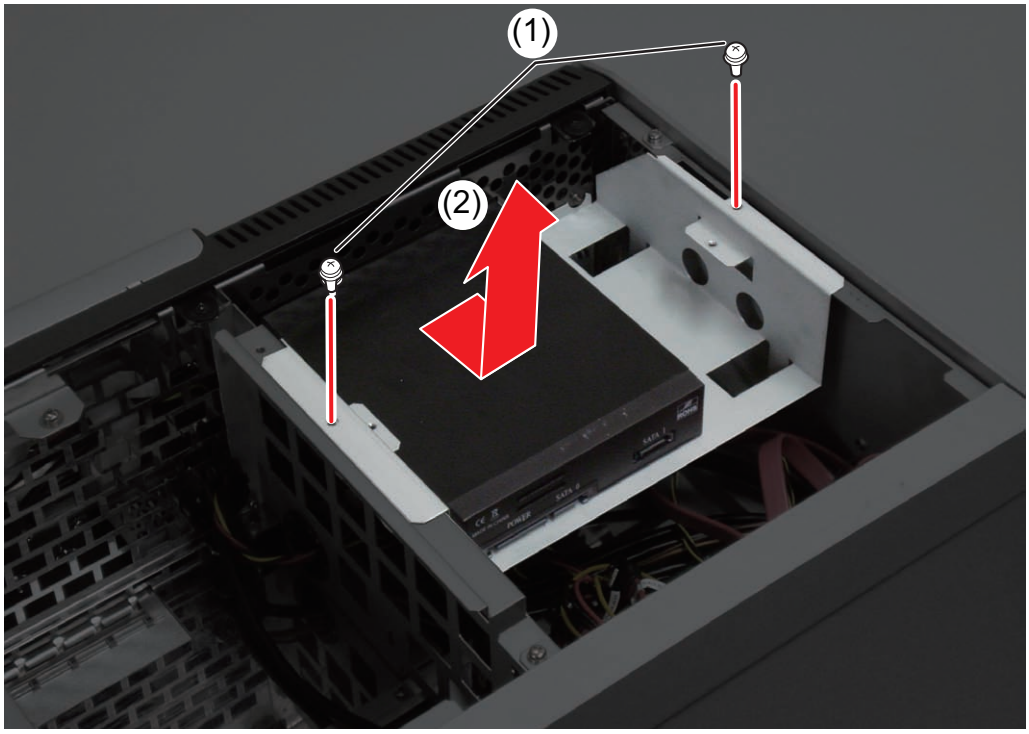
2.5 inch removable SSD bay is equipped on T2 Elite/Pro/Express.

1. Perform the procedure in "SSD (for the system) removal" on page 97 up to step 4.
2. Disconnect the cables.
   (1) Disconnect the power cable while holding the latch.
   (2) Disconnect the SATA cable while holding the latch.
   - The cable is labeled as “SATA0”.

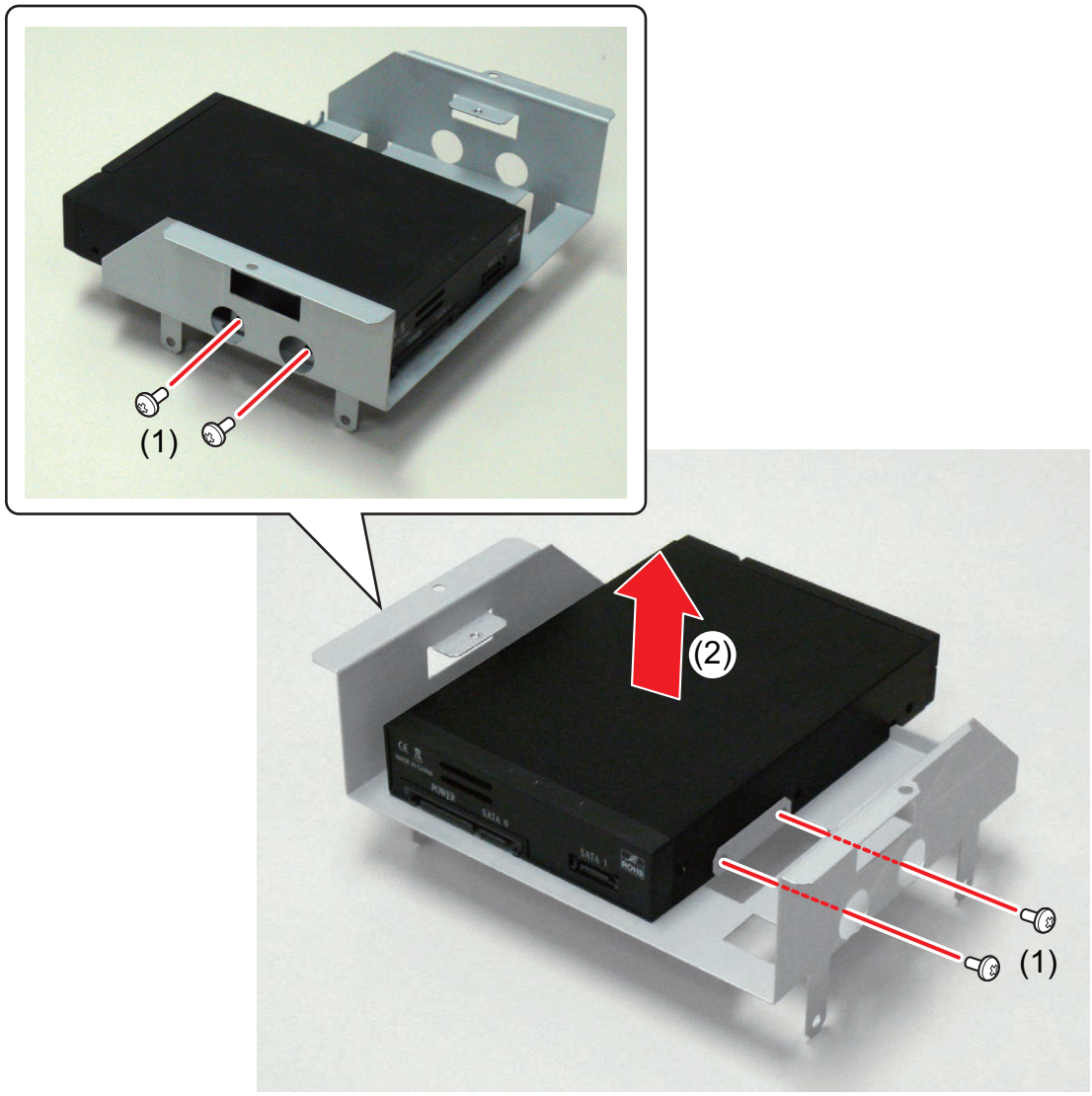
   (3) Disconnect the SATA cable while holding the latch.
   - The cable is labeled as “SATA1”.



3. Remove the 2.5 inch removable SSD bay from the T2.
   (1) Remove two screws (with springs and small washers).
   (2) Remove the 2.5 inch removable SSD bay in the direction of the arrow.



4. Remove the 2.5 inch removable SSD bay from the support frame.
   (1) Remove four round screws.
   (2) Remove the 2.5 inch removable SSD bay from the support frame.

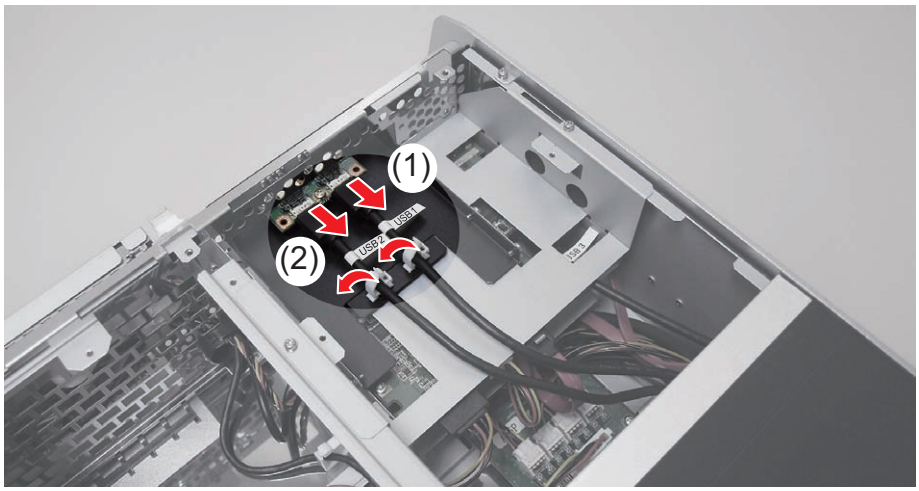


# Front USB 3.0 board removal

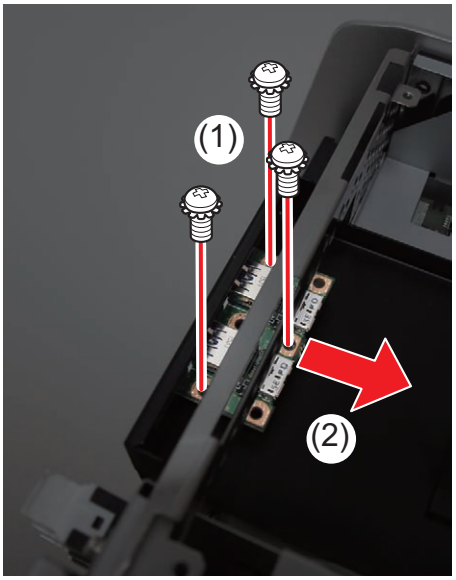
Front USB 3.0 board is equipped on T2 Elite 2/Pro 2/Express 2.

1. In "SSD (for the system) removal" on page 97, perform the procedure up to step 4.
2. Remove the front panel.
   - For more information, see "Front panel removal" on page 107.
3. Disconnect the cables.
   (1) Remove the cable clip, and then disconnect the USB 3.0 cable.
   - The cable is labeled as "USB 1".

   (2) Remove the cable clip, and then disconnect the USB 3.0 cable.
   - The cable is labeled as "USB 2".



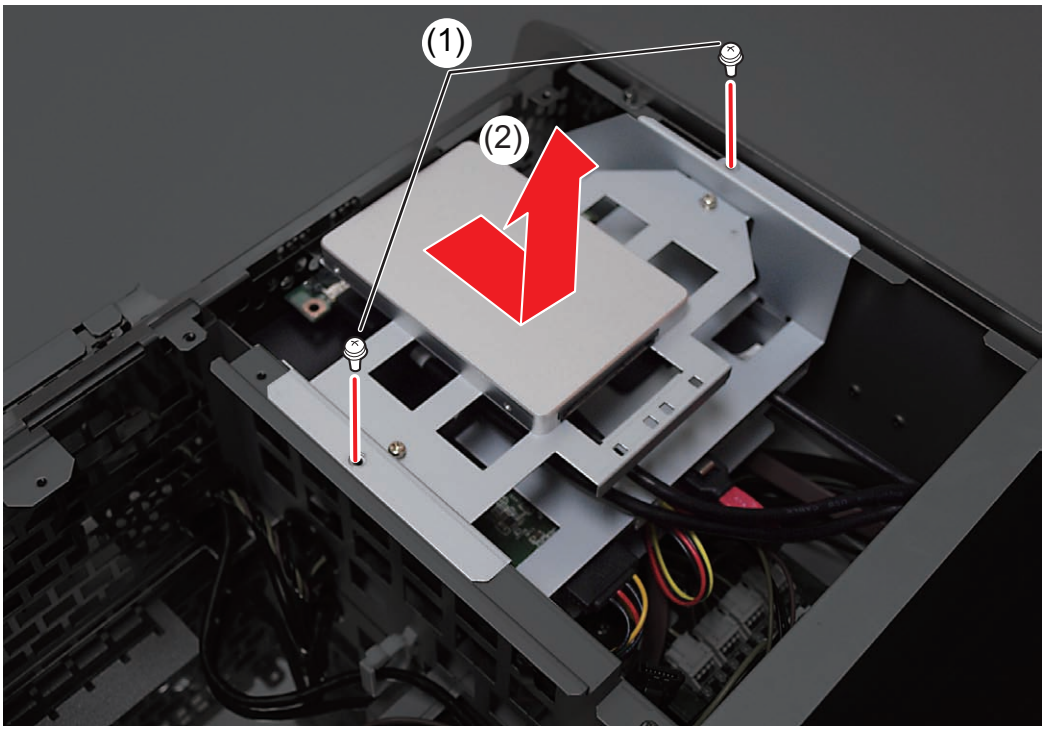

4. Remove the front USB 3.0 board.
   (1) Remove three screws (with external toothed washers).
   (2) Remove the front USB 3.0 board in the direction of the arrow.



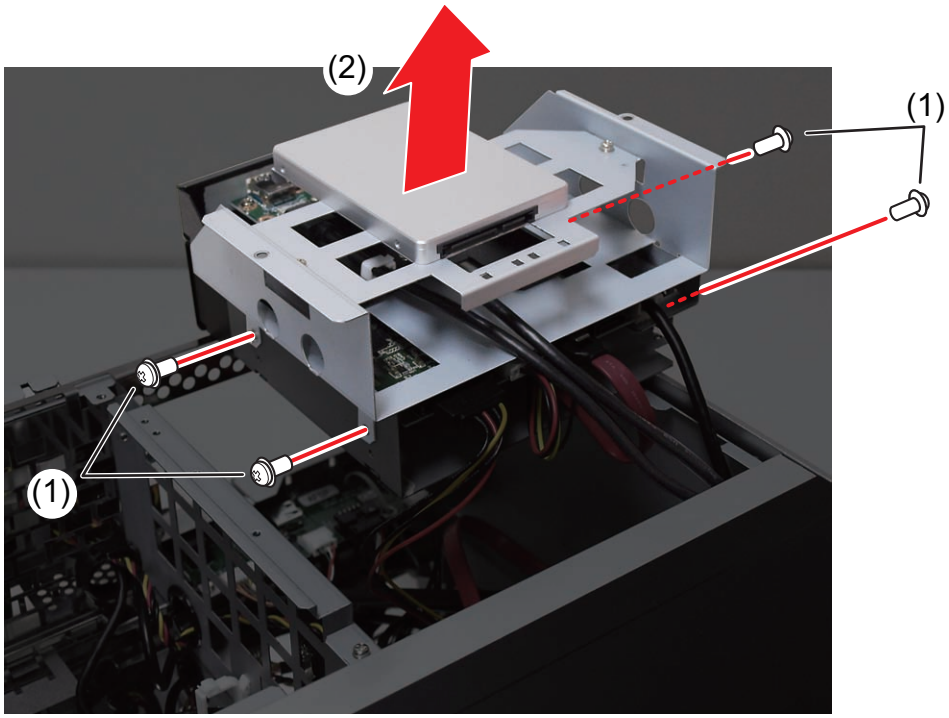
# Media Card Reader Assy removal

Media Card Reader Assy is equipped on T2 Elite 2.

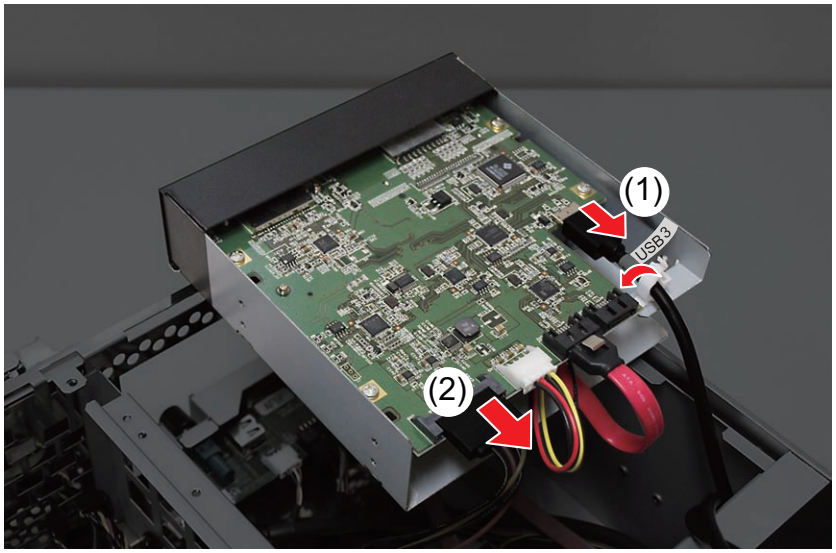
1. In "SSD (for the system) removal" on page 97, perform the procedure up to step 3.
2. Remove Media Card Reader Assy from T2.
   (1) Remove two screws (with springs and small washers).
   (2) Remove the media card reader in the direction of the arrow.
   - It is not necessary to remove SSD (for the system), front USB 3.0 board, and the cables.



3. Remove the stay from the media card reader.
   (1) Remove four screws (with springs and small washers).
   (2) Remove the stay in the direction of the arrow.
   - The stay includes SSD (for the system) and front USB 3.0 board.




4. Disconnect the cables.
   (1) Remove the cable clip, and then disconnect the USB 3.0 cable.
   - The cable is labeled as "USB 3".
   (2) Disconnect the power cable.



# Fuse board unit removal

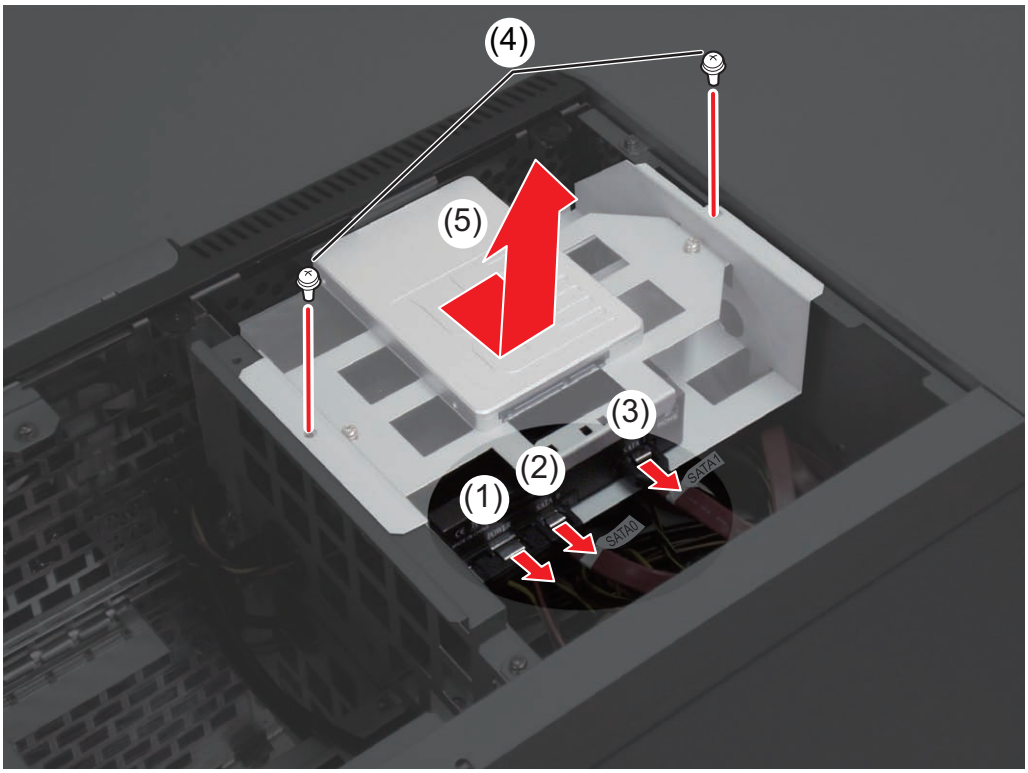
The removal procedure of the fuse board unit differs depending on the model.

### For T2 Elite/Pro/Express

1. Perform the procedure in "SSD (for the system) removal" on page 97 up to step 3.
2. Remove the 2.5 inch removable SSD bay and SSD (for the system).
   (1) Disconnect the power cable connected to the 2.5 inch removable SSD bay while holding the latch.
   (2) Disconnect the SATA cable connected to the 2.5 inch removable SSD bay while holding the latch.
   - The cable is labeled as “SATA0”.

   (3) Disconnect the SATA cable connected to the 2.5 inch removable SSD bay while holding the latch.
   - The cable is labeled as “SATA1”.

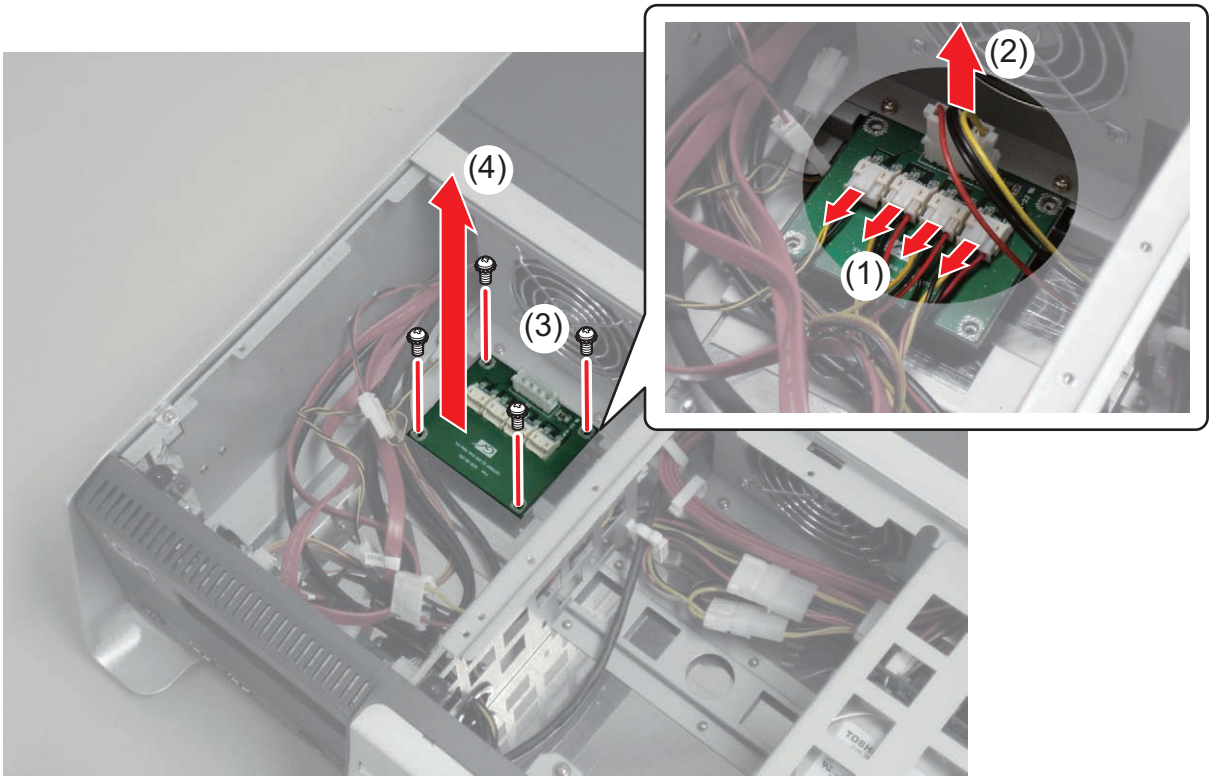
   (4) Remove two screws (with springs and small washers).
   (5) Remove the 2.5 inch removable SSD bay and SSD (for the system) in the direction of the arrow.



3. Remove the fuse board unit from the T2.
   (1) Disconnect four power cables **(small)** while holding the latch.

***NOTE: When you connect the power cables to the fuse board unit, you can connect them into any of the four power sockets.***

   (2) Disconnect the power cable (large).
   (3) Remove four screws (with toothed washers).
   (4) Remove the fuse board unit from the T2 in the direction of the arrow.

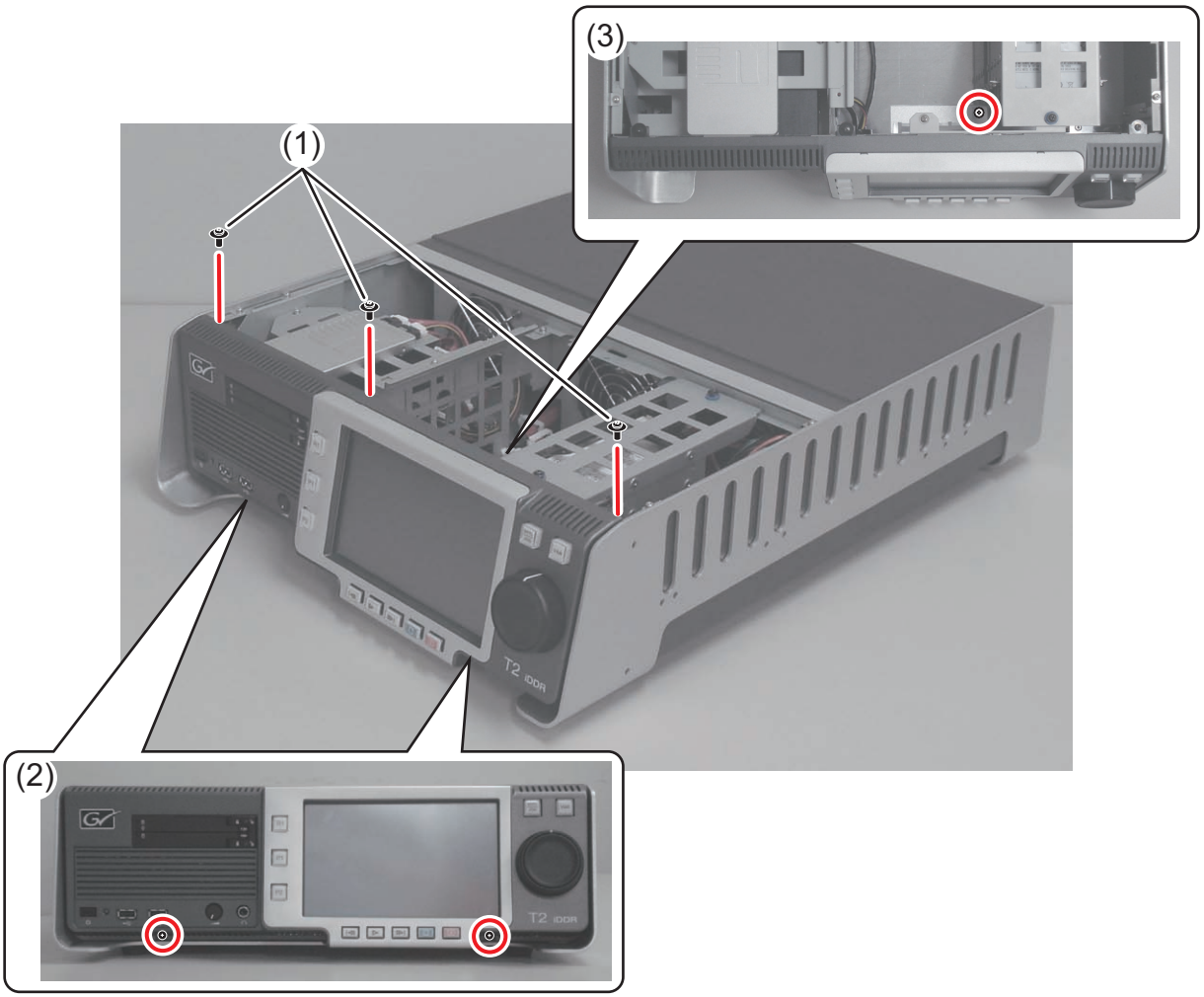



### For T2 Elite 2/Pro 2/Express 2

1. Remove the upper stay of the fuse board unit.
   - For T2 Elite 2, see steps 1 to 3 in "Media Card Reader Assy removal" on page 103.
   - For T2 Pro 2/Express 2, see steps 1 to 2 in "Media Card Reader Assy removal" on page 103.
2. Remove the fuse board unit from T2.
   - See step 3 in "For T2 Elite/Pro/Express" on page 105 for more details.

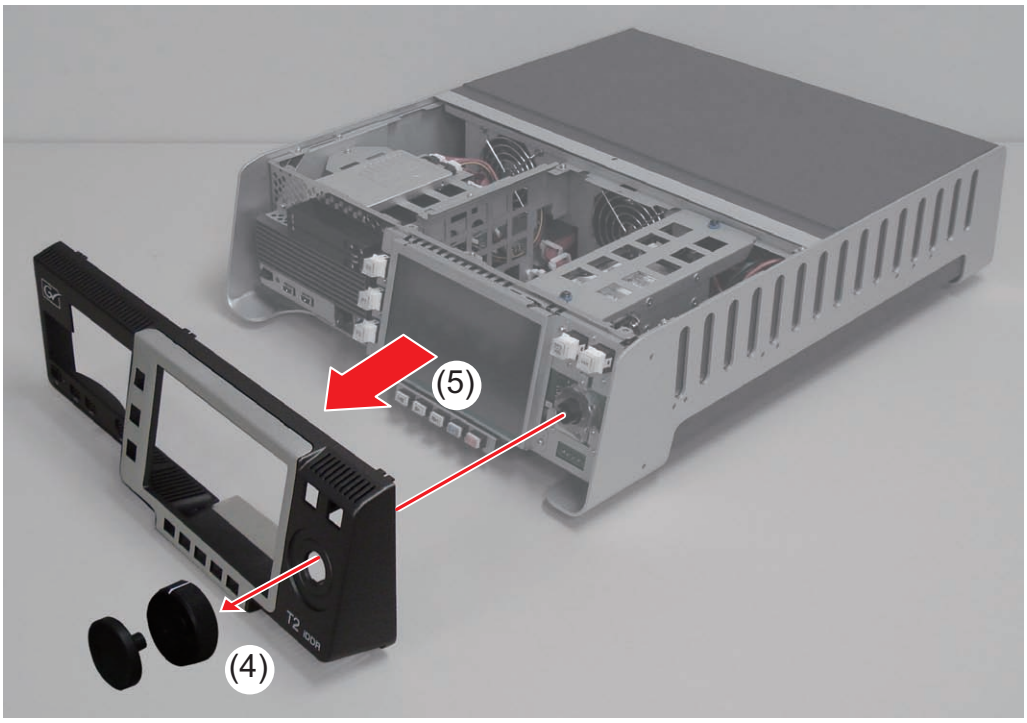
# Front panel removal

1. Remove the top cover (front).
   - For more information, see "Top cover (front) removal" on page 92.
2. Remove the front panel.
   (1) Remove three screws (with large washers, black) on the top side of the front panel.
   (2) Remove two binding screws (black) on the lower side of the front panel.
   (3) Remove a screw (with a toothed washer) on the bottom side of the front panel (inside of the unit).

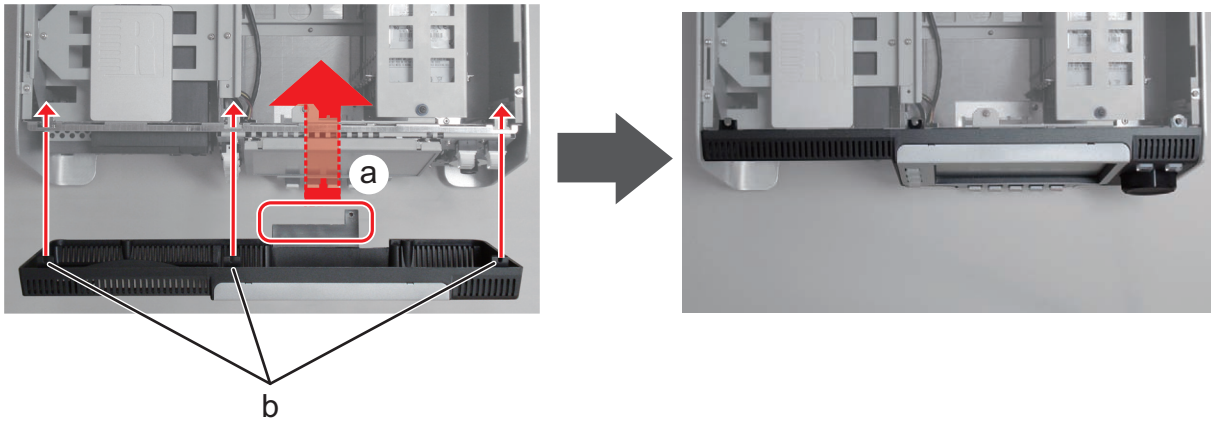


(4) Remove the Jog/Shuttle knob.

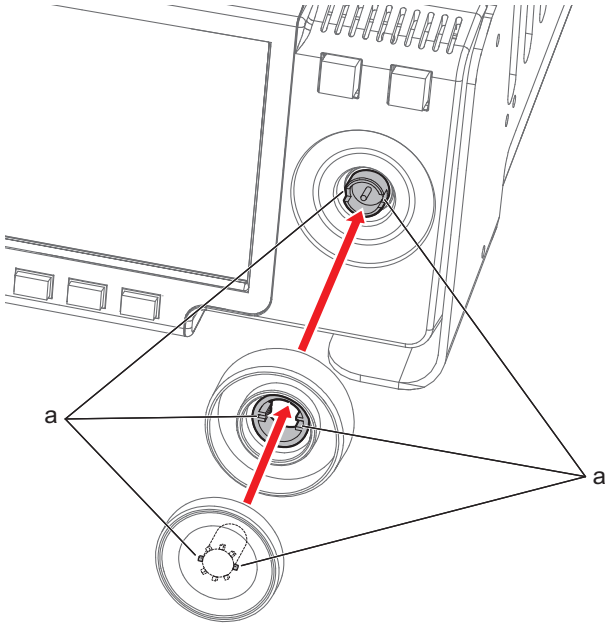
(5) Remove the front panel in the direction of the arrow while keeping it straight up.




***NOTE: When you install the front panel, let the (a) part touch the bottom of the T2, and then insert the (b) part into the hole of the frame.***



***NOTE: When you install the jog knob and the shuttle knob, insert them so that the (a) parts are aligned.***




# Jog knob removal

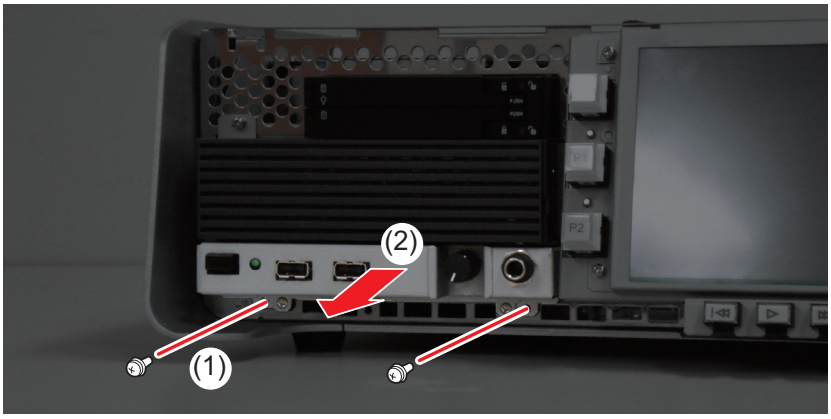
For instructions on how to remove the jog knob, see "Front panel removal" on page 107.

# Shuttle knob removal

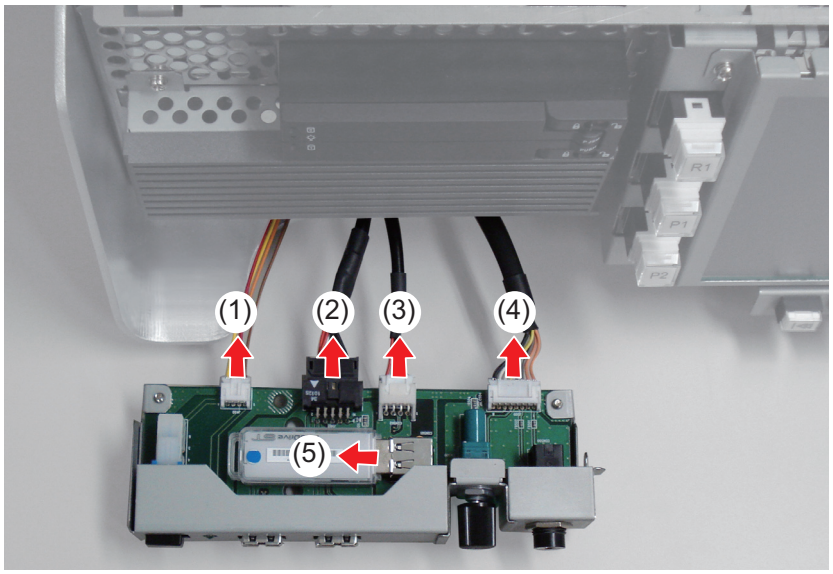
For instructions on how to remove the shuttle knob, refer to "Front panel removal" on page 107.

# Front USB group unit removal

1. Remove the front panel.
   - For more information, see "Front panel removal" on page 107.
2. Remove the front USB group unit from the T2.
   (1) Remove two screws (with springs and small washers) on the both edges of the front side of the front USB group unit.
   (2) Remove the USB group unit from the T2 in the direction of the arrow.

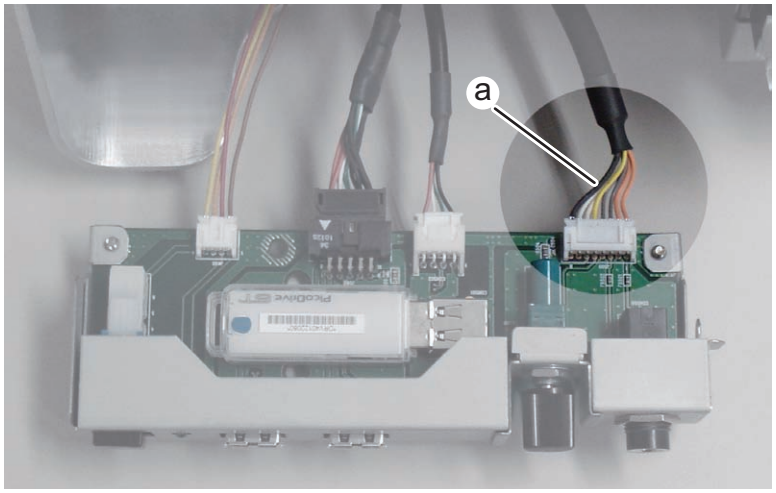



3. Disconnect the cables.
   (1) Disconnect the power switch cable.
   (2) Disconnect the USB cable (black).
   (3) Disconnect the USB cable (white).
   (4) Disconnect the audio cable.
   (5) Cut off the cable ties with nippers, and then remove the recovery UFD.

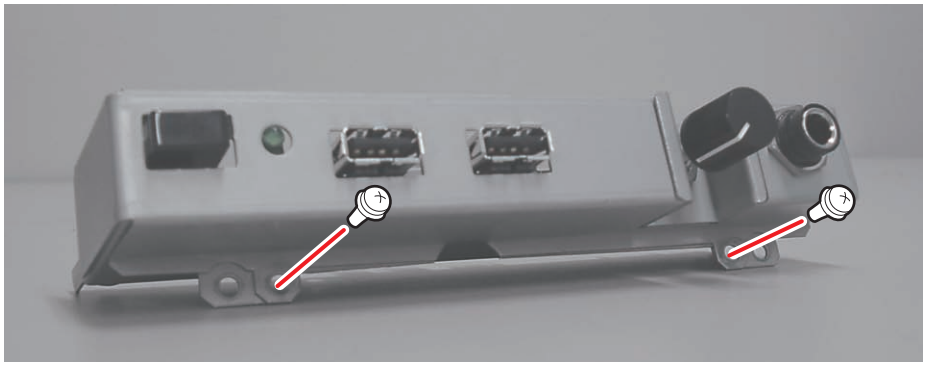



***NOTE: When you install the recovery UFD, insert the cable ties from the holes on the board, install the UFD, and then fix it with the cable ties.***

***NOTE: When connecting the audio cable to the board of the front USB group unit, confirm that the audio cable connector has a black grounding cable (a).***

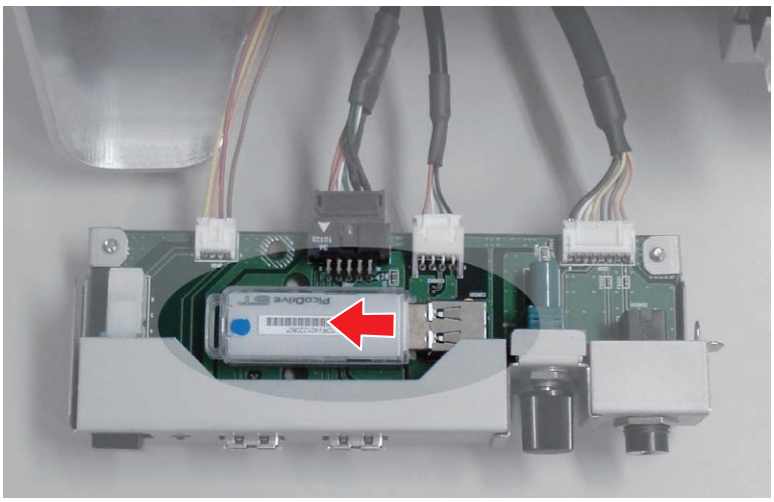



4. Remove two screws (with springs and small washers) on the front side of the front USB group unit.



# Recovery UFD (USB Flash Drive) removal

1. Perform the procedure in "Front USB group unit removal" on page 110 up to step 2.
2. Cut off the cable ties with nippers, and then remove the recovery UFD.



***NOTE: When you install the recovery UFD, insert the cable ties from the holes on the board, install the UFD, and then fix it with the cable ties.***

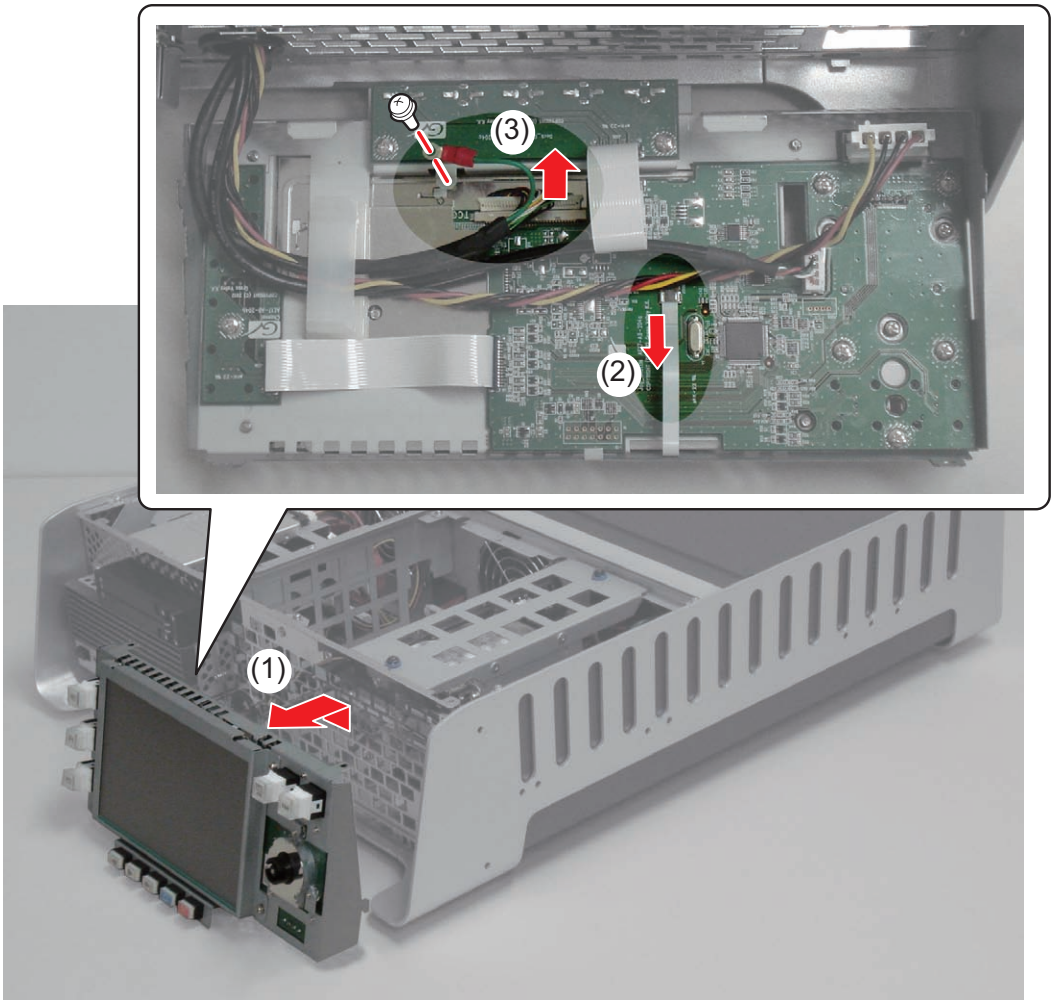
# Touch screen LCD removal

1. Remove the front panel.
   - For more information, see "Front panel removal" on page 107.
2. Remove the touch screen LCD from the T2.
   (1) Lift up the touch screen LCD and pull it out from the T2, with the button kit attached.
   (2) Disconnect the ribbon cable.

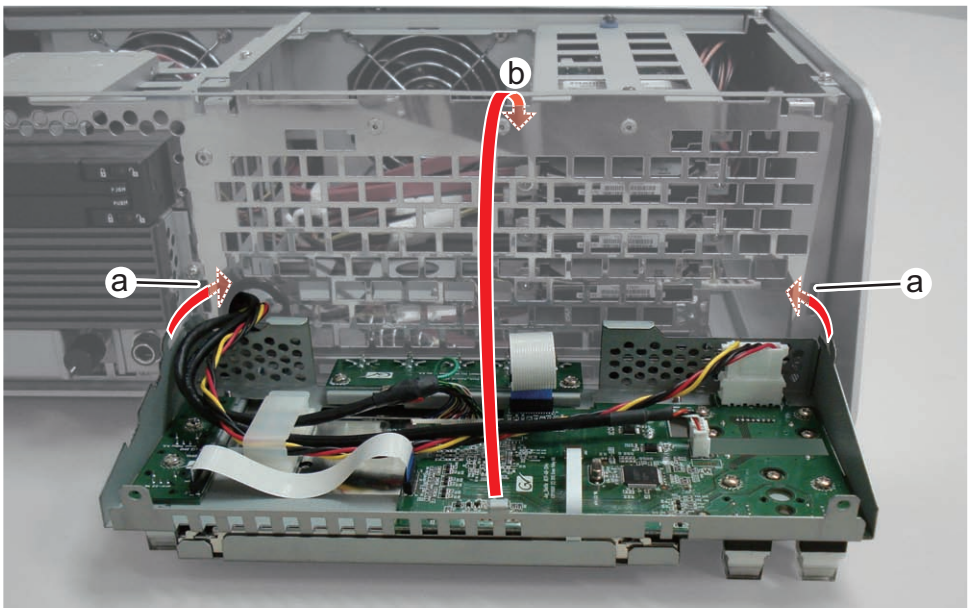
***NOTE: When you connect the ribbon cable to the button kit, connect it so that the signal surface faces the back side.***

   (3) Remove the screw (with a spring and small washer) that secures the ground cable, and then disconnect the LCD cable.

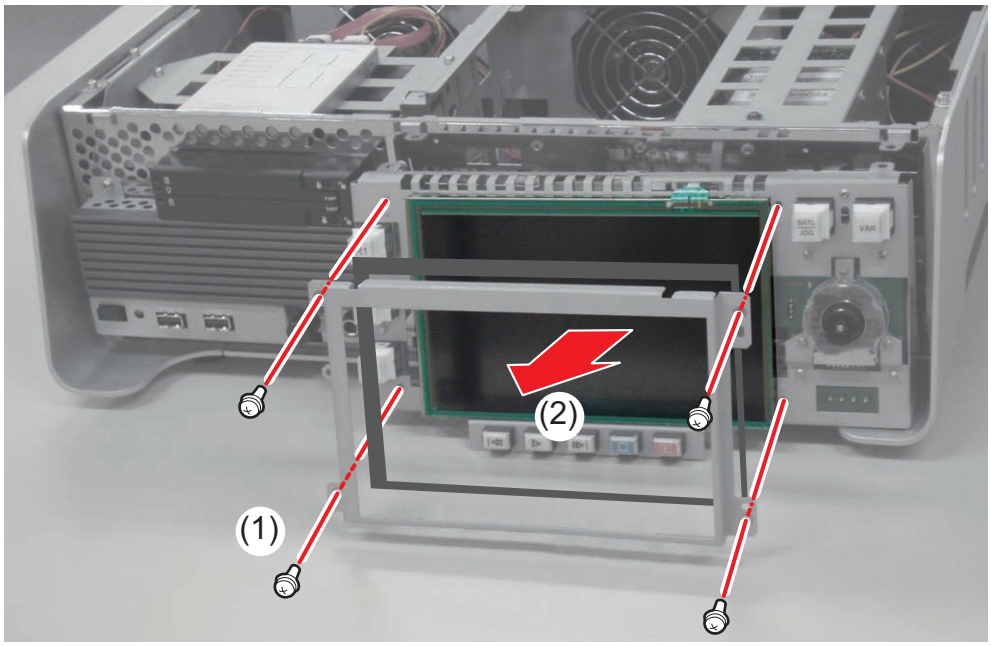
***NOTE: When you connect the LCD cable to the touch screen LCD, connect it paying attention to the orientation of the connector (so that its convex part faces the front side).***



***NOTE: When you install the touch screen LCD to the T2 with the button kit attached, insert the prongs on the right and left of the button kit to the (a) parts of the T2, and insert the upper tab to the (b) part.***

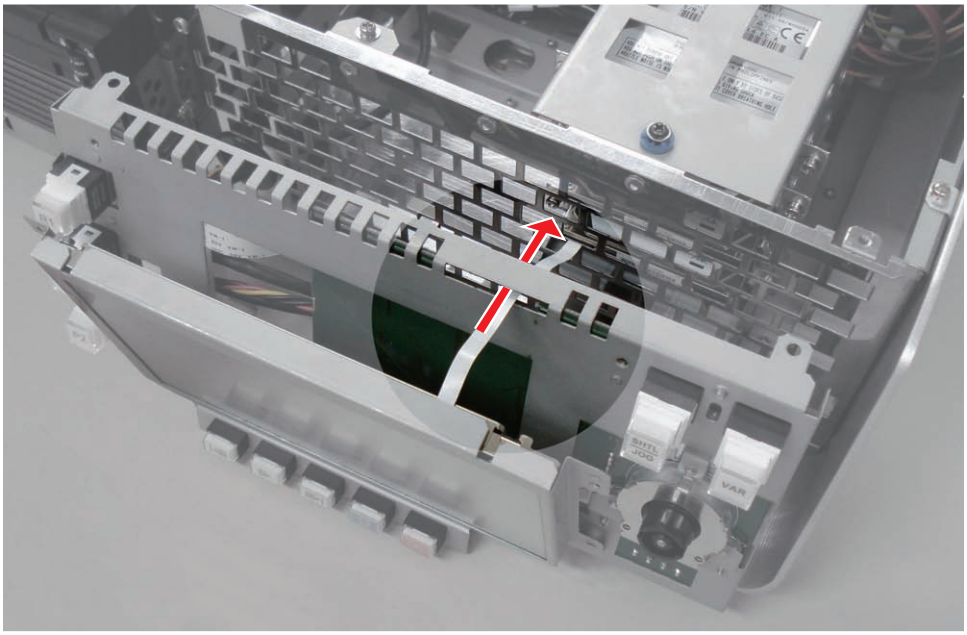



3. Remove the touch screen LCD from the button kit.
   (1) Remove four screws (with springs and small washers).
   (2) Remove the support frame and the LCD mask sheet attached to the touch screen LCD.




***NOTE: When you attach the support frame, be sure to attach it with the upper, lower, right, and left sides are correctly aligned.***

***NOTE: When you install the touch screen LCD to the button kit, insert the ribbon cable into the slit on the upper part of the button kit.***



# Button kit removal

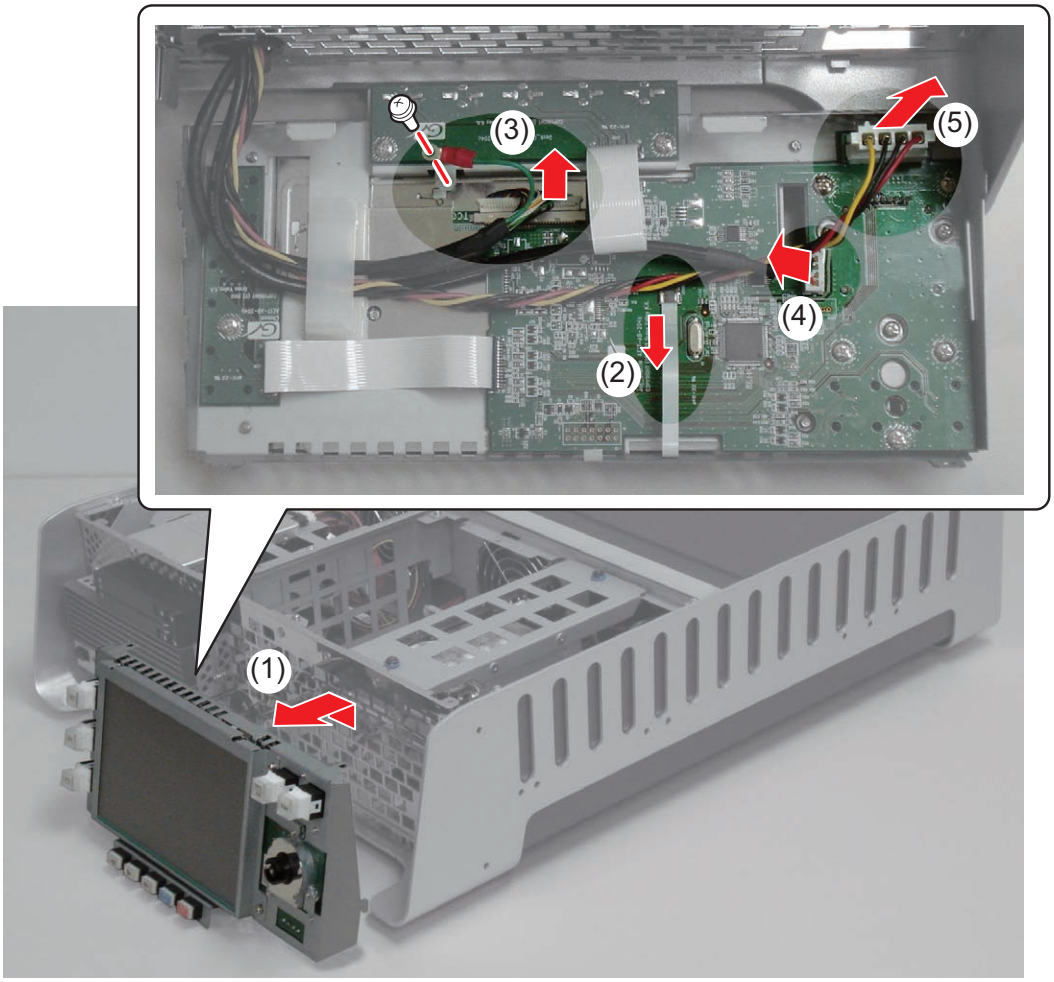
1. Remove the front panel.
   - For more information, see "Front panel removal" on page 107.
2. Remove the button kit from the T2.
   (1) Lift up the button kit and pull it out from the T2, with the touch screen LCD attached.
   (2) Disconnect the ribbon cable.

***NOTE: When you connect the ribbon cable to the button kit, connect it so that the signal surface faces the back side.***

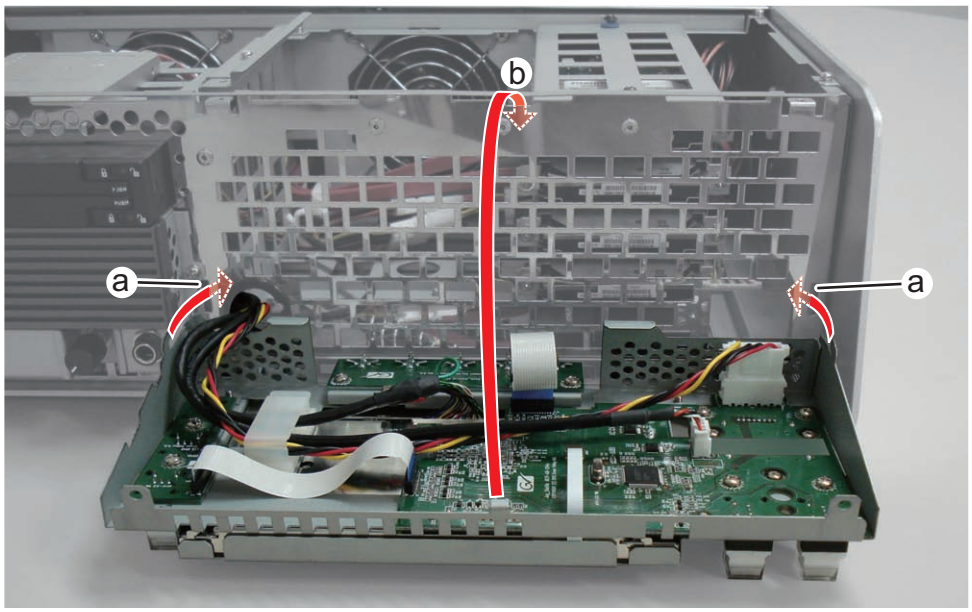
   (3) Remove the screw (with a spring and small washer) that secures the ground cable, and then disconnect the LCD cable.

***NOTE: When you connect the LCD cable to the touch screen LCD, connect it paying attention to the orientation of the connector (so that its convex part faces the front side).***

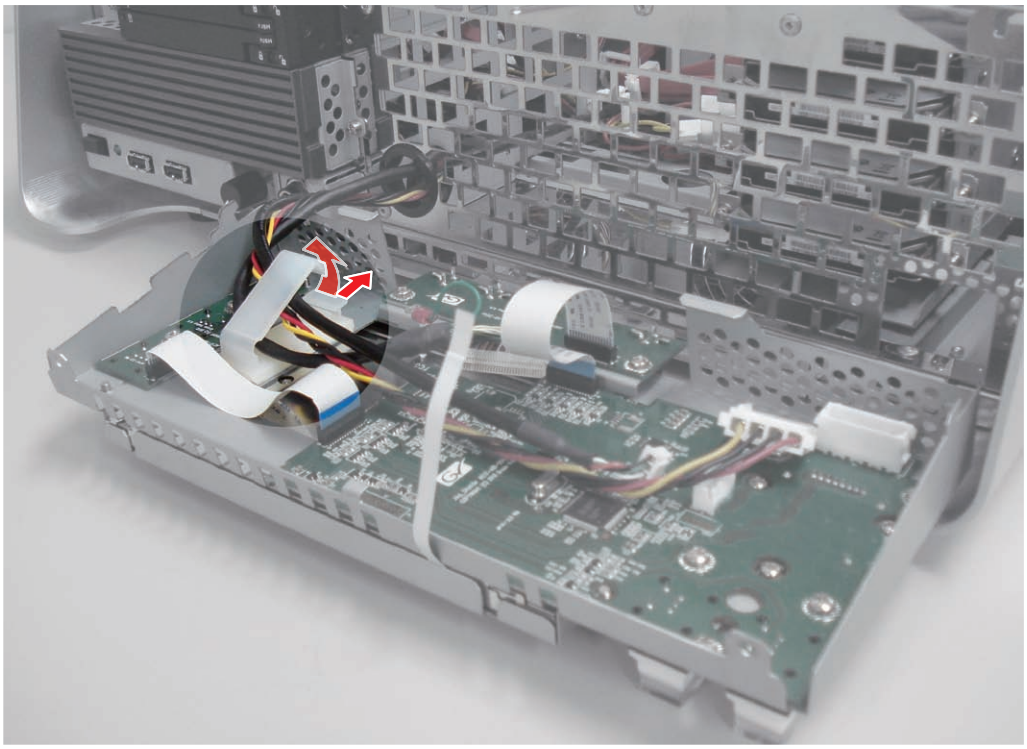
   (4) Disconnect the USB cable.
   (5) Disconnect the power cable.



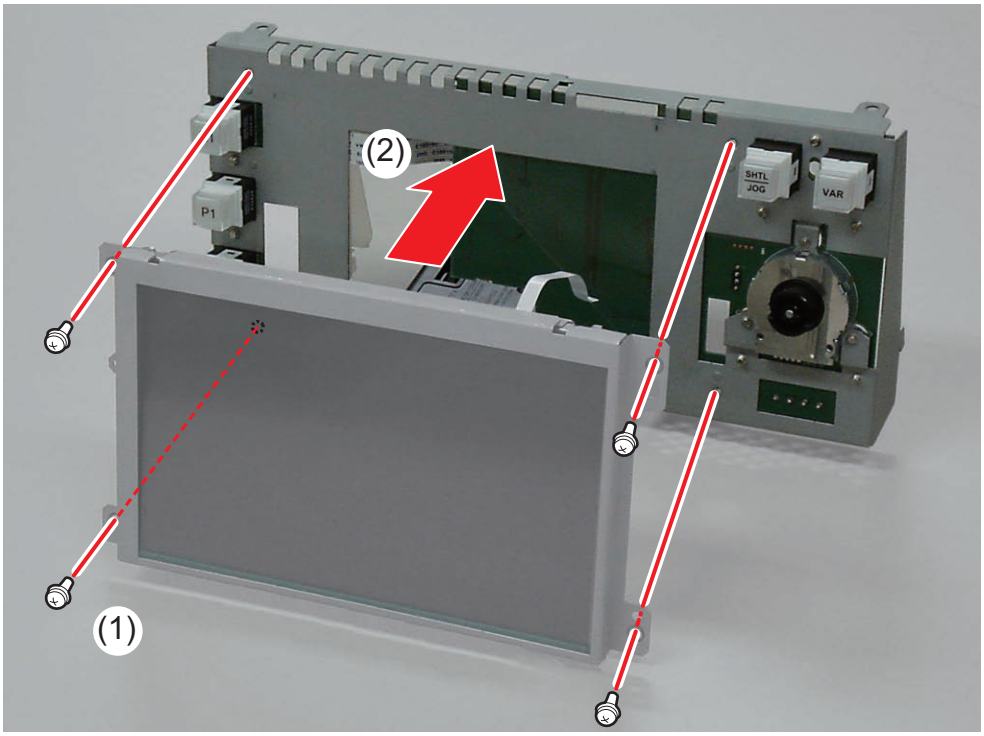
***NOTE: When you install the button kit to the T2 with the touch screen LCD attached, insert the prongs on the right and left of the button kit to the (a) parts of the T2, and insert the upper tab to the (b) part.***




3. Remove the cable clips and disconnect the cable.

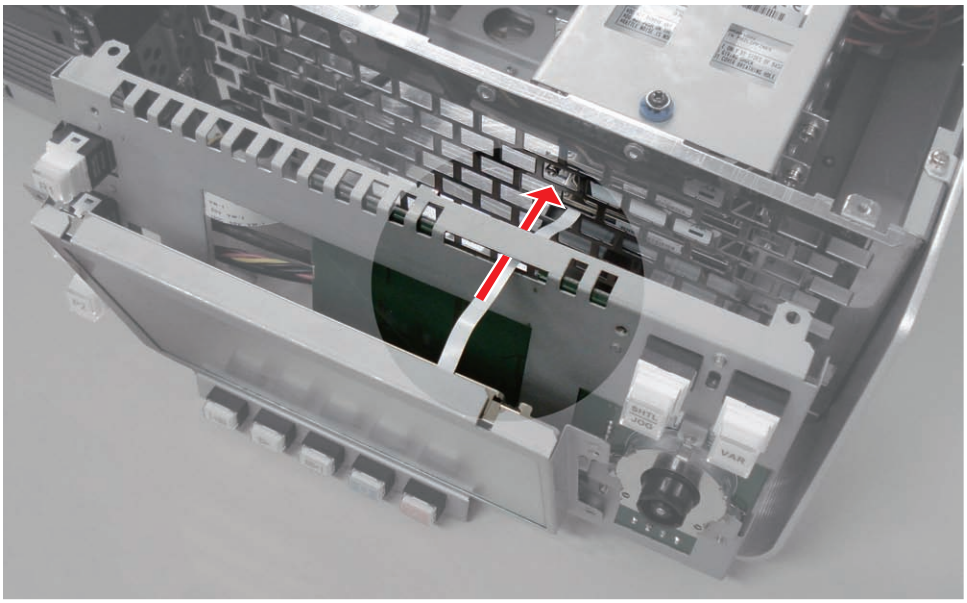


4. Remove the button kit from the touch screen LCD.
   (1) Remove four screws (with springs and small washers).
   (2) Remove the button kit from the touch screen LCD.




***NOTE: When you attach the touch screen LCD to the button kit, be sure to attach it with the upper, lower, right, and left sides are correctly aligned.***

***NOTE: When you install the touch screen LCD to the button kit, insert the ribbon cable into the slit on the upper part of the button kit.***



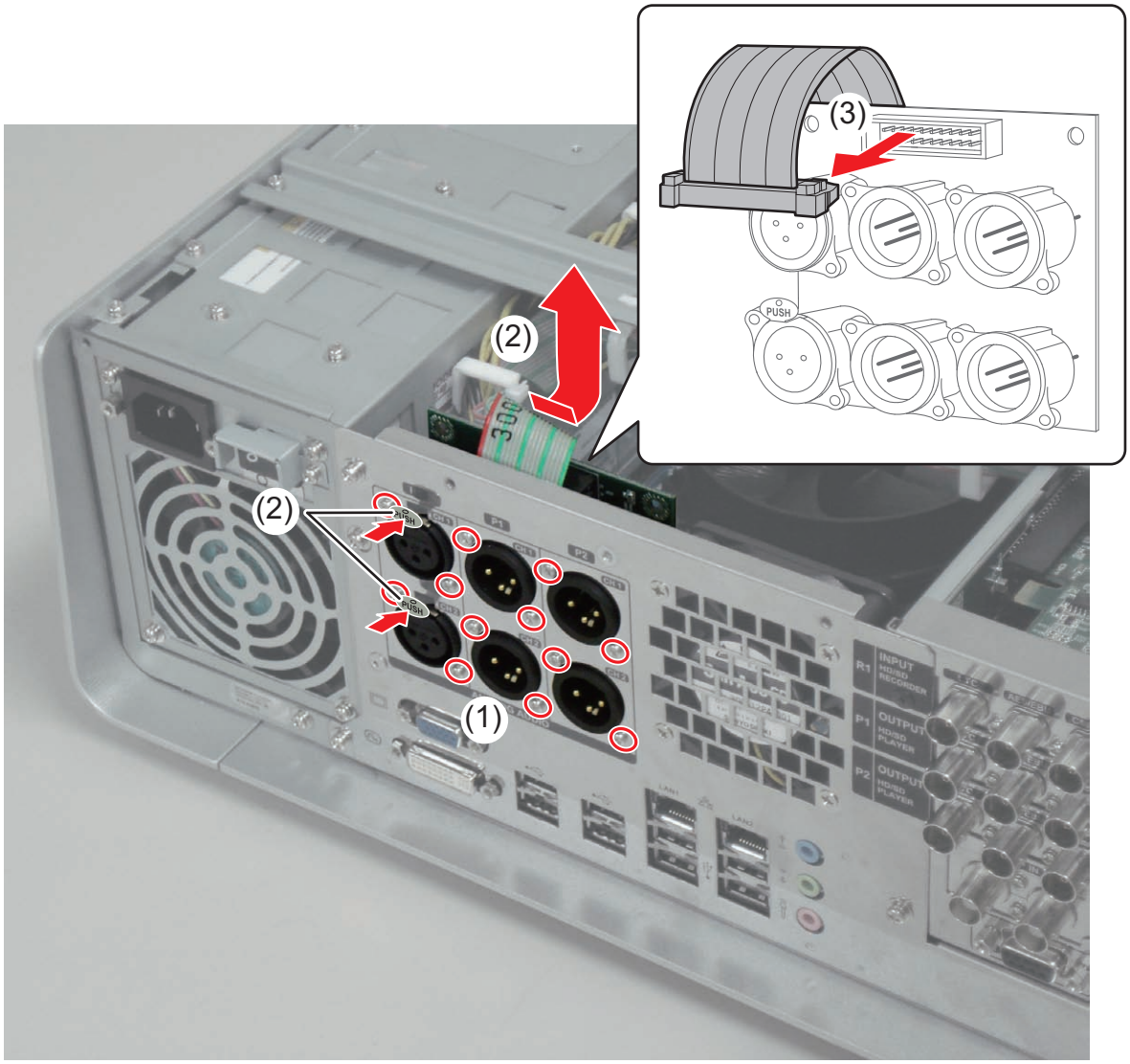
# Memory (RAM) removal

1. Remove the top cover (rear).
   - For more information, see "Top cover (rear) removal" on page 93.
2. Remove the memory (RAM) from the T2.
   (1) Push and open the levers outward on both sides at the same time to remove the memory (RAM) from the slot.

***NOTE: When you install a memory (RAM), insert it perpendicular to the slot until it clicks into place.***

# XLR×6 unit removal

1. Remove the top cover (rear).
   - For more information, see "Top cover (rear) removal" on page 93.
2. Remove the XLR×6 unit from the T2.
   (1) Remove 12 round screws (small).
   (2) Push the tabs stamped as “PUSH” and remove the XLR×6 unit from the T2 in the direction of the arrow.
   (3) Disconnect the rear balanced audio cable while pressing down both sides of the connector.

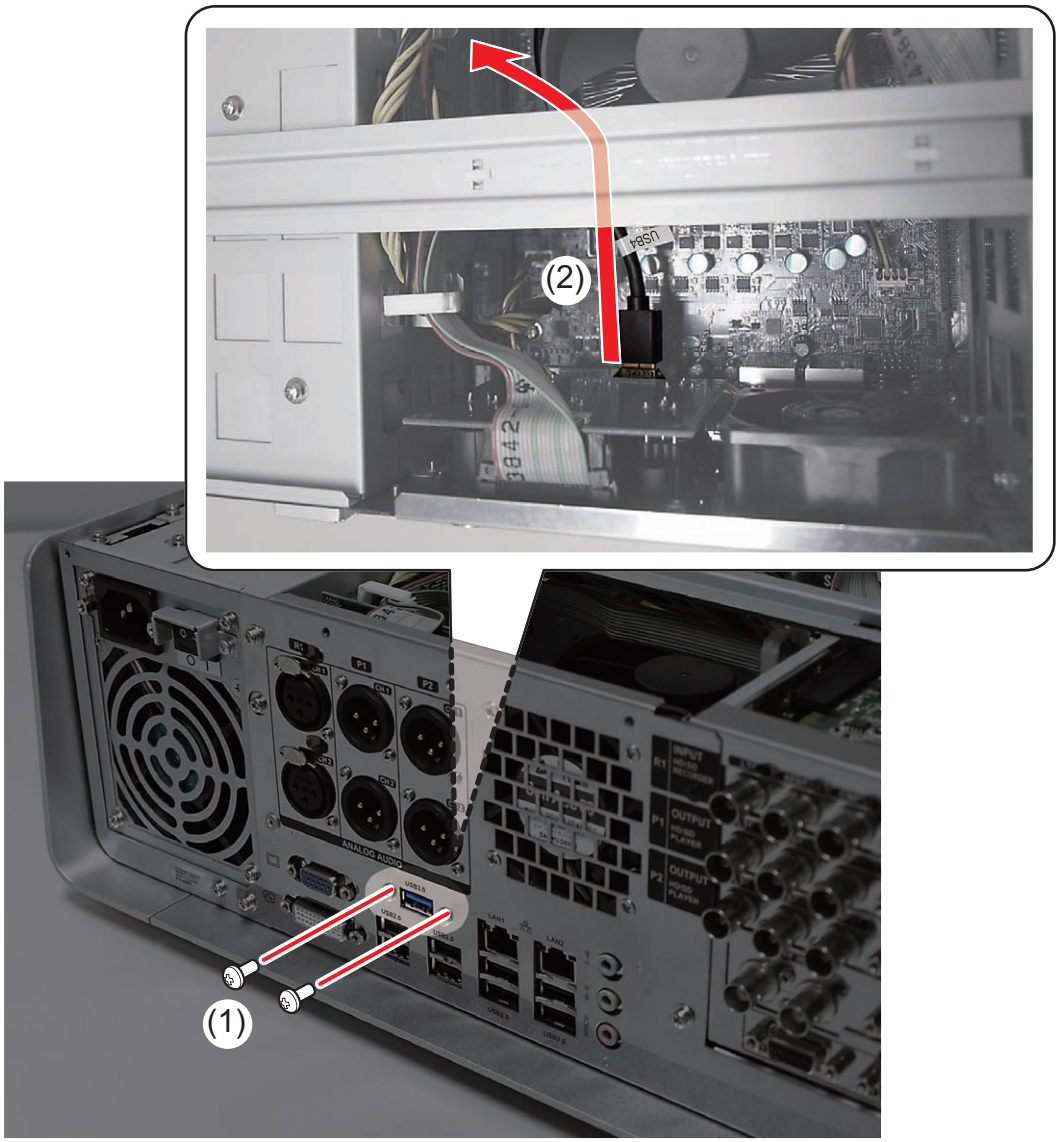



***NOTE: When installing the XLR×6 unit to the T2, insert the tabs stamped as “PUSH”, and then install it.***

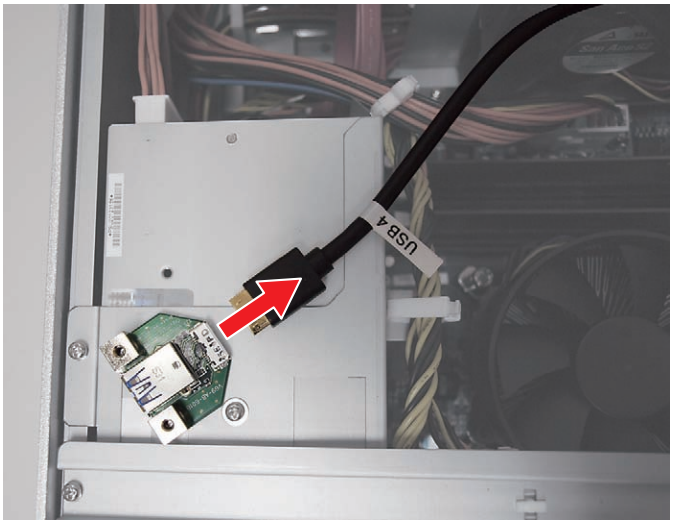
# Rear USB 3.0 port removal

Rear USB 3.0 port is equipped on T2 Elite 2/Pro 2/Express 2.

1. Remove the top cover (rear side).
   - For more information, see "Top cover (rear) removal" on page 93.
2. Remove the rear USB 3.0 port from T2.
   (1) Remove two round screws.
   (2) With the USB 3.0 cable connected, remove the rear USB 3.0 port in the direction of the arrow.

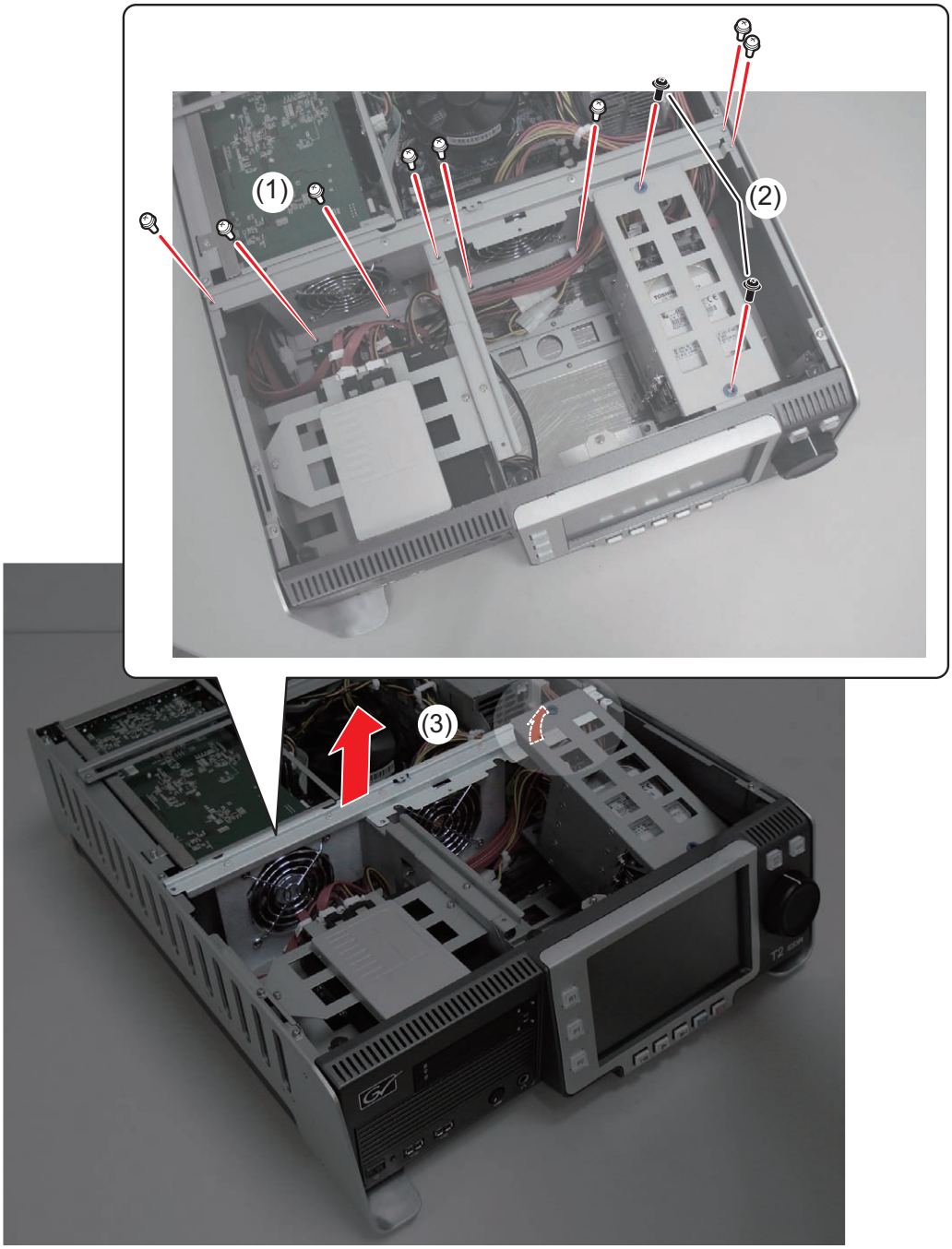


3. Disconnect the USB 3.0 cable.
   - The cable is labeled as "USB 4".

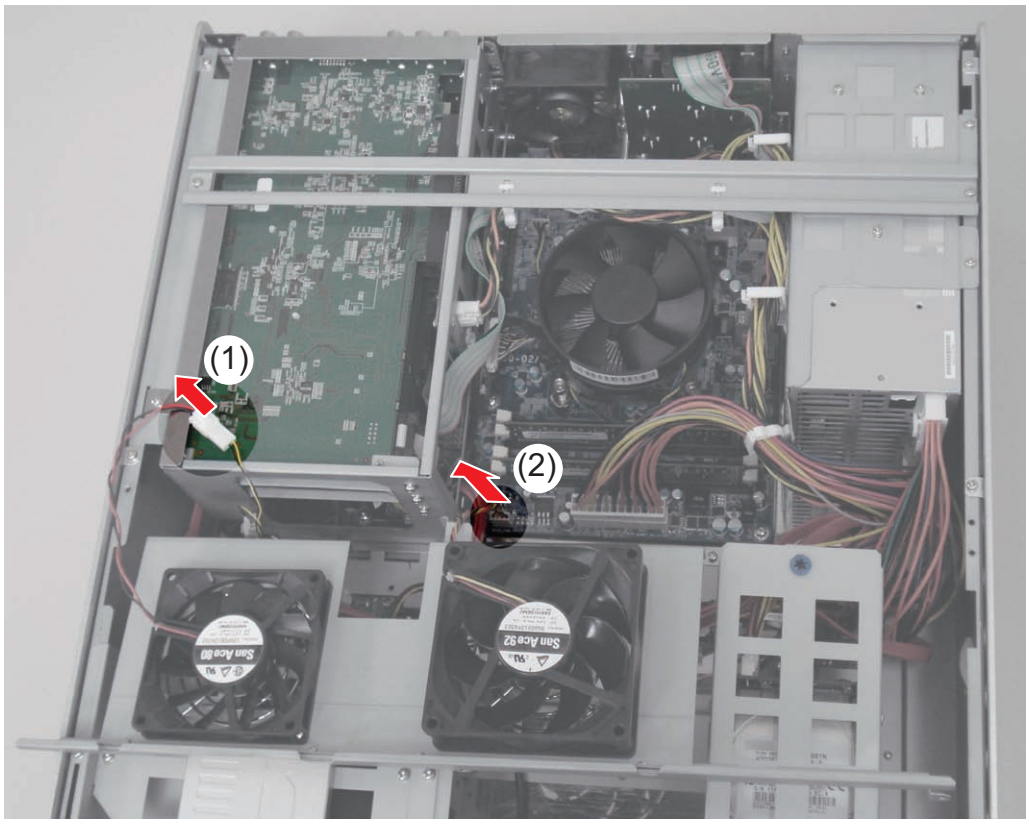


# Center fan (92 mm) removal

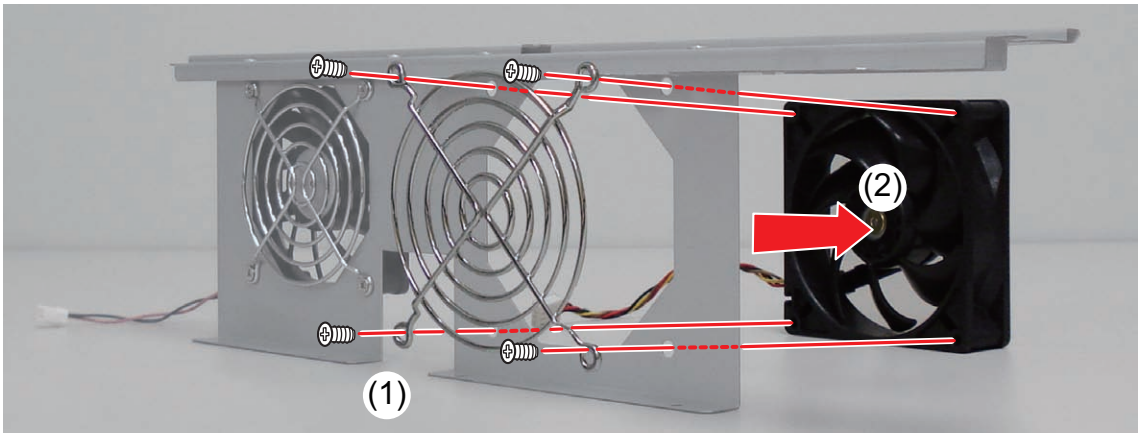
1. Remove the top cover (rear).
   - For more information, see "Top cover (rear) removal" on page 93.
2. Remove the center fan from the T2.
   (1) Remove eight screws (with springs and small washers) that secures the fan bracket.
   (2) Remove two HDD unit fixing screws on the HDD/SSD (for data).
   (3) Lift up the HDD/SSD (for data) in the direction of the arrow and remove the center fan in the direction of the arrow.



3. Disconnect the power cable.
   (1) Disconnect the power cable of the center fan (80 mm) from the power socket.
   (2) Disconnect the power cable of the center fan (92 mm) from the power socket.



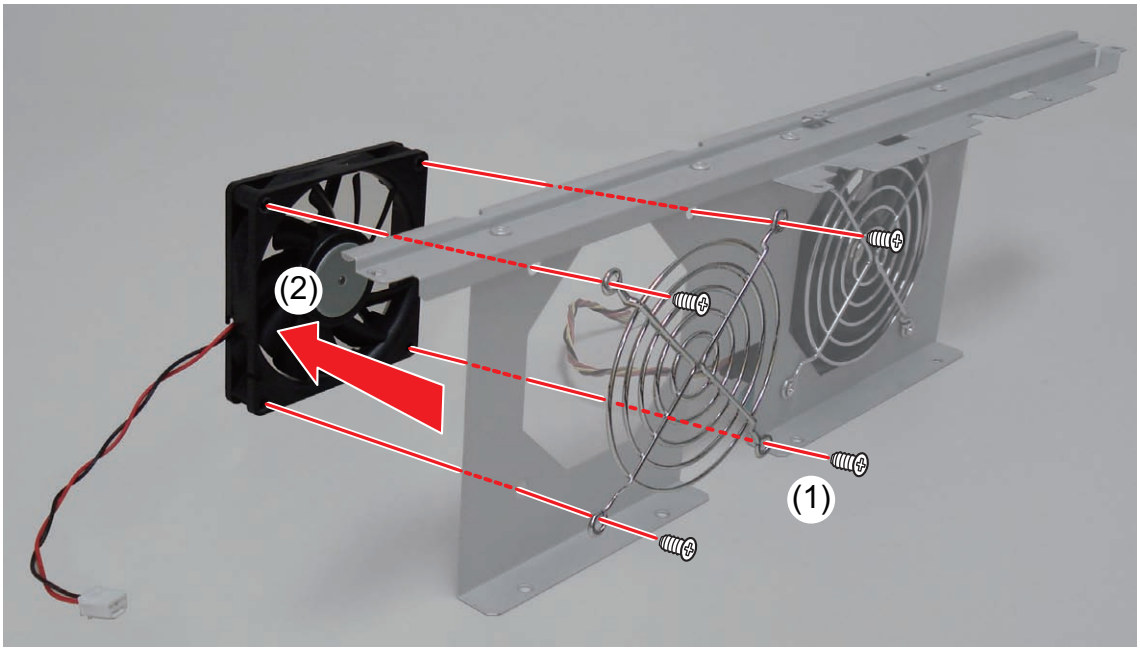

4. Remove the center fan from the fan bracket.
   (1) Remove the tapping screws.
   (2) Remove the center fan in the direction of the arrow.




***NOTE: When you install the fan to the fan bracket, place the fan so that its labeled surface faces the front side.***

# Center fan (80 mm) removal

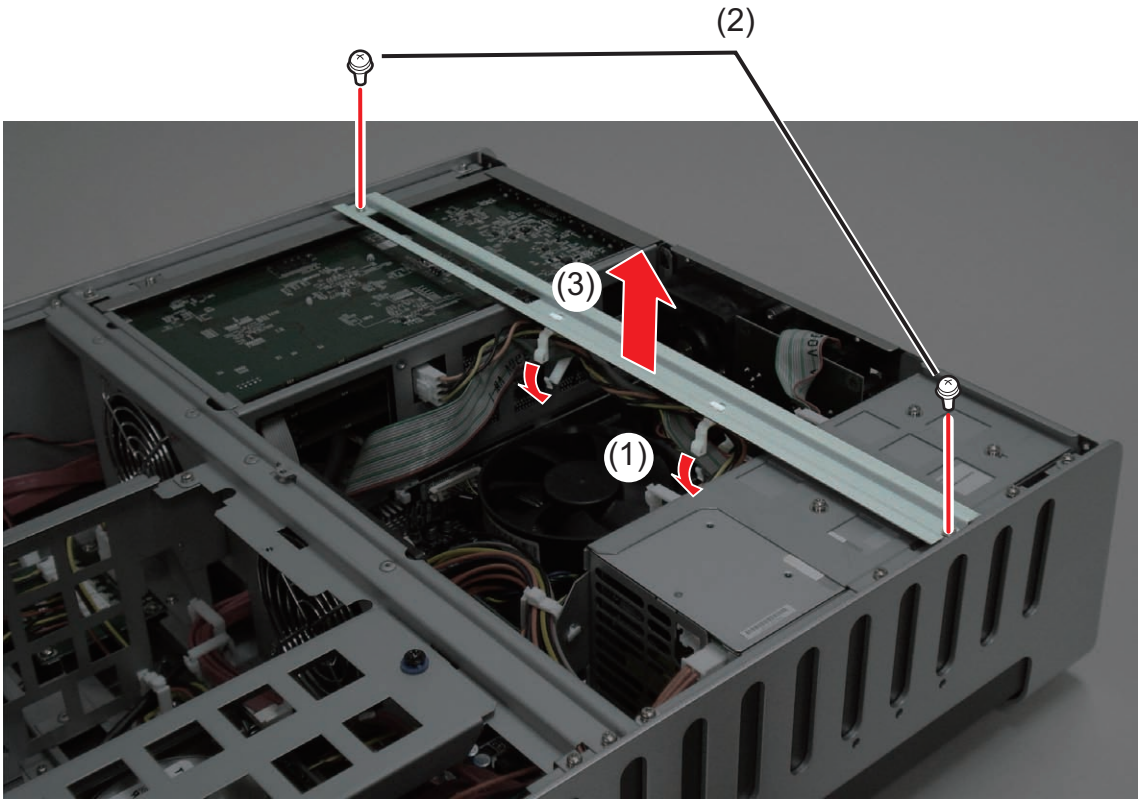
1. Perform the procedure in "Center fan (92 mm) removal" on page 123 up to step 3.
2. Remove the center fan from the fan bracket.
   (1) Remove the tapping screws.
   (2) Remove the center fan in the direction of the arrow.




***NOTE: When you install the fan to the fan bracket, place the fan so that its labeled surface faces the front side.***

# Rear fan (60 mm) removal

1. Remove the top cover (rear).
   - For more information, see "Top cover (rear) removal" on page 93.
2. Remove the rear beam.
   (1) Open the cable clips (two pieces) in the direction of the arrow and remove the power cable and rear balanced audio cable from the cable clips.
   (2) Remove two screws (with springs and small washers).
   (3) Remove the rear beam.

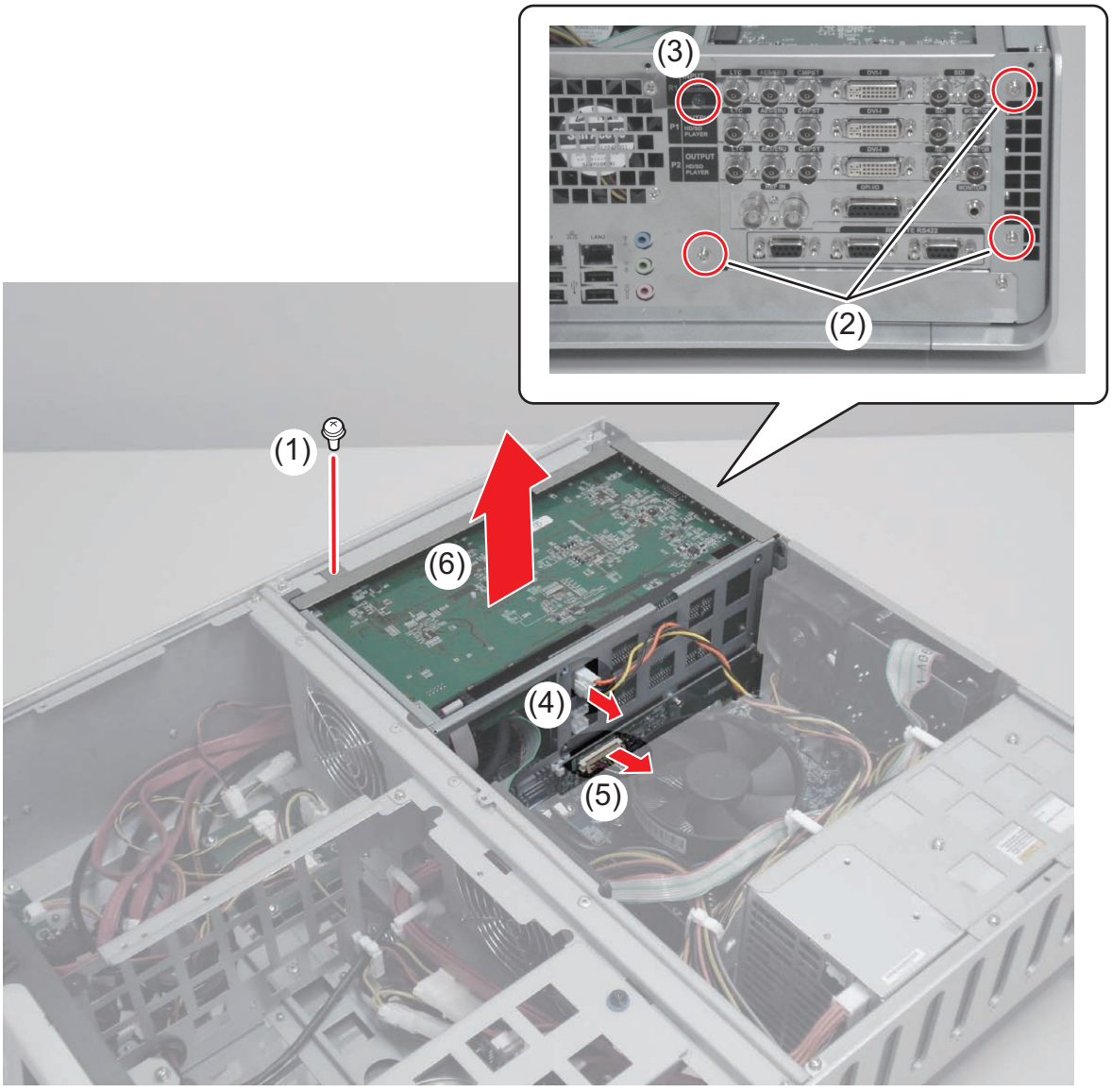


3. Remove the rear fan from the T2.
   (1) Disconnect the power cable from the power socket.
   (2) Remove the tapping screws.
   (3) Remove the rear fan in the direction of the arrow.

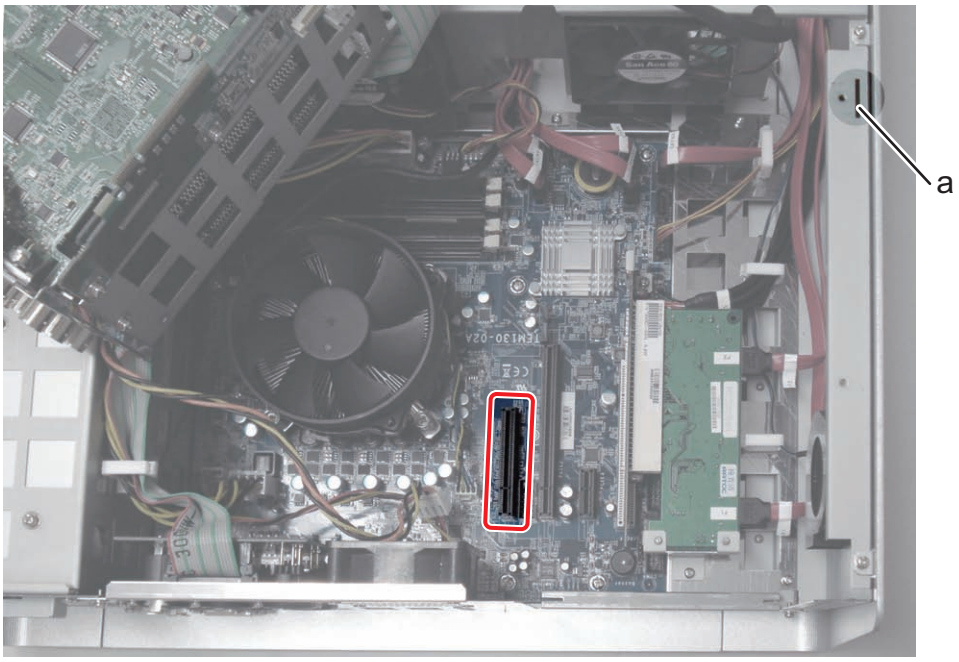
***NOTE: When you install the fan, place it so that its labeled side touches the rear panel.***

# I/O board unit removal

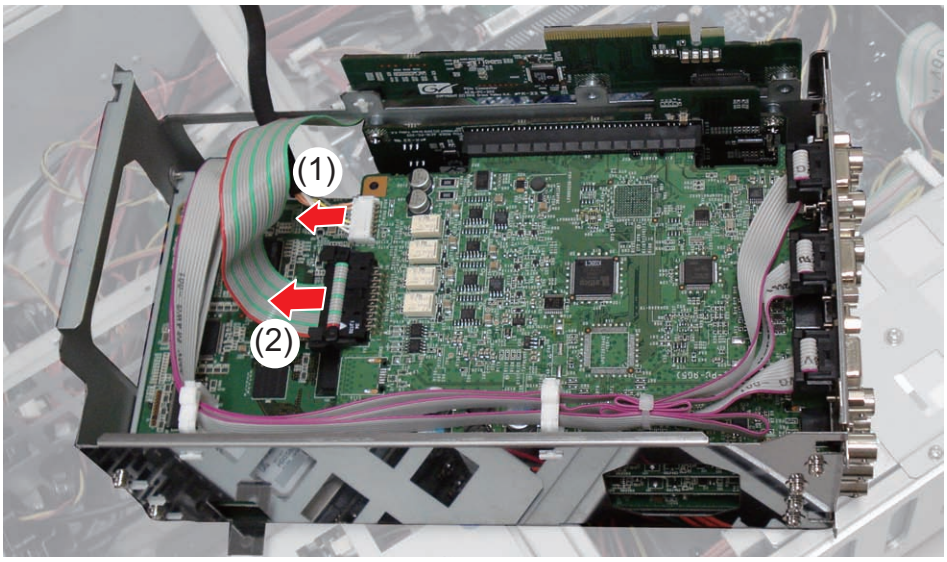
1. Perform the procedure in "Rear fan (60 mm) removal" on page 126 up to step 2.
2. Remove the I/O board unit from the T2.
   (1) Remove a screw (with a spring and small washer).
   (2) Remove three screws (with springs and large washers) on the rear side.
   (3) Remove the round screw (black) on the rear side.
   (4) Disconnect the power cable.
   (5) Disconnect the signal cable.
   (6) Remove the I/O board unit in the direction of the arrow.



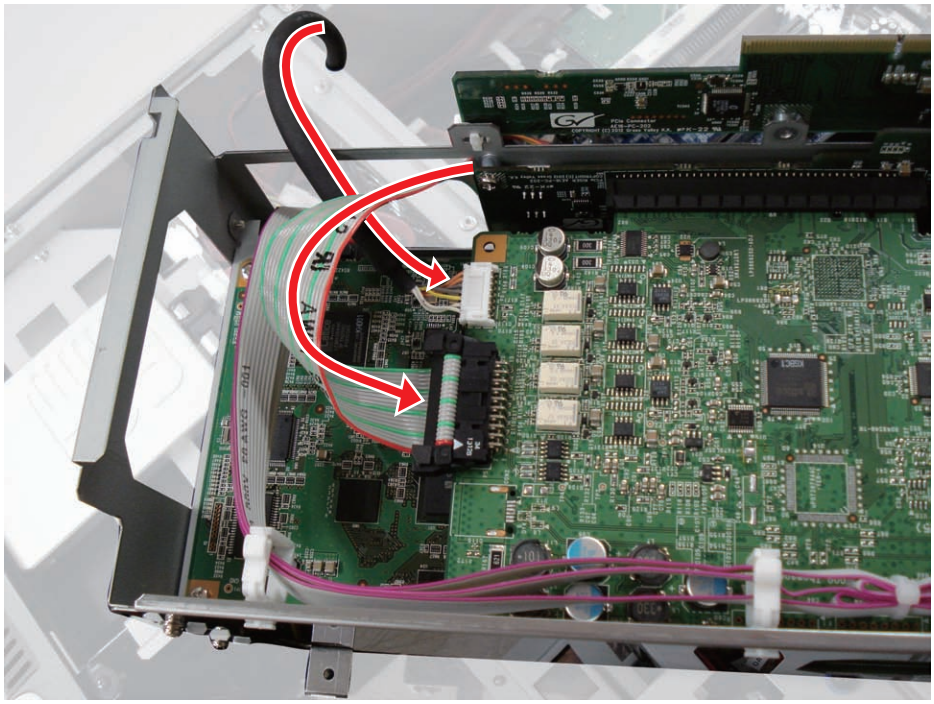
***NOTE: When you install the I/O board unit onto the T2, insert it into the PCI Express ×4 slot and the slit (a).***




3. Disconnect the cables.
   (1) Disconnect the audio cable (front headphone).
   (2) Disconnect the rear balanced audio cable while pressing down both sides of the connector.



***NOTE: When you connect the cables, route them as they were before you disconnected them. When you install the audio cable (front headphone), route it from the outside of the I/O board unit (upper left of the preceding illustration). To connect the rear balanced audio cable, route it through the gap between the frames (upper left of the preceding illustration).***



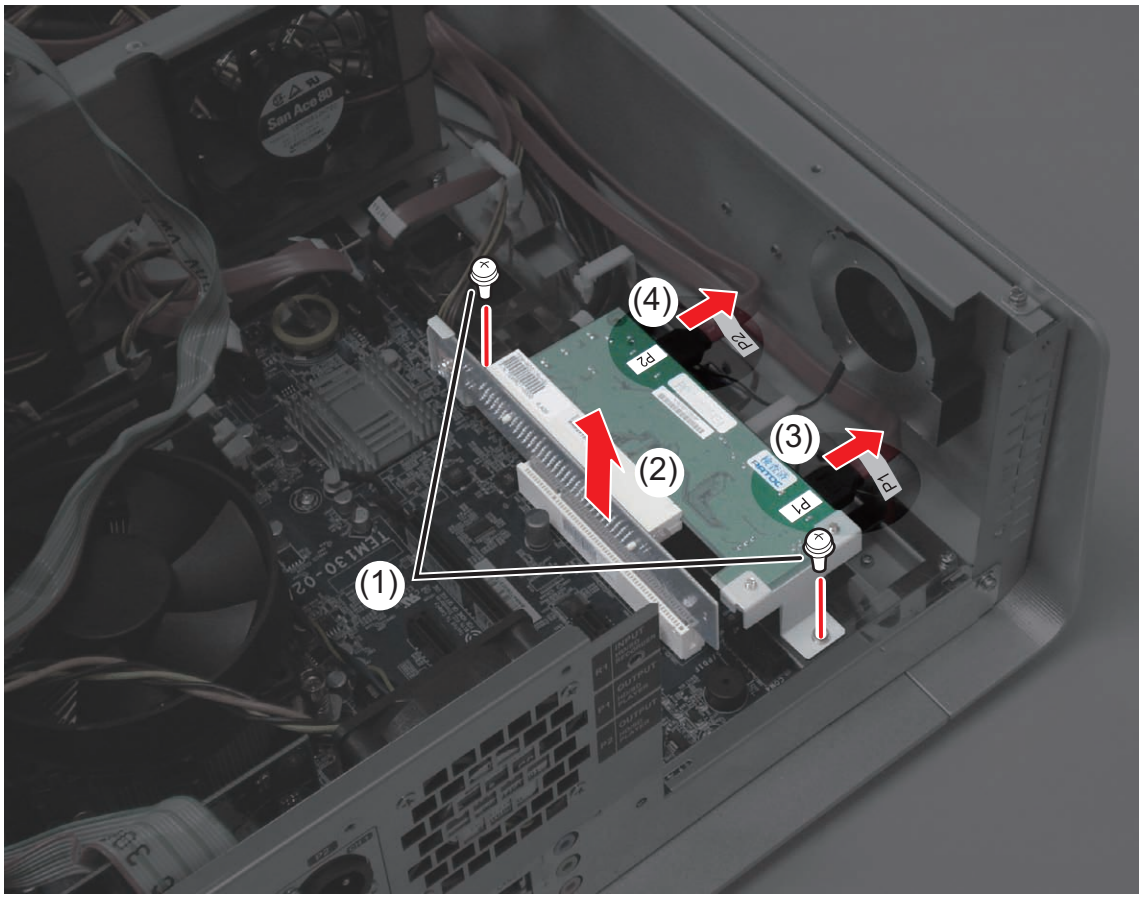
# SATA card unit removal

SATA card unit is equipped on T2 Elite/Pro/Express.

1. Perform the procedure in "I/O board unit removal" on page 128 up to step 2.
    - It is not necessary to disconnect the cables connected to the I/O board unit.

2. Remove the SATA card unit from the T2.
   (1) Remove two screws (with springs and small washers).
   (2) Remove the SATA card unit from the PCI slot.
   (3) Disconnect the SATA cable while holding the latch.
   - The cable is labeled as “P1”.

   (4) Disconnect the SATA cable while holding the latch.
   - The cable is labeled as “P2”.




# PCI-e USB 3.0 card removal

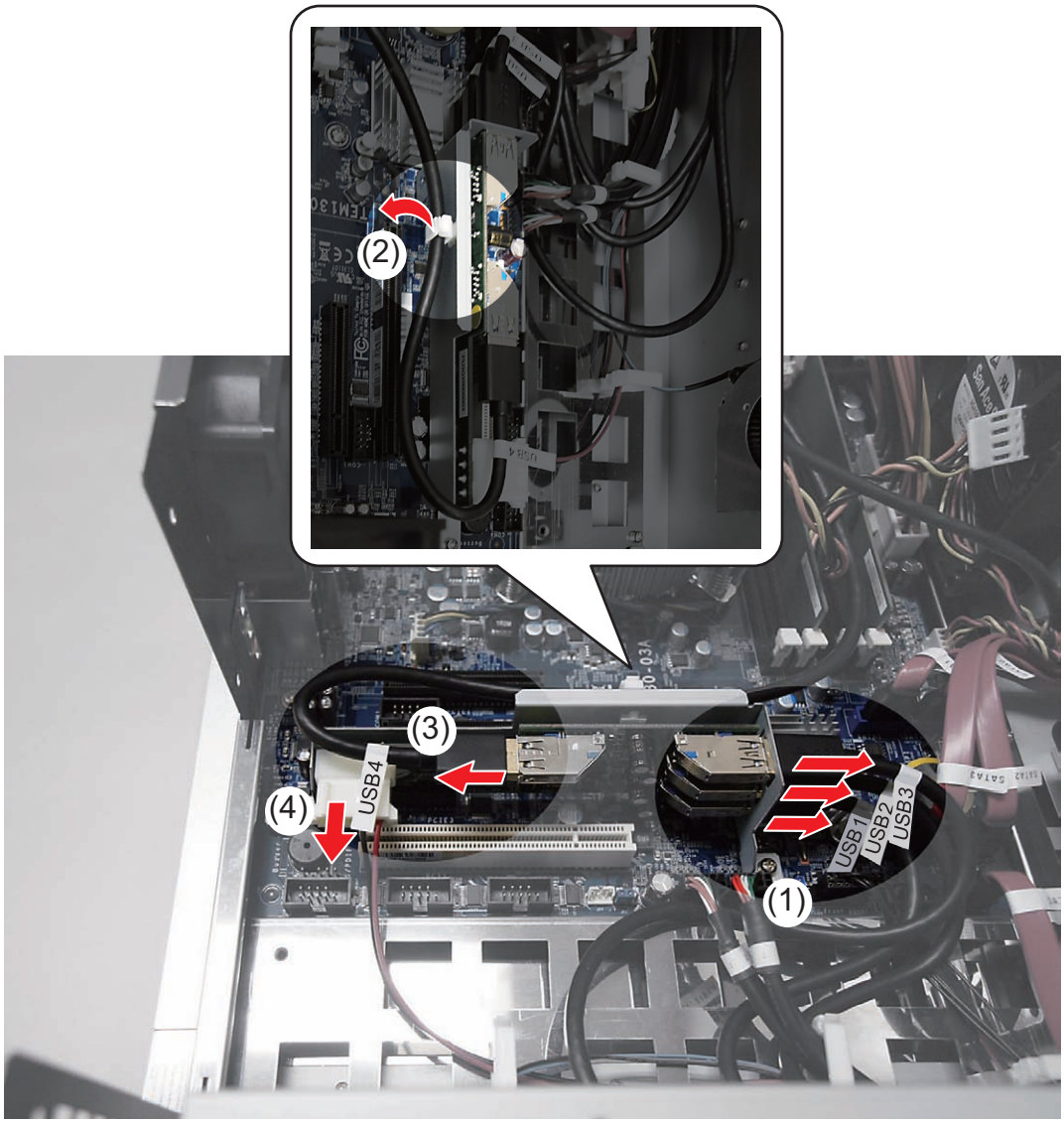
PCI-e USB 3.0 card is equipped on T2 Elite 2/Pro 2/Express 2.

1. Perform the procedure for "I/O board unit removal" on page 128 up to step 2.
   - It is not necessary to disconnect the cables connected to the I/O board set.

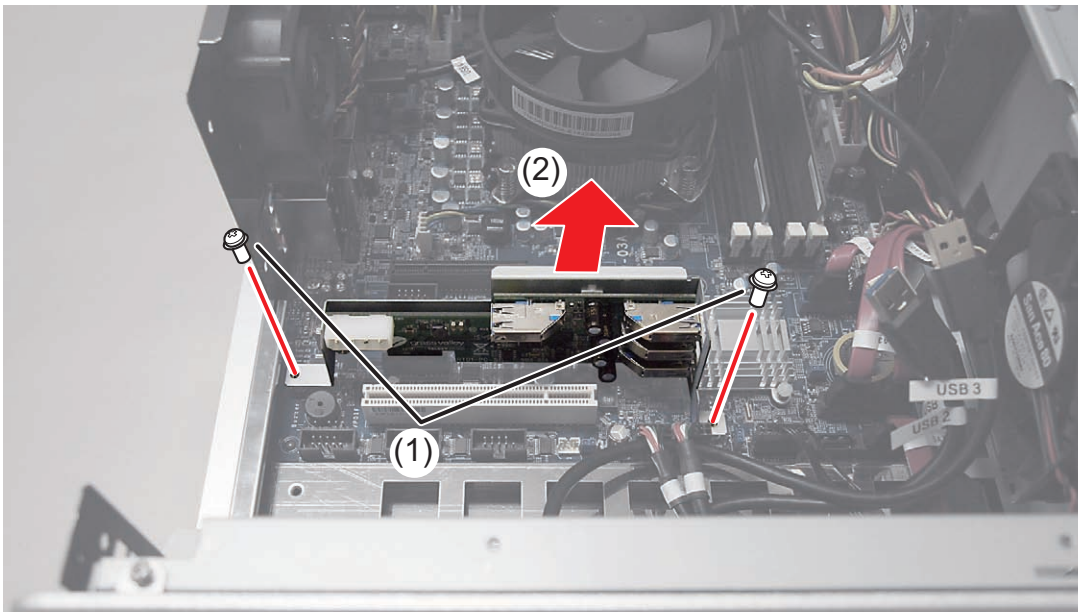
2. Disconnect the cables.
   (1) Disconnect the USB 3.0 cable.
   - For T2 Elite 2, disconnect three of them. The cables are labeled as "USB 3", "USB 2", and "USB 1" from the top.
   - For T2 Pro 2/Express 2, disconnect two of them. The cables are labeled as "USB 2" and "USB 1" from the top.

   (2) Remove the cable clip.
   (3) Disconnect the USB 3.0 cable.
   - The cable is labeled as "USB 4".

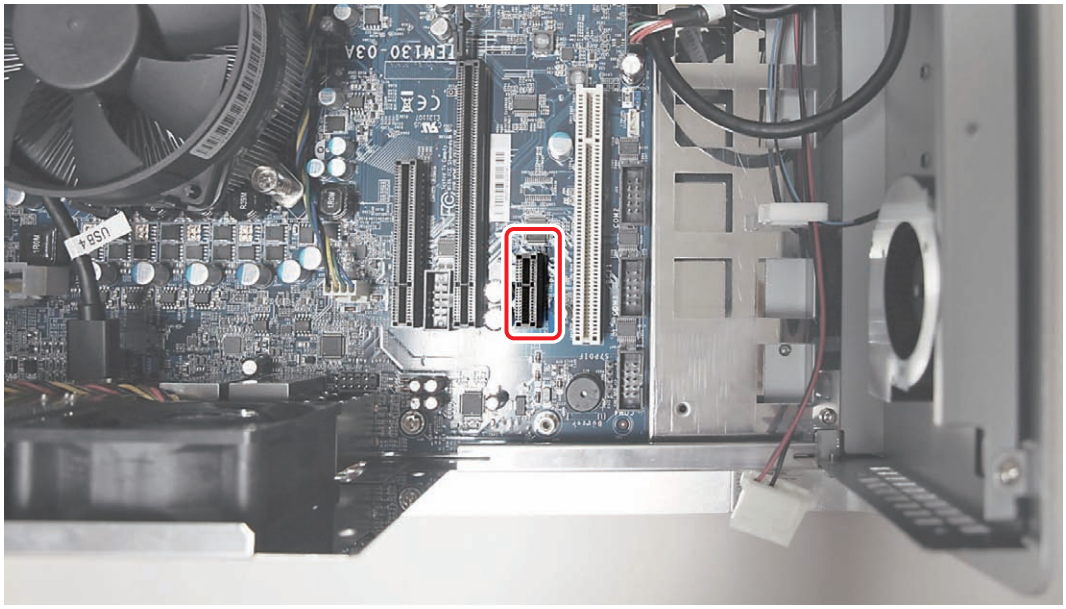
   (4) Disconnect the power cable.



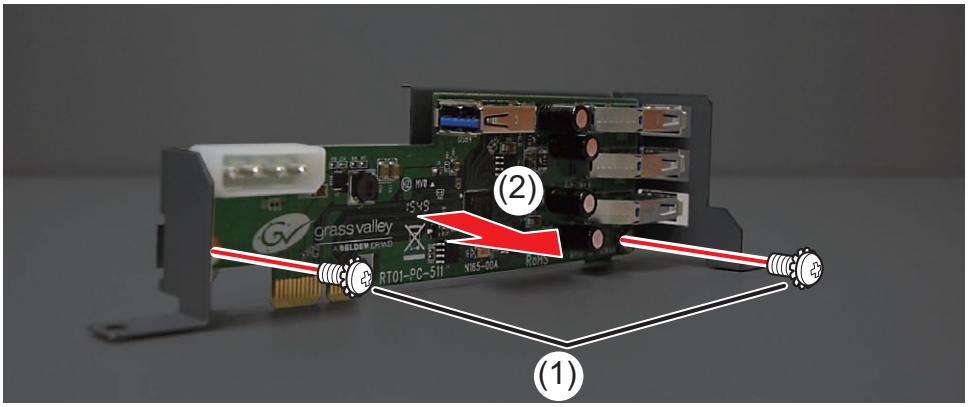
3. Remove the PCI-e USB 3.0 card from T2.
   (1) Remove two screws (with springs and small washers).
   (2) Remove the PCI-e USB 3.0 card in the direction of the arrow.




***NOTE: When you install the PCI-e USB 3.0 card onto T2, insert it into the PCI Express x1 slot.***



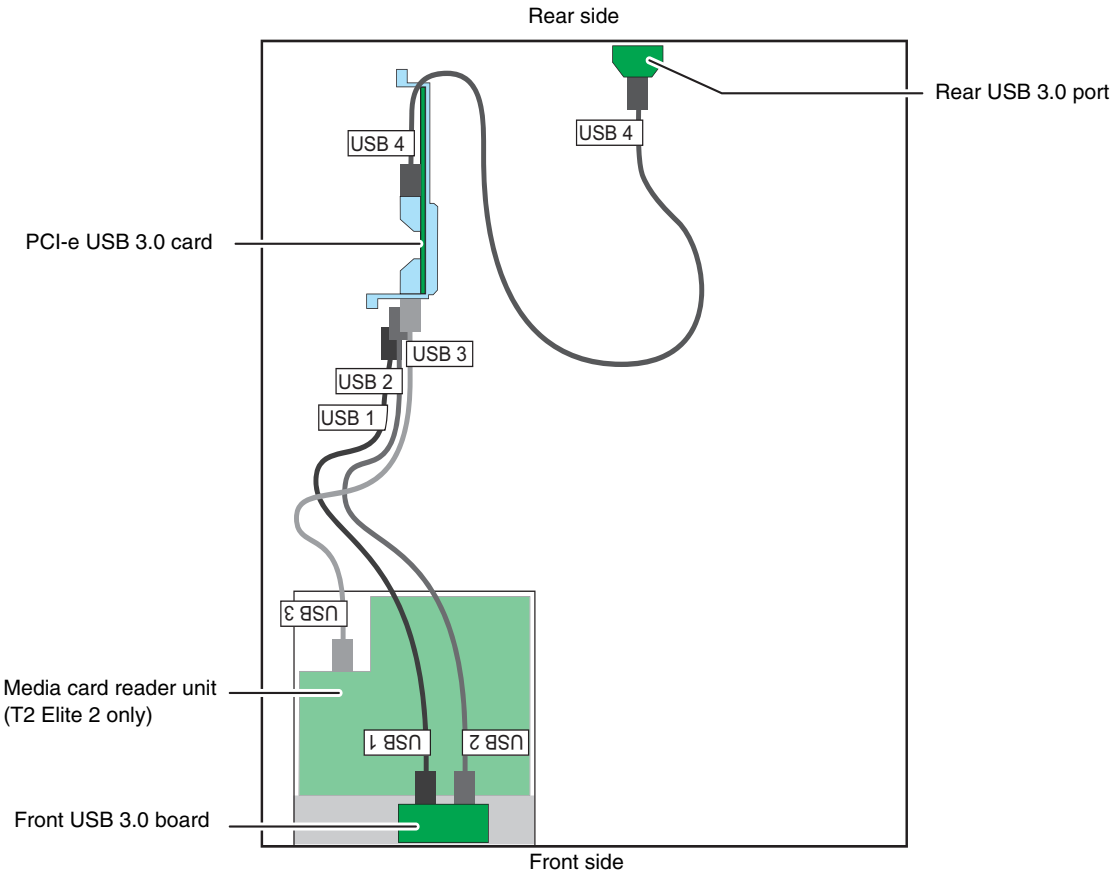
4. Remove the PCI-e USB 3.0 card from the stay.
   (1) Remove two screws (with external toothed washers).
   (2) Remove the PCI-e USB 3.0 card in the direction of the arrow.



# USB 3.0 cable disconnection

T2 Elite 2 is equipped with four USB 3.0 cables, and T2 Pro 2/Express 2 is equipped with three USB 3.0 cables.

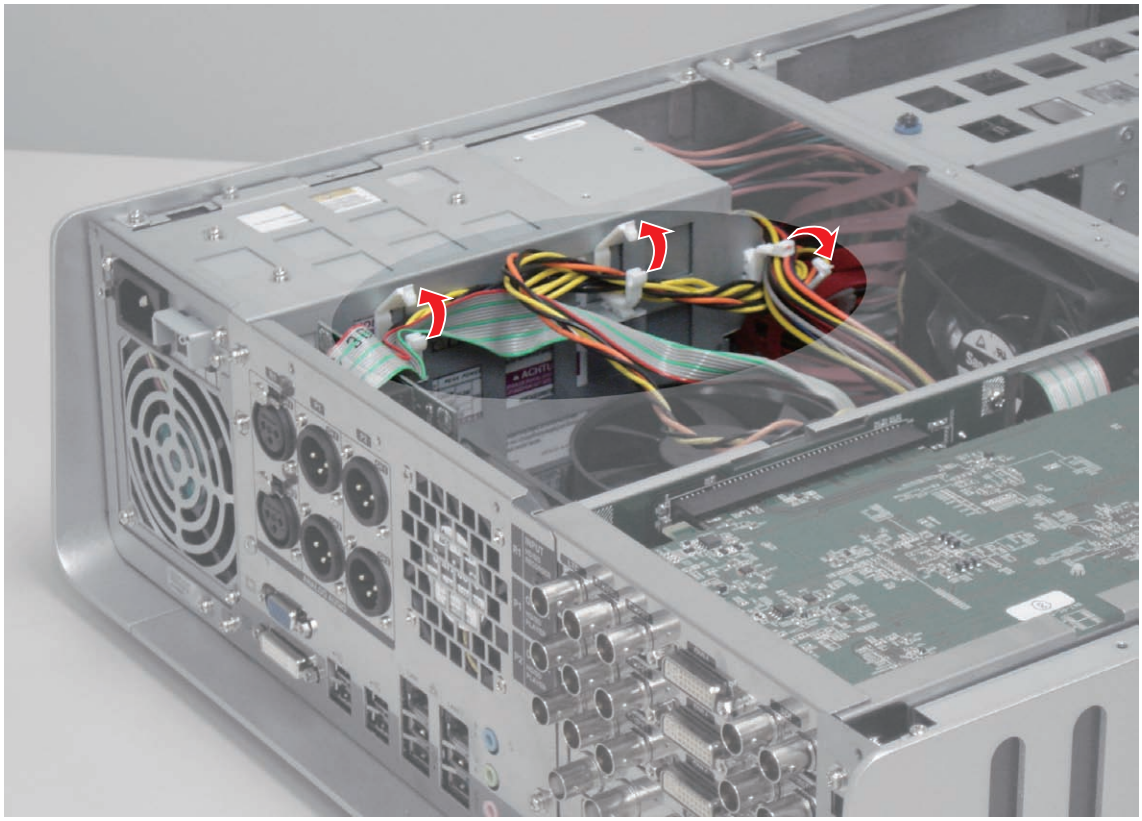
They are connected as in the figure below.



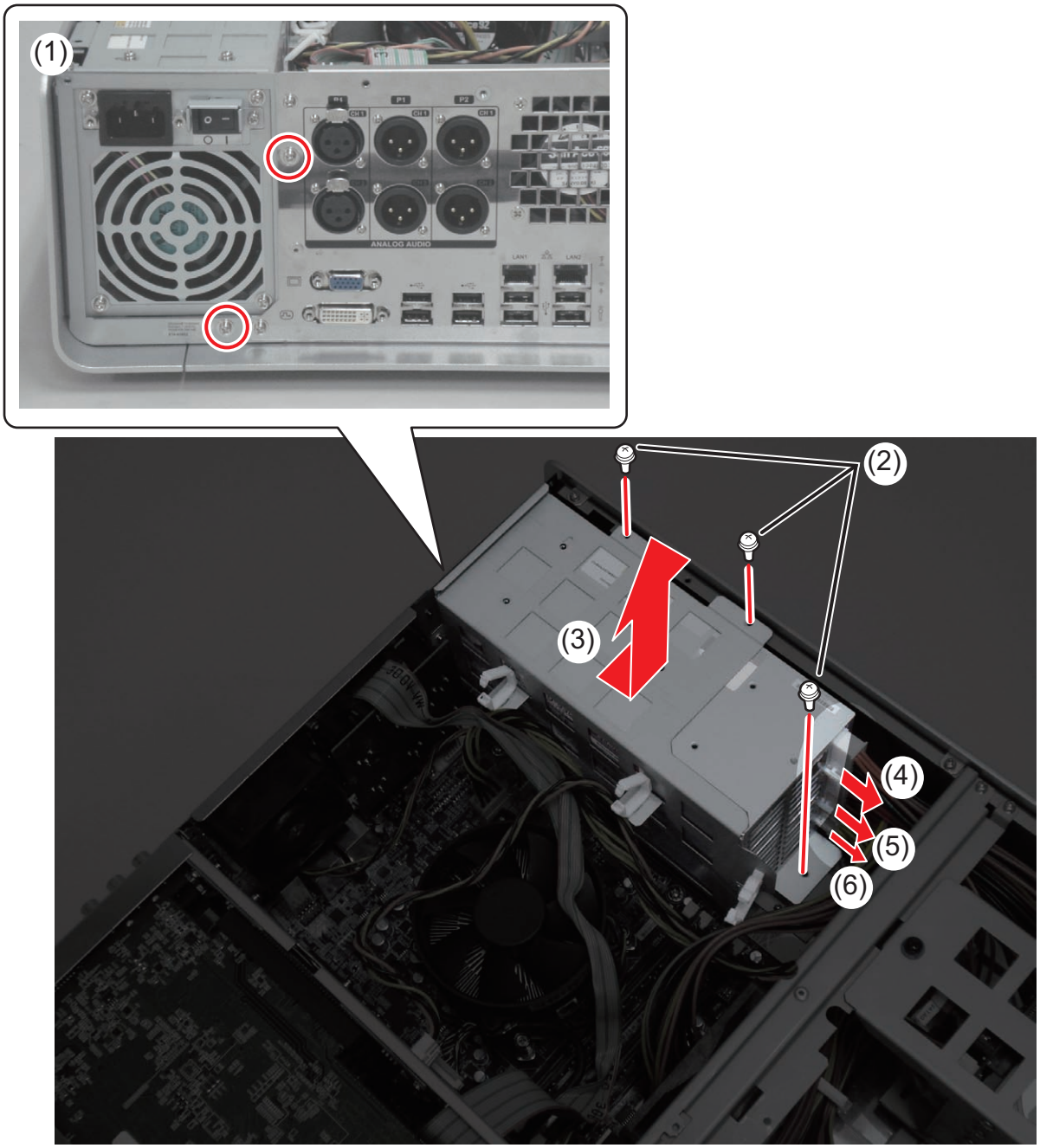

1. Perform the procedure for "PCI-e USB 3.0 card removal" on page 131 up to step 2 (3).
2. Perform steps 2 and 3 in "Rear USB 3.0 port removal" on page 121.
3. Perform steps 2 to 4 in "Front USB 3.0 board removal" on page 102.
4. For T2 Elite 2, perform the procedure for "Media Card Reader Assy removal" on page 103 through steps 3 to 4(1).

# Power supply unit removal

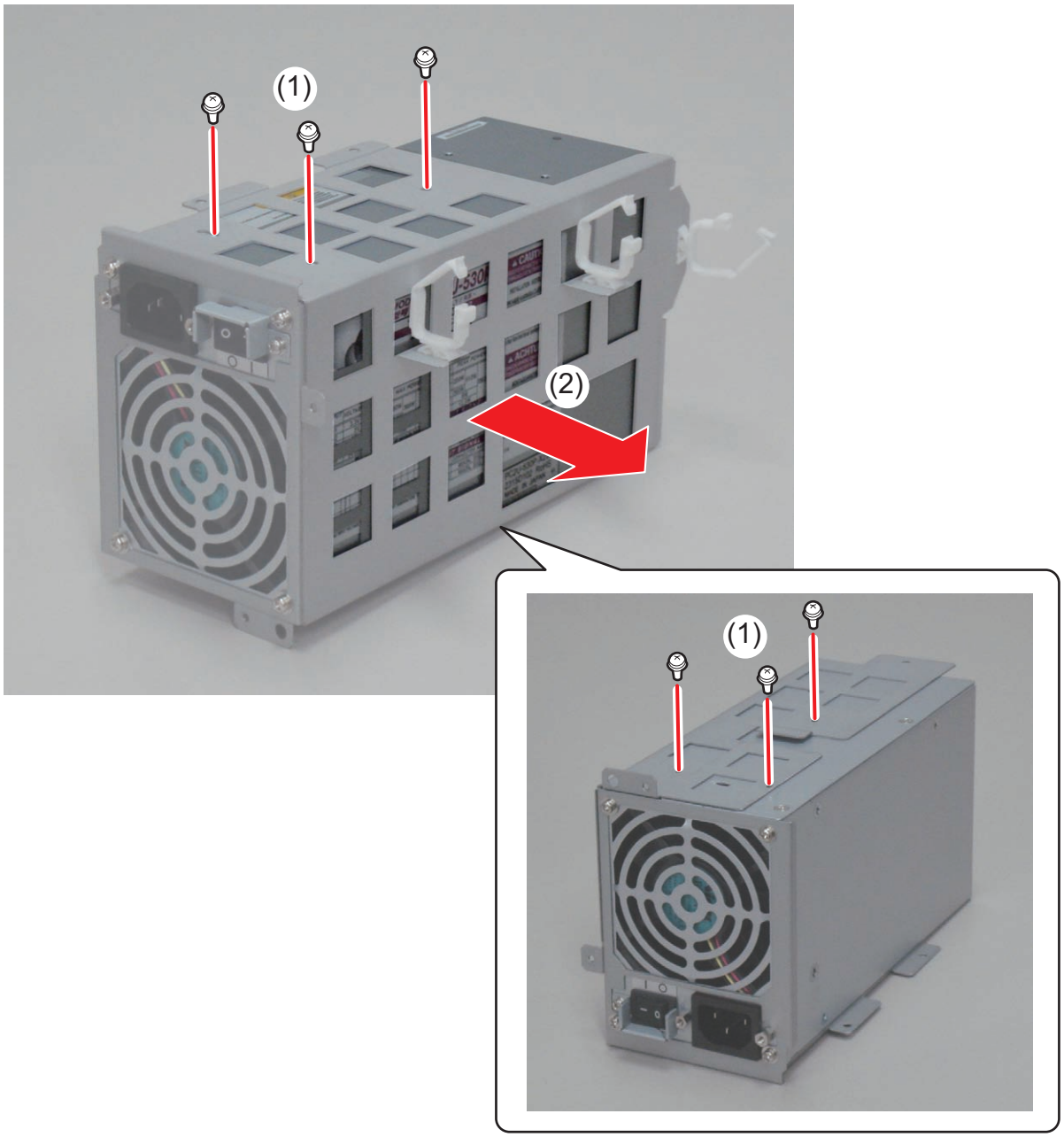
1. Perform the procedure in "Rear fan (60 mm) removal" on page 126 up to step 2.
2. Open the cable clips (three pieces) in the direction of the arrow and remove the three power cables and rear balanced audio cable from the cable clips.



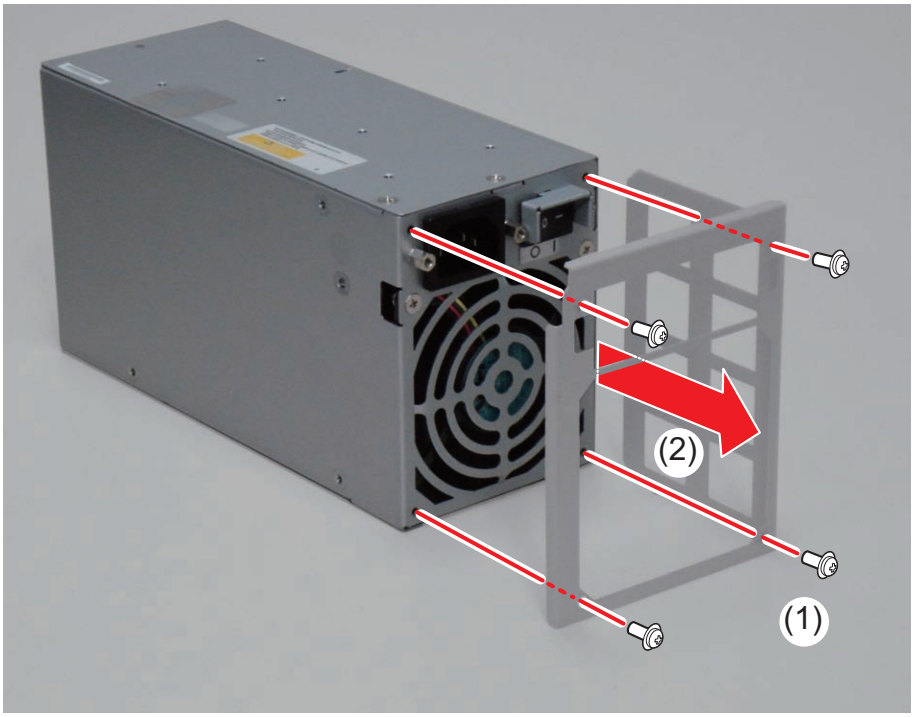
3. Remove the power supply unit from the T2.
   (1) Remove two screws (with springs and large washers) on the rear side.
   (2) Remove three screws (with springs and small washers).
   (3) Remove the power supply unit in the direction of the arrow.
   (4) Disconnect the 24 pin power connector.
   (5) Disconnect the 10 pin power connector.
   (6) Disconnect the 8 pin power connector.



4. Remove the power supply unit from the mount frame.
   (1) Remove six screws (with springs and large washers) that secures the mount frame.
   (2) Remove the mount frame.



5. Remove the power supply unit from the rear support frame.
   (1) Remove four screws (with springs and large washers) that secures the support frame.
   (2) Remove the support frame from the power supply unit.



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