

opentext™

Tableau TD2u

Version 2.0

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Tableau TD2u User Guide

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This documentation has been created for software version 2.0.

It is also valid for subsequent software versions as long as no new document version is shipped with the product or is published at <https://knowledge.opentext.com>.

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CONTENTS

Preface	7
About this Guide	7
Conventions Used in this Guide	7
Disk Capacity and Transfer Rate Measurement Conventions	7
CHAPTER 1 Overview	9
Tableau TD2u	11
TD2u Kit Contents	11
Navigating the TD2u	14
Reading the LEDs	15
USB Keyboard Support	15
CHAPTER 2 Setting up the TD2u	17
Startup Sequence	19
Initialization	19
Configuring the TD2u	19
User-Selected Startup Mode	19
System Settings (Menu 7.1)	20
Set Examiner Name (Menu 7.1.2)	23
Imaging Setup (Menu 7.2)	24

Error Recovery Modes	27
Factory Reset (Menu 7.3)	28
Duplicator Info (Menu 8)	28
Connecting Hard Drives	29
Drive Detection	30

CHAPTER 3 Using the TD2u 31

Overview	33
TD2u Menus and Options	33
Duplicate (Menu 1)	36
Initiating a Duplication Job (Menu 1)	36
Image Destinations	38
Preconditions Checking	39
Wipe Disk (Menu 2)	42
Single Pass Wipe	43
Multi-Pass Wipe	43
Secure Erase	43
Encryption (Menu 3)	44
Encrypt New Destination (Menu 3.1)	45
Unlock Destinations (Menu 3.2)	46
Change Dest Password (Menu 3.3)	46
Disk Information (Menu 4)	47
Disk Utilities (Menu 5)	49
Format (Menu 5.1)	49
Hash (Menu 5.2)	51
Blank Check (Menu 5.3)	51
HPA, DCO, and AMA Removal (Menu 5.4)	52
Status Information	52
Logs Menu (Menu 6)	54
View Logs (Menu 6.1)	55
Save All Logs (Menu 6.2)	58
Delete All Logs (Menu 6.3)	58

Print All Logs (Menu 6.4)	58
Resetting and Clearing Internally Stored Information	59
CHAPTER 4 Troubleshooting and Support	63
Troubleshooting Common Problems	65
Power Supply Issues	65
Problems with Disk Detection	65
Problems with Encrypted Drives	67
Replacing the Backup Battery for the Real-time Clock	68
Compatible Batteries	68
Replacing the Battery	68
Testing the New Battery	71
 Index	 73

PREFACE

About this Guide

This guide presents a wide range of technical information and procedures for using the TD2u. It is divided into the following chapters.

- **Overview:** Provides general information about the TD2u as well as unpacking, starting up, and navigating the TD2u menus and indicators.
- **Setting up the TD2u:** Provides system overview information about the TD2u as well as procedures for configuring and connecting the TD2u.
- **Using the TD2u:** Provides detailed information and procedures for using the TD2u.
- **Troubleshooting and Support:** Provides a brief list of potential problems and solutions. For more complete and current troubleshooting information as well as answers to frequently asked questions (FAQ), visit the Tableau web site at www.guidancesoftware.com/tableau.

Conventions Used in this Guide

The TD2u has two soft keys placed immediately under the LCD display. The bottom line of the display shows text indicating the current function for each of the two soft keys. In this guide, soft key labels are indicated with square brackets. For example, **[Select]** indicates that Select is displayed above a soft key on the display.

Disk Capacity and Transfer Rate Measurement Conventions

The computer industry generally adheres to two different conventions for the definitions of the terms megabyte (MB) and gigabyte (GB). For computer RAM, 1 MB is defined as $2^{20} = 1,048,576$ bytes and 1 GB is defined as $2^{30} = 1,073,741,824$ bytes. For disk storage, 1 MB is defined as $10^6 = 1,000,000$ bytes and 1 GB is defined as $10^9 = 1,000,000,000$ bytes. These two conventions are known as powers of two and powers of ten respectively. Microsoft deviates from the hard disk capacity measurement convention and uses the powers of two convention for its operating systems.

Tableau reports disk capacities and transfer rates according to the industry standard powers of ten convention. In TD2u screens, reports, and documentation, a 4 GB hard disk stores up to 4,000,000,000 bytes; a hard disk with a 150 MB/sec transfer rate transfers 150,000,000 bytes per second.

Note: For a complete list of changes for a given TD2u firmware release, see the release notes for the latest TFU version on the Tableau products web page at www.guidancesoftware.com/tableau.

CHAPTER 1

OVERVIEW

Tableau TD2u	11
TD2u Kit Contents	11
Navigating the TD2u	14
Reading the LEDs	15
USB Keyboard Support	15


Tableau TD2u





The Tableau TD2u is a forensic duplicator capable of performing 1:1, 1:2, and 1:3 duplications. It has many of the functions traditionally found in general-purpose, IT-oriented hard disk duplicators and provides features and functions that serve the specialized needs of forensic practice, including:


- Sustained data transfer rates of up to 16 GB/minute, while performing calculations of MD5, SHA-1, and SHA-256 hash values, also known as fingerprints.
- Native support for USB 3.0, SATA and IDE hard disks from the source interface.
- Parallel duplication to two SATA and one USB 3.0 destination hard disks.
- Parallel image and clone duplication.
- Optional destination disk encryption to ensure security of imaged source data.
- Detailed log generation for case documentation.
- Automatic blank checking of source and destination drives.
- HPA, DCO, and AMA support for the detection and handling of hidden/protected data areas on source and destination drives.
- Automatic shutdown/standby of idle drives.
- Multi-lingual support for the UI and character input.

TD2u Kit Contents

The TD2u ships in a boxed kit that includes the following:

Item	Model #	Description
 A black, compact forensic duplicator device with a control panel on top and various ports on the front.	TD2u	TD2u Forensic Duplicator

Item	Model #	Description
	TP5-NC	High-output power supply. The TP5 provides enough power to supply the TD2u and most common combinations of source and destination hard disks. The TP5 uses a universal 2-pin AC line cord and is compatible with 110-240VAC line voltages worldwide.
	TP5-LC-US	North America shipments include the TP5-LC-US AC line cord for use with the TP5-NC power supply. When shipped to other geographic markets, the local reseller typically adds an AC line cord appropriate for the local market.
	TC2-8-R2	Hard disk power cable to connect IDE and some legacy-style SATA hard disks to the TD2u (3M to Molex).
	TC3-8	SATA signal cable to connect SATA hard disks to the TD2u.

Item	Model #	Description
	TC4-8-R2	SATA/SAS power/signal cable to SAS and 3M power (2 pieces). This unified cable connects power and signal connectors current hard disks.
	TC5-8-R2	Hard disk power cable to connect 15-pin SATA power connectors to the TD2u (SATA to 3M).
	TC6-8	IDE signal cable to connect IDE hard disks to the TD2u. Do not use the TC6-8 IDE cable to connect notebook drive adapters to the TD2u. Use the shorter TC6-2 IDE cable shown with the TKA5-AD adapter pack below.
	TC8	USB 2.0 cable. Used to connect the TD2u to a host computer for firmware updates.
	TQS-TD2u	Quick Start card for the TD2u kit.

Do not discard the foam packaging. It is designed to fit several industry-standard hard-sided carrying cases. If you received the TD2u kit in the cardboard box shipped by Tableau, you can buy a hard-sided case and reuse the foam insert directly in that case.

Navigating the TD2u

When using the TD2u, you may be prompted to enter certain information into the display. Use the up/down/left/right arrow keys and the center button to select values.

While you are entering information, the TD2u displays two soft key functions at the bottom of the LCD display. The soft keys perform major actions such as selecting a task, canceling a function, or moving between different display screens. Use the arrow keypad to navigate within a given screen/menu. The function of the soft keys depends on the current context. The soft keys might have functions such as **[Back]** and **[Next]**, as they do during the Configuration Wizard. The soft keys might also serve to select items like **[Cancel]** and **[Ok]**.



The center button on the arrow keypad also serves as a **[Select]** button when navigating among TD2u menus. It cannot be used to start major tasks, such as duplication or disk wiping. Only soft keys labeled **[Select]** or **[Start]** initiate major tasks. **Vertical Arrow Keys** scroll up or down and highlight menu items for selection. **Horizontal Arrow Keys** scroll left or right and toggle between character lists.

In the upper right corner of the Main menu, the TD2u displays the date and time. As you navigate the TD2u menu structure, the menu item number displays in the upper left hand corner. For example, the Disk Utilities menu is Menu 5, the Format menu is Menu 5.1, the Hash menu is Menu 5.2, and so on. These menu numbers help you navigate the menu hierarchy.

The TD2u ships with a Quick Start card illustrating the layout of the display, buttons, connectors, and switches on the TD2u. Keep the Quick Start card with the TD2u as you familiarize yourself with its operation.

Reading the LEDs

The front of the TD2u has nine light emitting diode (LED) indicators. A tenth LED is located on the rear of the TD2u, near the power connector.



The **SATA Source**, **IDE Source**, and **USB Source** LEDs indicate that the source drive is connected to the left side of the TD2u. The **SATA Dest 1**, **SATA Dest 2**, and **USB Dest** LEDs indicate that the destination drives are connected to the right side. A yellow **Alert** LED on the right flashes to indicate the need for user intervention.

USB Keyboard Support

You can connect a standard USB keyboard to any of the USB ports on the front and back of the TD2u. Using a keyboard for data entry can be faster and more convenient than using the arrow keypad on the TD2u.

When using a USB keyboard the Enter key on the keyboard generally corresponds to the right soft key on the TD2u. The Esc (escape) key on the keyboard generally corresponds to the left soft key.

If your keyboard has arrow keys or a mouse-like input device, the up and down arrows (or mouse actions) generally correspond to the up and down (vertical) arrows on the TD2u.

CHAPTER 2

SETTING UP THE TD2U

Startup Sequence	19
Initialization	19
Configuring the TD2u	19
User-Selected Startup Mode	19
System Settings (Menu 7.1)	20
Set Examiner Name (Menu 7.1.2)	23
Imaging Setup (Menu 7.2)	24
Factory Reset (Menu 7.3)	28
Duplicator Info (Menu 8)	28
Connecting Hard Drives	29
Drive Detection	30

Startup Sequence

The TD2u is optimized for the needs of forensic practitioners and computer forensic processes.

Initialization

After you turn on the TD2u, the device takes about five seconds to initialize and run a self-test procedure. The screen is blank and unlit until the self-test is complete. An LED check is then conducted so you can verify that all of the LEDs are functioning. When initialization is complete, the TD2u displays warning messages about any detected faults.

Configuring the TD2u

The TD2u comes ready to be connected to the TP5 power supply and turned on.

After running a three-second initialization and self-test procedure, the TD2u starts the Configuration Wizard. The Configuration Wizard prompts you for the default username, current date/time, and preferred startup mode. The TD2u stores these settings in non-volatile flash memory for use at each startup.

The startup mode feature lets you customize the TD2u for a specific workflow. The Startup Mode setting provides the following options.

- Main Menu
- Duplication (for cloning or imaging)
- Wipe Disk

You can configure the startup mode and other settings at any time from the **System Settings** menu (Menu 7.1).

Once you have configured your TD2u, the startup sequence bypasses the Configuration Wizard unless you have used **Factory Reset** (Menu 7.3) in the **Setup** menu.

User-Selected Startup Mode

The TD2u can be configured to display different screens at initial startup. This setting allows for quick access to commonly used functions. For example, if you use the TD2u mainly for duplications, you can customize the startup mode for disk duplication. Details on this and other settings made by the Configuration Wizard are discussed below in the section on **System Settings** (Menu 7.1).

System Settings (Menu 7.1)

The **System Settings** menu provides options for setting TD2u options, defaults, and the current date/time. The System Settings menu also provides options for viewing TD2u information and current status.

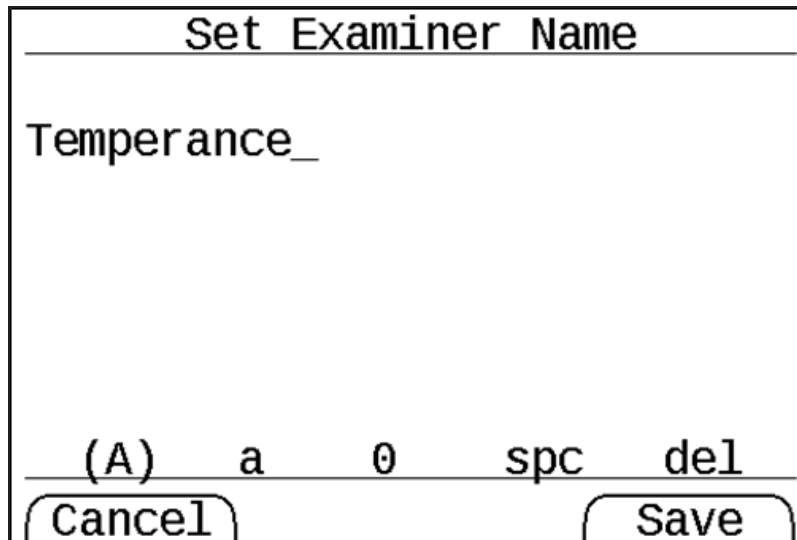
The following table lists additional options and values you can set in **System Options**.

Option	Choices	Default	Description
Startup Screen	Main Menu Duplication Wipe Disk	Main Menu	Specifies the TD2u startup mode as: Main Menu = Main Menu Duplication = Duplication setup screen Wipe Disk = Wipe Disk
Set Examiner Name	[Alphanumeric]	NA	The Examiner Name option lets you set or change the name of the examiner or user of the TD2u. This information appears in each log recorded by the TD2u. Alphabetic names can be entered using upper and lowercase letters and spaces. The square brackets in the screen indicate the selected data entry mode: enter an upper case character, enter a lower case character, enter a space (spc), or delete a character (del). The up and down arrows select the desired alphabetic character. The center button on the arrow keypad enters a letter or selects the delete function. Once you have set the desired name, press the [Save] soft key to record your changes. See below for more details.

Option	Choices	Default	Description
Set Date + Time	[Numeric]	NA	<p>The Date and Time option lets you set or change the time stored by the real time clock in the TD2u.</p> <p>The angle brackets in the screen indicate the currently selected field. Use the up and down arrow keys to select the desired field. Use the left and right arrow keys to change the value in each field. Once you have set the desired date and time, press the [Save] soft key to record your changes.</p>
Finished Alert	Off On	Off	<p>When On, the TD2u flashes the yellow Alert LED at the end of a normal/successful acquisition/task.</p> <p>When Off, the TD2u flashes the yellow Alert LED only if there is an unusual condition or error.</p>

Option	Choices	Default	Description
Drive Shdn Delay	Off 1 Minute 3 Minutes 5 Minutes 10 Minutes 15 Minutes	5 Minutes	<p>After certain jobs/tasks, the TD2u will shut down or put into standby drives that were involved in that operation, until user input is provided to acknowledge completion. This reduces drive wear and tear and power consumption for situations where the user is away from their TD2u for extended periods of time.</p> <p>This Drive Shutdown Delay setting represents the length of time from job/task completion to when the drive is shutdown or put into standby mode. If the Off option is chosen, no drives will be shutdown or put into standby mode.</p> <p>To change this setting, simply scroll to the desired shutdown delay duration, and hit Select.</p> <p>This drive shutdown feature applies to the following jobs/tasks and drive interfaces:</p> <ul style="list-style-type: none"> • Duplication - Source and destination drives • Hash – Source drive only • Blank Check – Source drive only • Wipe – Destination only
Language	English French German Spanish Turkish	English	Sets the language that displays in the TD2u user interface.

Set Examiner Name (Menu 7.1.2)



If you are using an external keyboard, entering the Examiner Name is fairly straightforward. Using the TD2u keypad requires scrolling through individual characters. The characters are divided into four categories that appear at the bottom of the screen:

- Capital letters (**A**)
- Lowercase letters (**a**)
- Numbers (**0**)
- Space (**spc**)

A set of parentheses appears around the currently selected category. In the above display, capital letters is selected.

For capital letters, lowercase letters, and numbers, use the **Up** and **Down** buttons to scroll through characters.

Press the center button on the keypad to select a character.

To delete the last character you entered, select **del** from the keypad.

To clear all text, use the right arrow to move to the **del** item and press the up or down arrow. This should change **del** to **clr**. Selecting this by pressing the center button clears all text.

Imaging Setup (Menu 7.2)

Imaging Setup lets you specify options related to disk imaging operations.

Note: As of version 1.3, you can change settings specific to each operation start screen by pressing the center button with the gear icon on that screen. Operations that do not have settings do not have a gear icon on their start screens.

The following table lists the options and values you can set for each option.

Option	Choices	Default	Description
File Type	Raw/DD	EX01	Specifies whether the Disk-to-File operation creates an EnCase <code>.e01</code> or <code>.Ex01</code> file, a Raw/DD file, or if the user should be prompted at execution time.
	E01		
	EX01		
	Prompt		
File Size	4GB	2GB	Size of an individual image file generated during Disk-to-File duplication operation.
	2GB		
	1GB		
	700MB		
	UNLIMITED		
E01/Ex01 Compression	On Off	On	When On , <code>.E01</code> and <code>.Ex01</code> files use compression to decrease file size and increase write and read speed when possible without compromising data.

Option	Choices	Default	Description
Directory Name	Date & Time Serial Number Model and Serial Manual	Date & Time	Specifies the directory name for the imaging operation. Date & Time generates a directory name of the form <code>yy-mm-dd hh-mm-ss</code> that corresponds to the date and time when the duplication started.
Custom Filename	Prompt Skip	Prompt	When set to Prompt , the user is prompted to enter the filename. When set to Skip , the default filename is used.
Raw File Ext	Default .dmg	Default	Sets the extension to the default value or <code>.dmg</code> .
Case ID	Prompt Skip	Skip	When set to Prompt , the TD2u prompts the user to enter Case ID. When set to Skip , the Case ID is suppressed in subsequent logs.
Case Notes	Prompt Skip	Skip	When set to Prompt , the TD2u prompts the user to enter Case Notes. When set to Skip , Case Notes are suppressed in subsequent logs.

Option	Choices	Default	Description
Error Recovery	Standard Exhaustive	Standard	<p>The TD2u supports two different error recovery modes: Standard and Exhaustive. If an error is encountered on the source drive during a read operation, the TD2u can be configured to retry the operation, depending on the Error Retry Count setting.</p> <p>The Standard setting retries the 32K block until it either succeeds or the Error Retry Count is exceeded.</p> <p>The Exhaustive setting causes the TD2u to attempt to recover each sector.</p>
Error Retry Count	Zero One Ten 100	One	Specifies the maximum number of errors allowed on each operation on the source drive.
Image Verification	No Verification Verify Prompt	Prompt	Specifies if, at the end of an imaging operation, the TD2u should automatically perform a hash verification of the destination(s), prompt the user, or do no verification at all.

Option	Choices	Default	Description
Wipe Type	Single Pass	Single Pass	Specifies the type of wipe to perform. Single Pass is one pass of zeros across the drive.
	Multiple Pass		Multiple Pass follows the pass of zeros with a pass of ones and a final pass of random data.
	Secure Erase		For some SATA solid state destinations, Secure Erase is a very fast wipe provided by the drive manufacturer.
Restore to Defaults	N/A	N/A	Resets the above options to the factory defaults.

Error Recovery Modes

The TD2u supports two different error recovery modes, Exhaustive and Standard. Both modes refer to the way in which the TD2u recovers from read errors on the source hard disk.

In the Exhaustive error recovery mode, when the TD2u detects a read fault, it begins a retry strategy that attempts to read each sector in the 64-sector block that contains the error. Exhaustive mode therefore produces the most complete destination image. However, if the source drive has many read faults, the exhaustive strategy used by the TD2u can also be time-consuming.

The Standard error recovery mode is intended for use with drives that have a high number of read faults. When in Standard mode, the TD2u treats the source drive as a series of 64-sector blocks (32,768-byte blocks). An error in any 64-sector block causes the entire block to be treated as an error. This allows the TD2u to move quickly through a drive with many read faults, but at the loss of some potentially readable sectors near each fault.

In both error recovery modes, the TD2u handles unreadable sectors in the same way. When the TD2u has determined that a sector cannot be read from the source drive, it fills in the missing data with zeros on the destination drive. Zero data inserted in this way is also included by the TD2u when calculating the MD5, SHA1, and SHA-256 hashes for the duplication.

The TD2u treats all media errors on a destination disk as fatal or unrecoverable errors because each destination disk is receiving a copy of evidence critical to a forensic examination. It is not recommended to store data to a destination disk with known defects.

Factory Reset (Menu 7.3)

The **Factory Reset** option resets all TD2u configuration settings to the factory state. **Factory Reset** also physically erases all user settings and logs stored in TD2u flash memory.

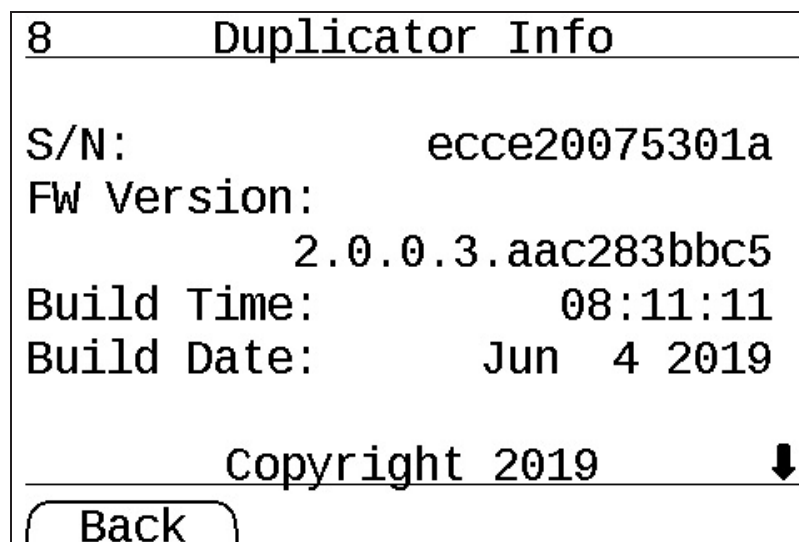
After performing a **Factory Reset** the TD2u retains no user-specific or case-specific information.

The only setting not cleared by a **Factory Reset** is the current date and time.

Internally Stored Information provides additional information regarding data stored in non-volatile memory by the TD2u.

Duplicator Info (Menu 8)

Selecting the TD2u **Duplicator Info** option displays selected information for the TD2u itself, as shown below.



Legend	Example Value	Description
S/N	ecce200753051a	The TD2u serial number.

Legend	Example Value	Description
FW Version	2.0.0.3.aac283bbc5	The TD2u firmware release.
Build Time	08:11:11	The build time of the TD2u firmware release.
Build Date	Jun 4, 2019	The build date of the TD2u firmware release.

Connecting Hard Drives

Viewing the front of the TD2u, the source drive attaches to the left side of the duplicator and the destination drive(s) attach to the right side.



The following procedure provides the steps for connecting hard disks to the TD2u. This procedure applies to typical 3.5" SATA and IDE hard disks.

To connect hard disks to the TD2u:

1. Confirm that the TD2u power is off (the Power LED will not be lit).
2. Connect the source disk with its signal cable to the signal input on the left side of the TD2u using the appropriate cable.
 - TC6-8 IDE signal cable
 - TC3-8 SATA signal cable
 - For USB hard drives, use the cable shipped with the USB drive, or a Tableau TCUSB3-18 cable

3. Connect the source disk with its power cable to the left side TD2u power input.
 - TC2-8-R2: IDE/SATA drive power cable
 - TC5-8-R2: SATA drive power cable
4. Connect the destination disk or disks to the right side of the TD2u with the appropriate cable.
 - For SATA devices, use the TC4-8-R2 unified cable
 - For USB hard drives, use the cable shipped with the device or a Tableau TCUSB3-18 cable
5. On the back of the TD2u, connect the TP5 power supply to the TD2u power input.
6. Using the appropriate line cord, plug your TD2u into an AC power source. The green DC Power In LED indicates that power is available at the power connector.
7. Turn on the TD2u by pressing the TD2u power switch located on the front of the unit to the lower left. The green **Power** LED indicates that the duplicator is turned on.

Note: When connecting an IDE source disk to the TD2u, always connect the blue end of the IDE cable (TC6-2 or TC6-8) to the TD2u and the black end to the hard disk. If using other than a Tableau-supplied cable, ensure that the colored stripe on the cable aligns with Pin #1 on the hard disk. Failure to do so can result in unreliable communication between the hard disk and the TD2u.

You can connect two destination SATA disks to the TD2u. The TD2u can write to two destination drives simultaneously. To create a single copy, connect a drive to either the Dest-1 or USB destination port.

Drive Detection

After initialization, the TD2u begins drive detection.

Steady illumination of the IDE, SATA, USB Source, Destination 1, Destination 2, and USB Destination LEDs indicates drive detection. A blinking LED indicates that detection is still in progress.

Note: Because IDE drives do not support hot plug, they must be plugged in before the TD2u is turned on in order to be detected. Unplugging an IDE drive that has been detected by the TD2u will cause erratic or unexpected behavior since there is no way for the TD2u to know that the IDE is no longer connected.

CHAPTER 3

USING THE TD2U

Overview	33
TD2u Menus and Options	33
Duplicate (Menu 1)	36
Preconditions Checking	39
Wipe Disk (Menu 2)	42
Encryption (Menu 3)	44
Disk Information (Menu 4)	47
Disk Utilities (Menu 5)	49
Status Information	52
Logs Menu (Menu 6)	54
Resetting and Clearing Internally Stored Information	59

Overview

This chapter covers detailed procedures and information for using the TD2u. It is organized according to the TD2u menu tree to facilitate navigation of the TD2u.

TD2u Menus and Options

The menus and screens in the TD2u are arranged in a tree structure. Under the Main menu, each branch of the tree is numbered to guide you as you navigate the menu tree. These numbers also make it easy to refer back to this guide for detailed information. The following outline provides the menu structure.

Main Menu	Sub-menu
1. Duplicate	
2. Wipe	
3. Encryption	3.1 Encrypt New Destination 3.2 Unlock Destinations 3.3 Change Dest Password
4. Disk Info	4.0 SATA Source Info 4.1 IDE Source Info 4.2 USB Source Info 4.3 SATA Dest 1 Info 4.4 SATA Dest 2 Info 4.5 USB Dest Info

Main Menu	Sub-menu
5. Disk Utilities	5.1 Format 5.1.1 Format Destination 5.1.2 Format USB Accessory 5.2 Hash 5.3 Blank Check 5.4 AMA/HPA/DCO Removal
6. Logs	6.1 View Logs 6.2 Save All Logs 6.3 Delete All Logs 6.4 Print All Logs

Main Menu	Sub-menu
7. Setup	7.1 System Settings
	7.1.1 Startup Screen
	7.1.2 Examiner Name
	7.1.3 Set Date and Time
	7.1.4 Finished Alert
	7.1.5 Drive Shutdown Delay
	7.1.6 Language
	7.2 Imaging Setup
	7.2.1 File Type
	7.2.2 File Size
	7.2.3 E01/EX01 Compression
	7.2.4 Directory Name
	7.2.5 Custom Filename
	7.2.6 Raw File Ext
	7.2.7 Case ID
	7.2.8 Case Notes
	7.2.0 Error Recovery
	7.2.10 Error Retry Count
	7.2.11 Image Verification
	7.2.12 Wipe Type

Main Menu	Sub-menu
	7.2.13 Restore Defaults
	7.3 Factory Reset
8. Duplicator Info	

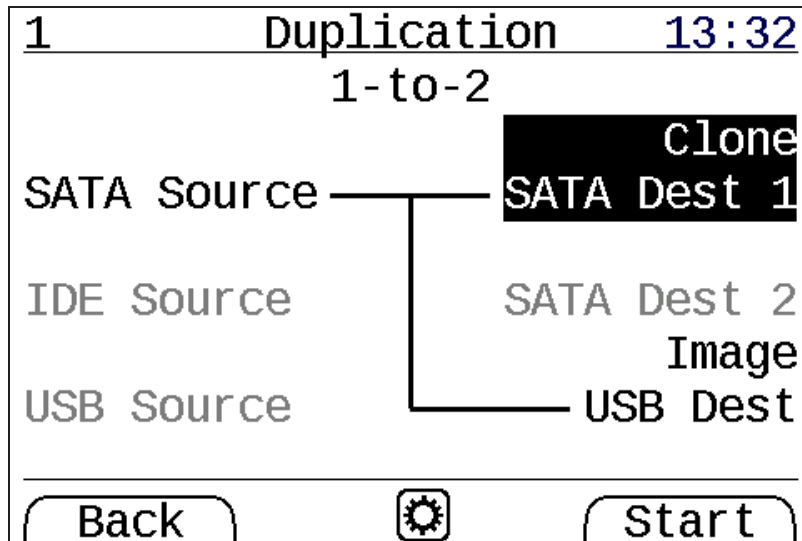
Duplicate (Menu 1)

The TD2u duplicates hard disks by either cloning or imaging them. Cloning, also known as disk-to-disk duplication, is the process of copying a source disk, sector by sector, to a destination disk. Source disk sector one is copied to destination disk sector one, then sector two is copied to sector two, sector three to sector three, and so on. Imaging, also known as disk-to-file duplication, is the process of copying a source disk to a series of files on destination disks.

Note: Starting with TD2u firmware version 1.3, the selection of clone or image for a specific destination drive is no longer done through distinct sub-menus. Selecting the Duplicate item will launch a Duplicate job setup page that allows for in-line selection of clone or image for all connected destination drives. This allows each destination to be selected as clone or image independently from other destinations.

Initiating a Duplication Job (Menu 1)

1. Follow the steps listed in [Connecting Hard Drives](#) on page 29.
2. From the Main menu, use the arrow keys to navigate to **Duplication** (Menu 1).



3. For each connected destination, highlight that destination with the up and down arrow keys, and use the left and right arrow keys to select Image or Clone per destination.
4. If any other settings need to be modified, the center button on the keypad will open a settings menu containing the Duplication/Imaging Setup settings.

Note: If you have enabled additional prompts (through **Setup > Imaging Setup** or through the options menu (gear icon) on the duplication start screen) you will be prompted for additional information after pressing the **[Start]** soft key. By default, directory and filename prompts are turned off. Through the setup menus you can choose to enable prompts for those items as well as for file format selection and the fields for Case Notes and Case ID.

Note: If mistakes are made in data entry leading up to the start of a new duplication job, the Back button can now be used to make changes before proceeding. Earlier versions of TD2u software required cancelling the job setup and starting over.

5. Press the **[Start]** soft key to initiate the duplication process.
6. If applicable based on Imaging Setup settings, select **Verify** or **No Verification**. To abort the process, press the **[Cancel]** soft key.
7. If applicable based on Imaging Setup settings, enter a Case Note. To abort the process, press the **[Cancel]** soft key.
8. If applicable based on Imaging Setup settings, enter a Case ID. To abort the process, press the **[Cancel]** soft key.
9. Once all pre-condition checks have been satisfied, the duplication job begins and progress reports appear on the LCD. To see detailed information, press the **[Details]** soft key.

The TD2u provides a high degree of flexibility in selecting defaults for each field so that you can configure the TD2u to match your desired workflow.

Details about the current operation are available during or at the end of duplication. To view details during duplication, press the **[Detail]** soft key which displays the log entry for the duplication operation.

Image Destinations

When performing imaging, the TD2u creates files on the destination hard disk that contain the data copied from the source hard disk.

Note: For Image destinations, the TD2u performs any necessary destination disk formatting automatically. If a destination disk already has an acceptable format and sufficient free space to store the image, the TD2u uses that format. If a destination disk is not formatted the TD2u prompts you for confirmation to format the disk. This reduces the risk of overwriting valuable data.

Files are written to the destination disk according to the following convention:

```
(root dir)/
  TD2_IMG/
    [directory name]/
      [filename].E01
      [filename].E02
      ...
      [filename].E99
      YYYY-mm-dd hh-mm-ss nnnnn TTT.LOG
```

[directory name] is the name generated by the TD2u for each separate acquisition. If an acquisition spans multiple destination disks, the same [directory name] is used on each destination disk. This makes it easy to group image files related to a particular acquisition.

The [directory name] can be auto-generated by the TD2u or you can enter it yourself. Auto-generated names can be based on the date/time, the serial number of the source device, or the model and serial number of the source device. The auto-generated [filename] is IMAGE, although you may choose to override this value. For a complete list of the options you can use to control the auto-generation and user prompting for directory and filenames, see Imaging Setup (Menu 7.2) on page 24.

For Raw/DD [filename].001 is the first file, or portion of the data copied from the source disk. The file size is a user-settable option and may also be specified under the **Setup > Imaging Setup** menu.

When creating a DD image, you can also specify .DMG naming for files. .DMG refers to a file naming convention used by Apple operating systems. If the .DMG naming option is selected, the first file is named IMAGE.DMG instead of IMAGE.001. All other files have standard filenames (for example, IMAGE.002, IMAGE.003, and so on).

A .LOG file is generated by the TD2u for each disk-to-file acquisition. `yyyy-mm-dd hh-mm-sec` is the duplication task start date/time. The last part of the filename is the name of the type of task.

Preconditions Checking

Before starting a duplication, the TD2u automatically checks for a number of preconditions. Some preconditions are warnings, and you can choose to continue or cancel after viewing each one. Two preconditions (destination filesystem check and locked encryption) pause the process and prompt you to intervene to clear the flagged condition before automatically continuing. The following table summarizes the preconditions checked by the TD2u prior to duplication:

Name	Clone or Image Destinations	Type	Explanations
Source Hidden Data Areas	Both	Warning	<p>Reports that a DCO or AMA is in use on the source disk.</p> <p>The TD2u does not automatically remove DCO or AMA on the source disk, as doing so requires a permanent modification of the source disk. You can cancel the duplication and manually remove the DCO or AMA using the Disk Utilities option under the Main menu.</p>

Name	Clone or Image Destinations	Type	Explanations
Source Fits into Destination	Both	Fatal/Warning	<p>For Clone destinations, the destination disk must be at least as large as the source disk. For Image destinations, the TD2u checks the available space on the destination disk.</p> <p>If it is possible that the source may not fit on the Image destination (compression permitting), this warning informs the user. If it is certain that the source will not fit on the Image destination, this precondition is fatal.</p>
Source Not Blank	Both	Warning	<p>The TD2u checks select sectors on the source disk looking for non-blank data patterns. If all the checked sectors appear to be blank, the TD2u warns that the source might be blank. This does not mean the source is necessarily blank, but it could mean the source has been partially wiped or that hardware-based encryption (such as OPAL SED) is present.</p>

Name	Clone or Image Destinations	Type	Explanations
Destination Blank	Clone	Warning	<p>The TD2u checks select sectors on the destination disk looking for non-blank data patterns. If the destination disk is not blank, an unintentional overwrite is possible. This warning provides the opportunity to abort the duplication.</p>
Destination Filesystem	Image	Warning	<p>When performing Disk-to-File duplication the TD2u requires each destination disk to be formatted with the FAT32 or exFAT file system.</p> <p>If the destination disk is already formatted for FAT32 or exFAT, the TD2u uses this formatting without overwriting any existing files.</p> <p>If the destination disk does not have a usable file system, the TD2u can format one during duplication.</p> <p>If the destination disk appears to be blank, the TD2u formats it without any warnings.</p>

Name	Clone or Image Destinations	Type	Explanations
Destination Block Size	Clone	Warning	When performing a Clone duplication, differences in the block size between the source and destination drive may result in a clone drive not being intelligible to other host systems. This is because any existing source drive partition tables and/or filesystems will contain block-size-specific information that will be inaccurate on a destination drive with a different block size.
Encrypted Destinations Unlocked	Both	Warning	The TD2u checks if any of the destinations appear to have been encrypted in a way that TD2u can unlock and prompts you to unlock them if they are not already unlocked.

Wipe Disk (Menu 2)

You may want to wipe the destination disk before use, especially when doing disk-to-disk cloning. The TD2u provides three options to wipe a destination disk: a fast single-pass wipe, a multi-pass wipe, or a Secure Erase. Follow the steps below to specify the type of wipe operation to perform:

1. Navigate to **Wipe** (Menu 2), then press the center button to open the wipe specific settings options. Wipe Type is option 3 in this menu.

2. Select the Wipe Type setting to open the setting selection menu. You can choose **Single Pass**, **Multiple Pass**, **Secure Erase**, or you can choose to have the wipe startup prompt you for a type at that time.
3. Follow the steps listed in Connecting Hard Drives (see Connecting Hard Drives on page 29) and turn on the TD2u. No source disk is necessary.
4. From the Main menu, use the arrow keys to navigate back to **Wipe** (Menu 2).
5. To start the wipe process, press **[Yes]**. The wiping task starts, and its progress appears on the display.

Note: If you connect two or more destination disks of different sizes, the Wipe Disk utility wipes all disks fully. It may take longer to wipe larger or slower disks.

Single Pass Wipe

The TD2u writes a constant pattern of zeros (00h) to the destination drive in a single pass. The TD2u will display on-screen performance and timing metrics during the wiping process.

You can cancel the wiping operation at any time by pressing the **[Cancel]** soft key.

Note: The TD2u will not automatically overwrite a DCO or AMA on the destination drive.

Multi-Pass Wipe

The TD2u performs three write passes on the destination drive. The first pass writes zeros (00h), the second pass writes ones (FFh), and the third pass writes a randomly selected constant value between 01h and FEh. The TD2u will display on-screen performance and timing metrics during the wiping process.

You can cancel the wiping operation at any time by pressing the **[Cancel]** soft key.

Secure Erase

The TD2u is capable of using the SATA Secure Erase command to use the internal firmware of a hard drive to do a complete low level erasure of the disk contents. This feature is only supported on SSDs. This limitation is due to a significant number of rotating media drives not correctly supporting the SATA Secure Erase function, which results in hard drives that are completely unusable.

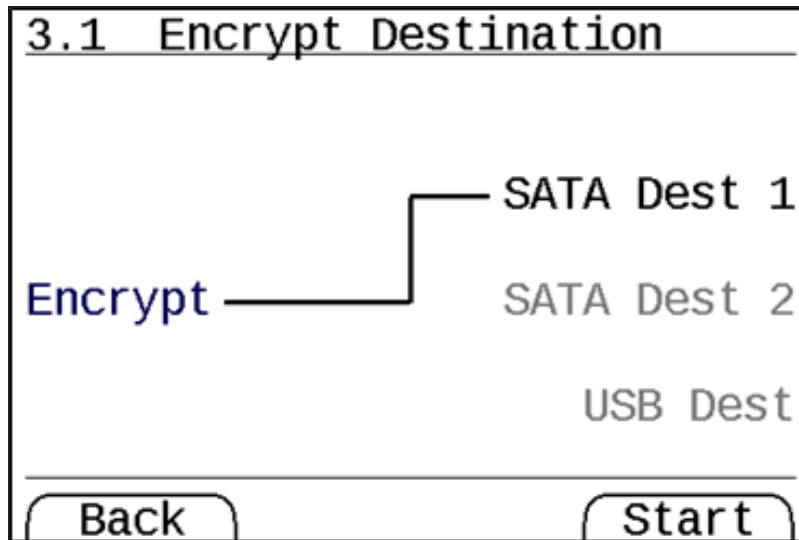
Encryption (Menu 3)



The TD2u can encrypt destinations using whole disk encryption. All data stored on the destination is encrypted and hosts will only read seemingly random data until it is decrypted. Decrypting the data requires special decryption software/hardware and knowledge of the password used for encryption. On Windows, the publicly available open source program, VeraCrypt, can read disks encrypted by TD2u. However, drives encrypted first by VeraCrypt likely cannot be used by TD2u without re-encryption.

See the Guidance Software website for more information about whole disk encryption used by TD2u, including details about the exact algorithms used and the security of drives encrypted this way.

Encrypt New Destination (Menu 3.1)

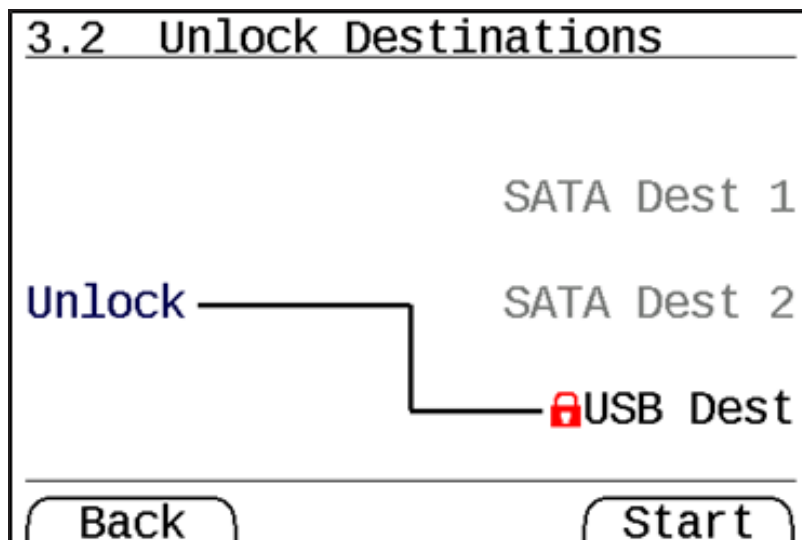


This operation allows you to set up new encrypted destinations. Whole disk encryption requires this setup, which writes over any data on the drive to create an encryption container for whole disk encryption. Only drives encrypted this way are supported as encrypted drives by TD2u. The TD2u identifies drives that appear to have been encrypted this way.

You are prompted to enter a new drive password for the drive or drives to be encrypted. This password is required each time you want to access the data on the destination (read or write). If the encryption header set up by Encrypt New Destination is overwritten, the encrypted data is permanently lost. See the [OpenText website](#) for more information on the methods and algorithms used for TD2u encryption.

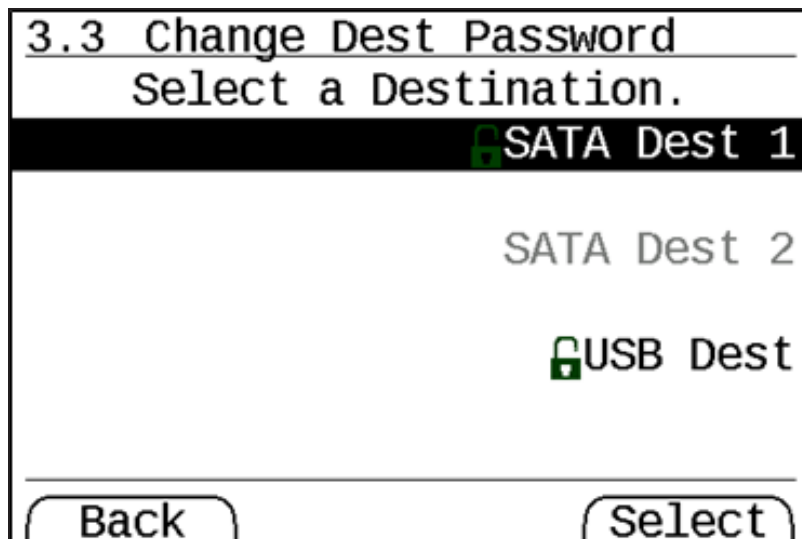
Securely encrypting destinations takes 15 to 20 seconds.

Unlock Destinations (Menu 3.2)



This operation allows you to unlock destinations that appear to have been encrypted by a TD2u. When you click **[Start]** there is a prompt to enter passwords for each destination to be unlocked. Unlocking encrypted destinations takes 15 to 20 seconds.

Change Dest Password (Menu 3.3)



This menu allows you to change the destination encryption header on an already unlocked destination. This does not change the encryption across the drive. Generating a new secure header takes 15 to 20 seconds.

Disk Information (Menu 4)

4.0	SATA Source	15:24
Model: Samsung SSD 850 EVO >		
Serial: S21CNXAG707236T		
Revision: EMT01B6Q		
Capacity: 16.0 GB		
Free Space: 16.0 GB		
Block Size: 512		
Block Count: 31391744		
Reported Capacity: 31391744 ↓		
Back		

The TD2u can display detailed information about the source or the destination hard disk(s). From the **Disk Info** (Menu 4.0) screen, select any drive attached to a source or destination port.

The following table lists the disk information displayed by the TD2u.

Legend	Example Value	Definition
Unlock Drive	(none)	This field displays for encrypted drives that are still locked. This behavior is the same as that of the Unlock Destinations screen and is provided for convenience.

Legend	Example Value	Definition
Legacy Unlock (VERY RARE)	(none)	This feature behaves like Unlock Drive but allows drives with 4096 byte sector sizes that were encrypted prior to TD2u v1.3.0 to be unlocked such that their data may be recovered. These drives were not encrypted in a way compatible with the Unlock Drive feature nor with most third-party tools like VeraCrypt. See Troubleshooting Common Problems on page 65 for additional details on how to recover previously encrypted data from 4096 byte sector size drives.
Model	Samsung SSD 850 EVO	Model name reported by the hard disk.
Serial	S21CNXAG707236T	Serial number reported by the hard disk.
USB Serial	3.ADD	(USB Devices Only) Serial reported over USB, which may be different than the serial number.
Revision	3.AAD	Firmware revision reported by the hard disk.
Capacity	40.0 GB	Capacity of the hard disk as it will be copied/used by the TD2u.
Reported Capacity	20,000,000	Capacity in sectors as reported by the hard disk at power ON.
HPA Capacity	78,125,000	(ATA Devices Only) Capacity in sectors as reported by the hard disk using the ATA HPA (Host Protected Area) feature set.

Legend	Example Value	Definition
DCO Capacity	156,301,488	(ATA Devices Only) Capacity in sectors as reported by the hard disk using the ATA DCO (Device Configuration Overlay) feature set.
AMA Capacity	3,907,029,168	(ATA Devices Only) Capacity in sectors as reported by the hard disk using the ATA AMA (Accessible Maximum Address) feature set.
HPA in Use	Yes	(ATA Devices Only) Yes, if the ATA HPA feature set is being used to reduce the apparent capacity of the hard disk.
DCO in Use	Yes	(ATA Devices Only) Yes, if the ATA DCO feature set is being used to reduce the apparent capacity of the hard disk.
AMA in Use	Yes	(ATA Devices Only) Yes, if the ATA AMA feature set is being used to reduce the apparent capacity of the hard disk.
Security in Use	No	(ATA Devices Only) Yes, if the ATA Security feature set is being used to password protect the contents of the hard disk. Note that ATA Security locked drives cannot be used for TD2u operations.

Disk Utilities (Menu 5)

The TD2u offers several utilities to assist with the processing of drives. These utilities can be found in Menu 5.

Format (Menu 5.1)

When using disk-to-file imaging, the destination drive must be formatted with a file system that is recognizable by the TD2u. The TD2u only supports formatting drives with the exFAT

filesystem. However, the TD2u will also accept destination disks that are formatted as FAT32. The FAT32 file size limit is 4 GB. The exFAT file size limit is 16 EB (16,000,000 TB). When file sizes are larger than 4 GB, exFAT should be used.

From the formatting menu you can manually format either the destination disk or a USB mass storage device attached to one of the TD2u USB ports.

1. From the Main menu, use the arrow keys to navigate to **Disk Utilities** (Menu 5) and then to **Format** (Menu 5.1).
2. Select **Format Destination** (Menu 5.1.1) or **Format USB Accessory** (Menu 5.1.2).
3. Press the **[Start]** soft key to confirm your selection. The formatting task begins.

Advanced Format Support

Traditionally, hard drives have had an internal structure built around sectors of 512 bytes. Newer drives, especially those with capacities greater than 2 TB, feature the Advanced Format (AF) structure that uses internal sectors of 4096 bytes. Such drives still support I/O transfers that reference 512-sectors; internally, the drives map these references to the internal 4096-byte physical sectors. Implicit in this mapping is the need to accommodate writes that alter the data stored in just a portion of a physical sector. This is accomplished by an inefficient read-modify-write cycle.

Historically, disks have been formatted with the first partition located at sector 63. However, if a host computer aligns partitions and clusters of 512-byte sectors on boundaries that are not a multiple of 8, then the frequency with which the drive must resort to read-modify-write cycles can severely degrade performance.

The TD2u recognizes AF disks. In order to maximize performance, it formats them accordingly with partitions and clusters positioned at sector locations that are a multiple of 8.

Format Destination (Menu 5.1.1)

The **Format Destination** option allows you to format destination disks with the ExFAT file system used by the TD2u. The TD2u performs what is generally referred to as a Quick Format, during which it writes the necessary Master Boot Record, Partition Boot Record, and data structures to the destination disk. The TD2u does not do a full surface scan of the destination disk. If you want to verify the integrity of the destination disk you should format it using the disk utilities of a traditional computer and operating system.

You do not need to preformat destination drives when using the disk-to-file duplication mode of the TD2u. If a destination disk is unformatted and not blank, the TD2u prompts you to format the disk before it begins the duplication. If a destination disk is unformatted and appears to be blank, the TD2u automatically formats it.

The TD2u only formats disks using ExFAT; however, disks that have been preformatted with FAT32 can be used on the system.

Format USB Accessory (Menu 5.1.2)

The **Format USB Accessory** option allows you to quickly format a USB disk connected to the rear accessory port. It works the same as formatting a destination, except it operates on the accessory port rather than any destination disks.

Hash (Menu 5.2)

There are times when a forensic practitioner would like to calculate the hash values, or fingerprints, for a source disk without making a copy of the disk. With the **Hash Utilities** menu, you can generate MD5, SHA-1, SHA-256 hash values for the hard disk attached to the source side of the TD2u.

You can cancel the hashing operation at any time by pressing the **[Cancel]** soft key.

If the source disk has an HPA-protected region, the TD2u automatically disables the HPA before performing the hash calculation. This is the same behavior is exhibited by the TD2u during duplication. If you compare the hash values produced when duplicating a disk and when using the **Hash Utilities**, you should get the same hash results.

When the hashing operation is finished, the TD2u screen displays the hash results.

Blank Check (Menu 5.3)

The **Blank Check** menu lets you do a quick blank check on the source or either destination drive.

The TD2u performs a quick check to determine if the selected disk appears to be blank by reading sectors in the Primary and Secondary GPT. A sector is considered to be blank if it contains only a repeating pattern such as 00h, E5h, or FFh. Any non-repeating pattern is considered to be non-blank. If all sectors read by the TD2u have repeating patterns (though not necessarily the same repeating pattern), then the TD2u concludes the drive may be blank.

This quick check is not an exhaustive check of the entire drive. It is possible for a drive to appear to be blank according to the quick check while still storing forensically relevant information. A forensic examiner should treat blank source disks with some suspicion and use other tools, like a Tableau write blocker, to examine the drive to see if it contains forensically relevant information.

HPA, DCO, and AMA Removal (Menu 5.4)

The TD2u automatically detects the use of the ATA HPA (Host Protected Area), DCO (Device Configuration Overlay), and AMA (Accessible Maximum Address) feature sets.

Note: Starting with the ACS-3 (ATA/ATAPI Command Set 3) specification update, the concept of Accessible Maximum Address (AMA) was introduced as a way to create hidden data regions on drives. Drives that support AMA do not support HPA/DCO, and vice versa. While somewhat rare, some drives do support this new AMA method of limiting the reported drive capacity, and it should be kept in mind during digital forensics investigations.

HPA, DCO, and AMA feature sets can be used to reduce the apparent capacity of a hard disk. From a forensic point of view, it is valuable to know if HPA, DCO, or AMA are in use. With that knowledge, the forensic practitioner can make an informed decision about whether or not to acquire data in the hidden regions of the drive.

You can disable HPA without making a permanent modification to the drive, so the TD2u automatically disables HPA on any hard disk connected to the source side of the duplicator. It is not, however, possible to disable DCO or AMA without making a permanent modification to the hard disk. For this reason, the TD2u will not automatically disable DCO or AMA on the source hard disk.

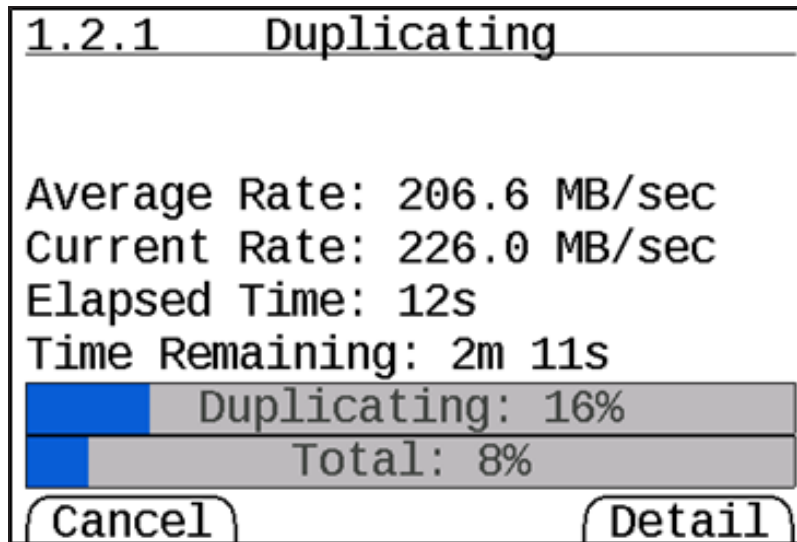
The TD2u cannot disable HPA, DCO, or AMA on the destination disk(s), however, the TD2u does detect and warn about DCO or AMA on the destination disk(s).

The options within the Disk Utilities menu allow you to permanently disable DCO, HPA, and AMA on the source disk.

Status Information

During long disk operations including duplication, wiping, and stand-alone hashing, the TD2u displays five performance/timing metrics in a rotating loop to track progress of the selected operation.

The following table describes each of the performance/timing metrics displayed by the TD2u.



Metric	Displayed As	Description
Average Transfer Rate (bytes per second/minute)	Average Rate: yyy GB/unit	The average transfer rate since the start of the current task.
Instantaneous Transfer Rate (bytes per second/minute)	Current Rate: xxx MB/unit	The average transfer rate over the last five seconds.
Elapsed Time	Elapsed Time: min sec	Total elapsed time since the start of the current task

Metric	Displayed As	Description
Time Remaining	Time Remaining: min sec	Estimated remaining time for the current task. This time is calculated using the amount of data remaining divided by the average transfer time.

A rotating-media hard disk transfers data faster at the beginning of duplication than at the end. Expect to see the instantaneous transfer rate at the beginning of a duplication task decrease up to 50% by the end of the task. This transfer rate decrease is normal and does not indicate a problem with any of the hard disks involved or with the TD2u.

Logs Menu (Menu 6)

6	Logs	15:25
1. View Logs		
2. Save All Logs		
3. Delete All Logs		
4. Print All Logs		
Back		
Select		

Whenever the TD2u performs an operation which reads, writes, or modifies a hard disk, it creates a log entry to record that operation. Encryption operations (encrypting a drive and changing the encryption password) will also be logged.

The TD2u has an internal flash memory with the capacity to store approximately 59 of the most recently logged operations. Once the TD2u has stored 59 log entries, the creation of a new log entry will automatically overwrite the oldest log entry.

The **Logs Options** menu lets you view, print, save, and erase log entries.

View Logs (Menu 6.1)

Selecting the **View Logs** option displays a list of the logs currently recorded in the internal flash memory of the TD2u. The most recent log entry is displayed at the top of this list with the oldest log entry at the bottom (end) of the list.

6.1	View Logs	15:27
2017/04/28	15:25	Hash ✓
2017/04/28	15:25	Format ✓
2017/04/28	15:18	Clone ✓
2017/04/28	15:17	Wipe !
2017/04/28	15:17	Clone !
2017/04/21	14:37	Image X
2017/04/21	14:33	Wipe !
2017/04/21	14:05	Wipe ! ↓



Back (1 of 93) Select

The first part of the line is the date (YYYY/MM/DD) on which the log was recorded. The second part is the time when the log was recorded (HH:MM) using a 24-hour clock format.

The third part of each line is a short form name of the type of operation the type of task recorded in the log.

The last part of the line is a symbol indicating the result of the logged operation:

Result	Definition
✓	Task completed normally.

Result	Definition
	Task did not completely normally.
	Task canceled.

Sample TD2u Log

The TD2u maintains detailed logs for each task initiated by the user. Here is a sample of an error-free log for a 1:3 Disk Duplication job:

```

-----Start of TD2u Log Entry-----
Task: Disk Duplication
Status: Ok
Created: Wed Jul 17 14:54:45 2019
Started: Wed Jul 17 14:54:45 2019
Closed: Wed Jul 17 15:00:25 2019
Examiner: QA-Test
Case ID: Example
Case Notes: Example
Imager App: TD2u
Imager Ver: 2.0.0 (build aac283bbc5)
TD2u S/N: 000ecce2 0075301a
-----SATA Source-----
Interface: SATA
Model: Samsung SSD 840 PRO Series
Firmware Revision: DXM04B0Q
Serial Number: S12RNEAD249589K
Capacity in Bytes: 10,000,000,512 (10.0 GB)
Block Size: 512 bytes
Block Count: 19,531,251
Power-ON Block Count: 19,531,251
HPA In Use: No
HPA Block Count: 19,531,251
DCO In Use: Yes
DCO Block Count: 500,118,192
Encrypted: No
-----SATA Dest 1-----
Interface: SATA
Model: Micron_1100_MTFDDAK256TBN
Firmware Revision: MOMU031
Serial Number: 18271D61EABC
Capacity in Bytes: 256,060,514,304 (256.0 GB)
Block Size: 512 bytes
Block Count: 500,118,192
Power-ON Block Count: 500,118,192
AMA In Use: No
AMA Block Count: 500,118,192
Encrypted: No

```



```
Destination Type: Clone
-----SATA Dest 2-----
Interface: SATA
Model: SATA SSD
Firmware Revision: SBFM61.3
Serial Number: 511190425261000115
Capacity in Bytes: 120,034,123,776 (120.0 GB)
Block Size: 512 bytes
Block Count: 234,441,648
Power-ON Block Count: 234,441,648
HPA In Use: No
HPA Block Count: 234,441,648
DCO In Use: No
DCO Block Count: 234,441,648
Encrypted: No
Destination Type: Image
-----USB Dest-----
Interface: USB
Model: SanDisk Extreme Pro
Firmware Revision: 0
Serial Number: 13D987654321
USB Serial Number: 123456789D31
Capacity in Bytes: 128,043,712,512 (128.0 GB)
Block Size: 512 bytes
Block Count: 250,085,376
Encrypted: No
Destination Type: Image
-----Imaging-----
Output File Format: Ex01 - EnCase 7 format
File Compressed: No
File Size in Bytes: 700,000,000 (700.0 MB)
Files written: 15
Filename of First File: 2019-07-17_14-54-29/image.Ex01
-----Disk Duplication Results-----
Total Errors: 0
Acquisition MD5: be0ff9ed3e879f79bc9aa6ca01c13517
Acquisition SHA-1: 69d148c9394c59b93ebb634ee2dacf81ca68edb5
Acquisition SHA-256:
50bcb437813b135ae8dfe69cd6505c66bb72b118ce4b521dba2d69c25e6511c5
-----Readback Verification Results-----
Destination: 511190425261000115
Verification MD5: be0ff9ed3e879f79bc9aa6ca01c13517
Verification SHA-1: 69d148c9394c59b93ebb634ee2dacf81ca68edb5
Verification SHA-256:
50bcb437813b135ae8dfe69cd6505c66bb72b118ce4b521dba2d69c25e6511c5
Destination: 13D987654321
Verification MD5: be0ff9ed3e879f79bc9aa6ca01c13517
Verification SHA-1: 69d148c9394c59b93ebb634ee2dacf81ca68edb5
Verification SHA-256:
50bcb437813b135ae8dfe69cd6505c66bb72b118ce4b521dba2d69c25e6511c5
Destination: 18271D61EABC
Verification MD5: be0ff9ed3e879f79bc9aa6ca01c13517
Verification SHA-1: 69d148c9394c59b93ebb634ee2dacf81ca68edb5
Verification SHA-256:
50bcb437813b135ae8dfe69cd6505c66bb72b118ce4b521dba2d69c25e6511c5
Status: Verified
-----End of TD2u Log Entry-----
```

If the TD2u had detected any bad sectors on the source drive, it would have added a section at the end of the TD2u log. This additional section would list the sector address and sector length of each unreadable region of the source disk.

Save All Logs (Menu 6.2)

You can save all logs to a USB storage device connected to one of the TD2u USB ports. After connecting a USB storage device to one of the TD2u USB ports, select the **Save All Logs** option to save the logs. Logs are saved in an ASCII text format. Use any text editor to view the logs.

Writing Logs to a USB Storage Device

The TD2u lets you write logs to a USB storage device and adheres to the following directory and naming conventions:

```
(root dir)/  
    td2u_logs/  
        yyyy_mm_dd_hh_ss_operationtype.log
```

The format of the .LOG filename is described in Files Created During Disk-to-File Duplication on page 1.

Delete All Logs (Menu 6.3)

If you want to delete the logs stored in the TD2u internal flash memory, select the **Delete All Logs** option. It is not possible to recover the logs after the **Delete All Logs** procedure is finished.

Print All Logs (Menu 6.4)

You can print all logs to a USB printer attached to one of the TD2u USB ports. After connecting a USB printer to one of the TD2u USB ports, select the **Print All Logs** option to print the logs.

The TD2u is compatible with USB printers which support the USB Printer Class Specification. The USB printer must support raw ASCII printing.

Resetting and Clearing Internally Stored Information

Some forensic and security applications require that the user be aware of the kinds of information that the duplicator can store. In some cases, you may want to know what, if any, information is preserved by the unit from one acquisition to the next. Or you might be in security-sensitive environments and need to be able to sanitize equipment before it is removed.

The TD2u has three separate non-volatile memories, as described below.

The first non-volatile memory is a flash device which is used to store the firmware and serial number of the TD2u. The firmware can be updated using the Tableau Firmware Update utility (available from www.guidancesoftware.com/tableau). This flash device is never used to record any user-specific or acquisition-specific information.

The second non-volatile memory is a separate flash device used to store two different types of information: configuration settings and logs. Configuration settings include the following:

- User/operator name (entered via Configuration Wizard or Setup Menu).
- Startup mode of operation (entered via Configuration Wizard or Setup Menu).
- Error handling settings (error recovery strategy and error counter limits).
- Default directory naming conventions for disk-to-file duplication (directory name format).
- Default file naming conventions for disk-to-file duplication (file name format).
- Default file format conventions (segment size, etc.).
- Last-used case ID and case notes.
- User preferences for prompts (directory name, file name, case information).

This second flash also records up to the most recent tasks performed by the duplicator. A task in this context is any operation which operates on a disk device, including duplication, formatting, wiping, hashing, blank checking, and HPA/DCO/AMA operations. Logs include detailed information about each disk device attached to the TD2u; this includes make/model, serial number, capacity, and so on.

The third and final non-volatile memory is the on-board real-time clock (RTC) with battery backup. The real-time clock records the date and time as set by the user. The real-time clock does not record any user-specific or acquisition-specific information.

The following table lists the reset/clear information stored internally by the TD2u.

Non-Volatile Memory	Information Stored	User or Case-Specific Info	Ability to Reset/Clear
Flash #1	TD2u firmware	None	Firmware cannot be erased, but can be updated using the Tableau Firmware Update program, which can be downloaded from www.guidancesoftware.com/tableau .
	TD2u serial number	None	It is not possible to change the TD2u serial number in the field.
Flash #2	TD2u configuration	User-specific	All configuration settings can be erased and restored to factory defaults by selecting Setup > Factory Reset . Configuration settings (excluding user name and startup mode) can be reset to defaults using Setup > Imaging Setup > Restore Defaults .
	TD2u configuration	Case-specific (if case ID/notes are enabled)	All configuration settings can be erased and restored to factory defaults by selecting Setup > Factory Reset . Alternately, the Case ID/Notes can be disabled through Setup > Case Info Options .
	TD2u logs	User-specific and Case-specific	All logs can be erased by either selecting Logs > Erase Logs or Setup > Factory Reset . Alternately, logs can be erased individually. When viewing a specific log entry, select the [Options] soft key, then select Erase Log .

Non-Volatile Memory	Information Stored	User or Case-Specific Info	Ability to Reset/Clear
Real-Time Clock	Date/Time	None	The Date/Time cannot be restored to a factory default state. However, after performing a Factory Reset , the TD2u prompts you to change the Date/Time within the Setup Wizard. The Date/Time can also be changed by selecting Setup > Date and Time .

The **Factory Reset** and **Erase Logs** options physically erase the flash memory corresponding to each item. It is not possible to recover settings or log entries after the flash memory has been physically erased.

CHAPTER 4

TROUBLESHOOTING AND SUPPORT

Troubleshooting Common Problems	65
Replacing the Backup Battery for the Real-time Clock	68

Troubleshooting Common Problems

This section provides the following troubleshooting issues and solutions:

- Power supply issues
- Problems with disk detection
- Replacing the backup battery for the real-time clock

Power Supply Issues

The TP5 power supply provided with the TD2u, when used with the appropriate adapter for the TD2u, is a 15-volt power supply that uses a barrel connector to interface with the TD2u. It is capable of powering the TD2u and nearly all combinations of one, two, or three SATA hard disks. The TD2u also employs staggered power sequencing for the source and destination hard disks. With staggered sequencing, power is first provided to one hard disk as it spins up, then to the second hard disk as it spins up, and finally to the third hard disk. It is normal to hear the source and destination drives spin up separately.

There is a green DC power LED on the rear edge of the TD2u, next to the female DC power barrel connector. If the TP5 power supply is connected properly to the TD2u and to AC power, the green LED illuminates. If you are having difficulty turning the TD2u on, check the status of the DC power LED to ensure that the TD2u is receiving power from the TP5 power supply. The LED will continue to blink if the DC power voltage is too high or low.

Problems with Disk Detection

When using a product like the TD2u, the most common problem users encounter is a failure to achieve drive detection. Most drive detection problems are the result of improper cabling. The following table lists the most common drive detection problems and corrective actions.

Problem	Corrective Action
Hard disk does not spin up	Check the power connection between the TD2u and the hard disk. Be especially careful to ensure that the 4-pin power connectors are properly seated in the connectors on the TD2u and on the hard disk (if using cable model TC2-8). The power and signal connectors should be fully inserted, not loose, in the TD2u and hard disk.
TD2u does not detect IDE hard disk	IDE hard disks should be set for Master or Single Drive.

Problem	Corrective Action
TD2u does not detect 3.5" IDE hard disk	<p>Normal 3.5" IDE hard disks can be connected to the TD2u using either the 8" TC6-8 IDE cable or the 2" TC6-2 cable. In either case, the blue end of the IDE cable must be connected to the TD2u.</p> <p>You must not use an IDE cable longer than 8" with the TD2u. Always use the Tableau-provided, high-quality, 80-conductor TC6-8 or TC6-2 cable.</p> <p>Drive power and signal must be attached before the TD2u is powered on.</p>
TD2u does not detect notebook IDE hard disk	<p>When using one of the notebook drive adapters (model TDA5-18, TDA5-25, or TDA5-ZIF), you must always use the 2" TC6-2 IDE cable.</p> <p>When using a notebook drive adapter, do not use the 8" TC6-8 IDE cable or any non-Tableau IDE cable. When using notebook drive adapters, the blue end of the TC6-2 IDE cable must be connected to the TD2u, and the black end of the cable must be connected to the notebook drive adapter.</p>
TD2u does not detect ZIF-style notebook IDE hard disk	<p>There are several models of ZIF hard disks. When using the TDA5-ZIF kit provided with the TD2u refer to the Support pages on the Tableau web site (www.guidancesoftware.com/tableau) for documentation regarding the proper selection and orientation of ZIF cables.</p>
TD2u does not detect SATA hard disk	<p>Use only the 8" TC3-8 SATA cable provided by Tableau. With some SATA hard disks, the SATA connector might be loose. Ensure that the TC3-8 cable is seated properly in the SATA connector of the hard disk.</p>

Tableau has tested the TD2u with an extensive in-house library of different hard disks spanning many years of hard disk development, but there might be compatibility issues with some hard disks. Tableau issues firmware updates to address most compatibility issues. If your hard disk is not recognized by the TD2u, check the Support pages on the Tableau web site (www.guidancesoftware.com/tableau) to see if any firmware updates are available for the TD2u.

Problems with Encrypted Drives

Prior to TD2u v1.3 release in December 2017, the method by which 4kbyte sector size drives were encrypted was not compatible with the VeraCrypt standard. This would result in an inability to properly decrypt a TD2u encrypted 4k drive on any system using the publicly available VeraCrypt application. Drives with 512 byte sector sizes and advanced format drives (4kbyte drives that act as 512 byte drives) were not affected by this issue.

This issue was fixed in TD2u v1.3 software. If you captured encrypted evidence on pre-v1.3 TD2u software, that evidence will no longer be usable on a TD2u that has been updated to v1.3 or later. Such a drive would be able to be unlocked, but the unlocked data container would present unintelligible information to the system. In that scenario, if the improperly encrypted 4k drive was attached to a TD2u destination port, no filesystem would be detected and the TD2u would prompt to format the drive during Duplication setup. That format request should be declined in order to preserve the previously captured evidence.

In order to recover the previously captured evidence, the v1.3 firmware includes a “Legacy Unlock” feature. If you have such a drive, the following procedure will allow for recapture of the previous evidence:

1. Update your TD2u to version 1.3 or newer.
2. Connect the encrypted, 4k sector drive to the appropriate source port on the TD2u.
3. Connect a different drive to one of the destination ports of the TD2u. This drive must be big enough to store the entirety of the 4k source.
4. Boot the TD2u.
5. Go to the Disk Info screen for the 4k source and select the **Legacy Unlock (VERY RARE)** option. This option will only be present for encrypted 4k drives. It will guide you through a familiar unlock process and instruct the TD2u to use the encryption style the 4k drive is using.
6. If desired, encrypt the destination drive.
7. Using the Duplication feature, clone the legacy unlocked source to the new destination. This will decrypt the data with the legacy encryption as it reads from the source, and store the decrypted data on the destination.
8. Once this duplication completes, your new destination contains the evidence from the source drive. If you want to put this data back on that drive, you can re-encrypt that drive and duplicate the data back into it from the new copy. If the new copy is encrypted, it can be unlocked as a source from Disk Info (not the legacy unlock option)

Replacing the Backup Battery for the Real-time Clock

The TD2u uses a real-time clock (RTC) with a backup battery. The battery has a shelf life of 12-18 months. If you use the TD2u regularly, expect the battery to last longer than 18 months. As the battery discharges, the TD2u displays a low battery warning message.

This section provides an illustrated procedure for replacing the RTC backup battery.

Compatible Batteries

The TD2u uses an ANSI/NEDA type 5012LC battery. The following table lists three common batteries compatible with the TD2u.

Manufacturer	Model #
Duracell	DL1220
Energizer	CR1220
Rayovac	CR1220

Replacing the Battery

It is necessary to open the TD2u case in order to replace the battery. You need a #1 Phillips screwdriver to open the TD2u case and a small flat-blade screwdriver to remove the battery.

The following procedure provides the steps for replacing the battery:

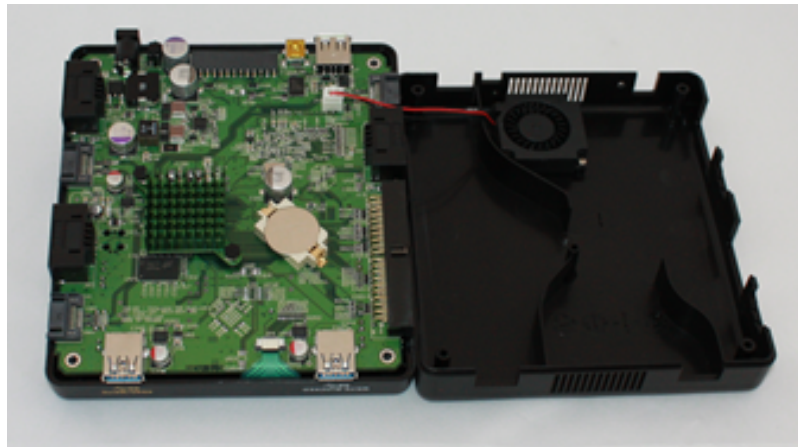
1. Disconnect all the power supply and all cables from the TD2u before opening the TD2u case. Never connect the power supply or operate the TD2u with the case open.
2. After disconnecting the power supply and all cables, turn the TD2u upside down on a clean work surface.
3. Remove the four screws and set them aside. The following photograph shows the location of the four case screws.



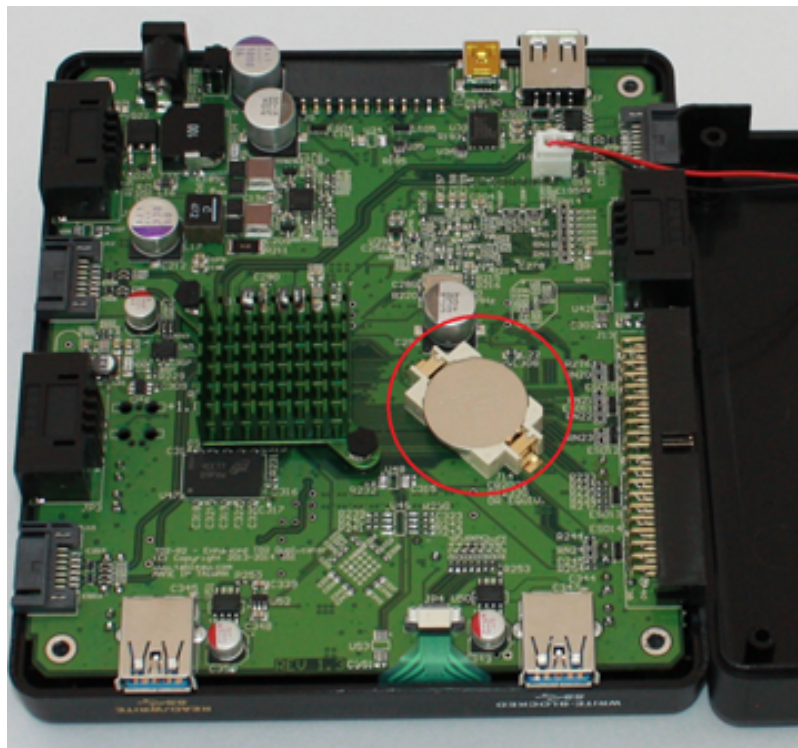
4. If possible, hold the TD2u with one hand as shown in the pictures below. Hold one of the 3M power connectors one each side. This will allow the PCB (Printed Circuit Board) to stay with the top of the case when the bottom is removed.



5. The fan used in the TD2u is attached to the lower half of the plastic case. Carefully lift the lower half of the case away from you.
6. Set the TD2u on a flat surface, as shown below. So as to not stretch or disconnect the cable from the fan, keep the bottom of the case as close to the rest of the unit as possible.



The backup battery is near the heatsink, as shown in the photograph below.



7. Using the flat-blade screwdriver, gently pry the battery from the battery holder.



8. Using a compatible battery, replace the RTC backup battery, making sure that the positive terminal of the battery is facing upward. For a list of compatible batteries, see [Compatible Batteries](#) on page 68.
9. After replacing the battery, reattach the case:
 - Carefully place the bottom plastic section of the enclosure straight down on top of the PCB, while aligning the screw openings with the appropriate connectors on the PCB.
 - Ensure that the case and main circuit board are aligned and replace the four case screws. The four screws that hold the TD2u case together also secure the main circuit board.
 - After replacing the four case screws, inspect the TD2u to ensure the case is tightly secured.

Testing the New Battery

After you have securely fastened the TD2u case, return it to its normal upright position and attach just the TP5 power supply. Turn the TD2u on and observe the startup sequence. You should not see a battery warning dialog, but you will probably see a date/time warning to reset the RTC.

To reset the date/time, from the TD2u Main menu, select **System Settings > Set Date and Time** (Menu 7.1.3). For detailed information about setting the date and time, see System Settings (Menu 7.1) on page 20.

After resetting the date/time, turn the TD2u off, wait two minutes, and turn the TD2u on. The date/time, located in the upper left corner of the Main menu, should be correct.

INDEX

A

- About this Guide 7
- Advanced Format Support 50

B

- Blank Check (Menu 5.3) 51

C

- Compatible Batteries 68
- Configuring the TD2u 19
- Connecting Hard Drives 29
- Conventions Used in this Guide 7

D

- Delete All Logs (Menu 6.3) 58
- Disk Capacity and Transfer Rate Measurement Conventions 7
- Disk Information (Menu 4) 47
- Disk Utilities (Menu 5) 49
- Drive Detection 30
- Duplicate 36
- Duplicator Info (Menu 8) 28

E

- Error Recovery Modes 27

F

- Factory Reset (Menu 7.3) 28
- Format (Menu 5.1) 49
- Format Destination (Menu 5.1.1) 50
- Format USB Accessory (Menu 5.1.2) 51

H

- Hash (Menu 5.2) 51
- HPA, DCO, and AMA Removal (Menu 5.4) 52

I

- Image Destinations 38
- Imaging Setup (Menu 7.2) 24
- Initialization 19
- Initiating a Duplication Job (Menu 1) 36

L

- Logs Menu (Menu 6) 54

M

Multi-Pass Wipe 43

N

Navigating the TD2u 14

O

Overview 9, 33

P

Power Supply Issues 65

Preconditions Checking 39

Preface 7

Print All Logs (Menu 6.4) 58

Problems with Disk Detection 65

Problems with Encrypted Drives 67

R

Reading the LEDs 15

Replacing the Backup Battery for
the Real-time Clock 68

Replacing the Battery 68

Resetting and Clearing Internally
Stored Information 59

S

Sample TD2u Log 56

Save All Logs (Menu 6.2) 58

Secure Erase 43

Set Examiner Name (Menu 7.1.2) 23

Setting up the TD2U 17

Single Pass Wipe 43

Startup Sequence 19

Status Information 52

System Settings (Menu 7.1) 20

T

Tableau TD2u 11

TD2u Kit Contents 11

TD2u Menus and Options 33

Testing the New Battery 71

Troubleshooting and Support 63

Troubleshooting Common
Problems 65

U

USB Keyboard Support 15

User-Selected Startup Mode 19

Using the TD2u 31

V

View Logs (Menu 5.1) 55

W

Wipe Disk (Menu 2) 42

Writing Logs to a USB Storage
Device 58