Demi YG1040
Operation Manual

Rev 7.01

Disclaimer:

Information contained in this document is subject to change without notice.

Contact your local distributor to receive instructions to obtain any repair/replacement services.

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1. Overview

1.1 Product Outline

The DemiYG1040 is an all-in-one hard drive management tool. It performs operations including test, duplication, erase, and forensic evidence acquisition for all ATA, SATA, SCSI, SAS, FC and USB3.0 hard drives. The highlights of the YG1040 are the ability to work with not only popular SATA and ATA, but SSD, SAS and FC (Fibre Channel) and USB3.0 hard drives.

1.2 Main Features

- Standalone device with simple touch-button operations at SATA III 6.0Gbps speed.
- All-Purpose Functions: Test, Analyze, Duplicate, Repair, Erase, Clip
- Forensic functions: DD Image, MD5 Calculation, SHA1 Calculation, SHA256 Calculation
- Mount HDD to PC for forensic investigation with Master channel Write Block**
- Works with any manufacturer's HDD (ATA, SATA, SAS, SCSI, Fiber Channel) with cross-copy functionality
- Recovers data from many hard drives that are not recognized by a normal PC
- Multiple secure delete functions, including DoD5220.22M, NSA, and NIST standard procedures
- Protects data on target drive from unintended overwrite
- Unlock security passwords
- Big Drive compatible: up to 144 PB capacity (full 48-bit addressing support)
- PC Control Software (YG1040 Host) for recording of log files, firmware download, PC acquisition, and remote unit control - sold separately**

**Support to be added in later firmware/software releases

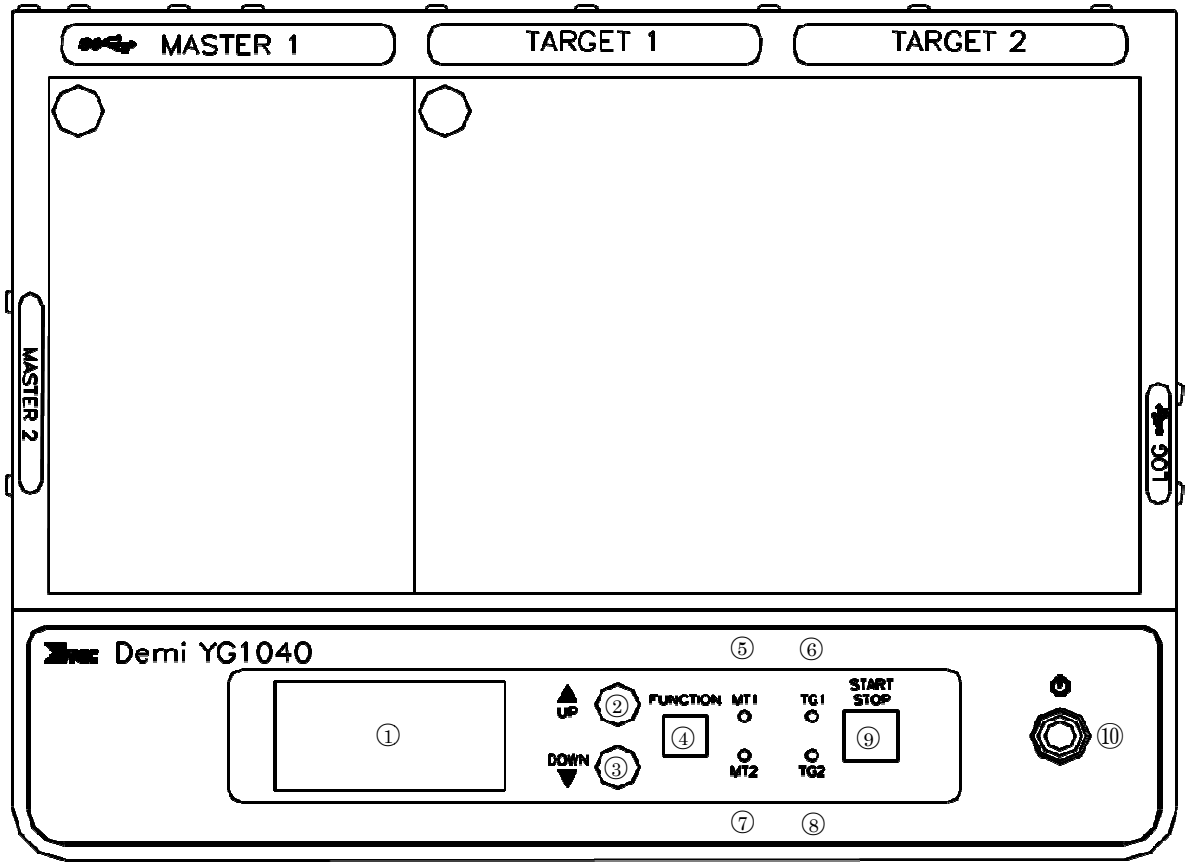
1.3 Shipment Contents

Item Name	QTY
Demi YG1040	1
Operation Manual	1
AC Power Cable	1
SATA Interface Cable	4
SAS Interface Kit	1
Optional Items	
PATA Kit	1
SCSI interface Kit	1
FC Interface Kit	1
USB3.0 Interface Kit	1
Terminal Software	1

1.4 Views

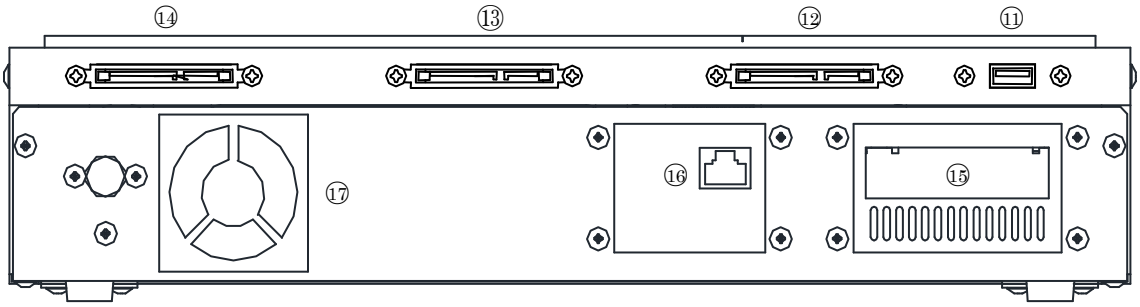
The YG1040 can perform 1:1, 1:2, or 1:3 operations. When 1:1, the unit will report a [DEVICE NOT FOUND] error on the unused Target channel (LED status light will turn red also). The used target channel, in this case, will still perform the operation normally.

Operation Panel



Name	Descriptions
(1) LCD	Item Function, Errors, Status Indicator, etc.
(2) UP S/W	Scroll up through menu
(3) DOWN S/W	Scroll down through menu
(4) FUNCTION S/W	Confirm menu selections
(5) Access LED for Master-1 Channel	Device access status for Master 1 Channel
(6) Access LED for Master-2 Channel	Device access status for Master 2 Channel
(7) Access LED for Target-1 Channel	Device access status for Target 1 Channel
(8) Access LED for Target-2 Channel	Device access status for Target 2 Channel
(9) START/STOP S/W	Start/stop/clear Item
(10) POWER LED	Main power **(Hold for 4 sec to power off)**

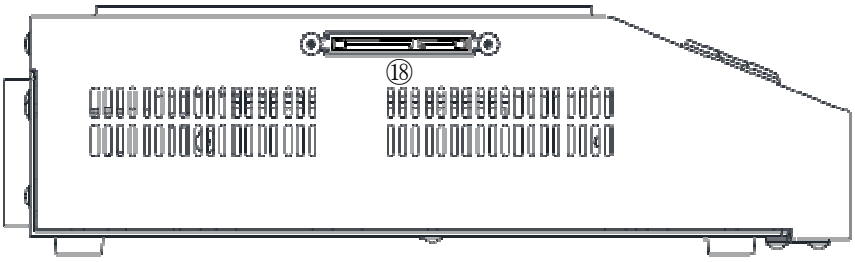
Rear View



Name	Descriptions
(11) USB-A Connector for Master-1	USB connector for Master-1
(12) SATA interface connector for Master-1	SATA Interface connector for Master-1
(13) SATA interface connector for Target-1	SATA Interface connector for Target-1
(14) SATA interface connector for Traget-2	SATA interface connector for Target-2
(15) Option board slot	Insert option interface cards
(16) Ethernet (RJ45) connector	Connect RJ45 cable to Host Computer
(17) Exhaust fan	Exhaust fan

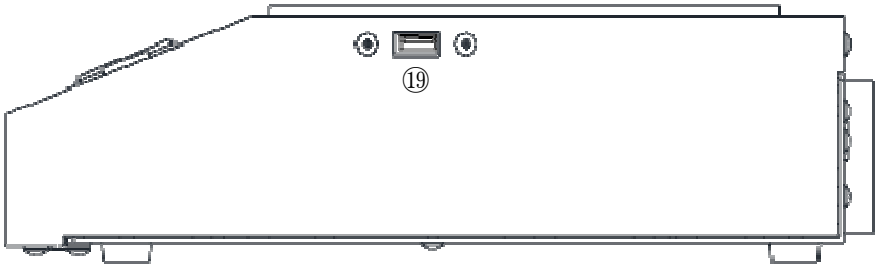
The ventilation slots in the back of the main body have been installed for heat radiation. DO NOT cover vents! It may cause the unit to overheat and cause damage.

Left Side View



Name	Descriptions
(18) SATA interface connector for Master-2	SATA interface connector for Master-2

Right Side View



Name	Description
(19) USB connector	Connect USB Thumb drive for logs

1.5 Cable Connection

SATA Cable

⑳

SATA Cable

Description
(20) Connect to HDD
(21) Connect to Main SATA interface connector

1.5.1 ATA Interface

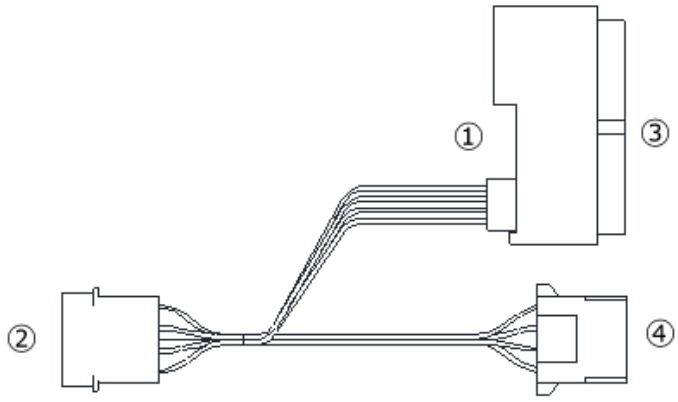
Cable

SATA Interface Cable

Description
(1) Connect to SATA HDD
(2) Connect to Main Unit SATA Port

DC Cable

Description
(1) Connect to HDD
(2) Connect to Main Unit DC out

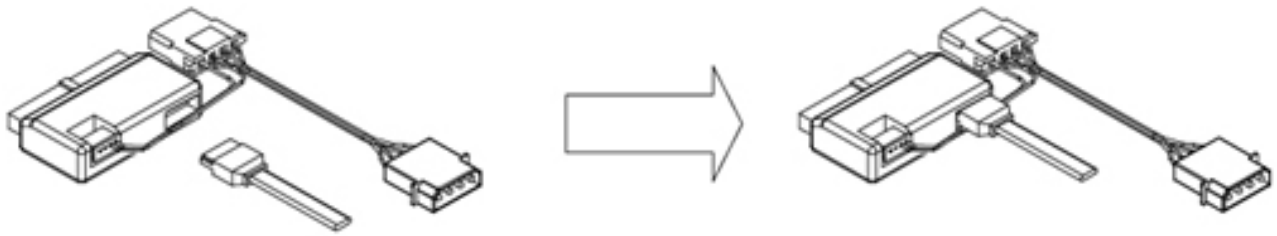


Description
(1) Connect SATA Interface Cable
(2) Connect DC Cable to HDD
(3) Connect to ATA Hard disk
(4) Connect to DC connector in ATA Hard disk

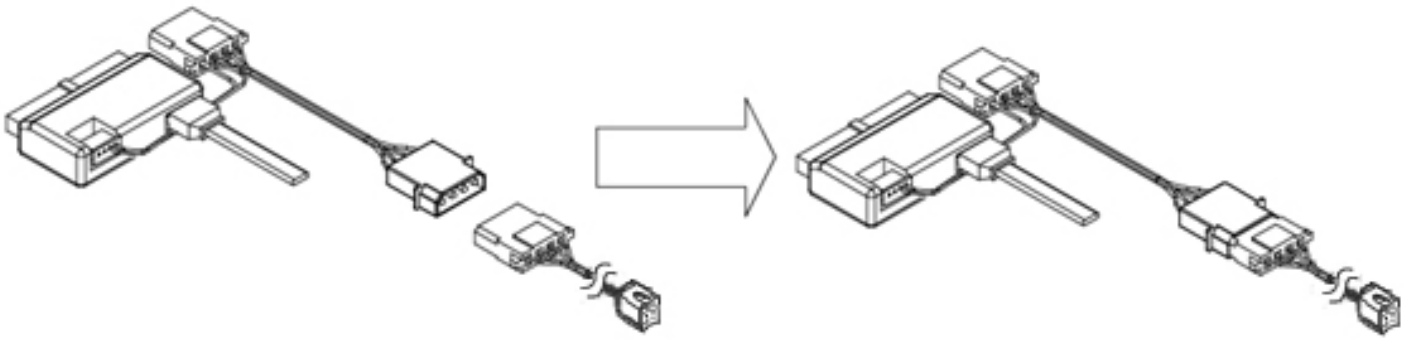
1) Connect SATA Cable to Main Unit SATA Port1, SATA Cable to Main Unit SATA Port2

2) Connect DC Cable to Main Unit DC out

3) Connect SATA Interface cable to SATA <=> ATA adapter

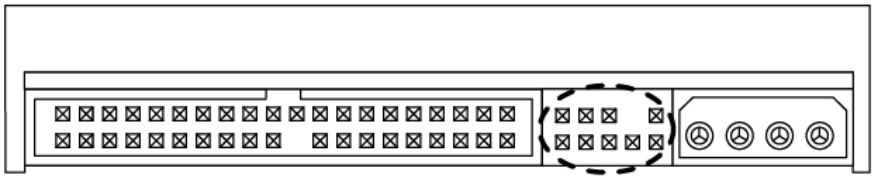


4) Connect Power Cable to SATA <=> ATA adapter

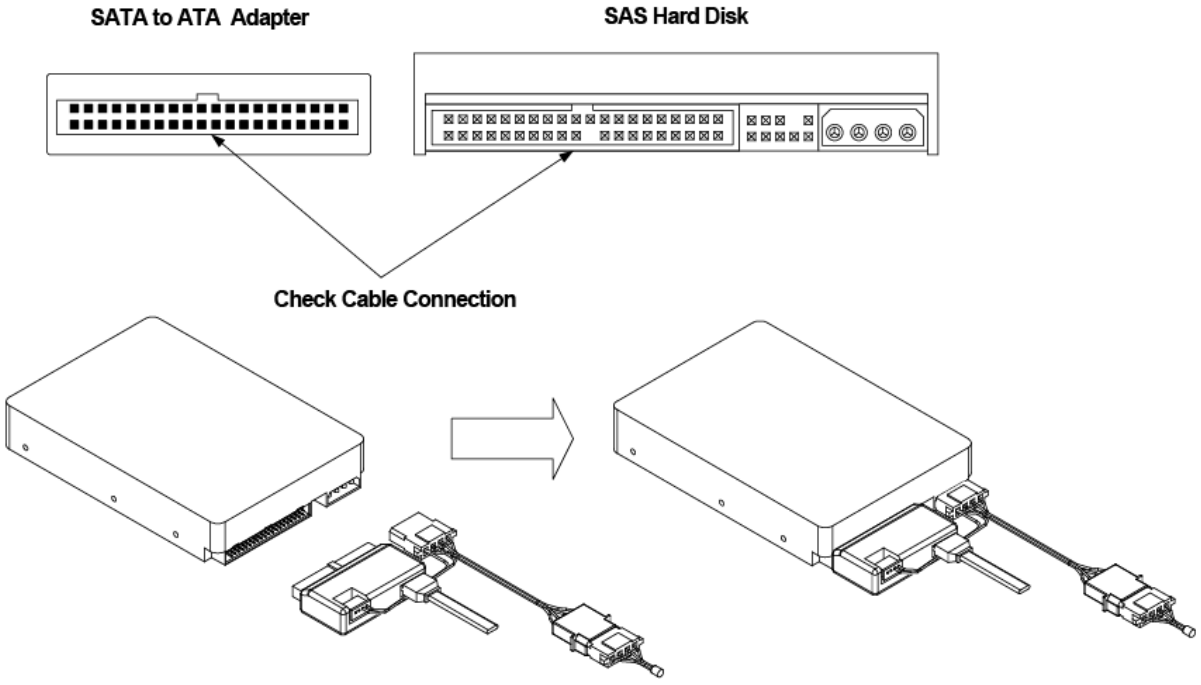


1.5.2.1 ATA Hard Drive special setting

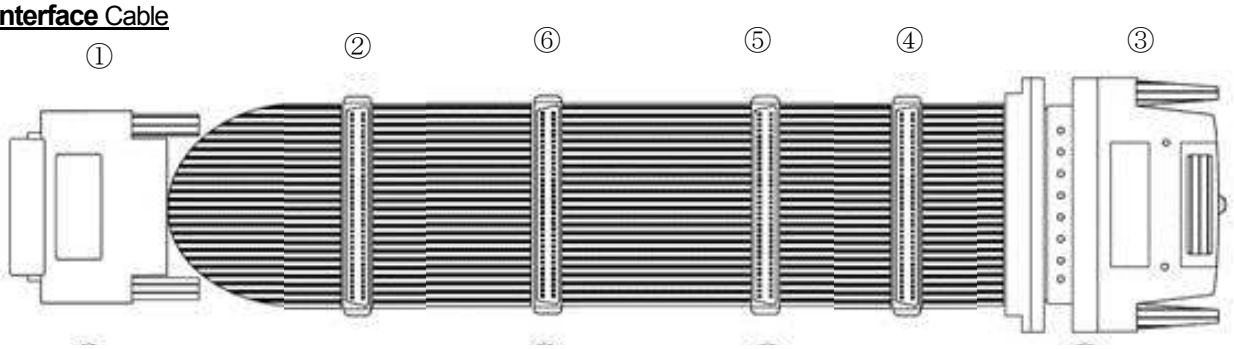
1) Please set jumper pin as Master. Please refer the user manual from HDD manufacturer for pin locations, as they may vary between drives.



2) Connect the SATA to ATA Adapter to the drive. Then connect the SATA interface cable to the adapter and DC power cable directly to the HDD



1.5.3 SCSI Interface Cable



SCSI Interface cable for Master & Target Channel

Description
(1) Connect to SCSI connector of main unit
(2) Connect to Master-1 (ID0) SCSI HDD
(3) Connect to Master-2 (ID1) SCSI HDD
(4) Connect to Target-1 (ID2) SCSI HDD
(5) Connect to Target-2 (ID3) SCSI HDD
(6) SCSI Interface Cable with terminator for Master & Target Channel

1.5.3.1 SCSI Interface – Master/Target

1) Connect SCSI Cable to SCSI Master/Target Connector of Main Unit

2) Connect DC Power Cable from Master Channel of unit to SCSI Master HDD or adapter.

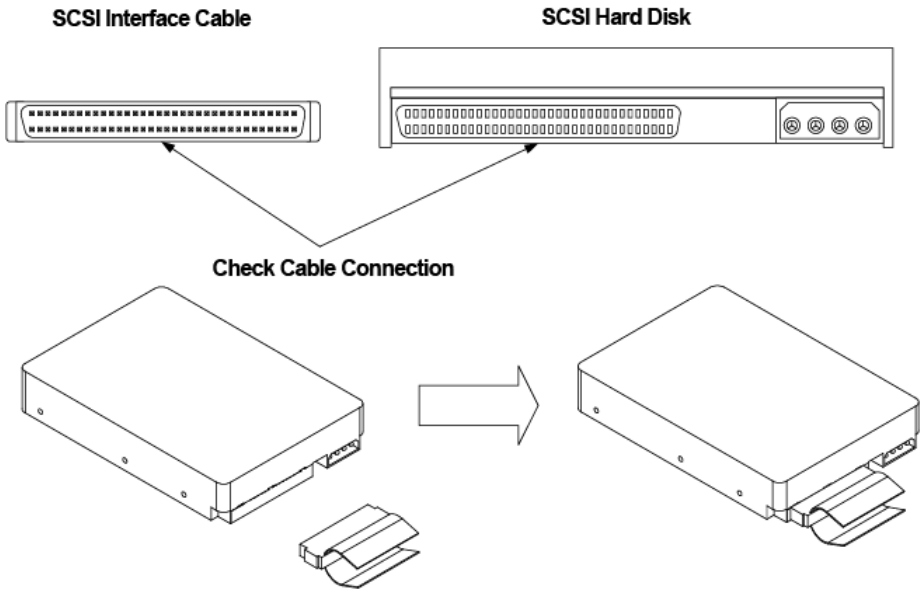
3) Connect DC Cable from Main Unit Targets DC out to Target HDD or adapter.

1.5.3.2 SCSI Hard Drive special setting

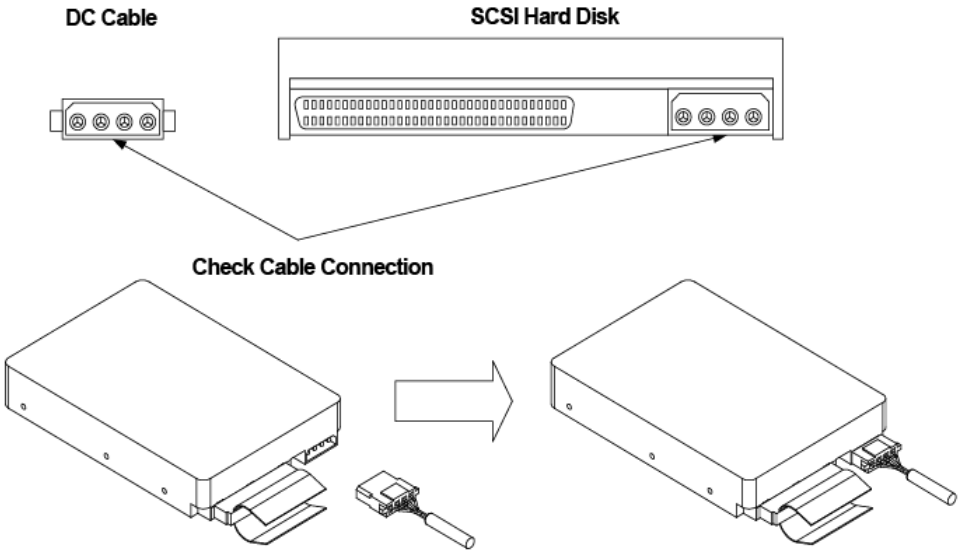
1) Please set jumper pin as below. Please refer the user manual from HDD manufacturer to confirm the pin locations, as they may vary between drives.

Channel	SCSI ID	Jumper
Master-1	0	None
Master-2	1	ID0
Target 1	2	ID1
Target 2	3	ID2 & ID1

SCSI ID Settings



2) Connect DC Cable to Hard Disk



1.5.4 Fibre Channel Interface

Please refer to FC ENG_YG1040_FC_Option.pdf

1.5.5 USB Interface

1.5.5.1 Master Channel

1) Connect USB Interface Cable to USB Master Connector of Main Unit

1.5.5.2 Target Channel

1) Connect USB Interface Cable to USB Target Connector of Main Unit

If USB device is not found in the unit, change 06:POWER ON INTVL in 09:CONFIG menu. (Thumb drive 3000~, HDD 5000~)

2. Basic Operation

2.1 Setup

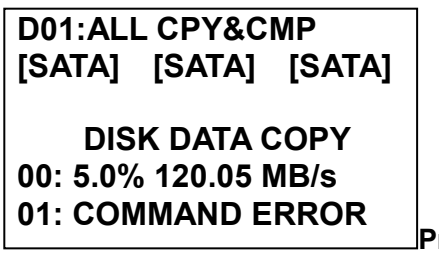
Connect AC power, DC power and interface (I/F) cables. Turn on main power.
After the initial boot sequence, the LCD will display the initial item menu.

2.2 LCD screen indication

ITEM Operation Status Display

1) **Selected Item** Current Item operation
2) **Status** Progress of current function (% , MB or time) Press function button during the operation to change the display mode.

Progress status with Status% **Progress status with transferred data**



Progress status with elapsed time

3) **Error Message** Current Errors (if applicable)

2.3 Operation

1) Select Interface Mode

A) Press **[FUNCTION] button** to reach the **[Function Selection]** menu.

[Function Selection] Menu

```
FUNCTION SELECT
>01: DUPLICATE
 02: CLIP
 03: ERASE
 04: TEST
```

B) In **[FUNCTION SEL]** menu, scroll to **[09: CONFIG]** and press **[START]** to select

```
FUNCTION SELECT
 06: FORENSIC 1
 07: FORENSIC 2
 08: ONLINE
>09: CONFIG
```

C) In **[CONFIG]** menu, scroll to **[02: MASTER I/F]** and press **[START]** to select

D) In **[MASTER I/F]** menu, scroll between interface types until the desired is selected

E) Press **[START]** when to confirm desired interface type

F) Repeat steps in **[CONFIG]** menu for **[03: TARGET1 I/F]** and **[04: TARGET2 I/F]**

G) Press **[FUNCTION]** twice to return to the main menu

2) Select Item Operation Mode

A) Press the **[FUNCTION]** button

B) Scroll through items:

- **[01: DUPLICATE]**
- **[02: CLIP]**
- **[03: ERASE]**
- **[04: TEST]**
- **[05: INFORMATION]**

C) Press **[START]** button when on desired item operation mode

3) Select an Operation to Perform

A) After selecting the Item Operation Mode, use the **[UP]** and **[DOWN]** buttons to navigate through available operations

B) When on desired operation, press **[START]** button and operation will begin

*To stop an operation, press the **[START]** button again and power-down sequence will begin

4) Normal Completion

The LED for each channel will turn green to indicate successful completion of selected item operation

The LED for each channel will turn red if an error has occurred

CAUTION

■Using SCSI Interface

Hard Drive Connection

- **68 pin WIDE**
  Use provided I/F cable / DC cable
- **50 pin NARROW**
  Use provided I/F and DC cable with conversion adapter
- **80 pin SCA**
  Use provided I/F and DC cable with SCA conversion adapter

Note - 68 pin SCSI Terminator should always be attached to SCSI I/F cable.

Note - Changing the SCSI ID# is not required for 1:1 duplication (use original SCSI ID#)
(OK to use same SCSI ID# between master and target devices)

■Using SAS Interface

Hard Drive Connection

When connecting to the provided SAS adapter, lower numbered SATA-like data cable must be connected to port nearest DC power cable. Ex: For Target 1, cables are labeled “P1” and “P2”. “P1” must be connected to port nearest DC power cable. For Target 2, cables are labeled “P3” and “P4”. “P3” must be connected to port nearest DC power cable.

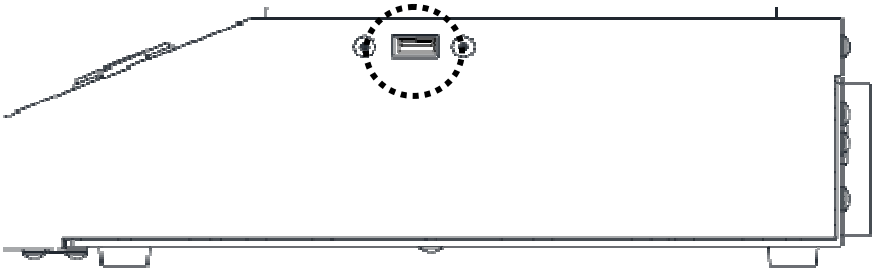
2.4 Saving Map Information to USB drive

2.4.1 Enable saving map

Enable **[16:MAP DATA SAVING]** for saving MAP information.

2.4.2 Changing save location

Connect USB drive to USB port on right side. Select [USB drive] in the configuration **[17: MAP DATA LOC.]**. The USB drive should be formatted by FAT 32 or FAT 16.



USBPort

2.4.3 Saving location on USB thumb drive

The path of saving location

YEC¥MAP_DATA¥*ZZZZZZZZ*.TXT

ZZZZZZZZ sequential numbers (8digits start from 00000000)

e.g. If three of the map information files exist already, next file name and path will be;

YEC¥MAP_DATA¥00000003.TXT

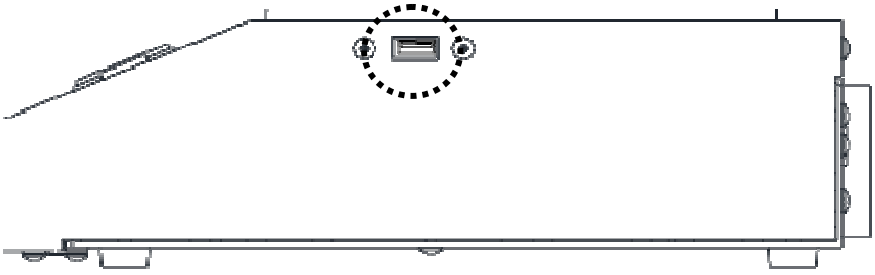
2.4.4 Maximum number of saving map

Location	Maximum numbers
Flash memory(Inside)	4 ～ 64logs (depending on used area of the master HDD)
USB Thumb drive	1000 logs

2.5 Saving Log to USB drive

2.5.1 Enable saving log

Before saving logs, enable **[50: LOGGING FEATURE]** in the configuration. Connect an USB thumb drive to USB port located right side of the unit. The USB thumb drive must be formatted with FAT32 or FAT16.



USBPort

2.5.2 Saving Log

The log will be saved when an item finish to run. If an USB drive is not connected, the following screen will be shown.

```
D01:All CPY & CMP

LOG SAVING ERROR:
  USB KEY NOT FOUND
```

Screen for failed to save

The unit keeps last log until power off. The log can be saved to use **[51: SAVE LAST LOG]** in configuration if the log was failed to save.

2.5.3 changing save location

The log will be saved in following location.

YEC¥LOG_DATA¥DM*XXXXXX*¥*YYYYMMDD*¥*ZZZZZZZZ*.LOG

XXXXXX	Last 6digits of the unit MAC address
YYYY	Year (run the item / 4 digits)
MM	Month (run the item / 2 digits)
DD	Day (run the item / 2 digits)
ZZZZZZZZ	Sequential numbers (8 digits)

e.g. MAC address 00:1A:C2:01:23:45 / Date 04/01/2011 / 3rd attempt will be;

YEC¥LOG_DATA¥DM012345¥20110401¥00000002.LOG

3. Specifications

3.1 Technical Specifications

■Dimensions	W350 x D255 x H70 (mm)
■Weight	5.9 lbs (not including optional connectors)
■Power	AC100~240V 50/60Hz (less than 2A)
■Number of Hard Drives	Master : 2 Target : 2 (1*) *FC
■Device I/F	SATA
	SAS
	Fibre Channel
	SCSI
	USB3.0
■Max Volume of Hard Drive	144 PB (full 48-bit addressing support)
■Safety and Protection	Primary power input protection (3A fuse)
■Operating Conditions	Temperature 10-40 °C
	Humidity 20-80% (non-condensing)

3.2 Options

■ SCSI Kit

Includes:

- ○ SCSI controller board
- ○ SCSI cables with terminators (x1)

This option will enable you to duplicate, test, erase, etc SCSI drives. SCSI adapters for 80-pin (SCA) and 50-pin available - sold separately

■ FC Kit

Includes:

- ○ FC controller board x1
- ○ FC cables (Master x1 and Target x1)
- ○ Transceiver x2
- ○ FC Adapter x2

This option will enable you to duplicate, test, erase, etc FC drives

■ SAS Kit

Includes:

- SAS controller board x1
- 2-ports iSAS cables (Master x1 and Target x1)

This option will enable you to duplicate, test, erase, etc. SAS drives

■ USB Kit

Includes:

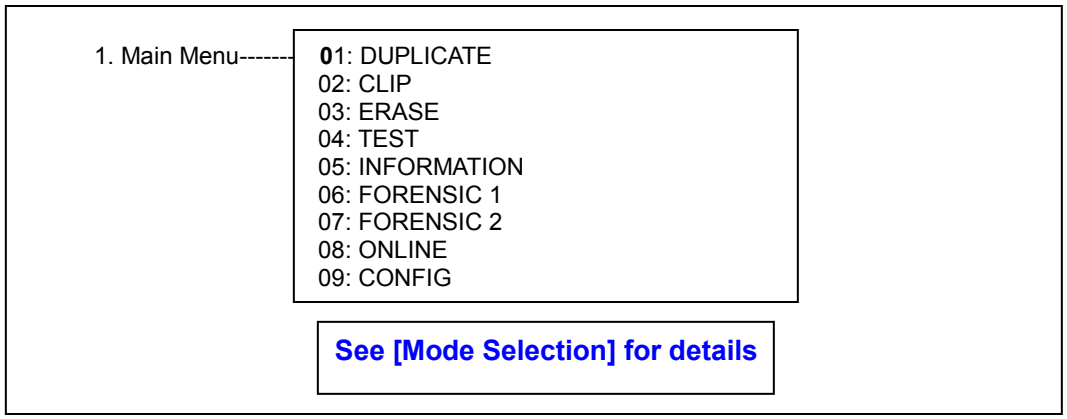
- USB controller board x1

This option will enable you to duplicate, test, erase, etc. USB thumb drive

4. Item list

4.1 Directory Structure

Press **[FUNCTION]** button from the starting screen to reach initial function menu (below)



4.2 Mode Selection

4.2.1 DUPLICATE Mode

ITEM	LCD	Operation
D01	ALL CPY&CMP	**All Copy & All Compare:** 1) Sector-to-sector copy of all sectors on connected HDD 2) Sector-to-sector compare of all sectors on connected HDD Notes: • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master
D02	ALL COPY	**All Copy** 1) Sector-to-sector copy of all sectors on connected HDD Notes: • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master
D03	ALL COMPARE	**All Compare** 1) Sector-to-sector compare of all sectors on connected HDD Notes: • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master
D04	SKIP COPY	**Skip Copy** 1) Sector-to-sector copy of all sectors on connected HDD Notes: • Bad sectors will be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master
D05	REVERSE COPY	**Reverse Copy** 1) Sector-to-sector copy of all sectors on connected HDD. Duplicate Master drive to Target drive start from the end of the drive to the beginning of the drive. Notes: • Bad sectors will not be skipped Target drive(s) capacity must be greater than or equal to the capacity of the Master
D06	RANGE SKIP COPY	**Range Skip Copy** 1) Sector-to-sector copy of sectors in specified range Notes: • Bad sectors will be skipped Target drive(s) capacity must be greater than or equal to the capacity of the Master
D07	RANGE REV COPY	**Range Reverse Copy** 1) Sector-to-sector copy of sectors in specified range. Duplicate Master drive to Target drive start from the end of the drive to the beginning of the drive. Notes: • Bad sectors will not be skipped Target drive(s) capacity must be greater than or equal to the capacity of the Master
D08	FS CPY&CMP	**File System Copy and Compare** 1) Analyze partition table of Master HDD 2) Copy data-area only to Target HDD(s) 3) Compare data-area only Notes: • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master • Compatible with NTFS and FAT32 disks only
D09	FS COPY	**File System Copy** 1) Analyze partition table of Master HDD 2) Copy data-area only to Target HDD(s) Notes: • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master • Compatible with NTFS,FAT32, and EXT2/3 disks only

D10	FS COMPARE	**File System Compare** 1) Compare data-area only Notes: • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master • Compatible with NTFS,FAT32, and EXT2/3 disks only
D11	MAP CPY&CMP	**MAP Copy and Compare** 1) Analyze partition table of Master HDD 2) Copy specific data-area only to Target HDD(s) 3) Compare data-area only Notes: • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master Compatible with NTFS and FAT32 disks only
D12	MAP COPY	**MAP Copy** 1) Analyze partition table of Master HDD 2) Copy specific data -area only to Target HDD(s) Notes: • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master Compatible with NTFS,FAT32, and EXT2/3 disks only
D13	MAP COMPARE	**Map Compare** 1) Compare map data-area only Notes: • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master Compatible with NTFS,FAT32, and EXT2/3 disks only
D14	MULTI CPY&CMP	**Multi CPY&CMP** 1) 1:3 Copy (Master-2 become Target drive) 2) Sector-to-sector copy of all sectors on connected HDD 3) Sector-to-sector compare of all sectors on connected HDD Notes: • Need to enable F15 1:3 mode • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master
D15	MULTI COPY	**Multi CPY&CMP** 1) 1:3 copy (Master-2 become Target drive) 2) Sector-to-sector copy of all sectors on connected HDD Notes: • Need to enable F15 1:3 mode • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master
D16	MULTI COMPARE	**Multi COMPARE** 1) 1:3 copy (Master-2 become Target drive) 2) Sector-to-sector compare of all sectors on connected HDD Notes: • Need to enable F15 1:3 mode • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master
D17	HPA ALL CPY&CMP	**HPA All Copy and Compare** 1) Set HPA on Target disk(s) to make capacity same as Master 2) Sector-to-sector copy of all sectors to connected Target(s) 3) Sector-to-sector compare of all sectors on connected Target(s) Notes: • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master

D18	HPA ALL COPY	**HPA All Copy** 1) Set HPA on Target disk(s) to make capacity same as Master 2) Sector-to-sector copy of all sectors to connected Target(s) Notes: • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master
D19	HPA SKIP COPY	**HPA Skip Copy** 3) Set HPA on Target disk(s) to make capacity same as Master 4) Sector-to-sector copy of all sectors to connected Target(s) Notes: • Bad sectors will be skipped Target drive(s) capacity must be greater than or equal to the capacity of the Master
D20	HPA FS CPY&CMP	**HPA File System Copy and Compare** 1) Set HPA on Target disk(s) to make capacity same as Master 2) Analyze partition table of Master HDD 3) Copy data-area only to Target HDD(s) 4) Compare data-area only Notes: • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master • Compatible with NTFS,FAT32, and EXT2/3 disks only
D21	HPA FS COPY	**HPA File System Copy** 1) Set HPA on Target disk(s) to make capacity same as Master 2) Analyze partition table of Master HDD 3) Copy data-area only to Target HDD(s) Notes: • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master • Compatible with NTFS,FAT32, and EXT2/3 disks only
D22	DCO ALL CPY&CMP	**Device Configuration Overlay All Copy and Compare** 1) Set DCO on Target disk(s) to make capacity same as Master 2) Sector-to-sector copy of all sectors to connected Target(s) 3) Sector-to-sector compare of all sectors on connected Target(s) Notes: • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master
D23	DCO ALL COPY	**Device Configuration Overlay All Copy** 1) Set DCO on Target disk(s) to make capacity same as Master 2) Sector-to-sector copy of all sectors to connected Target(s) Notes: • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master
D24	DCO FS CPY&CMP	**Device Configuration Overlay File System Copy and Compare** 1) Set DCO on Target disk(s) to make capacity same as Master 2) Analyze partition table of Master HDD 3) Copy data-area only to Target HDD(s) 4) Compare data-area only Notes: • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master • Compatible with NTFS,FAT32, and EXT2/3 disks only
D25	DCO FS CPY	**Device Configuration Overlay File System Copy** 1) Set DCO on Target disk(s) to make capacity same as Master 2) Analyze partition table of Master HDD 3) Copy data-area only to Target HDD(s) 4) Compare data-area only Notes: • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master • Compatible with NTFS,FAT32, and EXT2/3 disks only

D26	SF ALL COPY & COMPARE	**SF All Copy and Compare** 1) Use SCSI Format on Target disk(s) to make capacity and sector size as same as Master 2) Sector-to-sector copy of all sectors to connected Target(s) 3) Sector-to-sector compare of all sectors on connected Target(s) Notes: • Bad sectors will not be skipped Target drive(s) capacity must be greater than or equal to the capacity of the Master
D27	SF ALL COPY	**SF All Copy** 1) Use SCSI Format on Target disk(s) to make capacity and sector size as same as Master 2) Sector-to-sector copy of all sectors to connected Target(s) Notes: • Bad sectors will not be skipped Target drive(s) capacity must be greater than or equal to the capacity of the Master
D28	SF FS COPY & COMPARE	**SF File System Copy and Compare** 1) Use SCSI Format on Target disk(s) to make capacity and sector size as same as Master 2) Analyze partition table of Master HDD 3) Copy data-area only to Target HDD(s) 4) Compare data-area only Notes: • Bad sectors will not be skipped • Target drive(s) capacity must be greater than or equal to the capacity of the Master
D29	SF FS COPY	**SF File System Copy** 1) Use SCSI Format on Target disk(s) to make capacity and sector size as same as Master 2) Analyze partition table of Master HDD 3) Copy data-area only to Target HDD(s) Notes:

4.2.2 CLIP Mode

ITEM	LCD	Operation
C01	HPA AUTO CLIP	**HPA Auto Clip** 1) Set capacity of Target disk(s) to same as Master
C02	HPA CLIP (MB)	**HPA Clip (MB Input)** 1) Allow user input of new MB capacity of Target disk(s) 2) Set capacity of Target disk(s) to user-inputted MB value
C03	HPA CLIP (LBA)	**HPA Clip (LBA Input)** 1) Allow user input of new LBA capacity of Target disk(s) 2) Set capacity of Target disk(s) to user-inputted LBA value
C04	HPA CLIP OFF	**Remove HPA Clip** 1) Remove any existing HPA on Target disk(s)
C05	DCO AUTO CLIP	**DCO Auto Clip** 1) Set capacity of Target disk(s) to same as Master via DCO
C06	DCO CLIP (MB)	**DCO Clip (MB Input)** 1) Allow user to input new MB capacity for Target disk(s) 2) Set capacity of Target disk(s) to user-inputted MB value via DCO
C07	DCO CLIP (LBA)	**DCO Clip (LBA Input)** 1) Allow user to input new LBA capacity of Target disk(s)2) Set capacity of Target disk(s) to user-inputted LBA value via DCO
C08	DCO CLIP OFF	**Remove DCO Clip** 1) Remove any DCO capacity settings on disk
C09	SF AUTO CLIP	**SCSI Format Auto Clip** 1) Set capacity and setor size of Target disk(s) to same as Master with SCSI Format
C10	SF CLIP (MB)	**SCSi Format Clip (MB Input)** 1) Allow user to input new MB capacity for Target disk(s) with SCSI Format Set capacity of Target disk(s) to user-inputted MB value
C11	SF CLIP (LBA)	**SCSI Format Clip (LBA Input)** 1) Allow user to input new LBA capacity of Target disk(s) with SCSI Format 2) Set capacity of Target disk(s) to user-inputted LBA value
C12	SF CLIP OFF	**Remove SCSI Format Clip** 1) Remove any clipped capacity settings on disk with SCSI Format

4.2.3 ERASE Mode

E01	ONE-TIME ERASE	**One-time Erase** 1) Erase connected Target disk(s) with 1 pass erasure Notes: • Wipe pattern is set via [16: ERASE PATTERN] parameter (default [0000]h) • Master drive is not wiped by default. Set [18: ERASE MASTER] to [ENABLE] to alter setting.
E02	ONE-TIME ERS & CMP	**One-time Erase and Compare** 1) Erase connected Target disk(s) with 1 pass erasure Notes: • Wipe pattern is set via [16: ERASE PATTERN] parameter (default [0000]h) • Master drive is not wiped by default. Set [18: ERASE MASTER] to [ENABLE] to alter setting.
E03	N-TIME ERASE	**N-time Erase** 1) Erase connected Target disk(s) between 1 and 99 times Notes: • Wipe pattern is set via [16: ERASE PATTERN] parameter (default [0000]h) • Master drive is not wiped by default. Set [18: ERASE MASTER] to [ENABLE] to alter setting. • Number of erasures set via [16: ERASE PATTERN] parameter (default 3)

E04	N-TIME ERS&CMP	**N-time Erase and Compare** 1) Erase connected Target disk(s) between 1 and 99 times Notes: • Wipe pattern is set via [16: ERASE PATTERN] parameter (default [0000]h) • Master drive is not wiped by default. Set [18: ERASE MASTER] to [ENABLE] to alter setting. • Number of erasures set via [16: ERASE COUNT parameter (default 3)
E05	NSA ERASE	**NSA Standard Erase** 1) Sector-to-sector overwrite of Target disk(s) with random 512-byte pattern 2) Sector-to-sector overwrite of Target disk(s) with random 512-byte pattern 3) Sector-to-sector overwrite of Target disk(s) with [0000]h pattern Notes: • Master drive is not wiped by default. Set [18: ERASE MASTER] to [ENABLE] to alter setting.
E06	DoD ERASE	**DoD52220.22-M Standard Erase** 1) Sector-to-sector overwrite of Target disk(s) with user-defined value 2) Sector-to-sector overwrite of Target disk(s) with reverse of user-defined value 3) Sector-to-sector overwrite of Target disk(s) with random 512-byte pattern 4) Sector-to-sector compare of Target disk(s) against random 512-byte pattern Notes: • Wipe pattern is set via [16: ERASE PATTERN] parameter (default [0000]h) • Master drive is not wiped by default. Set [18: ERASE MASTER] to [ENABLE] to alter setting.
E07	US ARMY ERASE	**US Army Standard Erase** 1) Sector-to-sector overwrite of Target disk(s) with random 512-byte pattern 2) Sector-to-sector overwrite of Target disk(s) with user-defined value 3) Sector-to-sector overwrite of Target disk(s) with reverse of user-defined pattern Notes: • Wipe pattern is set via [16: ERASE PATTERN] parameter (default [0000]h) • Master drive is not wiped by default. Set [18: ERASE MASTER] to [ENABLE] to alter setting.
E08	US NAVY ERASE	**US Navy Standard Erase** 1) Sector-to-sector overwrite of Target disk(s) with user-defined value 2) Sector-to-sector overwrite of Target disk(s) with reverse of user-defined value 3) Sector-to-sector overwrite of Target disk(s) with random 512-byte pattern Notes: • Wipe pattern is set via [16: ERASE PATTERN] parameter (default [0000]h) • Master drive is not wiped by default. Set [18: ERASE MASTER] to [ENABLE] to alter setting.
E09	USAF ERASE	**US AIRFORCE Standard Erase** 1) Sector-to-sector overwrite of Target disk(s) with 0000h 2) Sector-to-sector overwrite of Target disk(s) with 1111h 3) Sector-to-sector overwrite of Target disk(s) with user-defined value Notes: • Wipe pattern is set via [16: ERASE PATTERN] parameter (default [0000]h) • Master drive is not wiped by default. Set [18: ERASE MASTER] to [ENABLE] to alter setting.
E10	NCSC ERASE	**NCSC Standard Erase** 1) Sector-to-sector overwrite of Target disk(s) with user-defined value 2) Sector-to-sector overwrite of Target disk(s) with reverse of user-defined value 3) Sector-to-sector overwrite of Target disk(s) with AA55h Notes: • Wipe pattern is set via [16: ERASE PATTERN] parameter (default [0000]h) Master drive is not wiped by default. Set [18: ERASE MASTER] to [ENABLE] to alter setting.
E11	SECURITY ERASE	Run “SECURITY ERASE” command for wiping (only the HDD support the command)
E12	ERASE DATA CHECK	Verify data wiped

4.2.4 TEST Mode

T01	ALL VERIFY	**ALL Verify Test** 1) Verify ECC of all sectors on Target disk(s) Notes: • Bad sector(s) is not repaired by default. Set [20: TEST REPAIR] to [ENABLE] to repair bad sector(s)
T02	ALL READ	**ALL Read Test** 1) Read of all sectors on Target disk(s) Notes: • Bad sector(s) is not repaired by default. Set [20: TEST REPAIR] to [ENABLE] to repair bad sector(s)
T03	RANDOM VERIFY	**Random Verify Test** 1) Random Verify of 1,024 sectors on Target disk(s) Notes: • Bad sector(s) is not repaired by default. Set [20: TEST REPAIR] to [ENABLE] to repair bad sector(s)
T04	RANDOM READ	**Random Read Test** 1) Random Read of 1,024 sectors on Target disk(s) Notes: • Bad sector(s) is not repaired by default. Set [20: TEST REPAIR] to [ENABLE] to repair bad sector(s)
T05	RANDOM WRITE	**Random Write Test** 1) Random Write of 1024 sectors on Target disk(s) Notes: • Bad sector(s) is not repaired by default. Set [20: TEST REPAIR] to [ENABLE] to repair bad sector(s)
T06	READ&WRITE&COMP	**Read, Write and Compare Test** 1) Read, Write and Compare of Inner, middle and outer tracks on Target disk(s) Notes: • Bad sector(s) is not repaired by default. Set [20: TEST REPAIR] to [ENABLE] to repair bad sector(s)
T07	RUNNING TEST	**Continues Test** 1) Read, Write and Compare of Inner, middle and outer tracks on Target disk(s) until abort by user Notes: • Bad sector(s) is not repaired by default. Set [20: TEST REPAIR] to [ENABLE] to repair bad sector(s)
T08	TEST REPAIR	**REPAIR BAD SECTOR** 1) Performs the read of all sectors on Target disk(s). During the READ, when error detected, rewrite and reassign the bad sector(s). Notes: • Repair bad sector with reassigned good sector(s).
T09	SMART ENABLE	**Enable SMART Functionality** 1) Enable SMART functionality on Target disk(s)
T10	SMART DISABLE	**Disable SMART Functionality** 1) Disable SMART functionality on Target disk(s)
T11	SMART READ DATA	**Read SMART Data** 1) Read SMART Data on Target disk(s)
T12	SMART VIEW DATA	**View SMART Data** 1) View SMART data on Target disk(s)
T13	SMART STATUS	**Check SMART Status** 1) Check SMART Status on Target disk(s) Notes: • By default, the Master port is not tested. To enable, set [18: TEST MASTER] to [ENABLE]
T14	SELF TEST (SHT.)	**SMART Short Mode Test** 1) Perform SMART Short Mode test on Target disk(s) Notes: • By default, the Master port is not tested. To enable, set[18: TEST MASTER] to [ENABLE]
T15	SELF TEST (EXT.)	**SMART Extended Mode Test** 1) Perform SMART Extended test on Target disk(s) Notes: • By default, the Master port is not tested. To enable, set[18: TEST MASTER] to [ENABLE]

4.2.5 INFORMATION Mode

I01	DEVICE SENSE	**Device Sense** 1) Dense device information on connected Target disk(s)
I02	DEVICE INFO	**Device Information** 1) Get detailed device information on connected Target disk(s)
I03	PARTITION CHECK	**Partition Check** 1)Check partition information on connected Target disk(s) for basic partition info Notes: •Works with NTFS and FAT32 partitions only
I04	PARTITION INFO	**Partition Info** 1)Get detailed partition info from connected Target disk(s) Notes: •Works with NTFS and FAT32 partitions only
I05	MAP DATA INFO	**Display MAP Info**
I06	MAP ERASE	**Delete MAP Info**
I07	MAP ERASE ALL	**Delete all MAP Info**
I08	ERROR INFO	**Error Info** 1) Get detailed error info from connected Target disk(s)

4.2.6 FORENSIC 1 Mode

ITEM	LCD	Operation
F01	SET DATE&TIME	**Set Date and Time** 1) Set time and date displayed on unit
F02	DEVICE SENSE	**Device Sense** 1) Sense device information on Target disk(s)
F03	DEVICE INFO	**Device Information** 1) Get detailed drive information on connected Target disk(s)
F04	HPA AUTO CLIP	**Automatic HPA Clip** 1) Set HPA on disk to match Target(s) capacity with Master
F05	ONE-TIME ERASE	**One-time Erase** 1) Erase connected Target disk(s) with 1 pass erasure Notes: •Wipe pattern is set via [15: ERASE PATTERN] parameter (default [0000]h) •Master drive is not wiped by default. Set [17: ERASE MASTER] to [ENABLE] to alter setting.
F06	HPA SKIP COPY	**HPA SKIP Copy** 1) Set HPA on Target disk(s) to make capacity same as Master 2) Sector-to-sector copy of all sectors to connected Target(s) 3) Sector-to-sector compare of all sectors on connected Target(s) Notes: •Bad sectors will not be skipped •Target drive(s) capacity must be greater than or equal to the capacity of the Master
F07	SKIP COPY&HASH	**Skip Copy and Hash** 1) Sector-to-sector copy of Master disk to Target 2) Hash calculation of Master disk: displayed at end of copy operation

F08	HPA ALL CPY&CMP	**HPA All Copy and Compare** 4) Set HPA on Target disk(s) to make capacity same as Master 5) Sector-to-sector copy of all sectors to connected Target(s) 6) Sector-to-sector compare of all sectors on connected Target(s) Notes: •Bad sectors will not be skipped •Target drive(s) capacity must be greater than or equal to the capacity of the Master
F09	ALL CPY&CMP&HASH	**All Copy and Compare and Hash** 1) Sector-to-sector copy of Master disk to Target(s) 2) Sector-to-sector compare of Master disk with Target(s) 3) Hash calculation of Master disk: displayed at end of copy operation
F10	FAT32 FORMAT	**FAT32 Format** 1) Format Target disk(s) with FAT32
F11	exFAT FORMAT	**exFAT Format** 1) Format Target disk(s) with exFAT
F12	NTFS FORMAT	**NTFS Format** 1) Format Target disk(s) with NTFS
F13	DD CREATE&HASH	**DD Image and Hash** 1) DD Image creation on Target disk of Master disk 2) Hash calculation of Master disk: displayed at end of copy operation Notes: •Target disk must be formatted with NTFS or FAT32
F14	DD CREATE&COMP	**DD Image and Compare** 1) DD Image creation on Target disk of Master disk 2) Comparison of created DD Image with Master disk Notes: •Target disk must be formatted with NTFS or FAT32
F15	E01 CREATE	**E01 Image and Hash** 1) E01 image creation on Target disk of Master disk 2) Hash calculation of Master disk: displayed at end of copy operation Notes:
F16	E01 CREATE&COMP	**E01 Image and Compare** 1) E01 image creation on Target disk of Master disk 2) Comparison of created E01 Image with Master disk Notes:
F17	Ex01 CREATE	**Ex01 Image and Hash** 1) Ex01 image creation on Target disk of Master disk 2) Hash calculation of Master disk: displayed at end of copy operation Notes:
F18	Ex01 CREATE&COMP	**Ex01 Image, Hash and Compare** 1) E01 image creation on Target disk of Master disk 2) Comparison of created E01 Image with Master disk 3) Hash calculation of Master disk: displayed at end of copy operation Notes:
F19	HASH CALCULATE	**Hash Calculation** 1) Hash calculation of Master disk: displayed at end of operation
F20	HPA CLIP OFF	**HPA Clip Off** 1) Remove HPA on Target disk(s)

4.2.7 FORENSIC 2 Mode

ITEM	LCD	Operation
F21	DD CREATE&HASH	**DD Image and Hash** 1) DD Image creation on Target disk of Master disk 2) Hash calculation of Master disk: displayed at end of copy operation Notes: • Target disk must be formatted with NTFS or FAT32
F22	DD CREATE&COMP.	**DD Image and Compare** 1) DD Image creation on Target disk of Master disk 2) Comparison of created DD Image with Master disk Notes: • Target disk must be formatted with NTFS or FAT32
F23	E01 CREATE&HASH	**E01 Image and Hash** 1) E01 image creation on Target disk of Master disk Notes:
F24	E01 CREATE&COMP	**E01 Image and Compare** 1) E01 image creation on Target disk of Master disk 2) Comparison of created E01 Image with Master disk Notes:
F25	Ex01 CREATE&HASH	**Ex01 Image and Hash** 1) Ex01 image creation on Target disk of Master disk Notes:
F26	Ex01 CREATE&COMP	**Ex01 Image and Compare** 1) E01 image creation on Target disk of Master disk 2) Comparison of created E01 Image with Master disk Notes:
F27	IMAGE FILE RESORE	**DD/Ex01/exFAT Image Restoration** 2) Restore DD/Ex01/exFAT image files of Master disk and copy on Target disk Notes:
F28	FAT32 FORMAT	**FAT32 Format** 1) Format Target disk(s) with FAT32
F29	exFAT FORMAT	**exFAT Format** 1) Format Target disk(s) with exFAT
F30	NTFS FORMAT	**NTFS Format** 1) Format Target disk(s) with NTFS
F31	MD5 CALCULATE	**MD5 Hash Calculation** 1) MD5 Hash calculation of Master disk: displayed at end of operation
F32	MD5 VALUE	**MD5 Value Display** 1) Display calculated MD5 of Master disk
F33	SHA1 CALCULATE	**SHA1 Hash Calculation** 1) Calculate SHA1 Hash value of Master disk: displayed at end of operation
F34	SHA1 VALUE	**SHA1 Value Display** 1) Display calculated SHA1 of Master disk
F35	SHA256 CALCULATE	**SHA256 Hash Calculation** 1) Calculate SHA256 Hash value of Master disk: displayed at end of operation
F36	SHA256 VALUE	**SHA256 Value Display** 1) Display calculated SHA256 value of Master disk

F37	MNT MASTER HDD	**Mount Master-1 drive as External drive** Notes: Need an iSCSI initiator function
F38	MNT TARGET HDD	**Mount Target-1 drive as External drive** Notes: Need an iSCSI initiator function

4.2.8 ONLINE Mode

This function menu is used to download customized scripts to the unit. The scripts can be stored to the unit for standalone usage. Please see the host software manual for further instructions.

ITEM	LCD	Operation
O01	No Item	Not Register
O02	No Item	Not Register
O03	No Item	Not Register
O04	No Item	Not Register
O05	No Item	Not Register
O06	No Item	Not Register
O07	No Item	Not Register
O08	No Item	Not Register
O09	No Item	Not Register
O10	No Item	Not Register
O11	No Item	Not Register
O12	No Item	Not Register
O13	No Item	Not Register
O14	No Item	Not Register
O15	No Item	Not Register
O16	No Item	Not Register

4.3 Config Settings

Press **[FUNCTION]** button at the main menu to display the [Function Selection] screen

```
FUNCTION SEL
  07: FORENSIC 2
  08: ONLINE
→09 CONFIG
```

Select **[09: CONFIG]** using [UP/DOWN] button and Press **[START]** button to confirm

Choose the parameter by the following table:

After changing parameter(s), select **[58: PARAMETER SAVE]** and press **[START]** to save the change

LCD	Parameter
01: LANGUAGE	Select Language: [ENGLISH] Default: [ENGLISH]
02: MASTER 1 I/F	Master Interface Type: [SATA], [SAS]*, [SCSI]*, [FC]*, [USB] *Only available when optional board installed Default: [SATA]
03: MASTER 2 I/F	Master Interface Type: [SATA], [SAS]*, [SCSI]*, [FC]*, [USB]* *Only available when optional board installed Default: [SATA]
04: TARGET 1 I/F	Target 1 Interface Type: [SATA], [SAS]*, [SCSI]*, [FC]*, [USB]* *Only available when optional board installed Default: [SATA]
05: TARGET 2 I/F	Target 2 Interface Type: [SATA], [SAS]*, [SCSI]*, [FC]*, [USB]* *Only available when optional board installed Default: [SATA]
06: POWER ON WAIT	Power On Wait: [00]~[99] seconds Default [20]
07: POWER ON INTVL	Power On Interval [0000]~[99999] Milliseconds Default [1000]
08: POWER OFF WAIT	Power Off Wait [00]~[99] seconds Default [10]
09: BLOCK SIZE	Block Size [1]~[4096] sectors Default[02048]
10: WRITE CACHE	Write Cache Setting [DEFAULT] [AUTO] [ENABLE] [DISABLE] Default: [DEFAULT]
11: READ CACHE	Write Cache Setting [DEFAULT] [AUTO] [ENABLE] [DISABLE] Default: [DEFAULT]
12: BLK RETRY MAX	Block Retry Count Max [0000]~[9999] Default :[0003]
13: SEC RETRY MAX	Sector Retry Count Max [0000]~[9999] Default :[0003]
14: ERROR SKIP	Error Skip [ENABLE] [DISABLE] Default :[DISABLE]
15: 1:3 MODE	3 Targets Copy Mode [ENABLE] [DISABLE] If Enable, Master-2 will become Target-1 Default :[DISABLE]

16: CAPACITY CHECK	Target Capacity Check [TOTAL SECS.] [PARTITION END] [MINIMUM SECS.]
	*The size of sectors required on Target compared to Master Default [TOTAL SECS.]
17: CHECK CONNECTION	Check three blocks of sectors on Target filled with 00h or specified otherwise to avoid unintended overwrite before copying. If not, all process will be aborted [ENABLE] [DISABLE]
	Default [ENABLE.]
18: FS DETECTION	Determine File System when checking the size [FOLLOW MBR.] [IGNORE MBR]
	Default [FOLLOW MBR.]
19: MAP DATA SAVING	Save MAP info [ENABLE] [DISABLE]
	Default :[DISABLE]
20: MAP DATA LOC.	Save MAP info Location [INTERNAL MEMORY] [USB KEY]
	Default :[INTERNAL MEMORY]
21: ERASE PATTERN	Erase Pattern [0000]~[FFFF]h
	Default [0000]h
22: ERASE COUNT	Erase Count [00]~[99]
	Default : [03]
23: ERASE MASTER	Erase Master [ENABLE] [DISABLE]
	Default :[DISABLE]
24: HPA/DCO RELEASE	Remove HPA/DCO when erasing [ENABLE][DISABLE]
	Default : [DISABLE]
25: TEST MASTER	Test Master [ENABLE] [DISABLE]
	Default : [DISABLE]
26: TEST REPAIR	Repair bad sector(s) when error occurred. [ENABLE] [DISABLE]
	Default [DISABLE]
27: HASH TYPE	Hash Type [NONE] [MD5] [SHA1] [SHA256]
	Default : [MD5]
28: MAX FILESIZE	Maximum File Size [0001]~[4095]MB
	For size of one DD image Default : [2048]MB
29: REMOVE HPA	Remove HPA automatically [ENABLE] [DISABLE]
	Default [DISABLE]
30: E01COMP. LEVEL	Specify compression level for E01 and Ex01 [NONE/LOW/MIDDLE/HIGH]
	Default [NONE]
31: SECURITY ID	Security password type [USER] [MASTER]
	Default : [USER]
32: SECURITY LEVEL	Security Level [MAXIMUM] [HIGH]
	Default : [MAXIMUM]
33: ENHANCED ERASE	Enhanced Security Erase [DISABLE] [ENABLE]
	Default : [DISABLE]

34: ATA ACCESS	ATA Access Mode [AUTO] [CHS(DEFAULT)] [CHS(CURRENT)] [LBA28] [LBA48]
	Default : [AUTO]
35: ATA TRANSFER	ATA Transfer Rate [AUTO] [PIO] [MDMA] [UDMA]
	Default : [AUTO]
36: ATA PIO MODE	ATA PIO Mode [AUTO] [PIO0] [PIO1] [PIO2] [PIO3] [PIO4]
	Default : [AUTO]
37: ATA MDMA MODE	ATA MDMA Mode [AUTO] [MDMA0] [MDMA1] [MDMA2]
	Default : [AUTO]
38: ATA UDMA MODE	ATA UDMA Mode [AUTO]~[UDMA7]
	Default : [AUTO]
39: ATA TIMEOUT	ATA Command Timeout [0000]~[9999] seconds
	Default : [0030]
40: SCSI ACCESS	SCSI Access Mode [AUTO] [CDB6] [CDB10] [CDB12] [CDB16]
	Default : [AUTO]
41: SCSI TIMEOUT	SCSI Command Timeout [0000]~[9999] seconds
	Default : [0030]
42: RESETTING SPEED	Transfer speed after skipped bad sector [LOWEST] [HIGHEST]
	Default : [HIGHEST]
43: IP ADDRESS	IP Address [0.0.0.0]~[255.255.255.255]
	Default: [192.168.0.1]
44: NET MASK	Net mask [0.0.0.0]~[255.255.255.255]
	Default: [255.255.255.0]
45: GATEWAY	Gateway [0.0.0.0]~[255.255.255.255]
	Default : [0.0.0.0]
46: MAC ADDRESS	Display MAC Address
47: SWITCH PUSH BEEP	Switch Button Beep Sound [ENABLE] [DISABLE]
	Default : [ENABLE]
48: SWITCH REPEAT	Switch Repeat [ENABLE] [DISABLE]
	Default : [ENABLE]
49: ALARM TIMEOUT	Alarm Sound Timeout [0000]~[9999] milliseconds
	Default : [1000]
50: ALARM PATTERN	Alarm Sound Pattern [NONE] [ON] [1Hz] [1Hz&4Hz] [2Hz] [2Hz&8Hz] [4Hz] [8Hz]
	Default : [ON]
51: PROGRESS TYPE	Progress Display Type [(TRANSFER) RATE] [POSITION(%)] [(Elapsed) TIME]
	Default : [RATE]
52: LOGGING FEATURE	Saving Log function [DISABLE] [INTERNAL MEMORY][USB MEMORY]

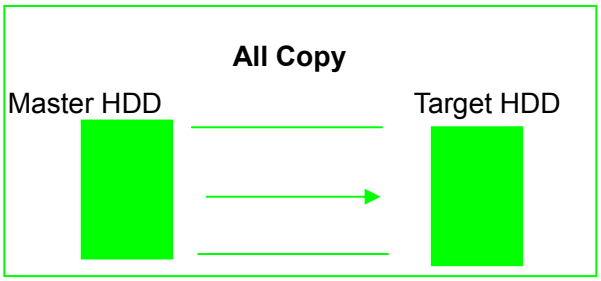
	Default : [DISABLE]
53: SAVE LAST LOG	Save last log to internal memory or USB drive. LOGGING FEATURE is INTERNAL MEMORY or USB.
	(Must insert USB key in order to use this feature)
54: LOG EXPORT	Export log from internal memory to USB drive
55: TIME ZONE	Time Zone Setting [GMT-12:00]~[GMT+12:00]
	Default : [GMT+00:00]
56: SYSTEM DATE	System Date [YYYY/MM/DD]
	Default : [0000/00/00]
57: SYSTEM TIME	System Time [HH:MM:SS]
	Default : [00:00:00]
58: SYSTEM VERSION	Display System Version
59: UPDATE F/W	Update F/W from USB Thumb drive
60: PARAMETER LOAD	Display Parameters saved
61: PARAMETER DEF.	Reset Default Parameters
62: PARAMETER SAVE	Save new Parameters

5. Item Description

5.1 All Copy and Compare

This function duplicates the Master device to the Target device(s) in a sector-to-sector fashion.

*Target HDD must be of equal or greater capacity to Master/Suspect device



If a bad sector is found in Master device:

Terminates procedure when bad sectors are found on Master device. If errors are found on Target device, the operation will continue, but error out bad drives.

***Generally used to duplicate known-good HDDs where any missing data from the Master is not acceptable.**

Limitations

(1) Windows

Windows maintains HDD data in the registry. This data will not be updated during the duplication process. Therefore, the system may require installation of new drivers when using new drive for the first time. (Message: “New device found” will appear after boot up)

(2) Hard Drive Differences

Created Targets may not work as a bootable device when both PCs are not identical. To guarantee a bootable disk, both devices (Master and Target) must be identical. Logical Borders should also be identical in Master and Target hard drive in order for Duplicate HDD to be bootable. Hardware inside the machines must also be identical.

5.2 File System Copy

This function analyzes the file system data structures of the Master drive and duplicates only the used data-area (FAT, FAT32, NTFS, and EXT2/3 only). When the capacity of the Target drive is different than the Master, the file system is copied directly onto the Target, with no partition expansion. The difference between the two capacities is left as Unallocated Space on the Target. Ex: if a 100 GB Master with a single partition is copied onto a 200 GB Target, the Target would appear as the original 100 GB partition, plus an additional 100 GB of Unallocated Space*

*Third-party software tools exist that can expand partitions to the full size of the disk

5.3 HPA

HPA (sometimes called clipping) is a function to change the volume of hard drive to a specified size by using the SET MAX ADDRESS command in the ATA specification. The hard drive must support this command for the operation to complete successfully.

■Specify volume size

LCD indicate as follows

① Use **[UP/DOWN button]** and press **[START]** to change numbers
② Confirm each numbers by [**FUNC S/W]**
③ Clip by pressing [**OK]**, **[FUNC]** for return previous screen, and [**CANCEL]** for cancel.

5.4 Erase

The YG1040 can erase up to three hard drives simultaneously. There are eleven different erasure methods available (E01 ~ E11) under the ERASE menu (see “4.2.3 Erase Mode” for details on all available modes). The E03 and E04 erase methods can be customized to meet any custom erasure standard (number of overwrites and overwrite pattern).

5.4.1 Parameter Settings for Erase Operation

Choose the following parameters for Erase operation

① Press **[FUNCTION]** button to display the Display Function selection menu
② Select **[09: CONFIG]** using [UP/DOWN] button and Press **[START]]** button to confirm
③ Select **[18: ERASE PATTERN]** using [UP/DOWN] button and Press **[START]** button to confirm
④ Change value to desired 2-byte wipe pattern (in hex)
⑤ Repeat steps 3 and 4 for **[19: ERASE COUNT]** and **[20: ERASE MASTER]**
⑥ Select **[58: PARAMETER SAVE]** to confirm and save the parameter changes

5.5 Data Recovery

When performing the [D04: SKIP COPY] operation, the YG1040 will automatically use its Data Recovery features.

1) The YG1040 Data Recovery functions will duplicate all usable data in a sector-by-sector fashion. When a bad sector is discovered (errors such as AMNF, ABRT, IDNF, UNC, etc), the unit will automatically move on to the next sector on the HDD. It will continue this process until all usable data has been extracted.

2) When errors are found on the Master HDD, [00]h values will be written in the corresponding location on the Target HDD(s).

3) Data Recovery functions can be optimized by adjusting Timeout and Retry settings in the Configuration menu.

5.6 Forensic Investigation

The YG1040 has the following functions specially designed for forensic investigators to improve efficiency of their daily tasks.

5.6.1 Current Time

Current Time is displayed when you select any of the DD Image operations

*Default Display Method: **YYYY/MM/DD**

5.6.2 Clock and Date Settings

① Press **[FUNCTION]** button to open the [Function Selection] menu and select **[09: CONFIG]**

```
FUNCTION SEL
  07: FORENSIC 2
  08: ONLINE
→09: CONFIG
```

② Select **[52: TIME ZONE]** using [UP/DOWN] button and Press **[START]** button to confirm

③ Change settings as necessary.

④ Repeat steps 2 and 3 for **[53: SYSTEM DATE]** and **[54: SYSTEM TIME]**

⑤ Select the last parameter **[58: PARAMETER SAVE]** to confirm the changes

5.6.3 DD Image File Size

Select DD image file size between **1MB** and **2,000MB (2 GB)**

*Defaults file size: **640MB** (CD storage size)

① Press **[FUNCTION]** button to open the [Function Selection] menu and select **[09: CONFIG]**

```
FUNCTION SEL
  07: FORENSIC 2
  08: ONLINE
→09: CONFIG
```

② Select **[24: MAX FILESIZE]** using [UP/DOWN] button and Press **[START]** button to confirm

③ Change file size to desired value **Default is [2048]**

④ Select the last parameter **[58: PARAMETER SAVE]** to confirm the changes

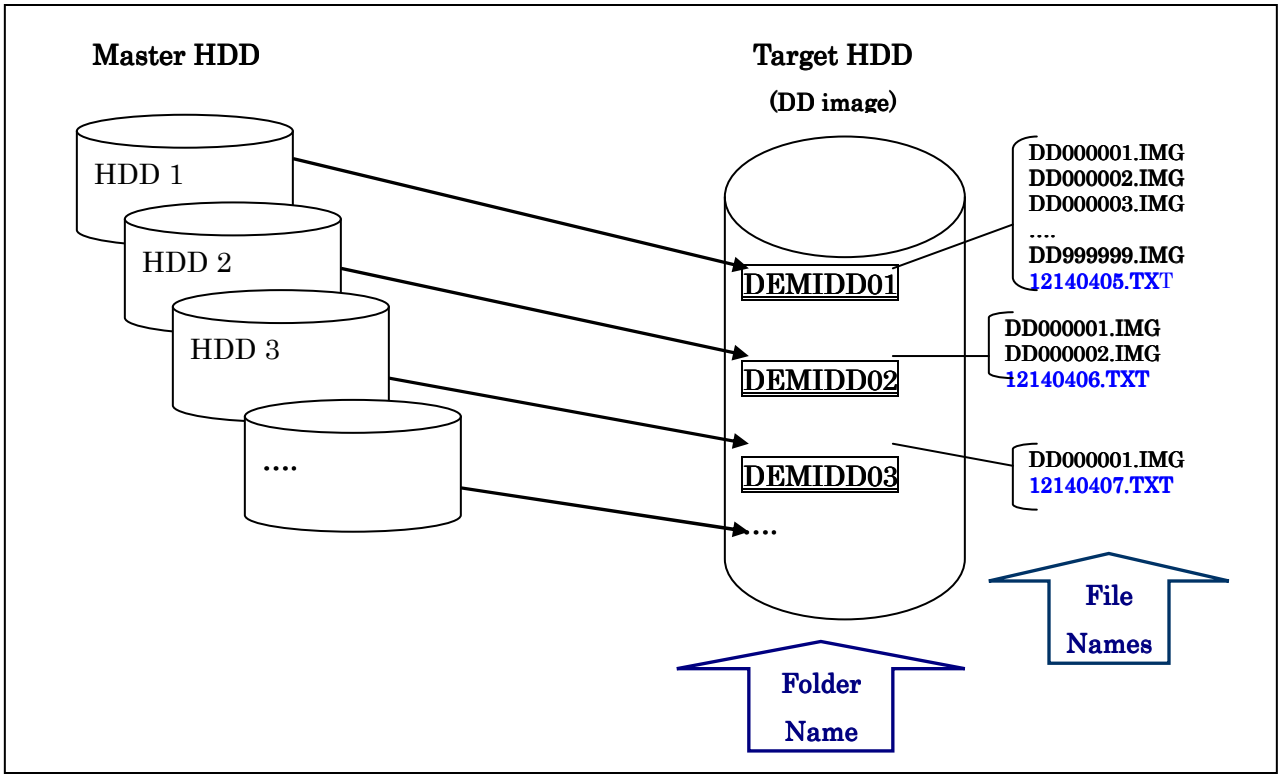
5.6.4 Format Target Hard Drive

① It is strongly recommended to erase the entire HDD before storing evidence on a disk.

② In order to store DD image file to Target HDD, the HDD must be formatted initially using **07:FORENSIC 2 [F23:FAT32 FORMAT]** or **[F24: NTFS FORMAT]**

5.6.5 Evidence Management

DD Image files created using any of the DD Image operations on the YG1040 will be created to the Target HDD with the following folder structures and file names



Folder Name: DEMI**XX** (DEMI01, DEMI02, DEMI03, DEMI04…)

*Folder will be created per acquired Suspect HDD, and assigned sequential titles.

* More than **99 folders** will result in **"ILLEGAL TARGET"** Message.

File Name: DDXXXXXX.IMG (DD000001.IMG, DD000002.IMG, DD000003.IMG, …)

Automatically assign sequential numbers in XXXXXX

Index File: MMDDYYHH.TXT

Index file will be created per acquired Suspect HDD, and assigned Date & Time information in MMDDYYHH format. (This Date & Time is when Suspect HDD acquisition is completed)

Example of ***Index File*** content

```
MD5 VALUE: 8856C367246E908F24FBD2828BCC54B1
ORIGINAL HDD HASH SECTOR: 0-1953503
HASH Completed: 12/14/2004 3:45:32am
Elapsed time: 0:01:18
================================================================================
#00,MODEL                          ,HITACHI_DK23AA-12
#00,S/N                            ,                N85305
#00,FIRMWARE_VERSION               ,00XDA0A2
#00,LBA_MODE_SECTORS               ,001DCEE0h,          1953504
#00,DEFAULT_HEAD                   ,   10h,     16
#00,DEFAULT_CYLINDER               , 792h, 1938
#00,DEFAULT_SECTOR                 ,   3Fh,     63
#00,DEFAULT(C*H*S)SECTORS    ,   1DCEE0h,     1953504
#00,CURRENT_HEAD                   ,   10h,     16
#00,CURRENT_CYLINDER               , 792h, 1938
#00,CURRENT_SECTOR                 ,   3Fh,     63
#00,CURRENT(C*H*S)SECTORS    ,   1DCEE0h,     1953504
#00,PIO_Modes_Supported       ,    3h,       3
#00,PIO_TimeWith(ns)               , 190h,    400
#00,PIO_TimeWithout(ns)       ,   78h,    120
#00,MULTWORD_DMA_Supported , 407h, 1031
#00,ULTRA_DMA_Supported       ,   1Fh,     31
#00,Volume                         ,              1000,MBytes
#00,SECURITY STATUS                ,   21h,     33
#00,SMART(0:NOT 1:SUPPORT) ,     1h,
```

***Note**:*

When a DD Image File operation is aborted, no DD Image file or Index file is created. Only a blank folder will appear.

5.6.6 MD5 Hash Value Display

After performing [F25: MD5 CALCULATE], select [F26: MD5 VALUE] to display the calculated MD5 value on the LCD screen.

5.6.7 Write Block

Write Blocking is enabled for the YG1040 Suspect/Master Channel. Any device connected to the Suspect/Master channel will be write blocked and writes will not be successfully.

5.7 Data Overwrite Blocking

The YG1040 can detect data in Target HDD to prevent from unintended overwrite when copying Master HDD. It checks three blocks of sectors if they are overwritten with 0 or other specified pattern. When not detecting it, duplication will be aborted with error message "INVALID CONNECT". This feature can be disabled in **17: DETECT IMPROPER CONNECTION** in CONFIG. Make sure that Target HDD has been erased before duplication.

5.8 Unlocking Security Password

Security Password set on Master can be unlocked using Demi YG1040.

When the security password was known and converted to ASCII codes, the unit unlocks the password.

When the security password was encrypted regardless the original password was known or not, Demi YG1040 will not be able to unlock. Use the device to unlock what was used to set the password.

5.8.1 How to Unlock Security Password

Demi YG1040 accepts up to 32 characters. Each word must be converted to ASCII codes.

1. When a master password is detected, LCD displays 2 rows of 16 zeroes. Press START/STOP when arrow signs blink if you need more space to enter ASCII codes.
2. Use Up Down button to position the cursor. Press START/STOP button to stop blinking.
3. Use Up Down button to set value. Press START/STOP button to fix it.
4. Move cursor to Setting and Press START/STOP to unlock the password.
5. If unable to unlock, the process will be terminated.

* There are cases that the above method may not unlock the password.

5.8.2 ASCII Codes

Characters	ASCII	Characters	ASCII	Characters	ASCII	Characters	ASCII
0	30	A	41	K	4B	U	55
1	31	B	42	L	4C	V	56
2	32	C	43	M	4D	W	57
3	33	D	44	N	4E	X	58
4	34	E	45	O	4F	Y	59
5	35	F	46	P	50	Z	5A
6	36	G	47	Q	51		
7	37	H	48	R	52		
8	38	I	49	S	53		
9	39	J	4A	T	54		

Characters	ASCII	Characters	ASCII	Characters	ASCII
a	61	k	6B	u	75
b	62	l	6C	v	76
c	63	m	6D	w	77
d	64	n	6E	x	78
E	65	o	6F	y	79
f	66	p	70	z	7A
g	67	q	71		
h	68	r	72		
i	69	s	73		
j	6A	t	74		

6. Error messages

6.1 Error messages

(1) YG1040 Error Messages

DEVICE NOT FOUND	Unable to detect connected HDD
COMMAND TIME OVER	No reply from connected HDD for the specified timeout after issuing command
DATA COMPARE ERROR	Mismatch of data found during comparison
MASTER FILE EMPTY	No data contained in or abnormal response from Master HDD
ILLEGAL TARGET	Volume of Target device(s) is less than Master device, in a duplication operation.
PARTITION TABLE ERROR	File system data on Master HDD is not recognized
COPY'S NOT BE POSSIBLE	Target HDD capacity is less than data contained in Master HDD, number of head is different between Master and Target HDD, or bad file directory data on Master HDD
MEMORY HARD ERROR	Calibration error on hardware unit
CRC CHECK ERROR	CRC does not match

(2) Error messages for Connected Device(s)

NOT READY	HDD is not ready
WRITE FAULT	Problem during writing of data
CORRECTABLE ERROR	Correctable error occurred
BAD BLOCK ERROR	[Bad Block Mark] found in the sector ID field
UNCORRECTABLE ERR	Uncorrectable data error found with sector ECC

ID ERROR	Cannot find sector ID field
ABORT	Operation interrupted due to HDD error or illegal command code
TRACK0 ERROR	Cannot find Track #0 during the recalibration
SMART ERROR	SMART status/threshold error on HDD
UDMA DMA CRC ERROR	CRC error found during an Ultra DMA transfer

6.2 Error messages for SCSI

(1) YG1040 Error Messages

LCD Error Message	Explanation
DEVICE NOT FOUND RESELECTION ERROR DISCONNECTED ERR MESSAGE OUT ERROR COMMAND OUT ERROR DATA OUT ERROR DATA IN ERROR MESSAGE IN ERROR STATUS IN ERROR PARITY ERROR UNDEF MESSAGE IN UNDEF STATUS IN UNDEF PHASE ERROR FAS366U ERROR NEGOTIATION ERROR REQUEST SENSE ERR	SCSI protocol error
COMMAND TIME OVER	No reply after a specified time from HDD, after issuing a command
COMPARE ERROR	Mismatch of data found during comparison
DEVICE POWER ERR	Device power problem found
SCSI I/F ERROR	SCSI interface problem
SCSI DEVICE ERROR	SCSI device not connected or interface communication problem
TERMPWR ERROR	Problem at terminator power
CRC CHECK ERROR	CRC check is unmatched or abnormal
ILLEGAL TARGET	Volume of Target device is less than Master device
ILLEGAL DT LENGTH	Device sector size is not 512 bytes
STATUS ERROR	Status Error on connected HDD

(2) Error messages for Connected Device(s)

[Error Status acquired by REQUEST SENSE COMMAND during CHECK CONDITION]

LCD Error Message	Explanation
NOT READY ,##$$:	Device is not ready
MEDIUM ERROR,##$$	Memory Media Error in Device
HARDWARE ERR,##$$	Hardware problem in device
ILLEGAL REQ ,##$$	Non compatible command for the device
DATA PROTECT,##$$	Read/Write Protected
STATUS ERROR ,**	Other Error
##	ADDITIONAL SENSE CODE
$$	ADDITIONAL SENSE CODE QUALIFIER
**	SENSE KEY

*Please see SCSI specification for complete details

7. Special Tips

7.1 Evidence Acquisition

Always perform [I01: DEVICE SENSE] to detect the following conditions of a Suspect HDD

Password lock: When an ATA password is set, you cannot acquire data from it until the password is removed

HPA: When an HPA is set on the hard drive, you cannot acquire data from HPA.

(The HPA can be removed using the YG1040)

Detect: HDD diagnostic to determine whether the Suspect HDD is detectable and ready for data acquisition.

Two Primary Methods of Data Acquisition:

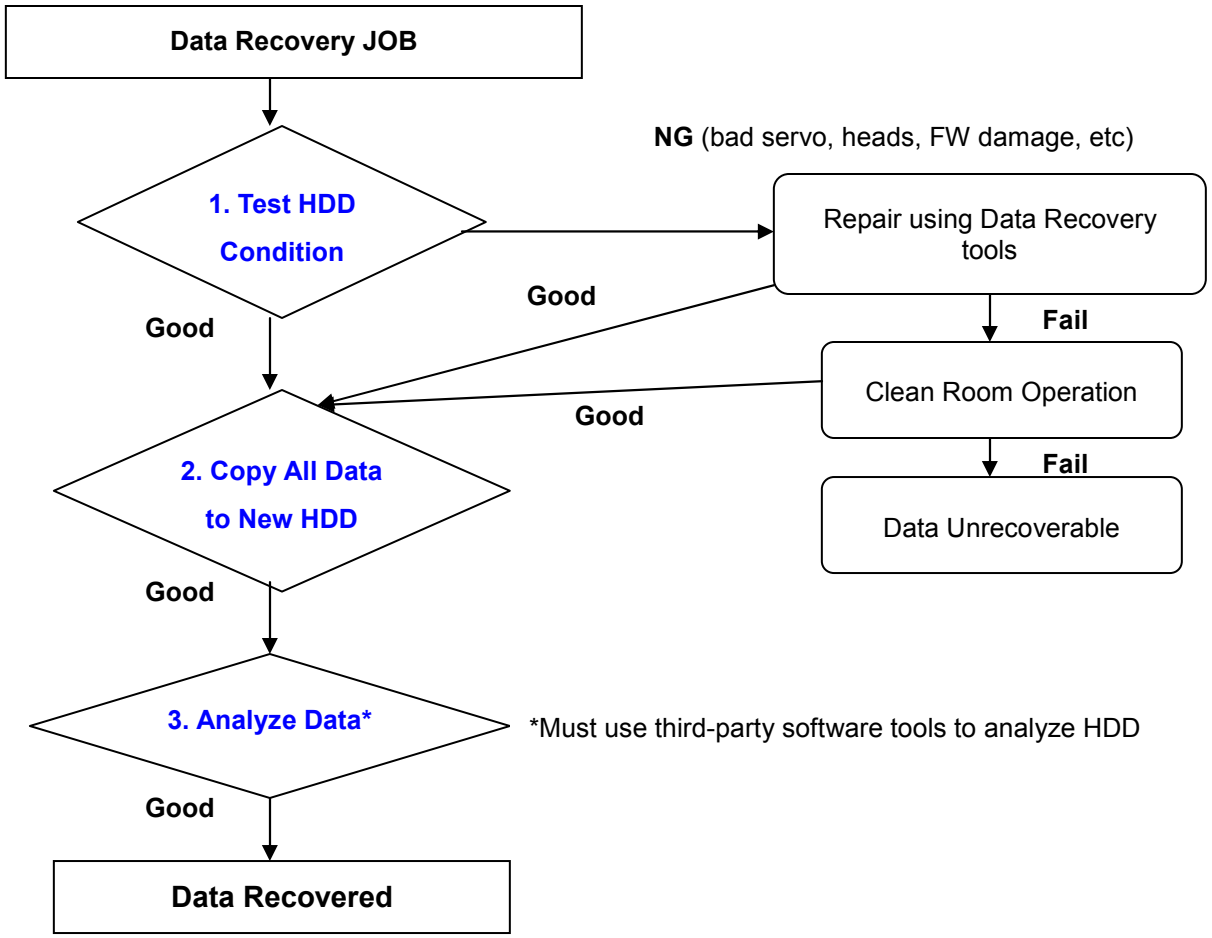
Note: It is common practice for investigators to preview a Suspect HDD before extracting data to a utility/evidence drive.

1) Make an exact same copy of Evidence via 1:1 duplication
   - ① Set Evidence HDD to Master Channel
   - ② Set Utility HDD to Target Channel
     *Utility/Target HDD must be of equal or greater capacity to Suspect/Master HDD
   - ③ Perform **[D02: ALL COPY]** in the Duplication menu
     *This function will produce a copy of the Suspect HDD that is identical (bit-to-bit) to the new utility drive
2) Make DD Image file(s) from Evidence:
   - ① Set Evidence HDD to Master/Suspect channel
     Set utility HDD to Target channel
     *Utility/Target HDD must be of equal or greater capacity compared to the Master/Suspect HDD
   - ② Perform **[FAT32 FORMAT]** or **[NTFS FORMAT]** in Forensic Mode to format Target disk
   - ③ Perform **[DD CREATE&HASH]** in Forensic Mode
     *This function will override errors, leaving blank data in the corresponding DD Image file location of bad sectors.
     *The value can be viewed in three places:
       1) On the LCD screen, immediately after the operation has completed
       2) In the log file on the Target drive

7.2 Data Recovery

The YG1040 provides capabilities for data recovery professionals via its built-in bad sector skipping / handling techniques. The [SKIP COPY] operation will jump HDD Errors (UNC, Abort, AM, IDNF, etc) and pick up only good sectors to acquire data from defective hard drives. Variable settings for timeouts retry counts, and error counts can also be configured to optimize data recovery operations to fit each user's needs.

7.2.1 Data Recovery Procedures



7.3 Test HDD Condition

The first step in recovering data for a customer is to evaluate the potential of recovering data from the given hard drive as quickly as possible and providing the customer with a time frame and price quote for the service.

The YG1040 can be used to evaluate HDD conditions promptly and accurately.

1) Connect problem HDD to Target 1 Channel

2) Select proper interface type for Target drive
   -Press [FUNCTION] key for Function Menu
   -Select [09: CONFIG]
   -Select [03: TARGET 1 I/F]
   -Select appropriate interface type
   -Press [FUNCTION] twice to return to main menu

3) Perform Device Sense test
   -Press [FUNCTION] key for Function Menu
   -Select [05: INFORMATION]
   -Select [I01: DEVICE SENSE]
   -Press [START] to initiate

4) Perform Random Read test
   -Press [FUNCTION] for Function Selection menu
   -Select [04: TEST]
   -Select [T04: RANDOM READ]
   - Press [START] to initiate

If all of these tests run successfully then the target HDD is most likely mechanically sound and there is a good chance for recovering a significant amount of data. If any of these tests fail, refer to the “Error Messages” section earlier in this manual to understand the error and how it may affect data recovery.

7.4 Recover Data to Good HDD

In order to avoid further damage to a customer’s data, it is common practice to duplicate all data to a known-good HDD before attempting to recover data. The duplicate HDD can then be used for data extraction with no risk to the customer’s original drive. This method is especially useful when the original HDD has SMART status errors or bad sectors. In these cases, the YG1040 would recognize a hard drive even though a personal computer would not be able to.

1) Connect customer HDD to Master channel
2) Connect known-good utility HDD to Target 1 channel
   (**Target HDD capacity must be the same or greater than the Master’s)
3) Select proper interface configuration
4) Select the [D04: SKIP COPY] operation
5) Press the [START] button to begin the recovery

During the recovery operation, errors may be displayed on the LCD. This is for informational purposes and these errors will be attempted to be skipped over automatically. Until “ITEM END” is displayed, the operation is still running.

8. Cautions

1. Please contact the A-Walk USA Technical Support if self-diagnostic problems are experienced.
2. If problems arise in function and operation, access the “Config” menu and reset all parameters to factory default settings.
3. In the “Config” menu, the data transfer speed is automatically set to the highest rate available. Please note that certain cases may call for manual transfer rate adjustment.
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5. A-Walk USA, Inc assumes no liability for damages resulting from the use of this product or the information contained in this manual.
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9. Limited Warranty

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10. Glossary

A

Access Retrieval of data from or transfer of data into a storage device.

Access Time The amount of time, including seek time, latency and controller time, needed for a storage device to retrieve information.

Active Partition The partition of the drive that contains the operating system. If the drive has multiple partitions, only the primary partition can be made active. A hard drive can have only one active partition.

Actuator A mechanical assembly that positions the read/write head over the appropriate track.

Actuator Arm The part of the actuator assembly that includes the positioning arm and the read/write heads.

Address In the hard drive industry, there are several types of addresses; an address may refer to that of a drive, called a unit address; radial position, called a cylinder address; or circumferential position, referred to as a sector address.

Allocation The method DOS uses to assign a specific area of the hard drive to a given file. (See also cluster.)

ATA (Advanced Technology Attachment) a standard interface for connecting storage devices such as hard disks and CD-ROM drives inside personal computers. Many terms and synonyms for ATA exist, including abbreviations such as IDE, ATAPI, and UDMA.

ATAPI Advanced Technology Attachment Packet Interface

Average Seek Time Length of time it takes the drive to move the read/write heads to a safe non-data landing zone and lock them in place.

B

.BAT (Batch File) A text file containing a series of commands intended to be executed by the command interpreter.

BIOS (Basic input/output system) A program or set of programs that control the basic functions of the computer.

Bit See “Units of Measure”

Bit density Expressed as bits per inch (BPI), the number of bits that can be written onto one inch of track on a disk surface.

Block (or BLK) A group of bytes handled, stored, and accessed as a logical data unit, such as an individual file record. A block in UNIX workstation environments is the smallest contiguous area that can be allocated for the storage of data. (Note: A different definition of the term is used when referring to the physical configuration of a hard drive.)

Boot To start or restart your computer; loading the operating system.

BPS Bytes per Second

Bus The path that carries data between the computer (microprocessor) and peripheral devices. An IDE interface cable and a SCSI cable are both examples of a bus.

Byte See “Units of Measure”

C

Cable Select (CSEL) An alternative option which can be used in place of setting Master/Slave jumpers in the designation of drives in a dual drive configuration.

Cache High-speed RAM used as a buffer between the CPU and a hard drive. The cache retains recently accessed information to

speed up subsequent accesses to the same data.

Capacity The amount of information, measured in bytes, that can be stored on a hard drive. Also known as storage capacity.

Channel A connection or socket on the motherboard or controller card. A motherboard may have one or two channels (primary and secondary). If your motherboard has only one channel, you may need to add a controller card to create a secondary channel.

CD Compact Disk

Certificate Validation of data being deleted

Clean Room An environmentally controlled, dust-free assembly or repair facility in which hard drives are assembled or opened for internal servicing.

Clipping (HPA) Using an ATA Set Max Address command to reduce the capacity of a hard drive. This is one common method for removing defective sectors on a hard drive so that it can be operable by computer. Some hard drives do not accept Set Max Address commands, and therefore cannot be clipped. Also referred to as “sector slipping.”

Cluster An allocation unit. At least one cluster is allocated to each file, regardless of the file's size, that is stored in the DOS environment. Cluster size increases with the partition size determined during formatting. (This definition applies to FAT16).

CMD Command

CMOS Complementary Metal-Oxide Semiconductor

COM (1,2,3,4,5,6,etc.) Short for communication. It is the tag for device I/O ports (asynchronous ports).

Command Queuing A feature that enables the drive to receive I/O processes from one or more initiators and execute them in an optimum sequence.

Compare Bit to Bit data comparison between master device and target to verify accurate similarity in content or performance.

Controller See disk controller, interface controller, and disk drive controller.

Controller Card An adapter with the control electronics for one or more hard drives. Usually installed in a bus slot in the computer.

Correctable Error An error that can be corrected by using Error Detection and Correction schemas.

CRC (Cyclic Redundancy Check) Used to detect errors after transmission or storage.

Cross Copy HDD duplication from 1 interface type to another. Example: Copying data from an IDE drive to a SATA drive.

CSV (Comma Separated Values) file format

Cylinder The cylindrical surface formed by identical track numbers on vertically stacked disks.

Cylinder, Head, Sector (CHS) Addressing A method of referencing the sectors on a drive as a collection of unique cylinder, head and sector addresses. Each block on the drive will have a unique cylinder, head and sector address.

D

Database A collection of data stored on a computer system medium, such as a hard drive, CD-ROM, etc., that can be used for more than one purpose.

Data Only Copy A cope function where only usable data is copied from Master device to Target. This is done by distinguishing usable data from unallocated HDD platter space. See “FS Mapping” and “Smart Copy”

Data Recovery The process of salvaging data from damaged or inaccessible primary storage media (such as a hard drive) when it cannot be accessed via normal operation (PC or otherwise).

Default Setting Manufacturer’s original configuration

Defragment (Defrag) A process that eliminates fragmentation in file systems. It does this by physically reorganizing the contents of the disk in order to store the pieces of each file close together and in continuous order.

DET Detection

DIMM Dual In-Line Memory Module

Differential SCSI an electrical signal configuration which uses pairs of lines for data transfer. Used primarily in applications requiring long cable lengths of up to 82 feet (25 meters).

Disk Controller The chip or circuit that controls the transfer of data between the disk and buffer. (See also disk drive controller and interface controller).

Disk Drive Controller The hard disk drive controller electronics which include the disk controller and the interface controller. (See also disk controller and interface controller.)

Disk Transfer Rate Speed at which data transfers to and from the disk media (actual disk platter). Hard drives have an increasing range of disk transfer rates from the inner diameter to the outer diameter of the disk.

DMA (Direct Memory Access) A process for transferring data directly to and from main memory, without passing through the CPU. DMA improves speed and efficiency by allowing the system to continue CPU processing even while it is transferring data to/from the hard drive.

DoD52220.22-M (Department of Defense Standard Erase) First (5555h), Second (AAAAh), then Final Random 256 word data is written in all areas of connected HDD. Then final written data will be Read-Write compared.

DOS (Disk Operating System) The computer program that controls the organization of data, files and processes on a computer.

DR See “Data Recovery”

E

E5 Mapping Copy The E5 Mapping copy function is used for non FAT/NTFS OS data only copying. Using this function, unallocated data (marked as “E5” hex data) is identified and bypassed in order to save operation time. See “Data Only Copy” *Master hard drive must be E5 pre-formatted.

EIDE (Enhanced Integrated Drive Electronics) The primary interface used by desktop PCs to handle communication between hard drives and the central processing unit. The equivalent interface system in most enterprise systems is SCSI.

Embedded Servo Control The embedded servo control design generates accurate feedback information to the head position servo system without requiring a full data surface (which is required with a "dedicated" servo control method) because servo control data is stored on every surface.

Encoding The process of modifying data patterns prior to writing them on the disk surface.

Error Correction Code (ECC) A mathematical algorithm that detects and corrects errors in a data field.

F

FAT (File Allocation Table) A data table stored at the beginning of each partition on the disk that is used by the operating system to determine which sectors are allocated to each file and in what order. Different version of FAT are FAT16, FAT32 and VFAT

Fdisk A software utility used to partition a hard drive. This utility is included with DOS and Windows 95 operating systems.

Fibre Channel (FC) The general name given to an integrated set of standards being developed by an ANSI-approved X3 group. This set of standards defines new protocols for flexible information transfer. Fibre channel supports three topologies: point-to-point, arbitrated loop, and fabric.

Firmware (or F/W) Permanent instructions and data programmed directly into the circuitry of read-only memory for controlling the operation of the computer.

Format A process that prepares a hard drive to store data. Low-level formatting sets up the locations of sectors so user data can be stored in them. Formatting erases all the information on a hard drive and it sets up the file system needed for storing and retrieving files.

Formatted Capacity (also see unformatted capacity) The actual capacity available to store data in a mass storage device. The formatted capacity is the gross capacity minus the capacity taken up by the overhead data required for formatting the media.

FS Mapping The analysis of the master file system and creation of mapping information for copy and compare processes.

FS Mapping Flexible Copy A “data only” copy function where Master device information (such as files and partitions) is copied to relative locations on a Target device as opposed to “corresponding LBA locations”. Some NTFS formatted hard drives encounter errors when this function is used. See “Data Only Copy””.

FS Mapping Mirror Copy A “Data Only” copy function where Master device information is copied to exact corresponding LBA locations on the Target device (as opposed to “relative location”).

Full-Duplex A communication protocol that permits simultaneous transmission in both directions.

G

GB (Gigabyte) (see Units of Measurement)

H

Half-Duplex A communications protocol that permits transmission in both directions but in only one direction at a time.

Hard Drive (or Hard Disk- HD/ Hard Disk Drive- HDD) An electromechanical device used for information storage and retrieval, incorporating one or more rotating disks on which data is recorded, stored and read magnetically. Western Digital's principal product.

Hard Drive Ready Time The initial startup time required by the hard drive

Hard Error An error that is repeatable every time the same area on a disk is accessed.

Head The minute electromagnetic coil and metal pole which write and read back magnetic patterns on the disk. Also known as a read/write head. A drive with several disk surfaces or platters will have a separate head for each data surface. See also MR Head.

Head Actuator A motor that moves the head stack assembly in a hard drive to align read/write heads with magnetic tracks on the disks.

Head Crash Refers to the damage incurred to a read/write head when the head comes into contact with the disk surface. A head crash might be caused by severe shock, dust, fingerprints, or smoke, and can cause damage to the surface of the disk and/or the head.

Head Disk Assembly (HDA) The mechanical components of a hard drive, including the disks, heads, spindle motor and actuator.

Head Stack Assembly The electromechanical mechanism containing read/write heads and their supporting devices.

HEX (Hexadecimal) In mathematics and computer science, base-16, hexadecimal, or simply hex, is a numeral system with a radix or base of 16 usually written using the symbols 0–9 and A–F or a–f. Hexadecimal is used in more generic computing, as the most commonly

found form of expressing a guarantee human-readable string representation of a byte.

Host The computer that other devices and peripherals connect to.

HPA (Hidden Partition Area) Using an ATA Set Max Address command to reduce the capacity of a hard drive. This is one common method for removing defective sectors on a hard drive so that it can be operable by computer. Some hard drives do not accept Set Max Address commands, and therefore cannot be clipped. Also referred to as “Sector Slipping” or “Clipping”.

Hyper-Threading Technology developed by the Intel corporation that improves processor performance under certain workloads by providing useful work for execution units that would otherwise be idle, for example during a cache miss

H/W Hardware

I

IDE (Integrated Drive Electronics) A type of drive where the interface controller electronics are incorporated into the design of the hard drive rather than as a separate controller.

I/F Interface

Initiator A device in control of the SCSI bus that sends commands to a target.

Interface A hardware or software protocol that handles the exchange of data between the device and the computer; the most common ones are AT (also known as IDE) and SCSI. (See AT and SCSI.)

Interface controller The chip or circuit that translates computer data and commands into a form suitable for use by the hard drive and controls the transfer of data between the buffer and the host. (See disk controller and disk drive controller.)

Interrupt A signal sent by a subsystem to the CPU that signifies a process has either completed or could not be completed.

J

Jumper In EIDE drives, a jumper is an electrically-conductive component that you place over pairs of pins that extend from the circuit board on the hard drive jumper block to connect them electronically. For example, a jumper is one way to designate a hard drive as master or slave. The jumper block is located next to the 40-pin connector on the hard drive.

K

KB (Kilobyte) (see Units of Measure)

KBps Kilobytes per Second

L

Landing Zone The heads move to this location on the inner portion of the disk when commanded, or when the power has been turned off. User data is not stored in this area of the disk.

Latency The period of time that the read/write heads wait for the disk to rotate to the correct position to access the desired data.

LBA (Logical Block Addressing) Addresses the sectors on the drive as a single group of logical block numbers instead of cylinder,

head and sector addresses. It allows for accessing larger drives than is normally possible with CHS addressing.

LCD Liquid Crystal Display

LED (Light Emitting Diode) Visual processing indicator

Log Recording of sequential data, often used to document performed operations.

Logical borders HD limits such as number of heads and size

Low-level formatting (or Initialization) The process of establishing a single consistent value to all sectors on a HD; this permits the operating system to use the regions needed to create the file structure. Also called initialization

Low profile (LP) Standard 3.5-inch hard drives are available in heights of 1.0-inch and 1.6-inches. Low-profile hard drives measure 1.0-inches in height.

M

Map Data the information (in bytes) storage locations

Mapping copy A "Data Only" copy function where the Master Device is initially scanned sector by sector in order to differentiate usable data from unallocated HDD platter space. Note: Same function as "Smart Copy."

Master Primary HDD or storage device. A master drive by itself (with no slave) is called a single drive.

MB (Megabyte) (see Units of Measure)

MBps Megabytes per Second

MBR Master Boot Record

MD5 (Message-Digest algorithm 5) A widely-used cryptographic hash function with a 128-bit hash value. MD5 has been employed in a wide variety of security applications, and is also commonly used to check the integrity of files. MD5 Hashing is commonly employed by YEC products to verify exact replication of a device or data source.

Mounting The process of making a file system ready for use by the operating system, typically by reading certain index data structures from storage into memory ahead of time.

N

NEC PC98 (-NX) Japanese original architecture of computers, optimized for using Japanese characters. It is not PC/AT hardware compatible, but MS-Windows software compatible.

NG No Good

NTFS (New Technology File System) the standard file system of Windows NT and its descendants: Windows 2000, Windows XP and Windows Server 2003. It replaced the FAT file system used by previous Windows versions.

NSA National Security Agency

O

OS (Operating System) Software that allows the user and programs installed on your system to communicate with computer hardware such as a hard drive.

P

Parameter A factor that determines a range of variations in HD specifications. It can be used to describe variations in a sequence or procedure.

PB (Petabyte) (see Units of Measure)

PC Personal computer

PDF Portable Document Format

Platter An actual metal (or other rigid material) disk that is mounted inside a fixed-disk drive. Many drives consist of multiple platters mounted on the spindle to provide more data storage surfaces. Each platter may use one or both surfaces to store data.

Port A connection or socket on the motherboard or controller card. A motherboard may have one or two ports (primary and secondary). If your motherboard has only one port, you may need to add a controller card to create a secondary port.

Primary Partition The partition where the operating system files are stored. To start your operating system from a hard disk, it must have a primary partition. You must also make the primary partition active.

PIO (Programmed Input / Output) Method used by older HDs whereas the CPU (Central Processing Unit) writes the Command Block Register files (CBR). This was replaced by DMA in which the HD wrote the CBRs itself and in turn increased the HD performance.

Protocol A convention of data transmission that defines timing, control format, and data representation.

PWR Power.

Q

Queue A first-in-first-out data structure used to sequence multiple demands for a resource.

R

RAID (Redundant Arrays of Independent Disks) Groupings of hard drives in a single system to provide greater performance and data integrity.

Random Access Memory (RAM) Memory that allows any storage location to be accessed randomly, as opposed to tape drives, which are sequential access devices.

Read Channel Performs the data encoding and conversions the drive needs to write computer generated information onto a magnetic medium and then read that information back with a high degree of accuracy.

Read Verify A data accuracy check performed by having the disk read data to the controller, which in turn checks for errors but does not pass the data on to the system.

Read-Write-Read Data stored or transmitted with data to detect corruption. By calculating the Read-Write-Read data and comparing it to the original data sent, the receiver can detect some types of transmission errors.

Registry a database which stores information and settings for all the hardware, software, users, and preferences of the PC.

RPM (Revolutions per Minute) Rotational speed of the media (disk), also known as the spindle speed. Disk RPM is a critical

component of hard drive performance because it directly impacts the rotational latency.

R/W Read/Write

S

SATA (Serial ATA) A computer bus technology primarily designed for transfer of data to and from a hard disk. It is the successor to the legacy Advanced Technology Attachment standard.

SCA-2 SCA-2 (Single Connector Attach) interface incorporates a grounding contact, blindmate connector, direct plug misalignment tolerance, ESD protection, hot swap capability, and backplane connector options for SCSI devices. SCA-2 is commonly called the 80-pin SCSI connector.

SCA SCSI Single Connector Attachment, or SCA, is a type of connection for the internal cabling of SCSI systems.

SCSI (Small Computer Systems Interface) An interface between a computer and peripheral controllers. Usually pronounced as "scuzzy." Different types of SCSI interface types include Narrow (50 pins), Wide (68 pins) and SCA (80 pins).

Sector A 512-byte packet of data in EIDE and SCSI hard drives. This is the smallest amount of data that can be read or written to the drive from the host interface. On Macintosh and Unix drives, sectors are usually grouped into blocks or logical blocks that function as the smallest data unit permitted.

Sector Reassignment the process of assigning new sector LBAs of a bad sector by the means of placing new sector links in the bad sector locations.

Seek The movement of a set of read/write heads to a desired location. The actuator moves the heads to the cylinder containing the track and sector where the data is stored.

Seek Time A measure (in milliseconds) of how fast the hard drive can move its read/write heads to a desired location.

Servo (Servomechanism) Motor used to operate HD.

SMART (Self-Monitoring, Analysis, and Reporting Technology) A technology to assist the user in preventing possible system down time due to hard drive failure by attempting to predict imminent hard drive failure before it occurs.

Smart Copy A “Data Only” copy function where the Master Device is initially scanned sector by sector in order to differentiate usable data from unallocated HDD platter space. Notes: -Same function as “Smart Copy.”

-The term Smart Copy has no relation to the above described “SMART” information

Sequential Access The reading or writing of data in a sequential order as opposed to random access. Magnetic tape drives store data in sequential blocks.

Slave The second drive in a dual drive combination.

Spindle The center, rod-like axle on which the disks are mounted.

Special Mode (Copy and Test) Provides a series of duplication functions (Same as Normal Mode selections) with test functions integrated simultaneously. Special Mode is recommended for manufacturing or any application requiring mass duplication.

Spindle Motor The motor that rotates the spindle and ultimately the disks.

Storage Capacity The amount of data that can be stored on a HDD.

Subsystem A secondary or component part of a system, as a hard drive is a subsystem of a personal computer.

Surface (HDD platter surface) The top or the bottom side of a platter coated with a magnetic material required to record data. A platter may use one or both surfaces to store data.

S/W Software

Synchronous Transmission Transmission in which the sending and receiving devices operate continuously at the same frequency and are held in a desired phase relationship by a correction device.

System Files The files needed to run an operating system.

T

TB (see Units of Measure)

TPI (Tracks per inch) The number of tracks written within each inch of the disk's surfaces, used to measure how closely the tracks are packed on a disk surface. Also known as track density.

Track A concentric magnetic circle pattern on a disk surface used for storing and reading data.

Transfer Rate The rate at which the hard drive sends and receives data from the controller.

Transfer Rate Test Measures the data transfer speed in appropriate unit of measure for specified address of HDD. The test result can be obtained in minimum, maximum, rate and integral average in appropriate unit of measure per selected block count size.

U

UDMA (Ultra DMA) A protocol developed by Quantum Corporation and Intel that supports burst mode data transfer rates of 33.3 MBps

Ultra SCSI Provides 20 MB/s transfers over an 8-bit bus or 40 MB/s transfers over a 16-bit Wide SCSI bus. Also known as Fast-20 SCSI, this feature is most commonly found in SCSI-3 drives.

Ultra DMA/33 A high-speed host data transfer feature that transfers data at 33.3 MB per second.

Unformatted Capacity The total number of usable bytes on a disk, including the space that is required to record location, boundary definitions, and servo data. (See also formatted capacity.)

Units of Measure 1 Byte = 8 Bits

1 Kilobyte = 1,000 Bytes (1024 exact)

1 Megabyte = 1,000 Kilobytes (1024)

1 Gigabyte = 1,000 Megabytes (1024)

1 Terabyte = 1,000 Gigabytes (1024)

1 Petabyte = 1,000 Terabytes (1024)

Upgrade A capability or performance enhancement.

USB Universal Serial Bus

V

Verify The test to check ECC in each sector. No data sent for read or write.

W

Write The recording of flux reversals onto the magnetic surface of a disk.

Write Cache High speed RAM used to buffer data transfer from the host to the hard drive.

X

XSMD eXtended Storage Module Drive

Y

YEC Youth Engineers Corporation

Z

Zoned Recording Increases the number of sectors on the outer tracks of the drive since the circumference of the outside tracks is greater. This type of recording affords more disk capacity because there can be more sectors on the larger outer tracks than would be possible if the number of sectors per track were constant for the whole drive