The HDAT2 Cookbook

"How can I do...?"

Version 2.1

31.01.2022

Lubomir Cabla / CBL

https://www.hdat2.com/

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Preface

This is the cookbook of program HDAT2 in pictures for beginners.
The document and images are for program version 7.4 except for updates.

Images and texts may be subject to change during the development of the program.

There should be the answers in the pictures for questions "How can I do…?"

For a more detailed information see "User's Manual HDAT2".

I am sorry for my English.

History

v2.1 HDAT2 7.5 31.1.2022
Updates from version 7.5 have been applied: Address Offset Mode, SCSI Capacity

v2.0 HDAT2 7.4 29.9.2021

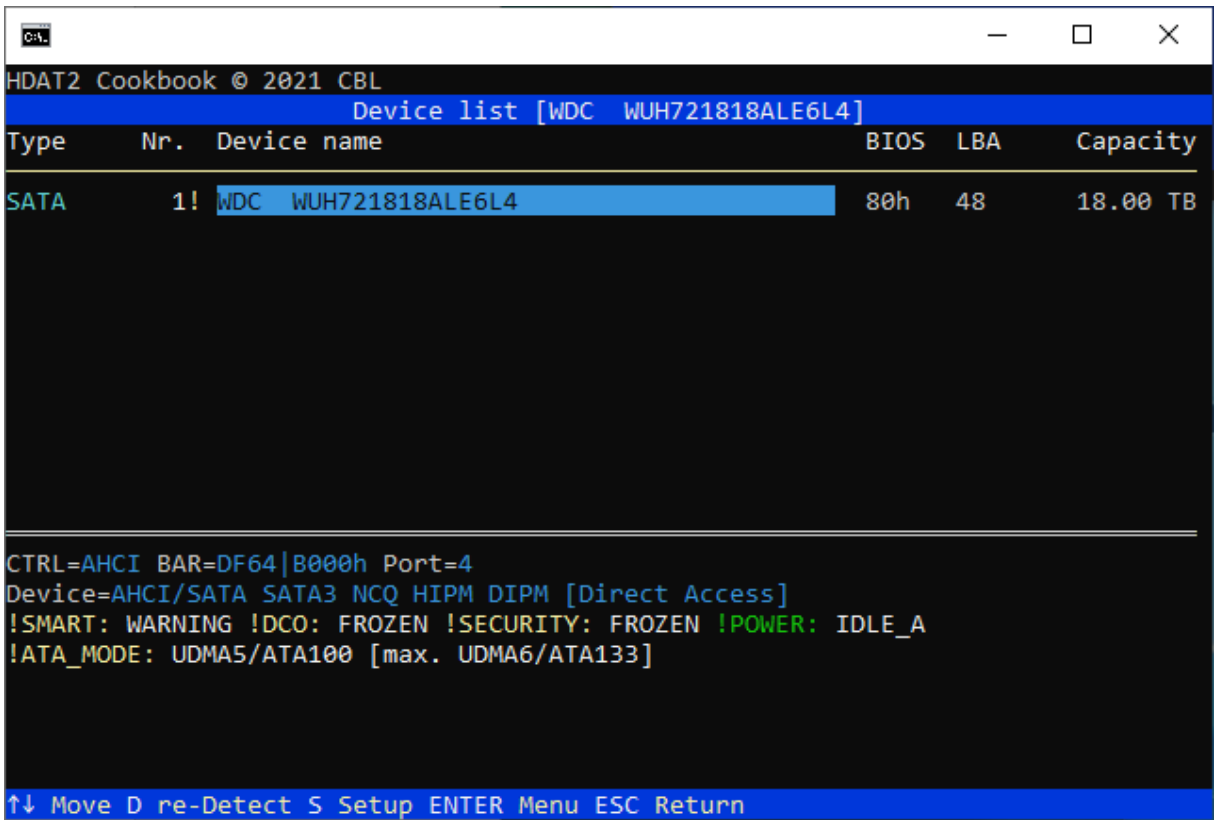
v1.1 HDAT2 4.9 8.9.2010

v1.0 HDAT2 4.9 8.9.2010

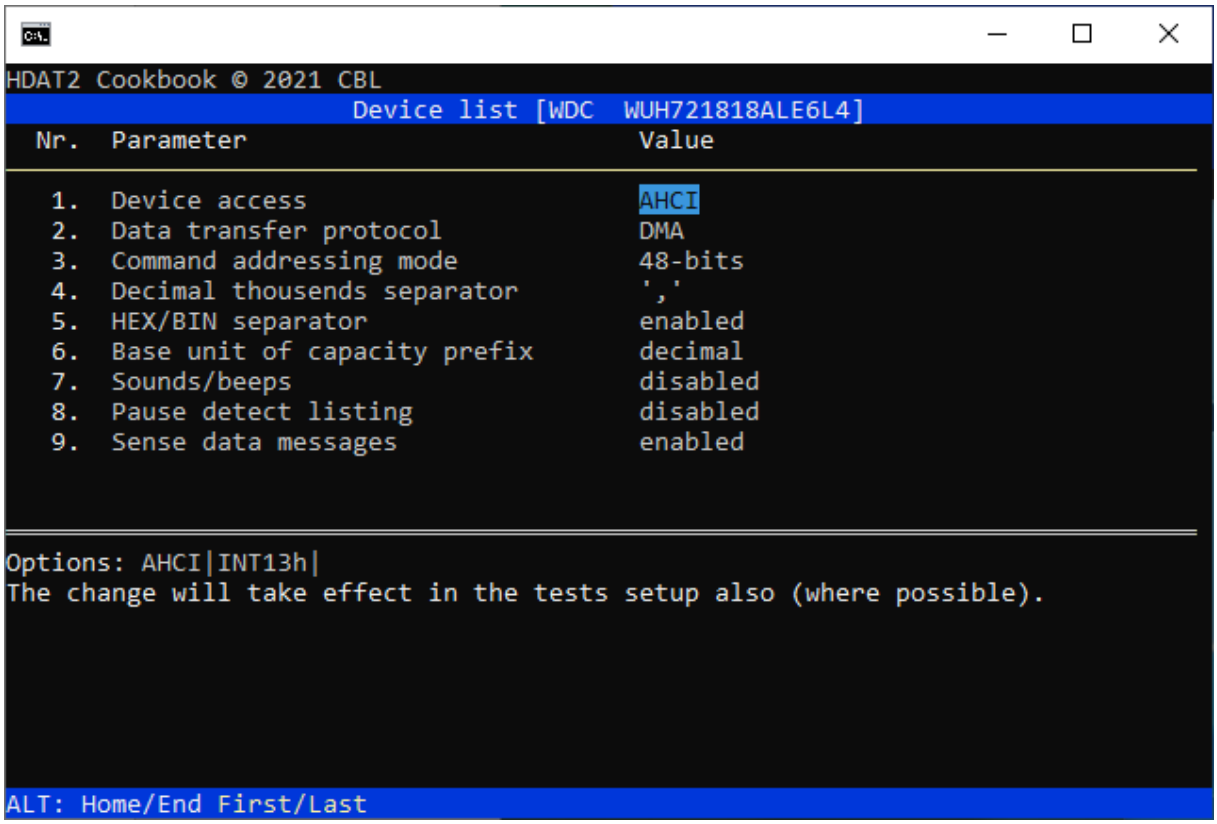
Run the program

Run the program without parameters:

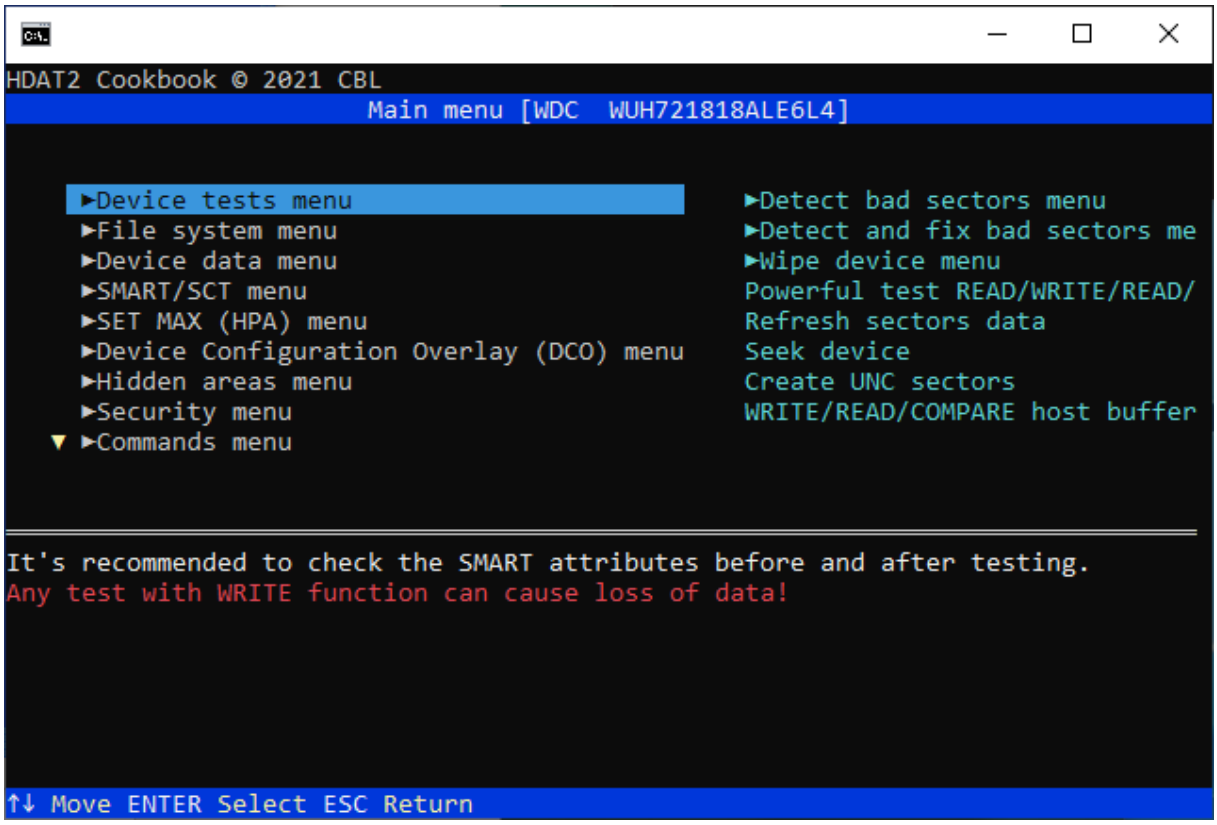
C:\>hdat2



By pressing the setup key 'S' in the device list you can set the general parameters of the program.

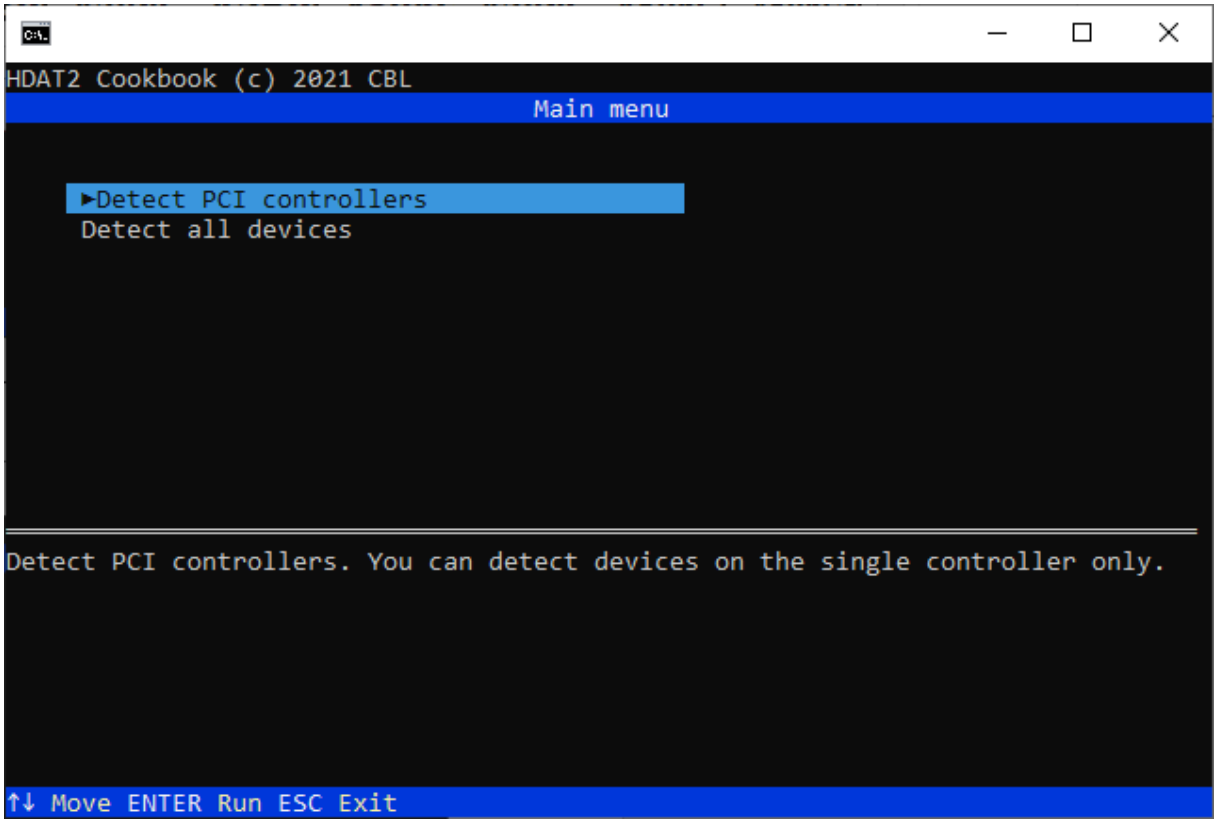


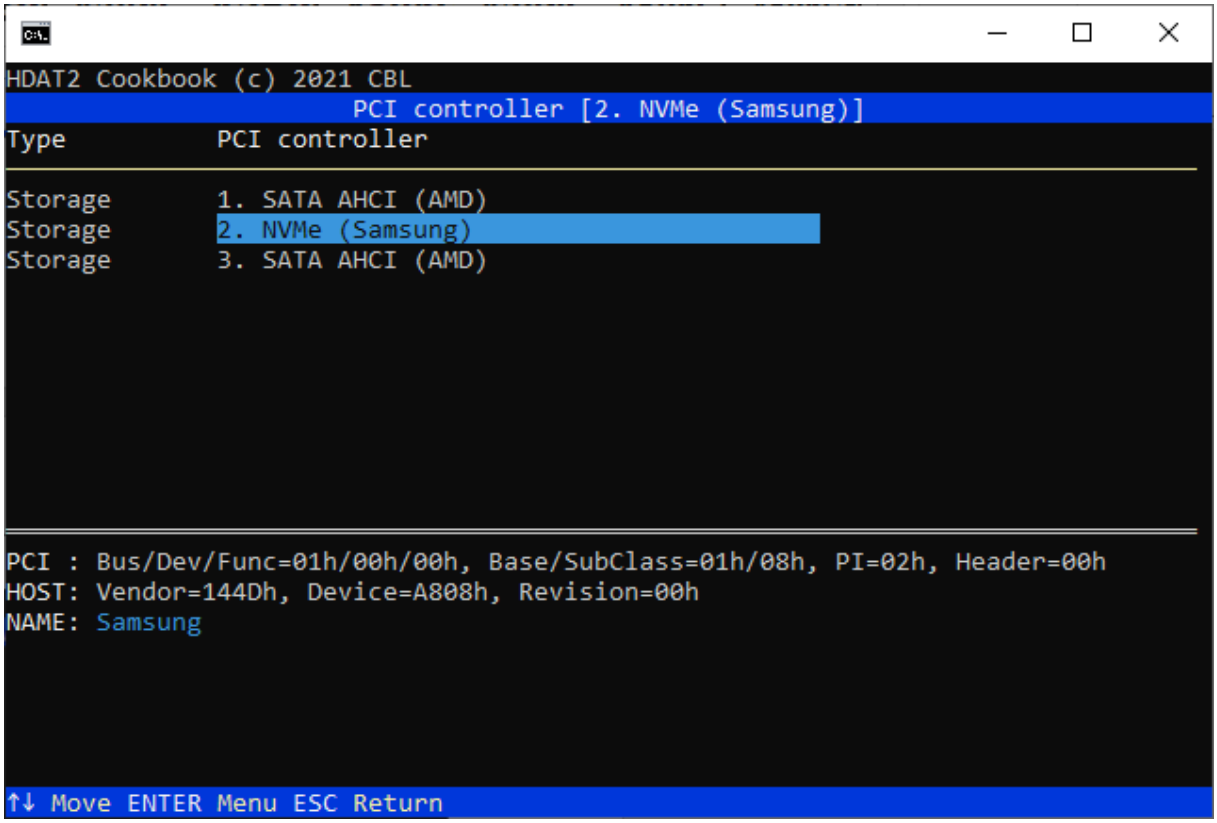
After pressing the ENTER key in the device list you will get the main menu of allowed commands for the given device.

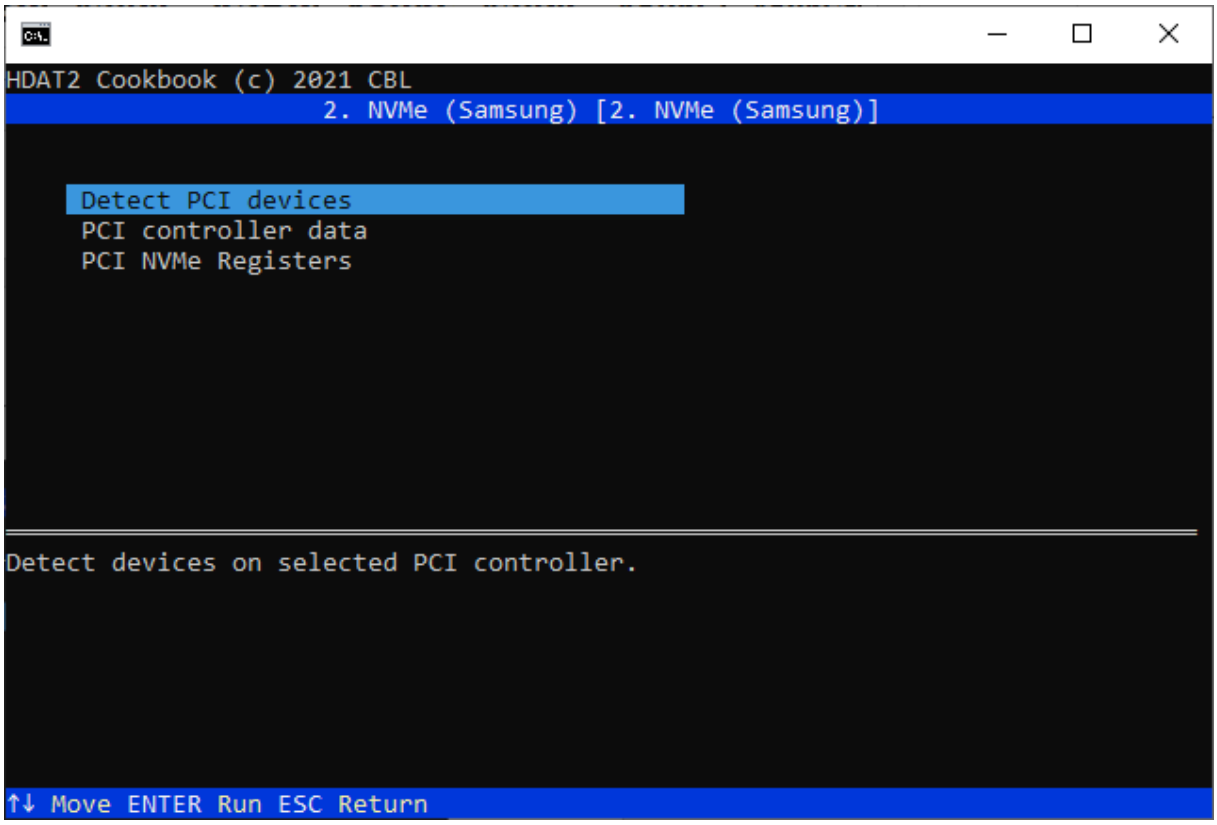


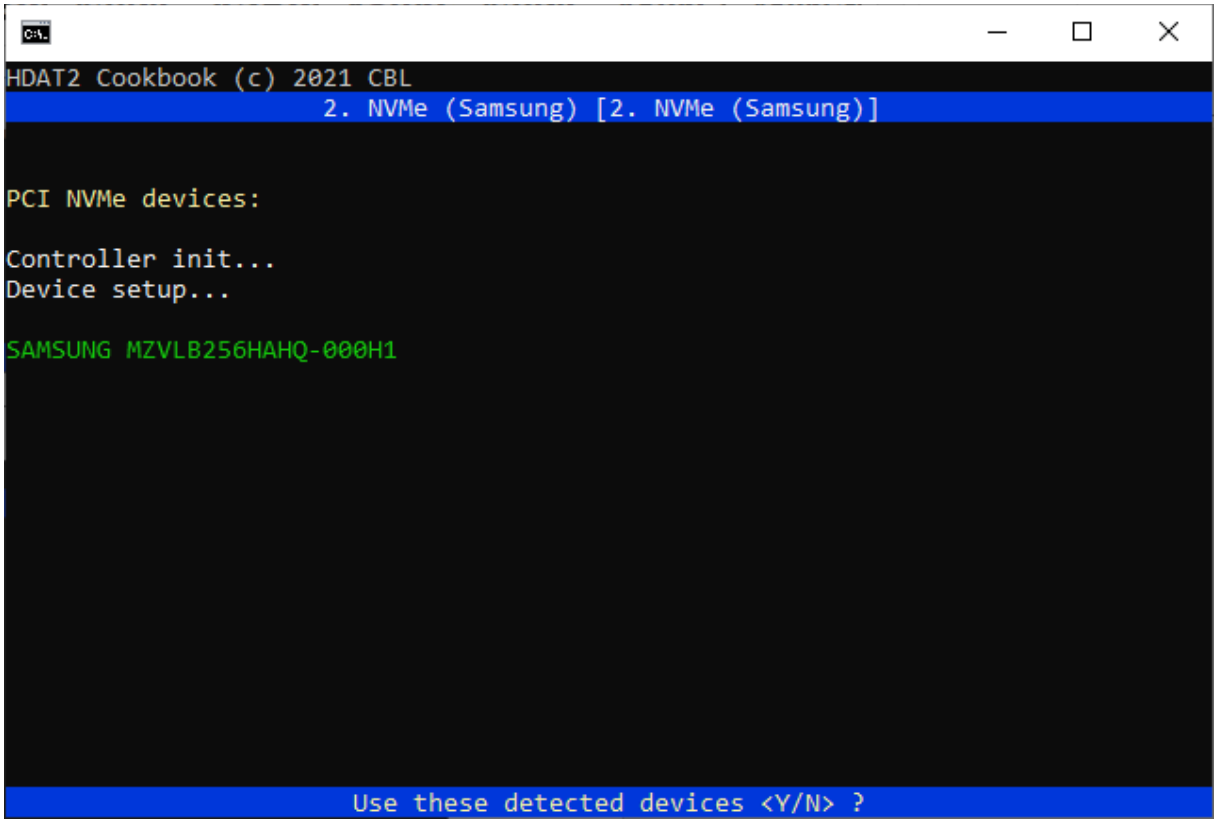
Run the program with the parameter '**/d=0**' to detect individual PCI controllers on the computer and detect devices only on the selected controller.

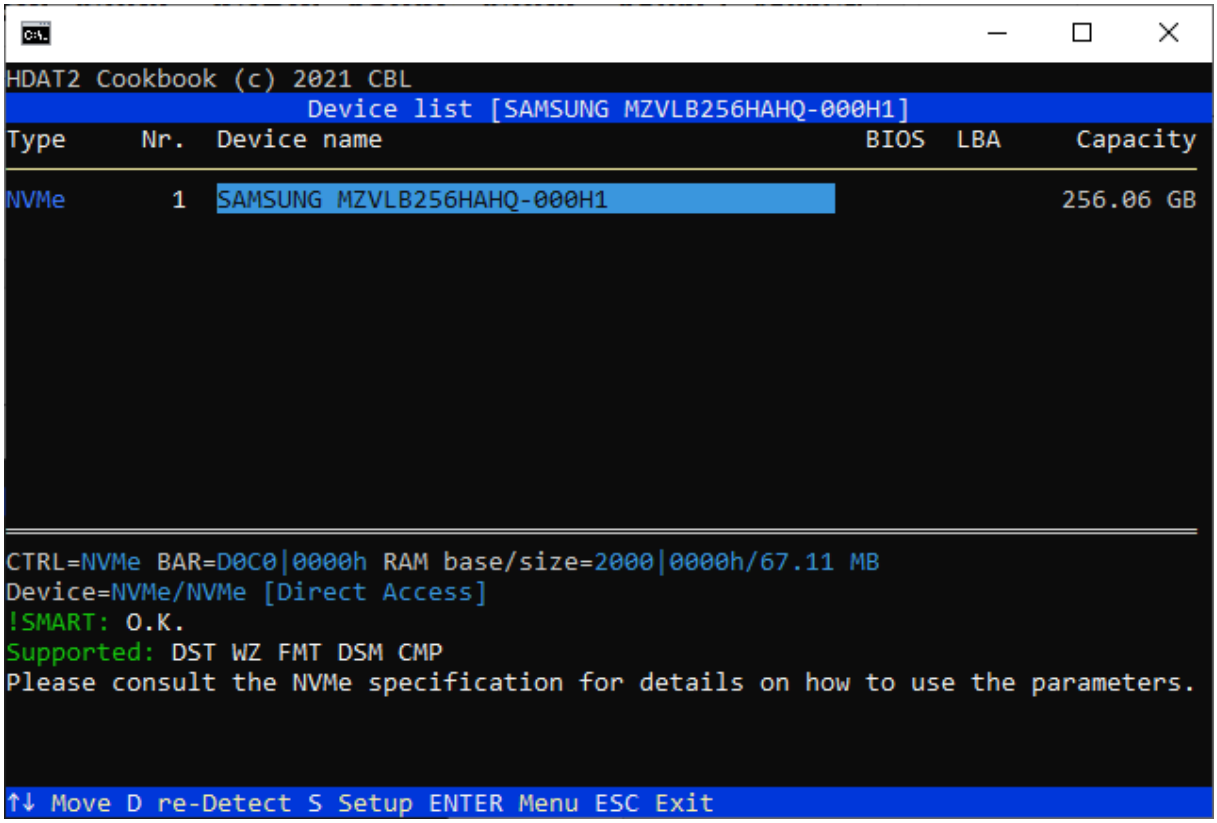
C:\>hdat2 /d=0




HDAT2 Cookbook (c) 2021 CBL
PCI controller [2. NVMe (Samsung)]
Type PCI controller
Storage 1. SATA AHCI (AMD)
Storage 2. NVMe (Samsung)
Storage 3. SATA AHCI (AMD)
PCI : Bus/Dev/Func=01h/00h/00h, Base/SubClass=01h/08h, PI=02h, Header=00h
HOST: Vendor=144Dh, Device=A808h, Revision=00h
NAME: Samsung
↑↓ Move ENTER Menu ESC Return


HDAT2 Cookbook (c) 2021 CBL
2. NVMe (Samsung) [2. NVMe (Samsung)]
Detect PCI devices
PCI controller data
PCI NVMe Registers
Detect devices on selected PCI controller.
↑↓ Move ENTER Run ESC Return


HDAT2 Cookbook (c) 2021 CBL
2. NVMe (Samsung) [2. NVMe (Samsung)]
PCI NVMe devices:
Controller init...
Device setup...
SAMSUNG MZVLB256HAHQ-000H1
Use these detected devices <Y/N> ?


HDAT2 Cookbook (c) 2021 CBL
Device list [SAMSUNG MZVLB256HAHQ-000H1]
Type Nr. Device name BIOS LBA Capacity
NVMe 1 SAMSUNG MZVLB256HAHQ-000H1 256.06 GB
CTRL=NVMe BAR=D0C0|0000h RAM base/size=2000|0000h/67.11 MB
Device=NVMe/NVMe [Direct Access]
!SMART: O.K.
Supported: DST WZ FMT DSM CMP
Please consult the NVMe specification for details on how to use the parameters.
↑↓ Move D re-Detect S Setup ENTER Menu ESC Exit

Change the native size (HPA, DCO, AMAX, SCSI)

The hidden area like Host Protected Area (HPA), Device Configuration Overlay (DCO) or Accessible Max Address (AMAX) area, is an area of a hard drive that is not normally visible to BIOS, an operating system, or user.

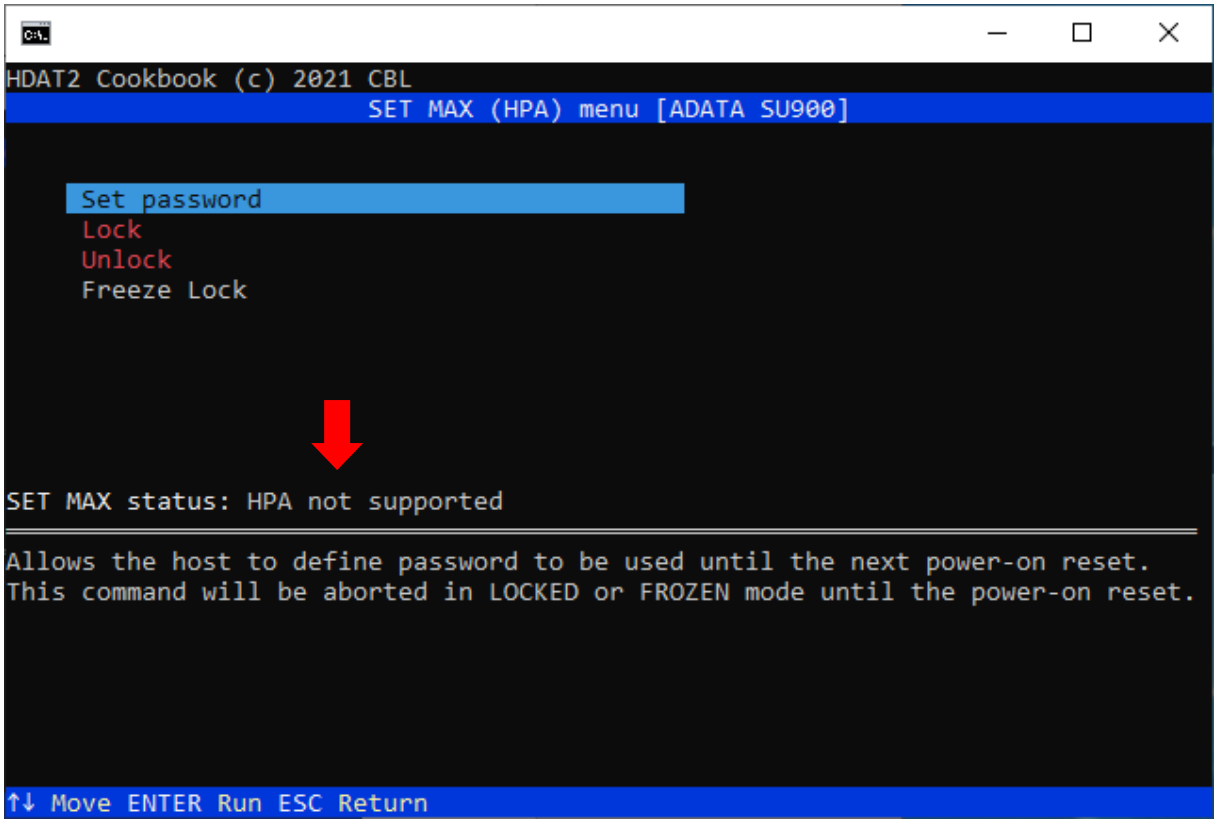
To create or remove Host Protected Area (HPA) is used the command SET MAX ADDRESS.

To create or remove DCO hidden area is used the command DCO MODIFY or DCO RESTORE.

To create or remove AMAX hidden area is used the command Set Accessible Max Address.

Note: To create or remove DCO area you must first remove an active HPA area. If you want to create both HPA and DCO area first you have to create DCO area without any HPA area. After power off/on you can create HPA area.

If HPA is not supported, the following message is displayed:

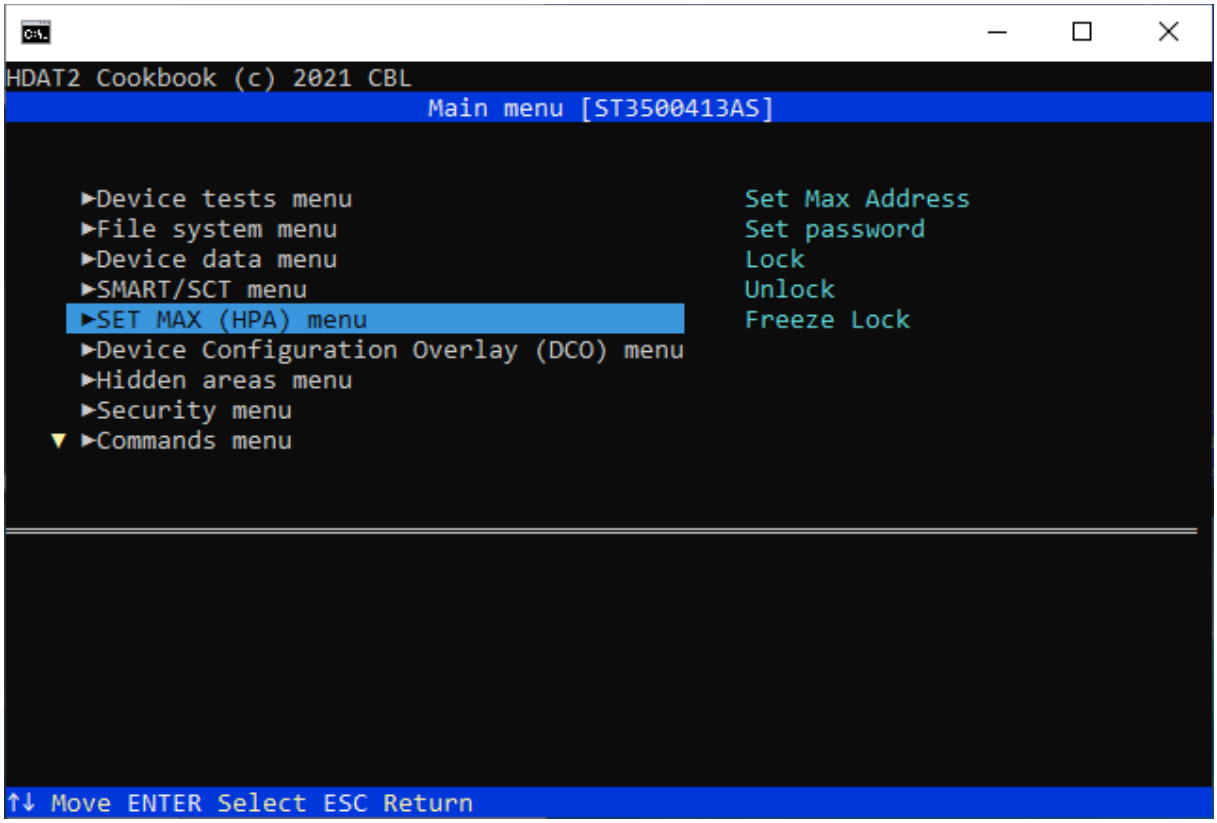


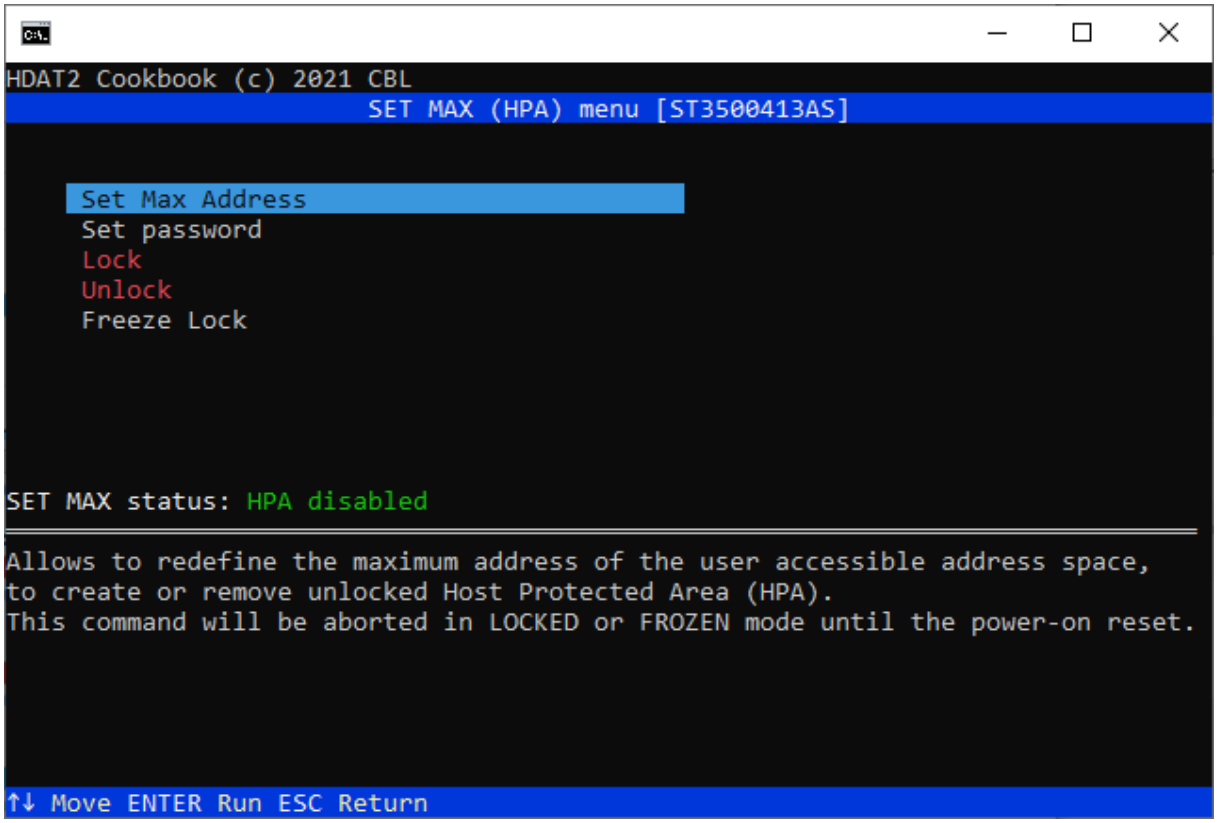
HPA area

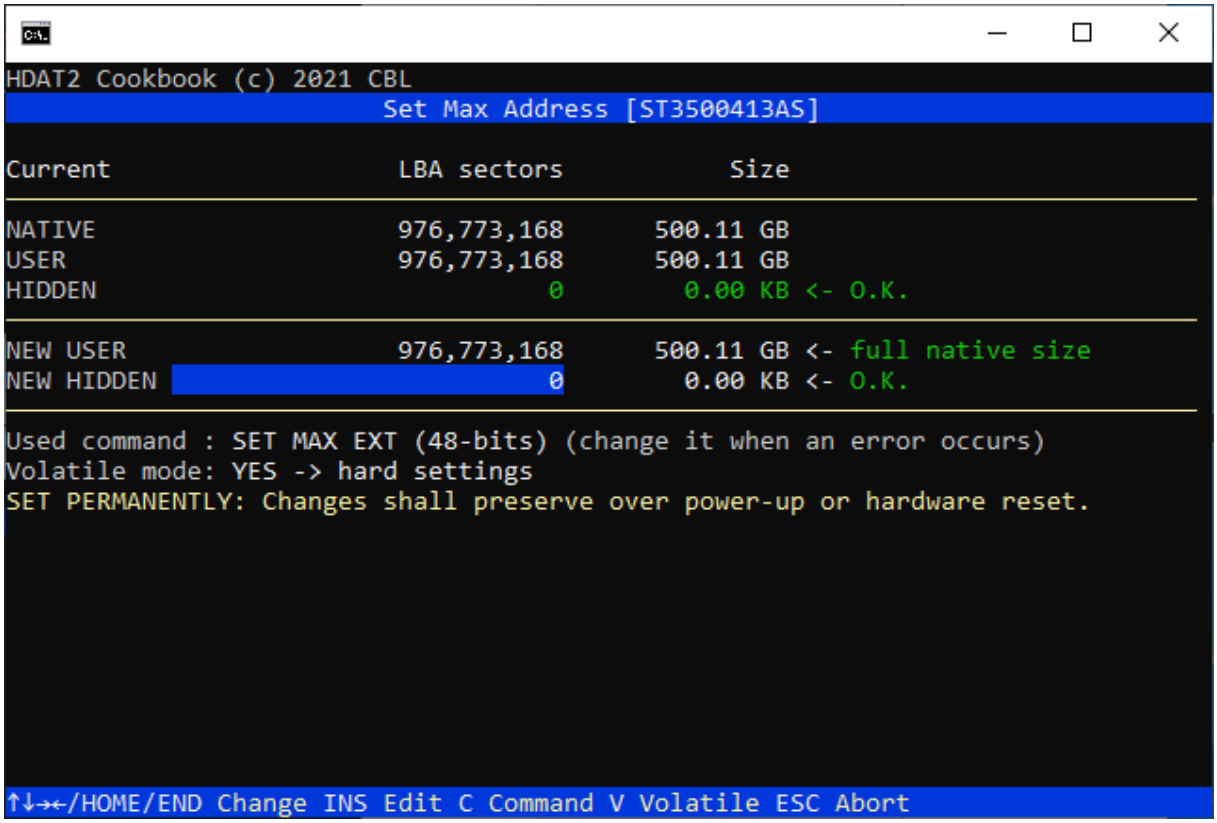
Host Protected Area (HPA)

Create hidden area HPA with SET MAX ADDRESS

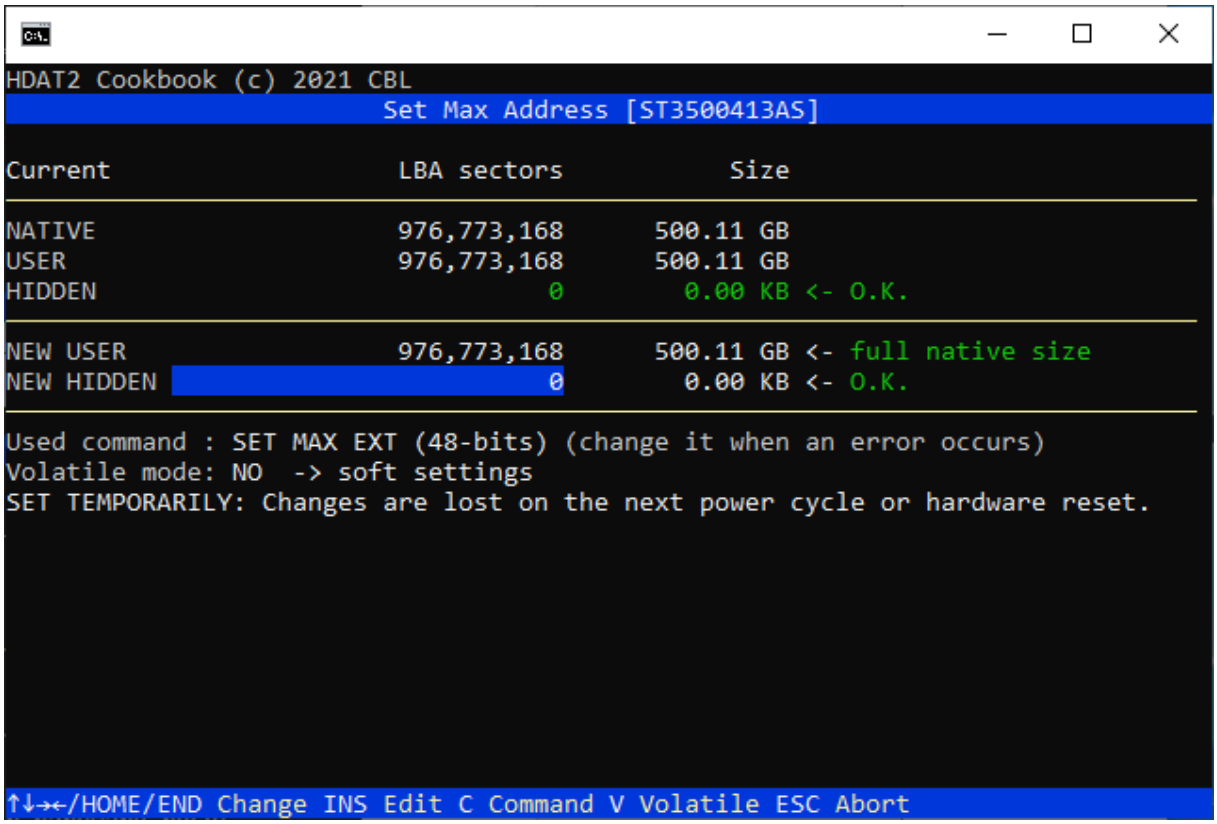
Example: We create HPA area with a size of 100 sectors (50 KB).

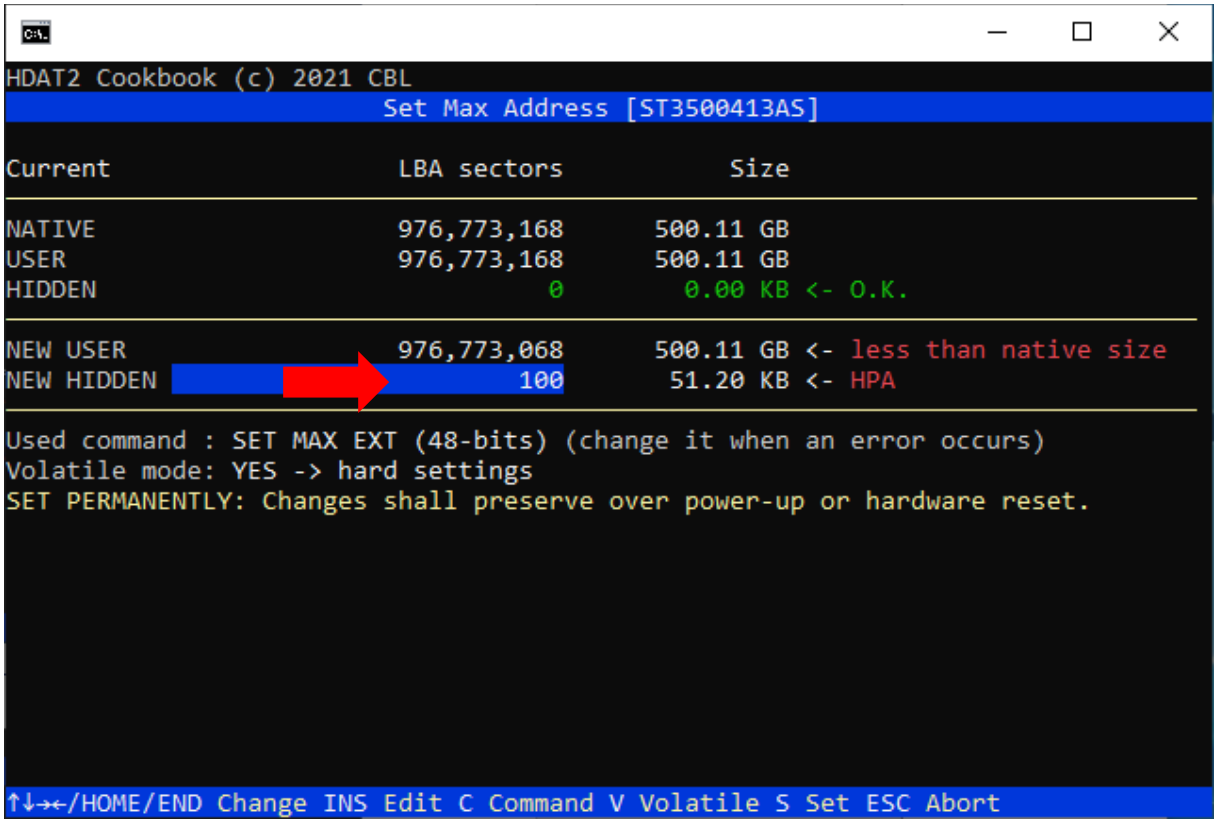

HDAT2 Cookbook (c) 2021 CBL
Main menu [ST3500413AS]
►Device tests menu
►File system menu
►Device data menu
►SMART/SCT menu
►SET MAX (HPA) menu
►Device Configuration Overlay (DCO) menu
►Hidden areas menu
►Security menu
►Commands menu
Set Max Address
Set password
Lock
Unlock
Freeze Lock
↑↓ Move ENTER Select ESC Return

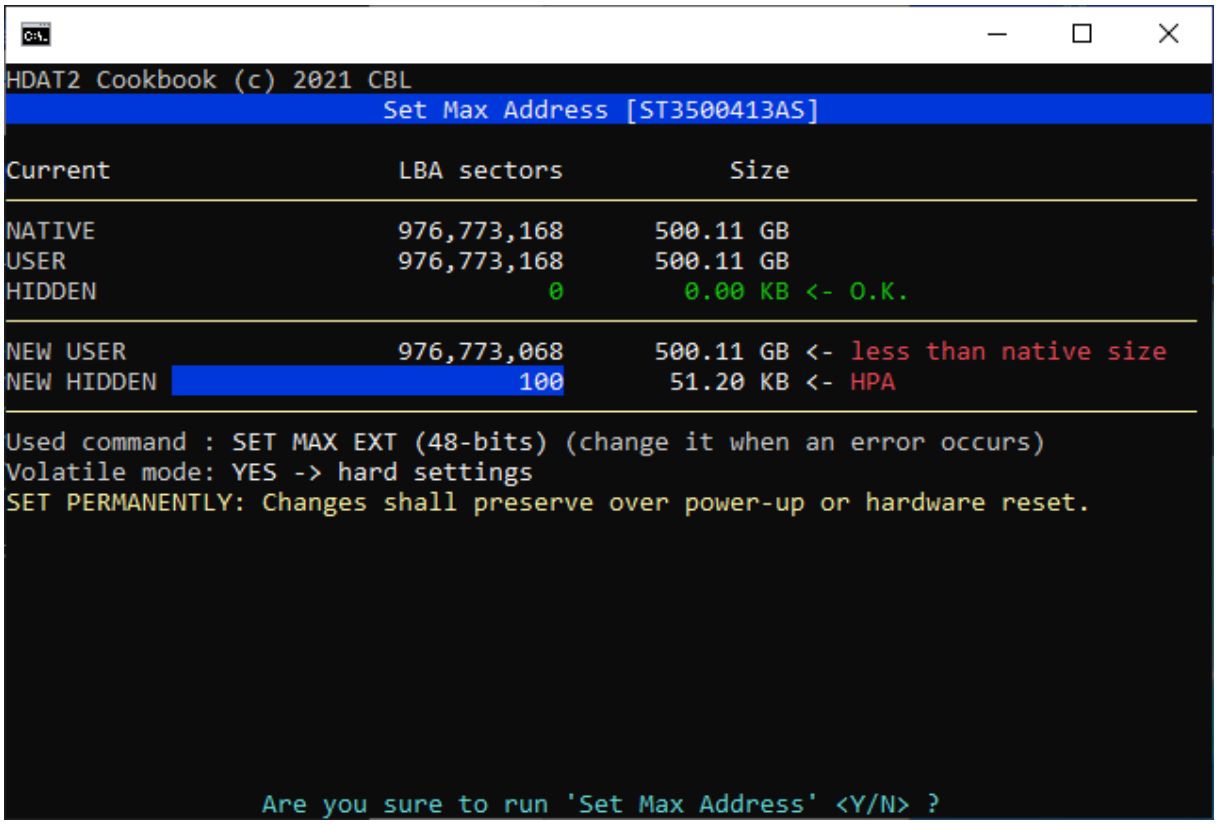

HDAT2 Cookbook (c) 2021 CBL
SET MAX (HPA) menu [ST3500413AS]
Set Max Address
Set password
Lock
Unlock
Freeze Lock
SET MAX status: HPA disabled
Allows to redefine the maximum address of the user accessible address space,
to create or remove unlocked Host Protected Area (HPA).
This command will be aborted in LOCKED or FROZEN mode until the power-on reset.
↑↓ Move ENTER Run ESC Return

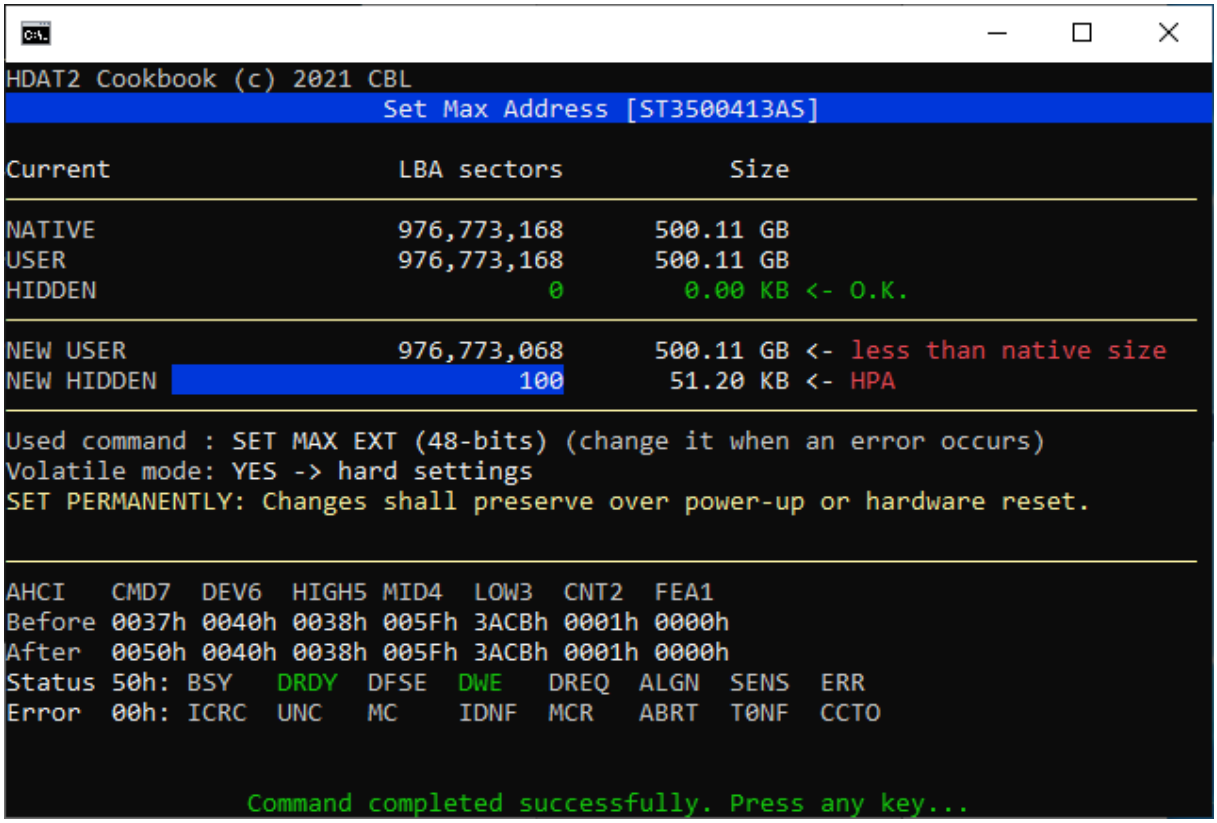


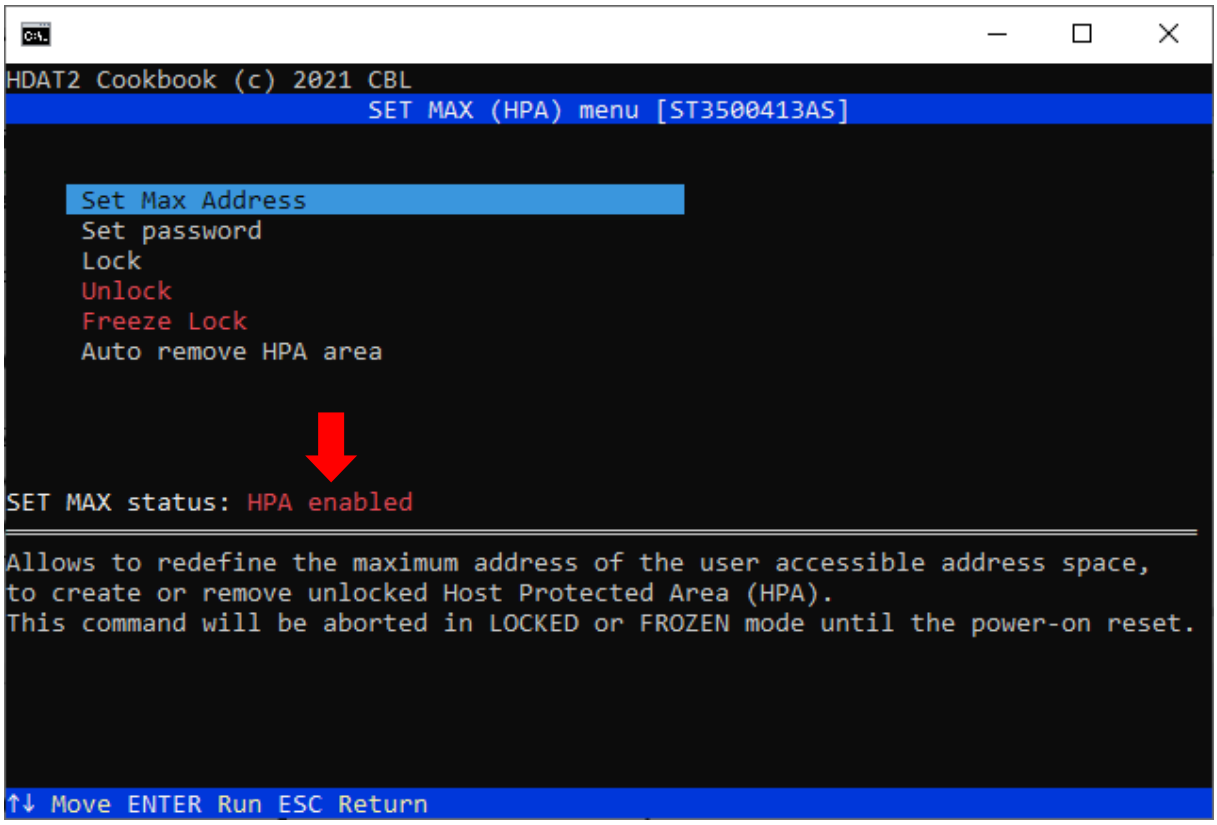
By pressing the 'V' you can change so-called the volatile mode from hard settings to soft settings.

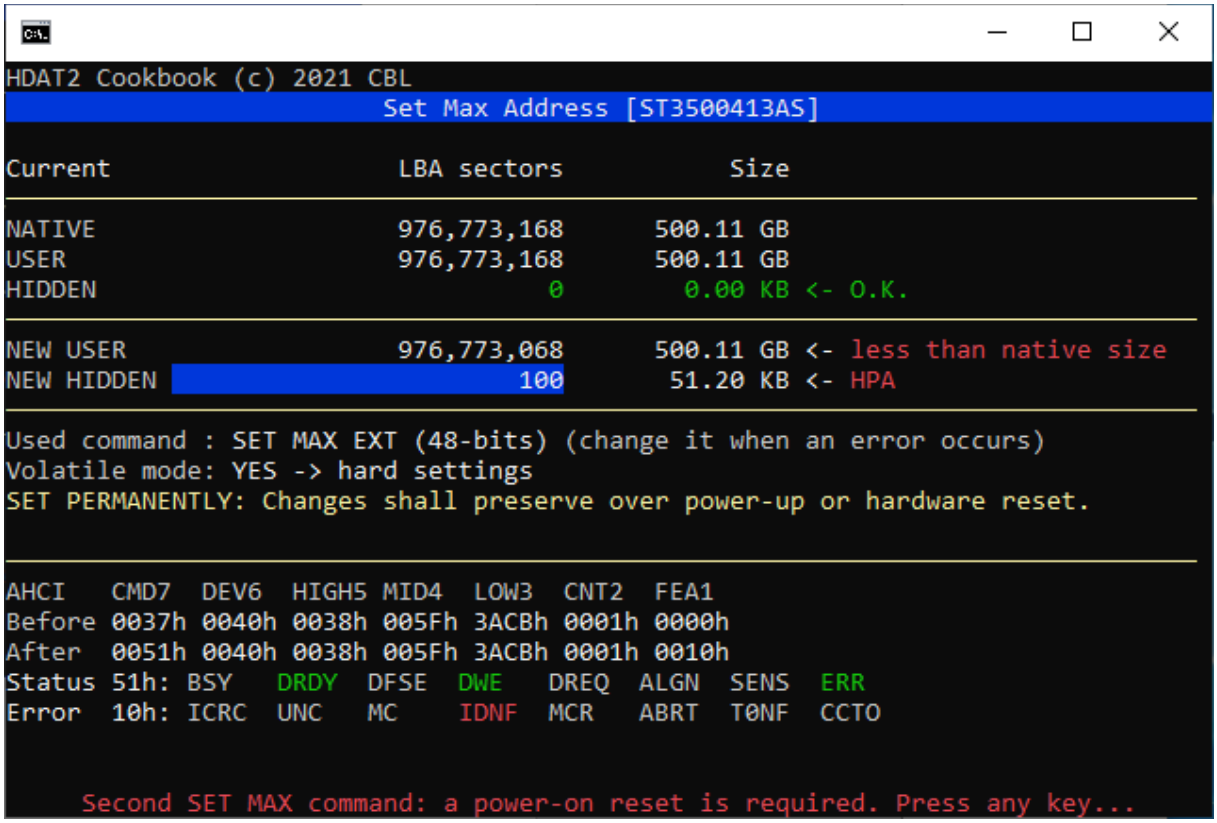



HDAT2 Cookbook (c) 2021 CBL
Set Max Address [ST3500413AS]
Current LBA sectors Size
NATIVE 976,773,168 500.11 GB
USER 976,773,168 500.11 GB
HIDDEN 0 0.00 KB <- O.K.
NEW USER 976,773,068 500.11 GB <- less than native size
NEW HIDDEN 100 51.20 KB <- HPA
Used command : SET MAX EXT (48-bits) (change it when an error occurs)
Volatile mode: YES -> hard settings
SET PERMANENTLY: Changes shall preserve over power-up or hardware reset.
↑↓→←/HOME/END Change INS Edit C Command V Volatile S Set ESC Abort


HDAT2 Cookbook (c) 2021 CBL
Set Max Address [ST3500413AS]
Current LBA sectors Size
NATIVE 976,773,168 500.11 GB
USER 976,773,168 500.11 GB
HIDDEN 0 0.00 KB <- O.K.
NEW USER 976,773,068 500.11 GB <- less than native size
NEW HIDDEN 100 51.20 KB <- HPA
Used command : SET MAX EXT (48-bits) (change it when an error occurs)
Volatile mode: YES -> hard settings
SET PERMANENTLY: Changes shall preserve over power-up or hardware reset.
Are you sure to run 'Set Max Address' <Y/N> ?


HDAT2 Cookbook (c) 2021 CBL
Set Max Address [ST3500413AS]
Current LBA sectors Size
NATIVE 976,773,168 500.11 GB
USER 976,773,168 500.11 GB
HIDDEN 0 0.00 KB <- O.K.
NEW USER 976,773,068 500.11 GB <- less than native size
NEW HIDDEN 100 51.20 KB <- HPA
Used command : SET MAX EXT (48-bits) (change it when an error occurs)
Volatile mode: YES -> hard settings
SET PERMANENTLY: Changes shall preserve over power-up or hardware reset.
AHCI CMD7 DEV6 HIGH5 MID4 LOW3 CNT2 FEA1
Before 0037h 0040h 0038h 005Fh 3ACBh 0001h 0000h
After 0050h 0040h 0038h 005Fh 3ACBh 0001h 0000h
Status 50h: BSY DRDY DFSE DWE DREQ ALGN SENS ERR
Error 00h: ICRC UNC MC IDNF MCR ABRT T0NF CCTO
Command completed successfully. Press any key...

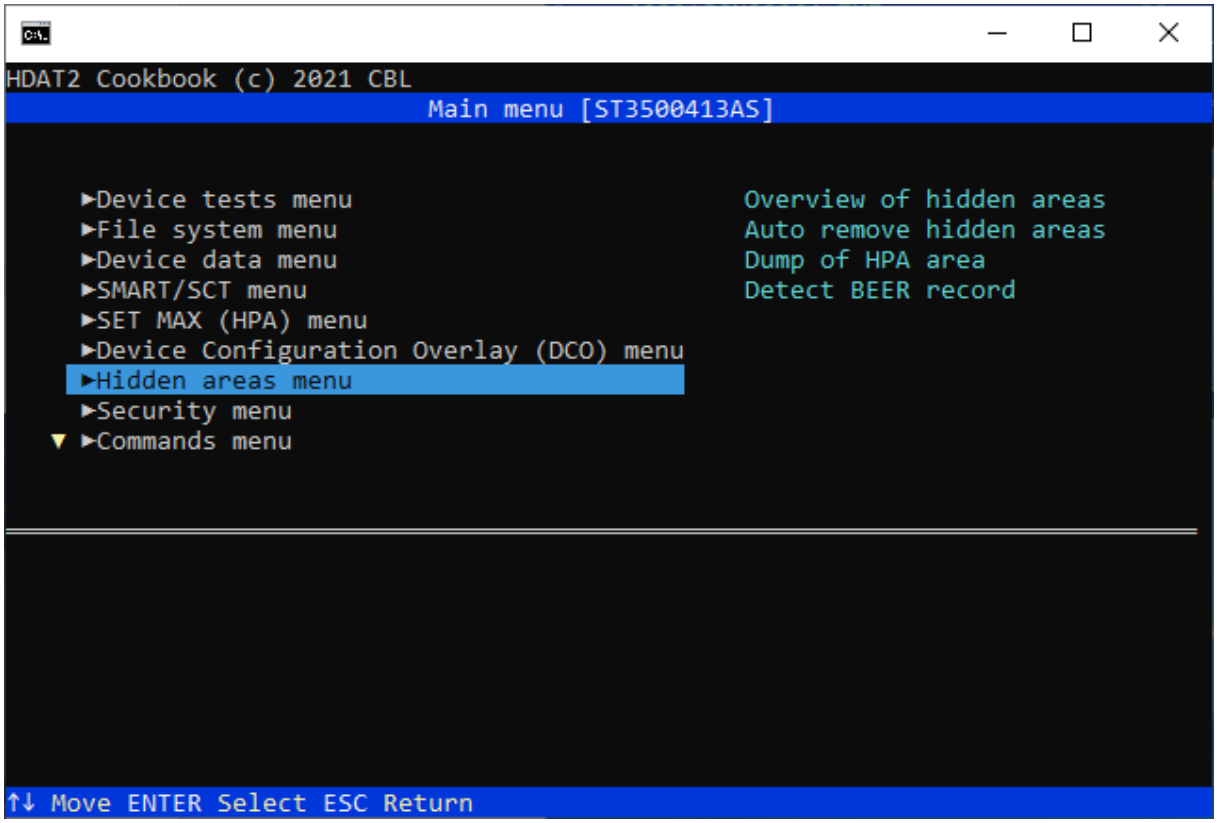

HDAT2 Cookbook (c) 2021 CBL
SET MAX (HPA) menu [ST3500413AS]
Set Max Address
Set password
Lock
Unlock
Freeze Lock
Auto remove HPA area
SET MAX status: HPA enabled
Allows to redefine the maximum address of the user accessible address space,
to create or remove unlocked Host Protected Area (HPA).
This command will be aborted in LOCKED or FROZEN mode until the power-on reset.
↑↓ Move ENTER Run ESC Return

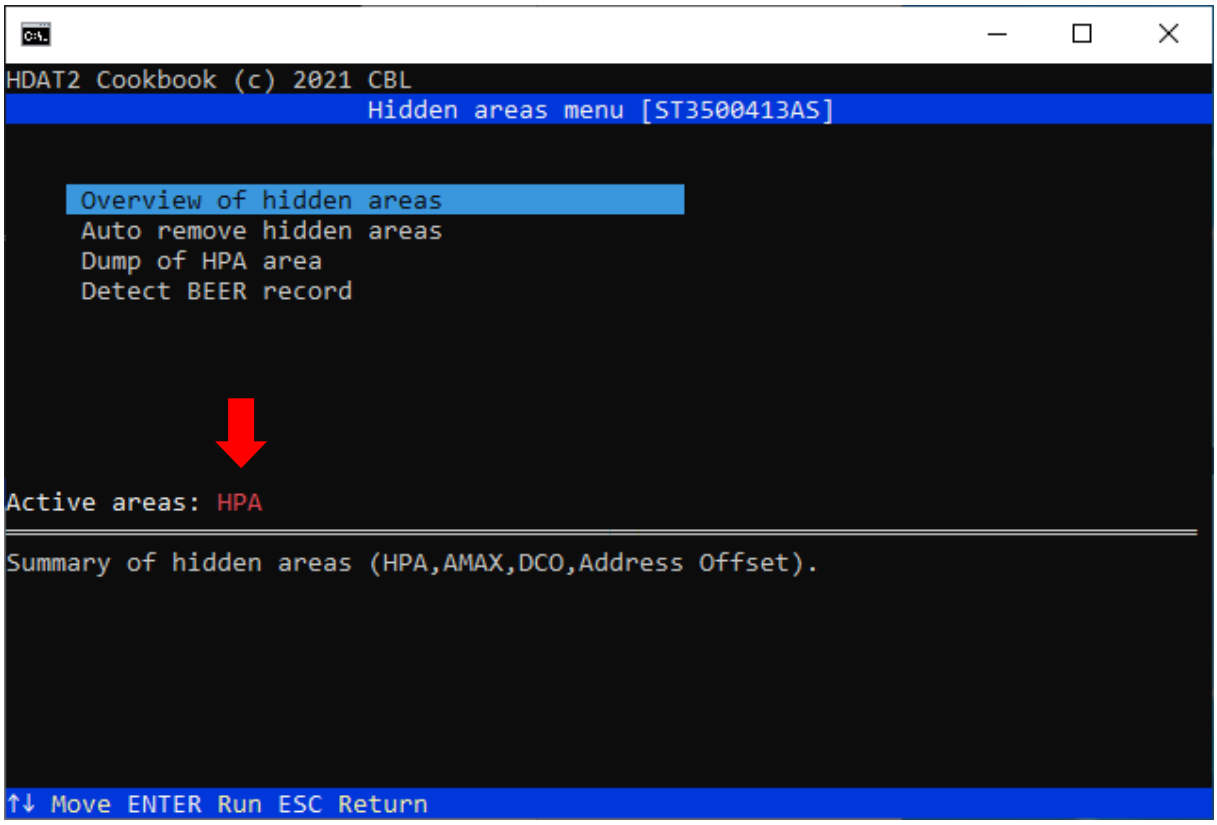


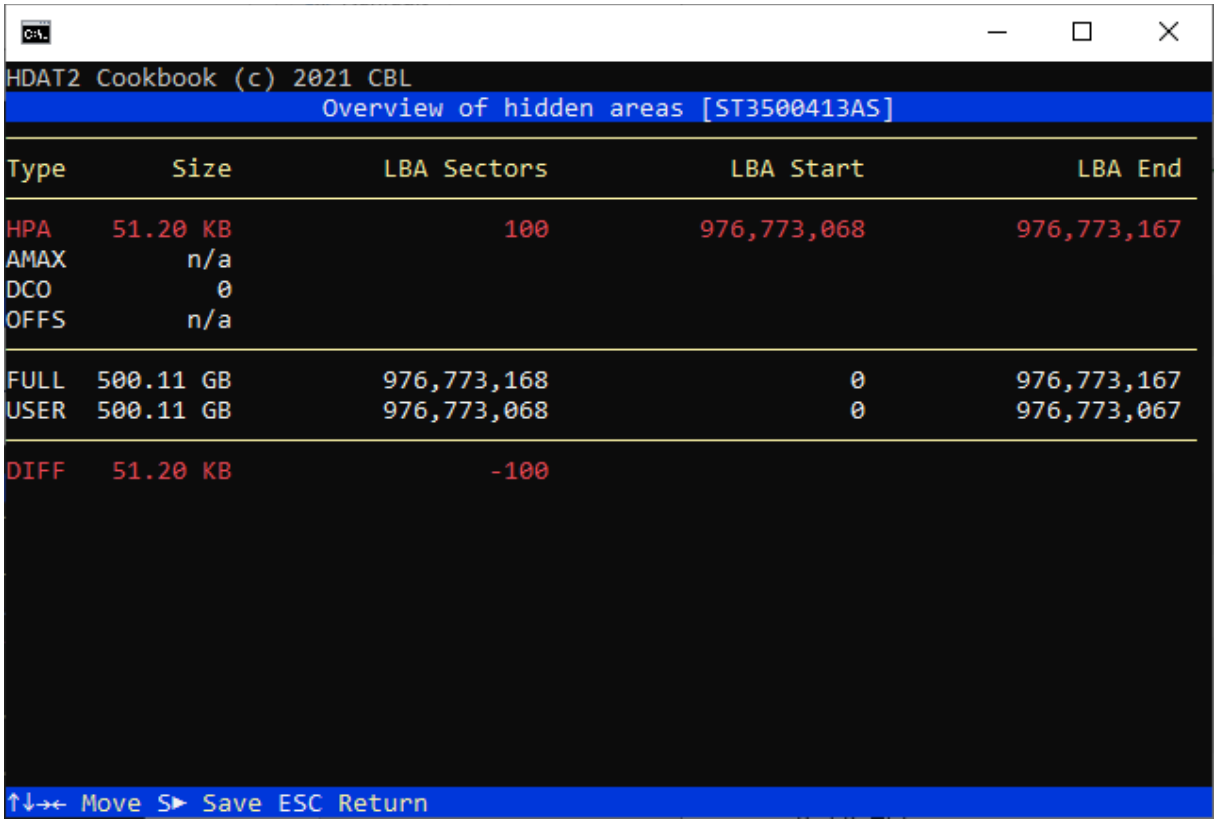
This error message you will see if you try to call the second non-volatile command without power off (e.g. immediately after the first creation of HPA area). So we turn power off and on and try it again.

After pressing the keys 'S' and 'Y' and message '**Command completed successfully**', the HPA area is set. The message '**Command aborted**' means something is wrong, you can try using the command 'C' key to set 28-bit instead of 48-bit SET MAX command and repeat the procedure.

You can check the settings of hidden areas in the '**Hidden areas menu**'.


HDAT2 Cookbook (c) 2021 CBL
Main menu [ST3500413AS]
►Device tests menu
►File system menu
►Device data menu
►SMART/SCT menu
►SET MAX (HPA) menu
►Device Configuration Overlay (DCO) menu
►Hidden areas menu
►Security menu
►Commands menu
Overview of hidden areas
Auto remove hidden areas
Dump of HPA area
Detect BEER record
↑↓ Move ENTER Select ESC Return


HDAT2 Cookbook (c) 2021 CBL
Hidden areas menu [ST3500413AS]
Overview of hidden areas
Auto remove hidden areas
Dump of HPA area
Detect BEER record
Active areas: HPA
Summary of hidden areas (HPA,AMAX,DCO,Address Offset).
↑↓ Move ENTER Run ESC Return

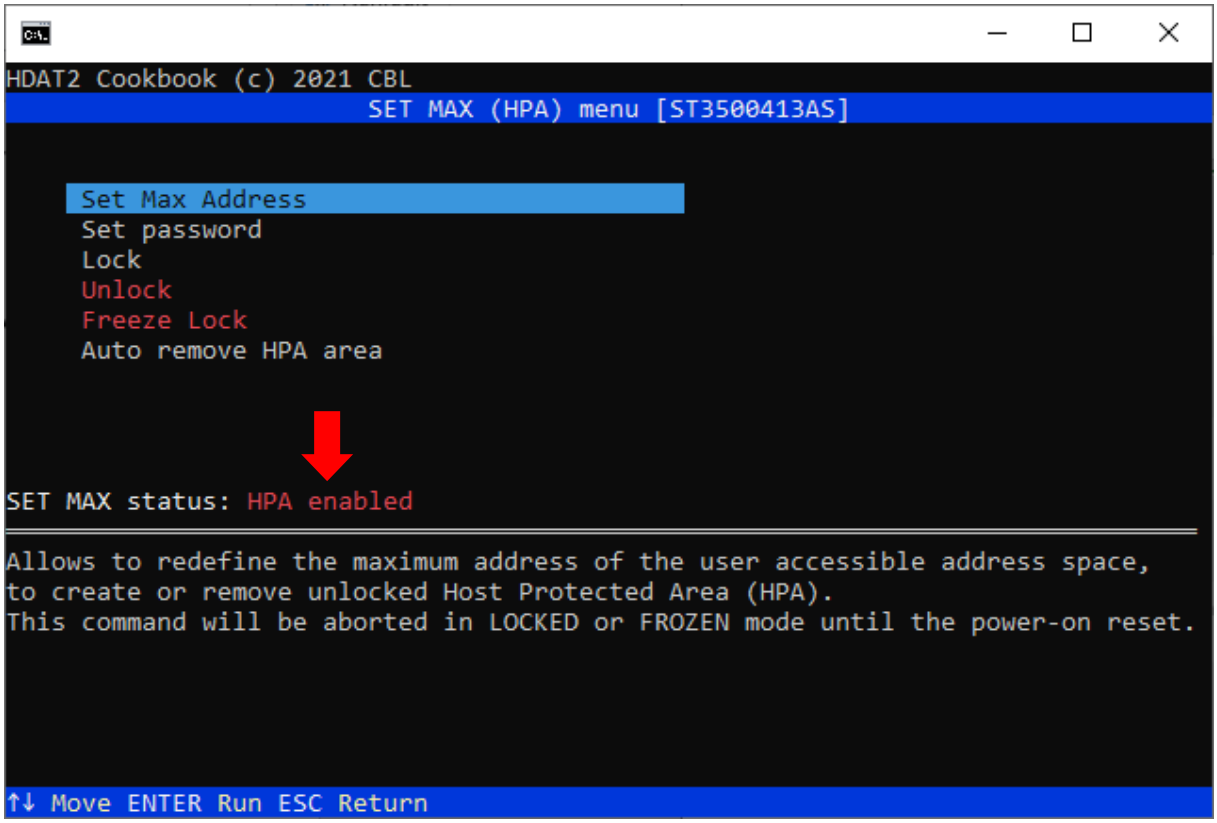


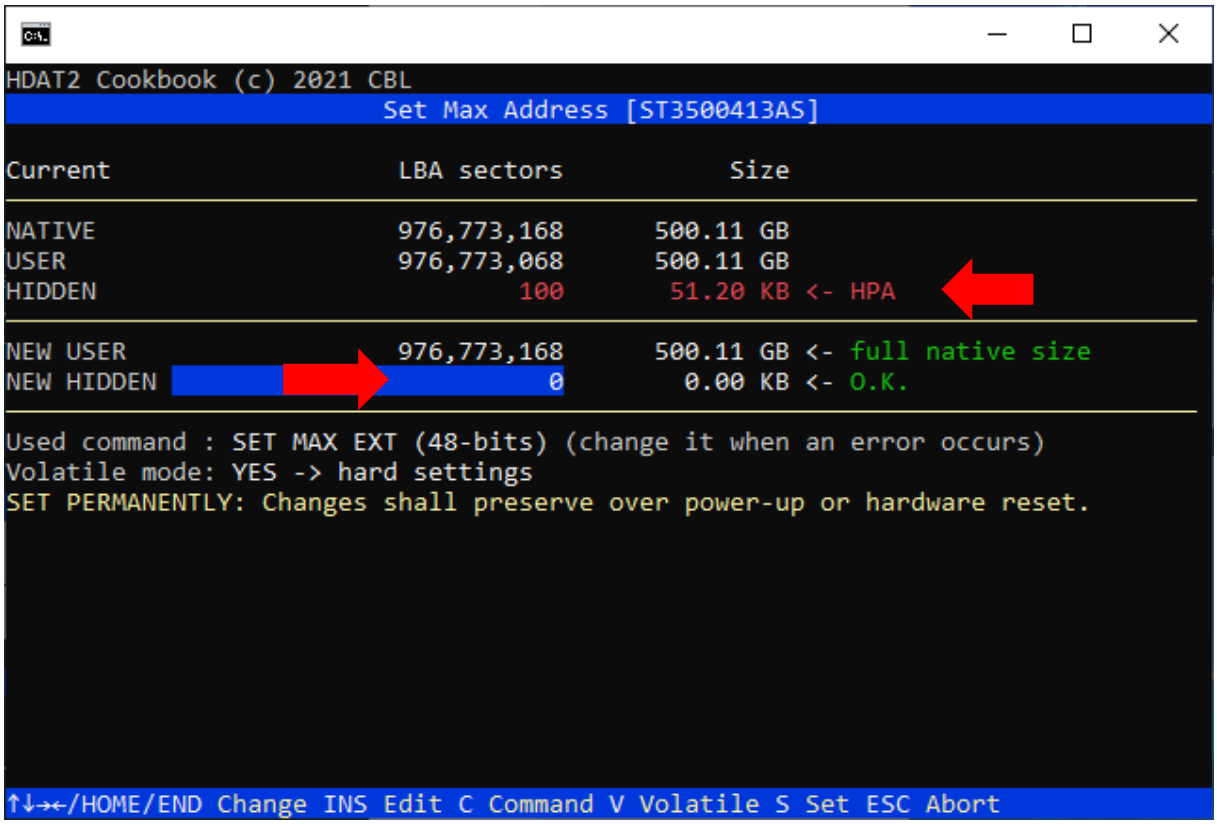
Remove hidden area HPA

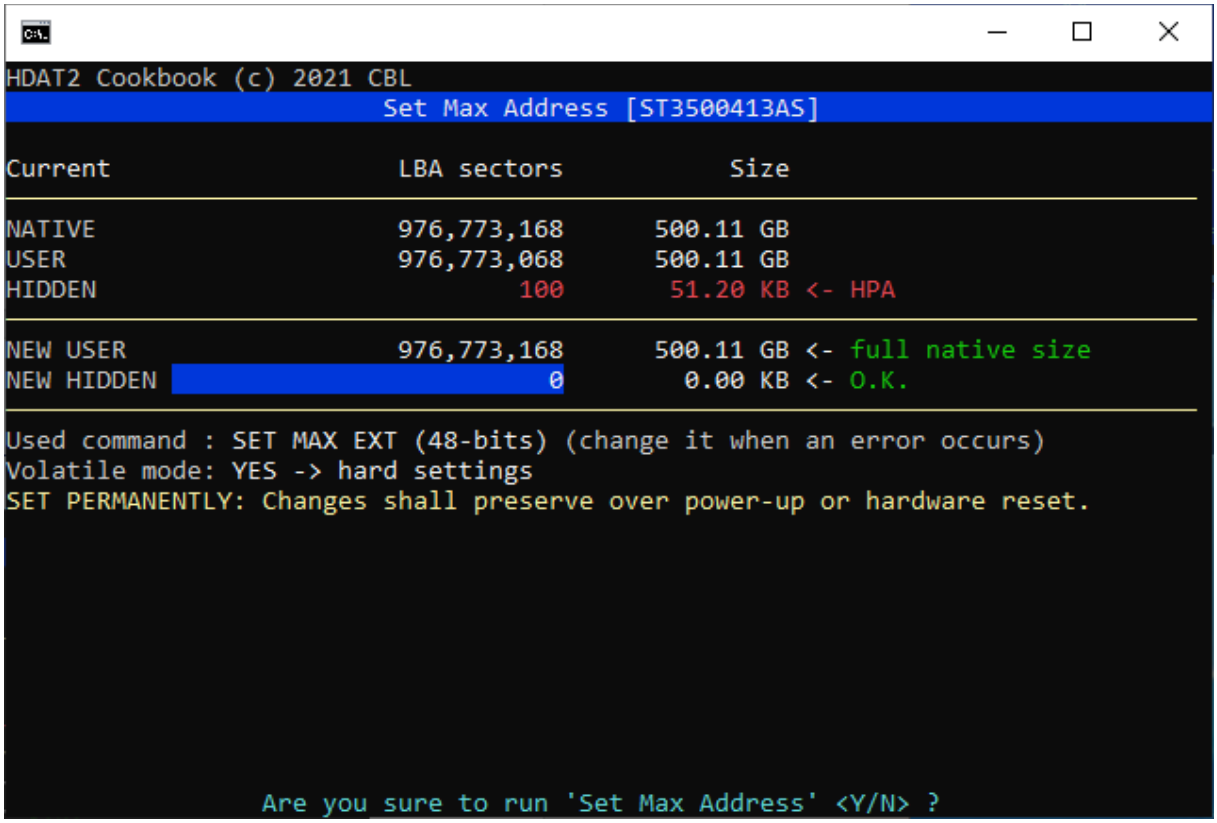
To remove HPA area you can use SET MAX ADDRESS command or menu option Auto Remove Hidden Areas.

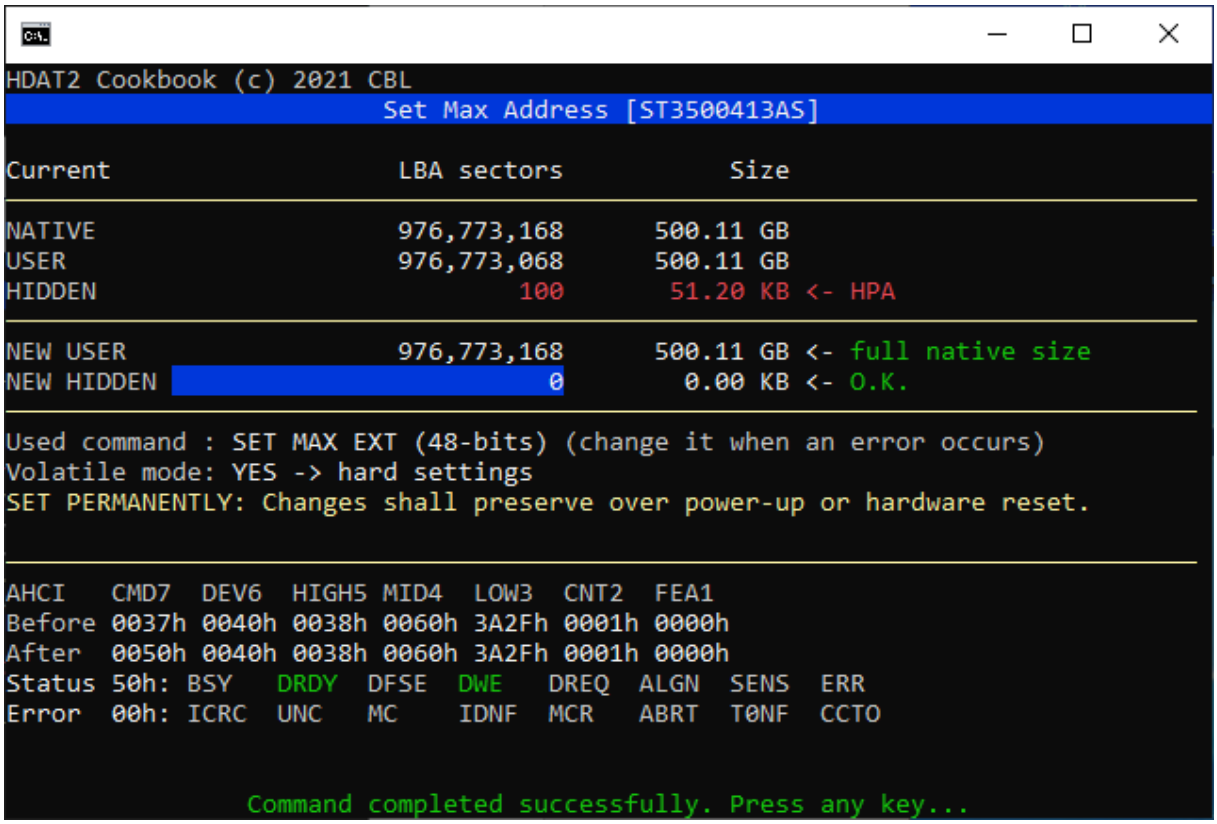
Remove hidden area HPA with SET MAX ADDRESS

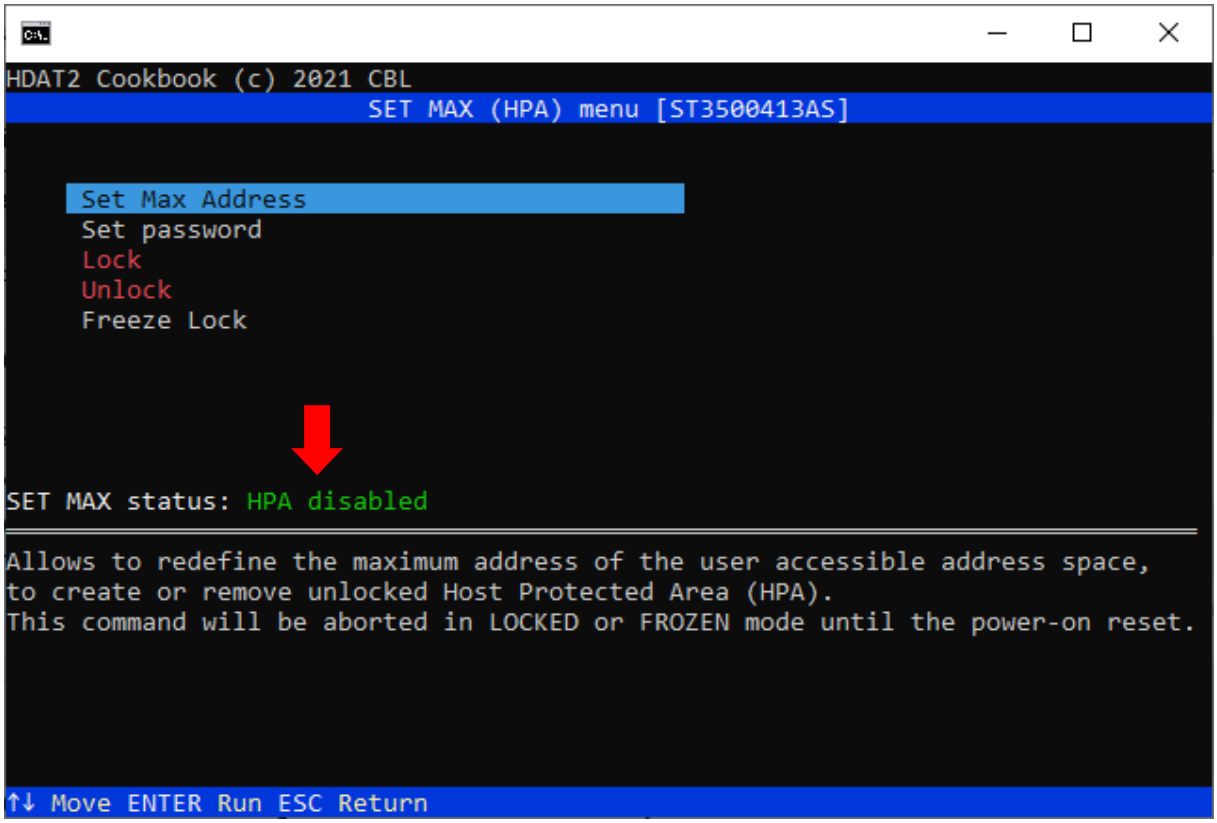
Example: We try to remove created HPA area with 100 sectors. We use 48-bit SET MAX ADDRESS command.


HDAT2 Cookbook (c) 2021 CBL
SET MAX (HPA) menu [ST3500413AS]
Set Max Address
Set password
Lock
Unlock
Freeze Lock
Auto remove HPA area
SET MAX status: HPA enabled
Allows to redefine the maximum address of the user accessible address space,
to create or remove unlocked Host Protected Area (HPA).
This command will be aborted in LOCKED or FROZEN mode until the power-on reset.
↑↓ Move ENTER Run ESC Return


HDAT2 Cookbook (c) 2021 CBL
Set Max Address [ST3500413AS]
Current LBA sectors Size
NATIVE 976,773,168 500.11 GB
USER 976,773,068 500.11 GB
HIDDEN 100 51.20 KB <- HPA
NEW USER 976,773,168 500.11 GB <- full native size
NEW HIDDEN 0 0.00 KB <- O.K.
Used command : SET MAX EXT (48-bits) (change it when an error occurs)
Volatile mode: YES -> hard settings
SET PERMANENTLY: Changes shall preserve over power-up or hardware reset.
↑↓→←/HOME/END Change INS Edit C Command V Volatile S Set ESC Abort


HDAT2 Cookbook (c) 2021 CBL
Set Max Address [ST3500413AS]
Current LBA sectors Size
NATIVE 976,773,168 500.11 GB
USER 976,773,068 500.11 GB
HIDDEN 100 51.20 KB <- HPA
NEW USER 976,773,168 500.11 GB <- full native size
NEW HIDDEN 0 0.00 KB <- O.K.
Used command : SET MAX EXT (48-bits) (change it when an error occurs)
Volatile mode: YES -> hard settings
SET PERMANENTLY: Changes shall preserve over power-up or hardware reset.
Are you sure to run 'Set Max Address' <Y/N> ?


HDAT2 Cookbook (c) 2021 CBL
Set Max Address [ST3500413AS]
Current LBA sectors Size
NATIVE 976,773,168 500.11 GB
USER 976,773,068 500.11 GB
HIDDEN 100 51.20 KB <- HPA
NEW USER 976,773,168 500.11 GB <- full native size
NEW HIDDEN 0 0.00 KB <- O.K.
Used command : SET MAX EXT (48-bits) (change it when an error occurs)
Volatile mode: YES -> hard settings
SET PERMANENTLY: Changes shall preserve over power-up or hardware reset.
AHCI CMD7 DEV6 HIGH5 MID4 LOW3 CNT2 FEA1
Before 0037h 0040h 0038h 0060h 3A2Fh 0001h 0000h
After 0050h 0040h 0038h 0060h 3A2Fh 0001h 0000h
Status 50h: BSY DRDY DFSE DWE DREQ ALGN SENS ERR
Error 00h: ICRC UNC MC IDNF MCR ABRT T0NF CCTO
Command completed successfully. Press any key...

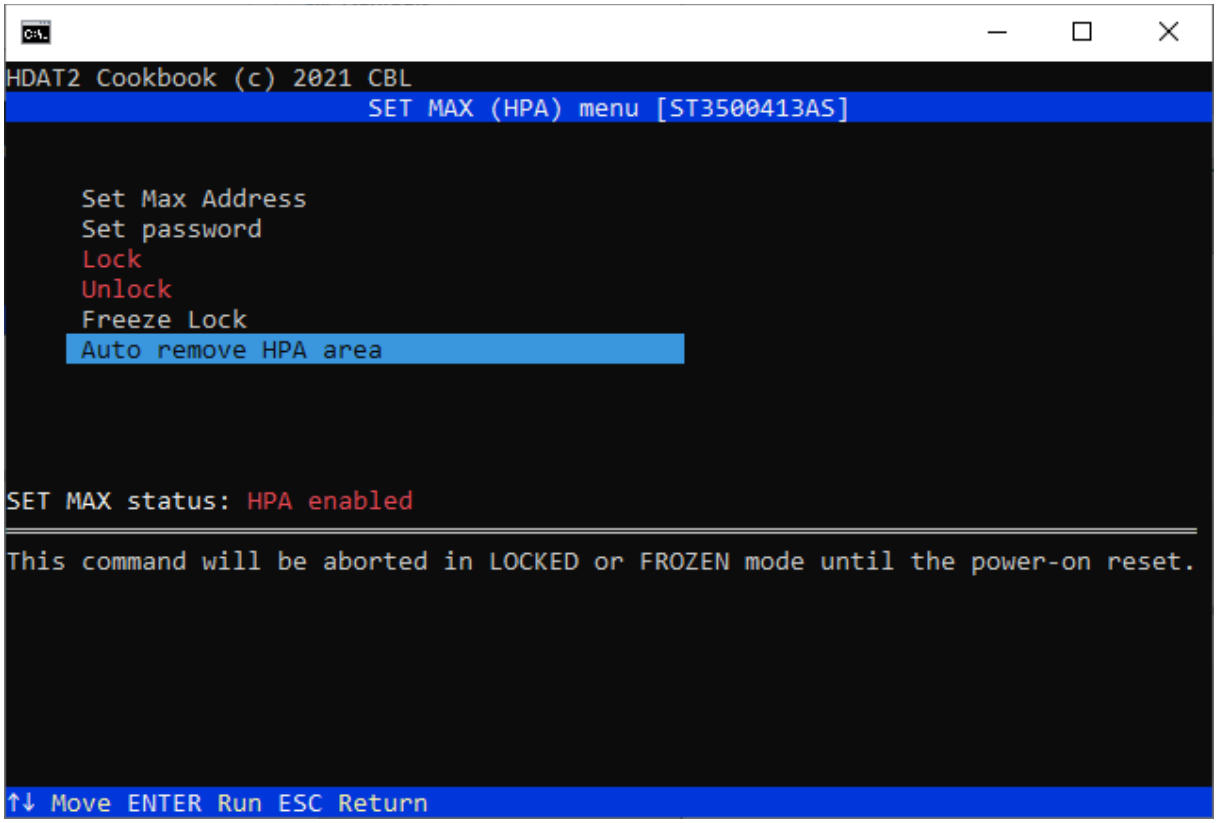


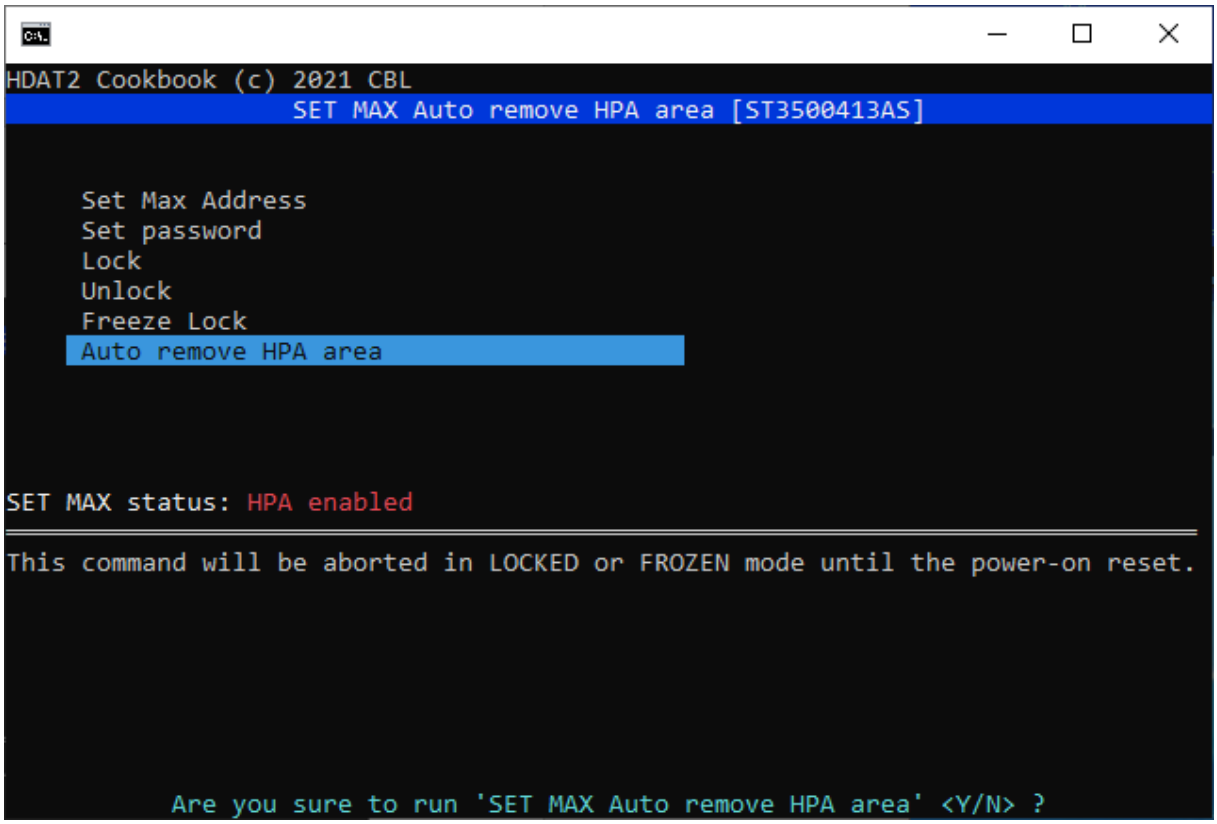
Now the HPA area is removed.

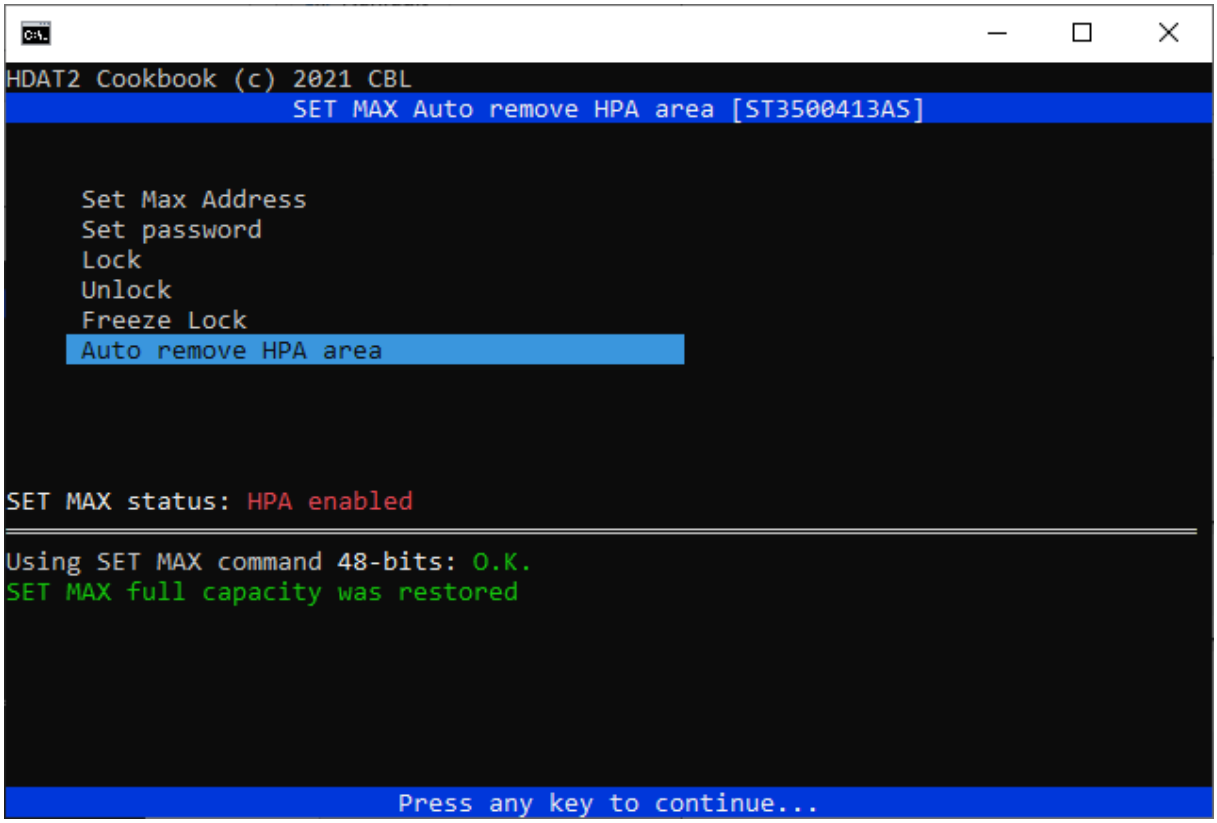
You get an error message '**Command aborted**' if you try to remove HPA area with 48-bit SET MAX command, but HPA area was created with 28-bit SET MAX command. So you need to select 28-bit SET MAX command.

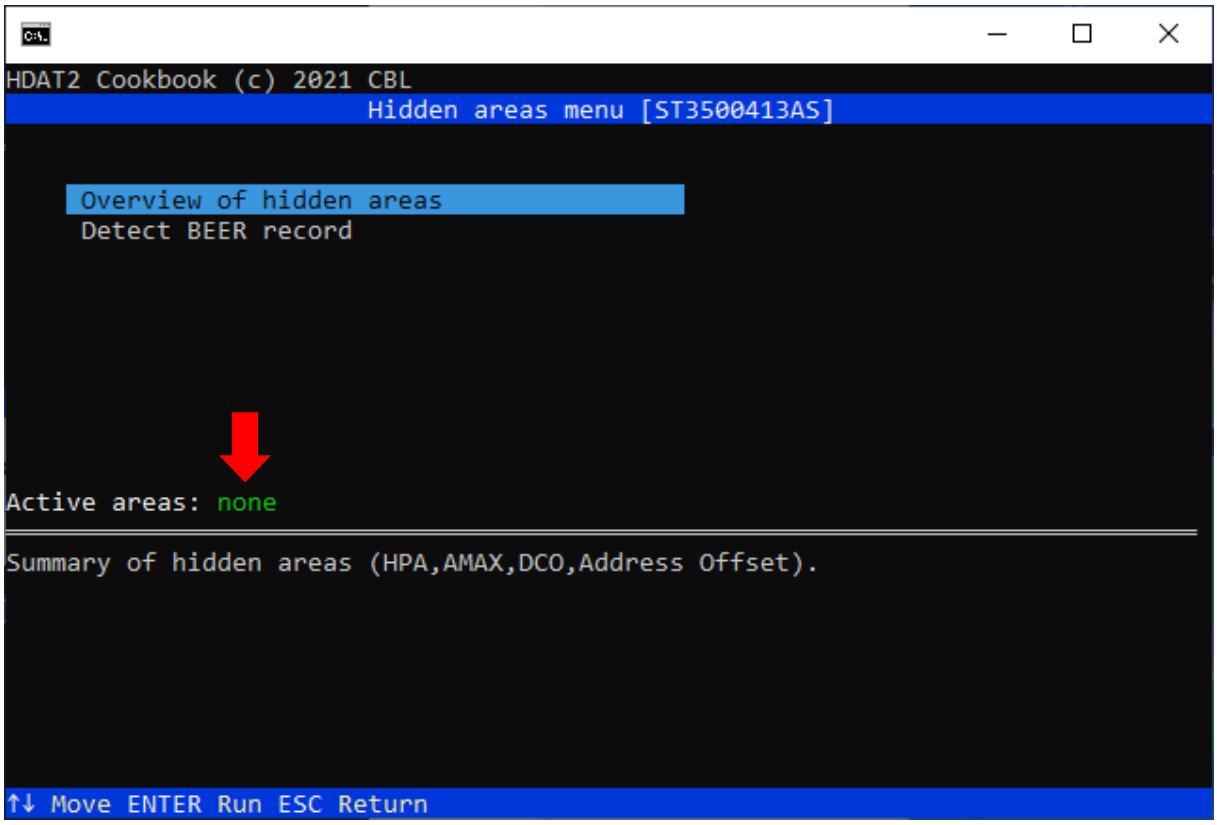
Auto remove HPA area

There are 2 options: 'Auto remove HPA area' in SET MAX menu or 'Auto remove hidden areas' in Hidden areas menu.

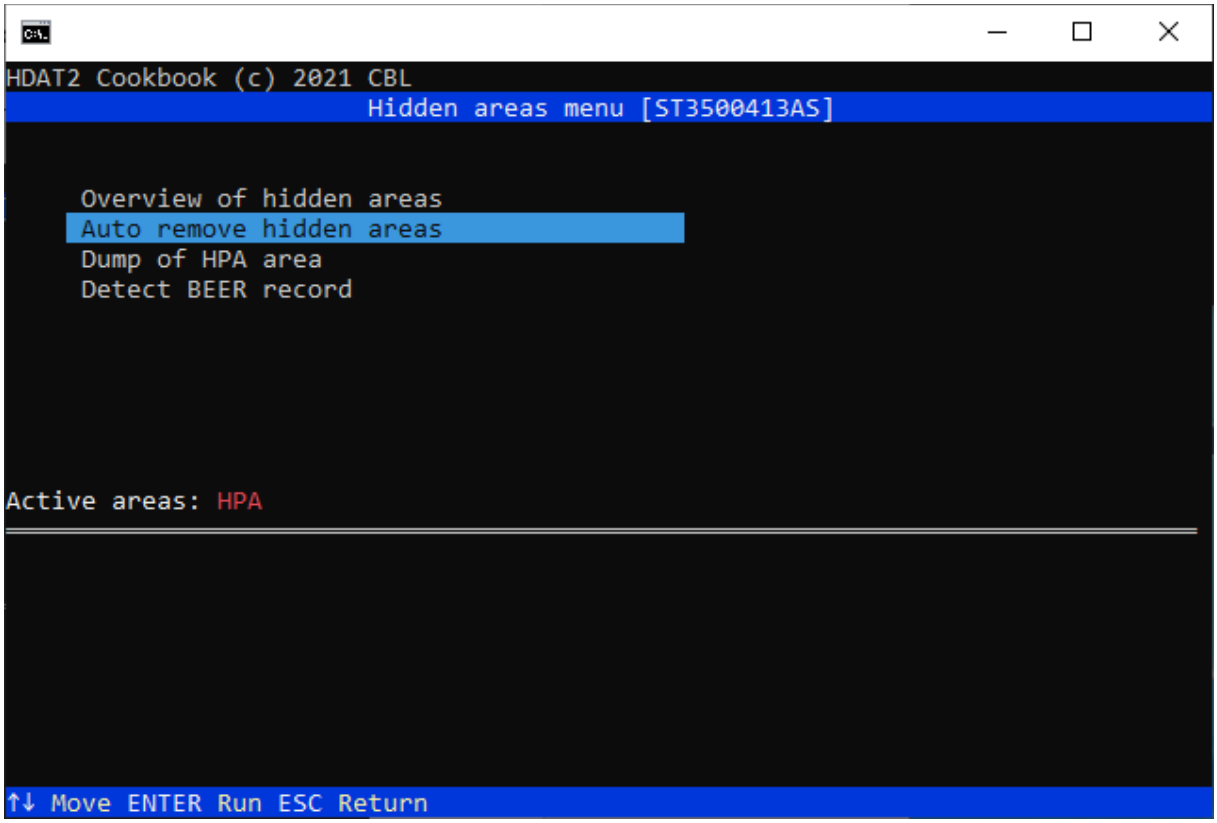

HDAT2 Cookbook (c) 2021 CBL
SET MAX (HPA) menu [ST3500413AS]
Set Max Address
Set password
Lock
Unlock
Freeze Lock
Auto remove HPA area
SET MAX status: HPA enabled
This command will be aborted in LOCKED or FROZEN mode until the power-on reset.
↑↓ Move ENTER Run ESC Return

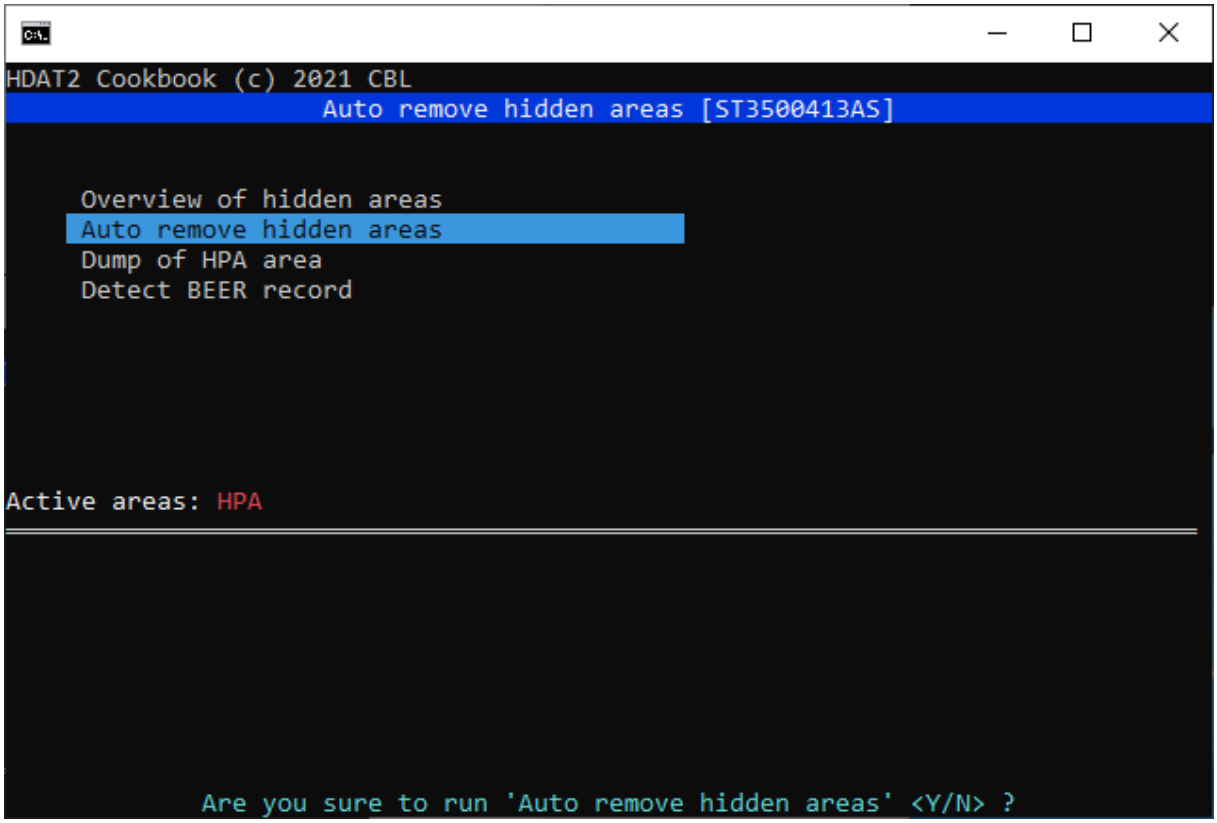

HDAT2 Cookbook (c) 2021 CBL
SET MAX Auto remove HPA area [ST3500413AS]
Set Max Address
Set password
Lock
Unlock
Freeze Lock
Auto remove HPA area
SET MAX status: HPA enabled
This command will be aborted in LOCKED or FROZEN mode until the power-on reset.
Are you sure to run 'SET MAX Auto remove HPA area' <Y/N> ?

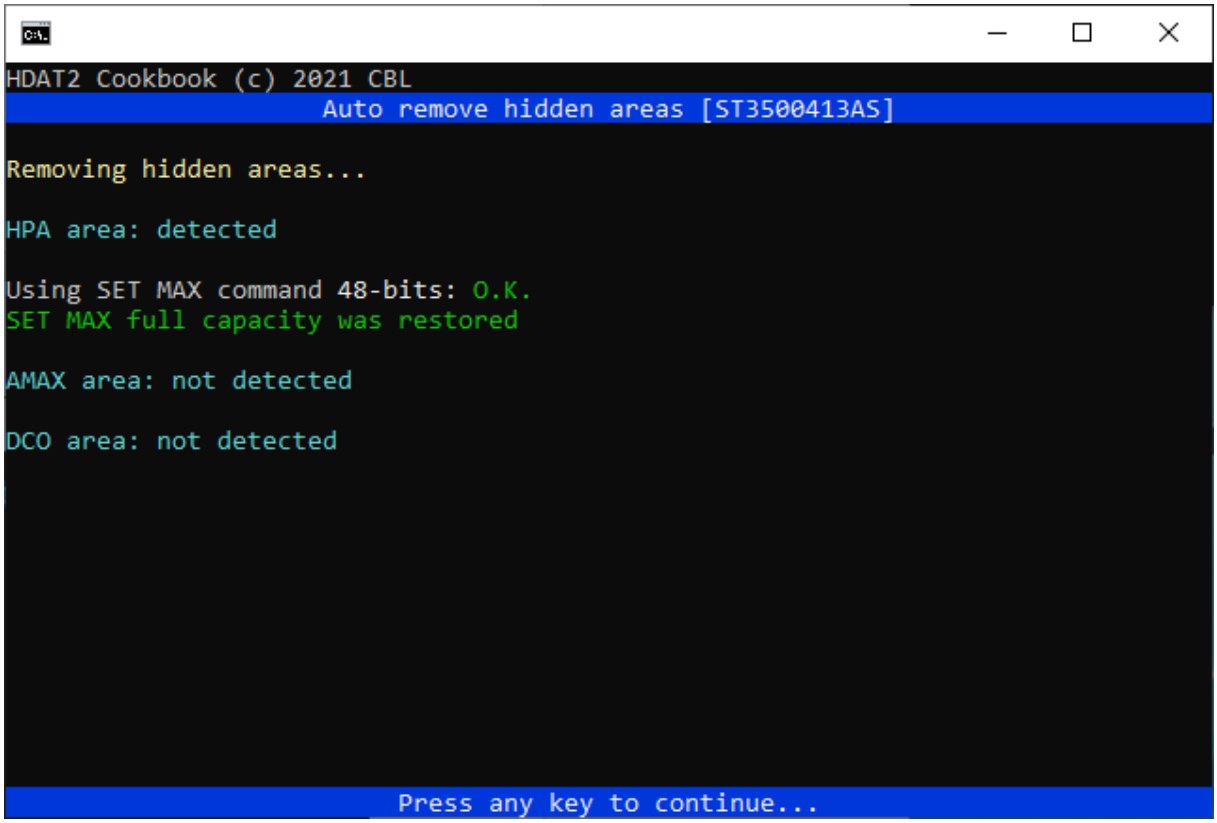


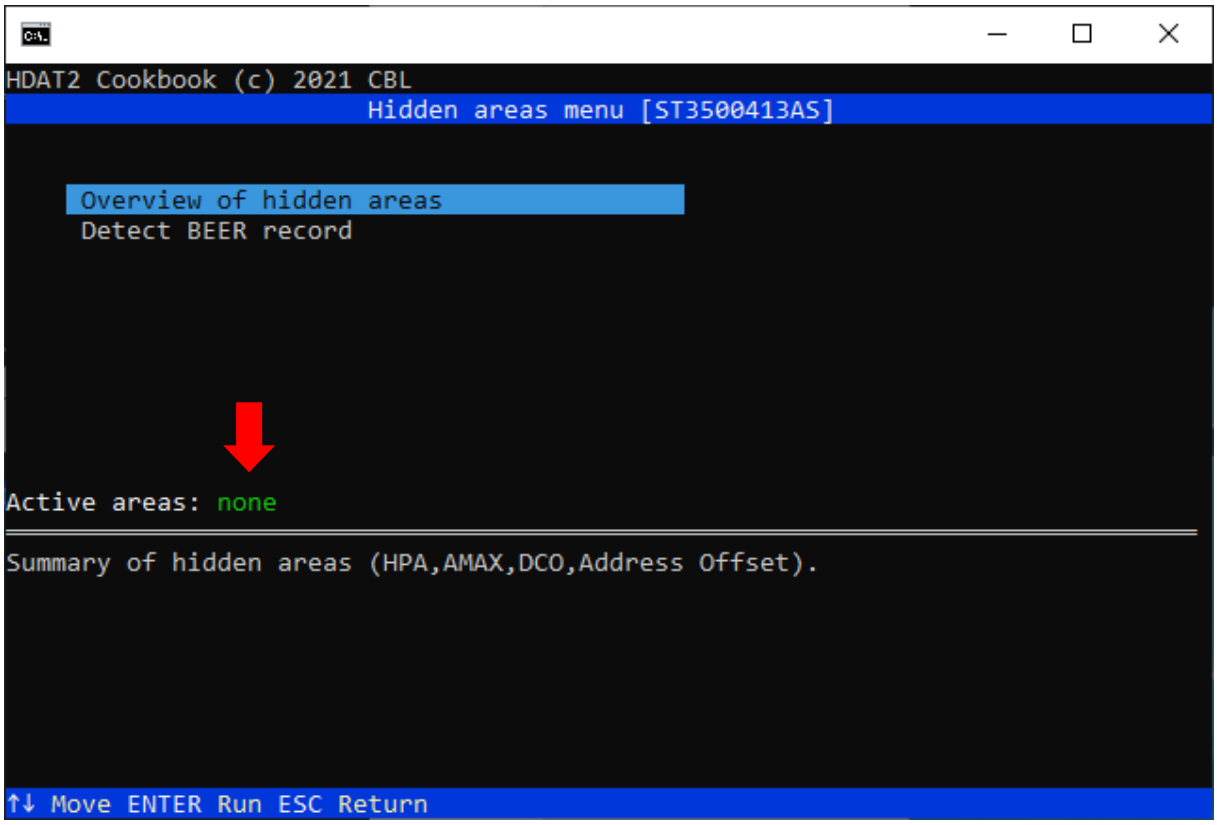


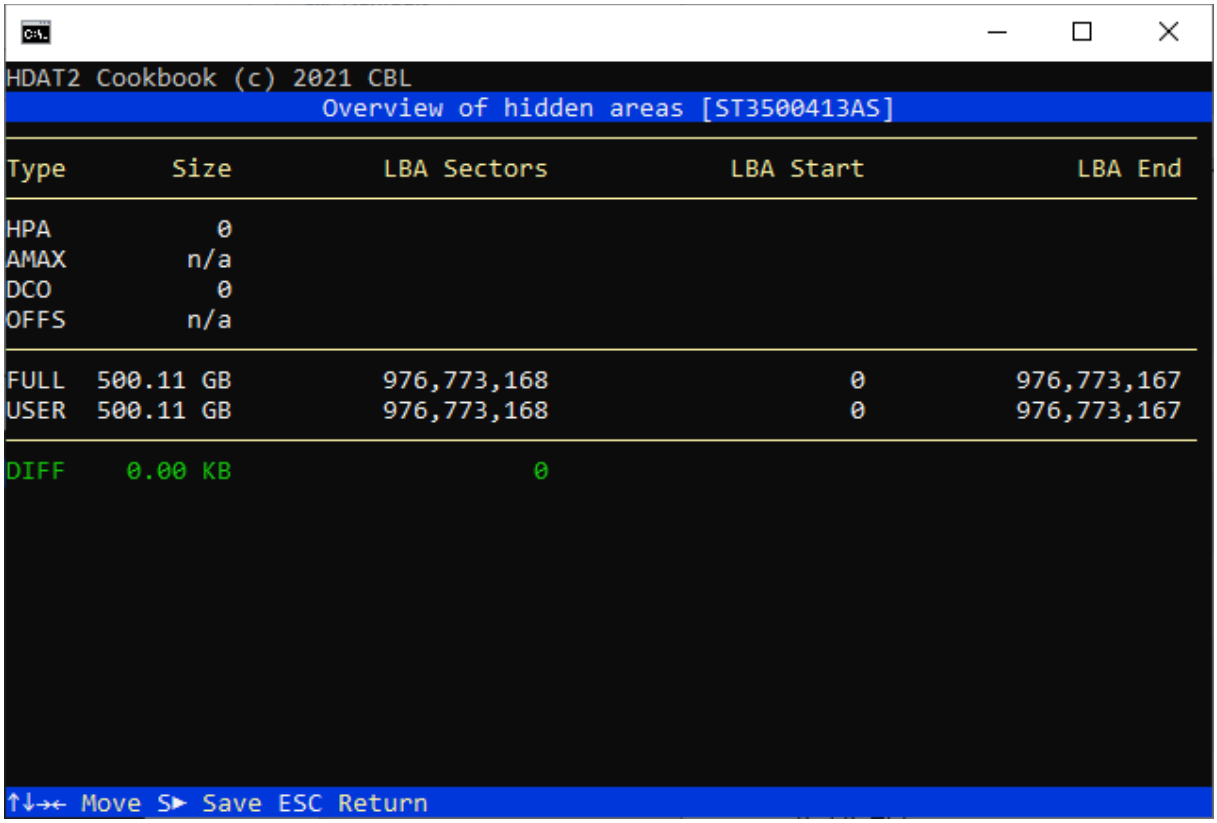
You can also use the option 'Auto remove hidden areas' in Hidden areas menu.


HDAT2 Cookbook (c) 2021 CBL
Hidden areas menu [ST3500413AS]
Overview of hidden areas
Auto remove hidden areas
Dump of HPA area
Detect BEER record
Active areas: HPA
↑↓ Move ENTER Run ESC Return


HDAT2 Cookbook (c) 2021 CBL
Auto remove hidden areas [ST3500413AS]
Overview of hidden areas
Auto remove hidden areas
Dump of HPA area
Detect BEER record
Active areas: HPA
Are you sure to run 'Auto remove hidden areas' <Y/N> ?

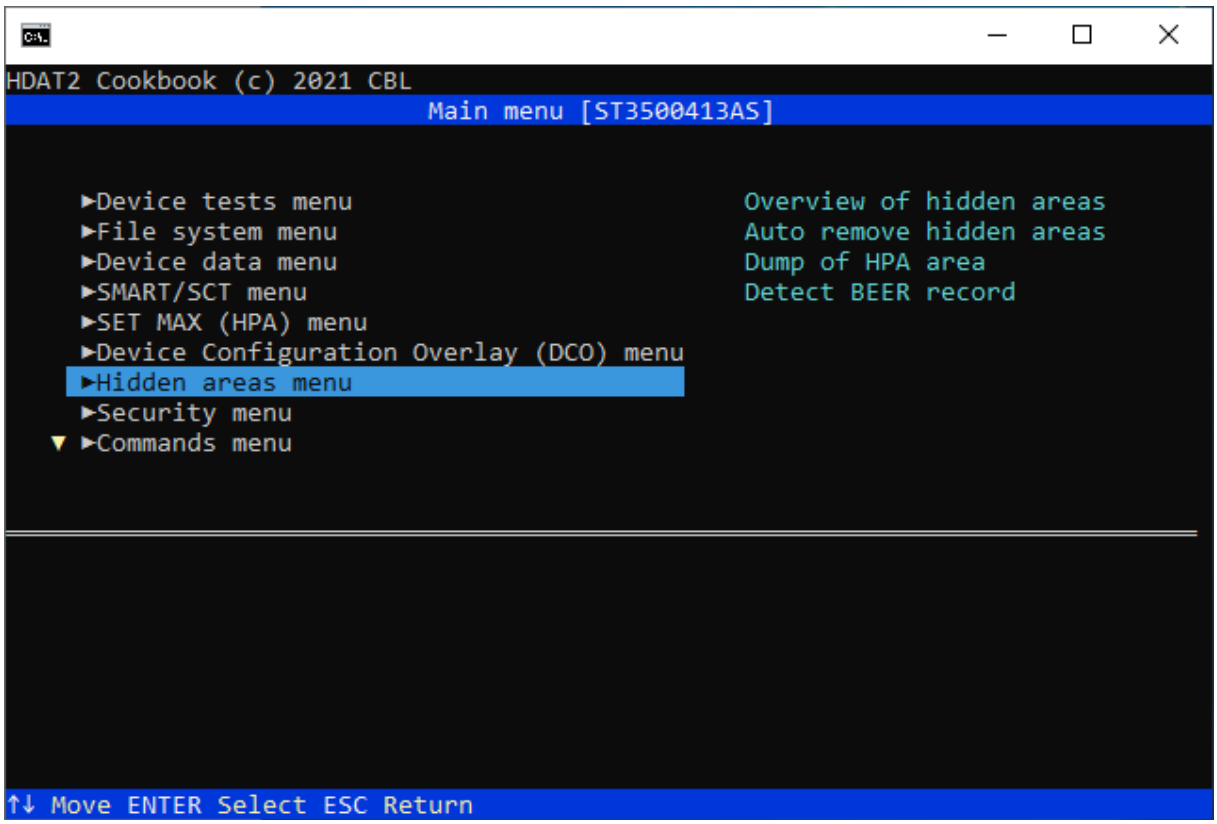

HDAT2 Cookbook (c) 2021 CBL
Auto remove hidden areas [ST3500413AS]
Removing hidden areas...
HPA area: detected
Using SET MAX command 48-bits: O.K.
SET MAX full capacity was restored
AMAX area: not detected
DCO area: not detected
Press any key to continue...

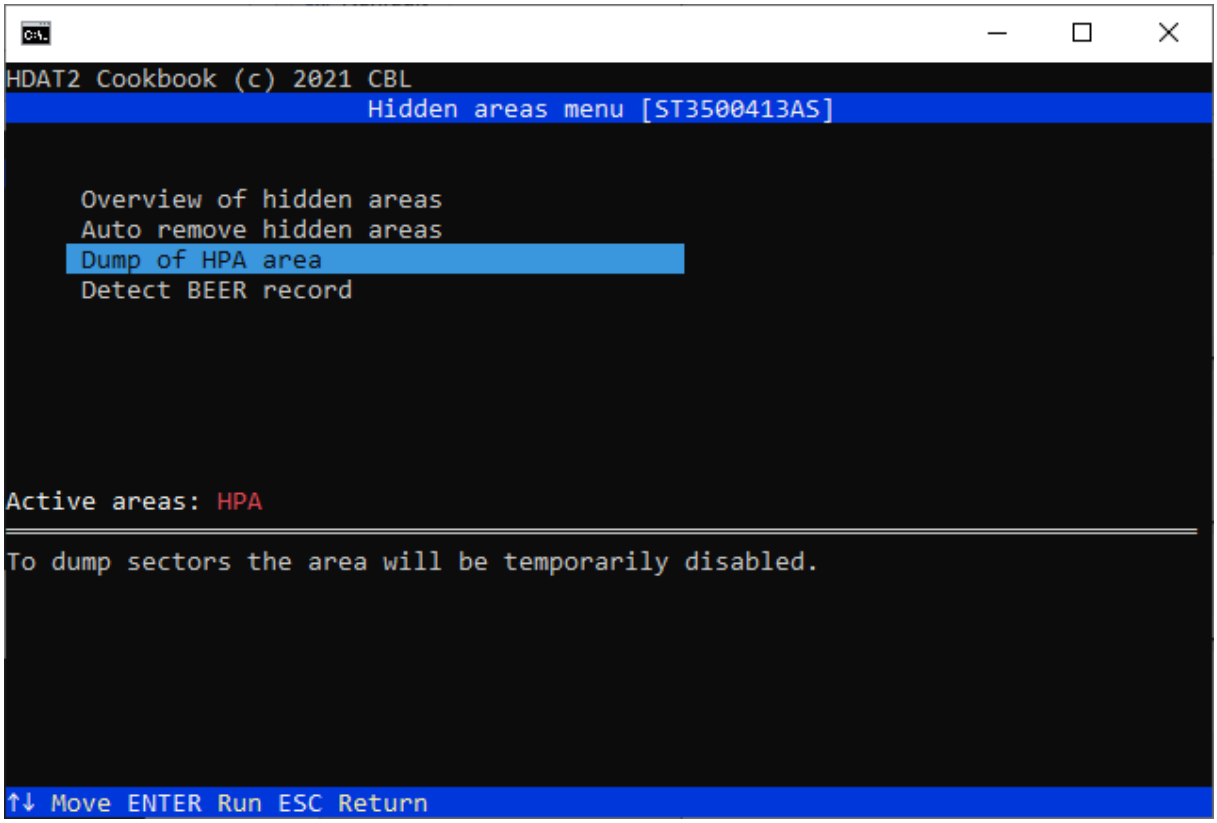

HDAT2 Cookbook (c) 2021 CBL
Hidden areas menu [ST3500413AS]
Overview of hidden areas
Detect BEER record
Active areas: none
Summary of hidden areas (HPA,AMAX,DCO,Address Offset).
↑↓ Move ENTER Run ESC Return

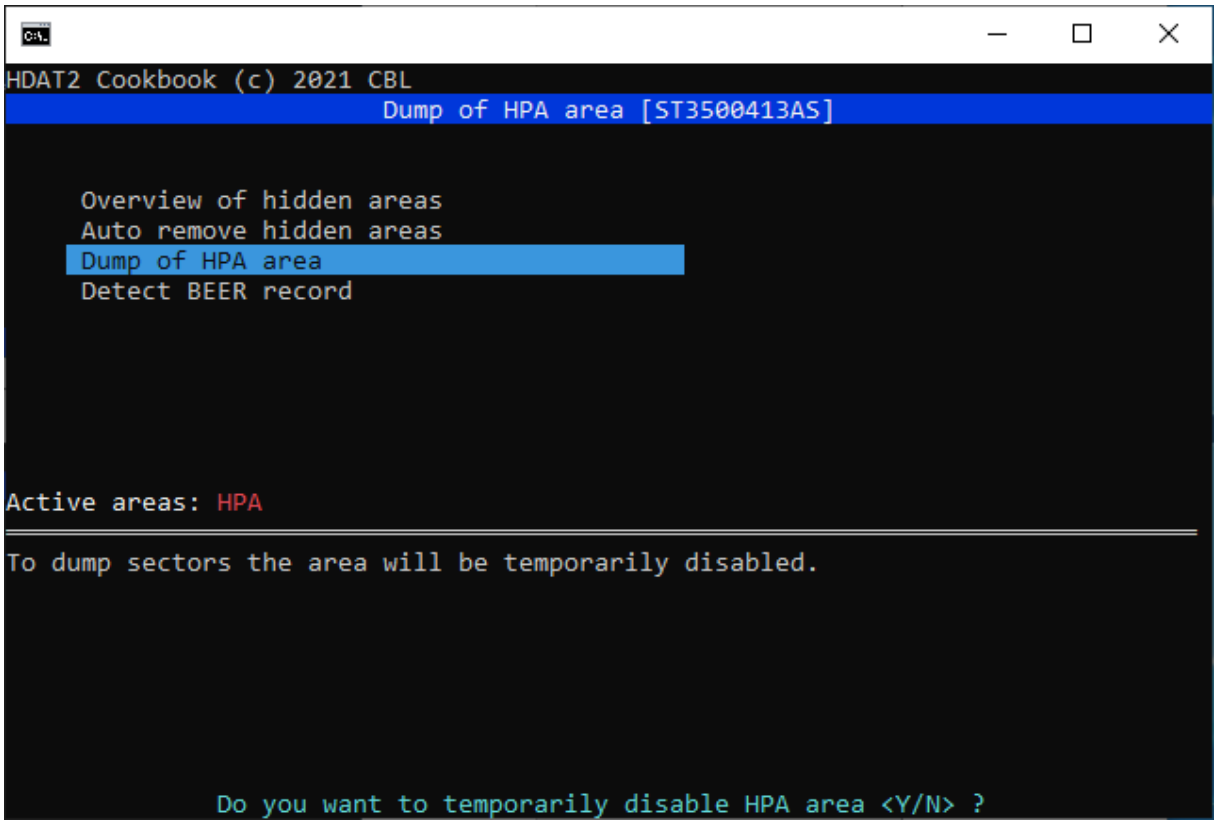


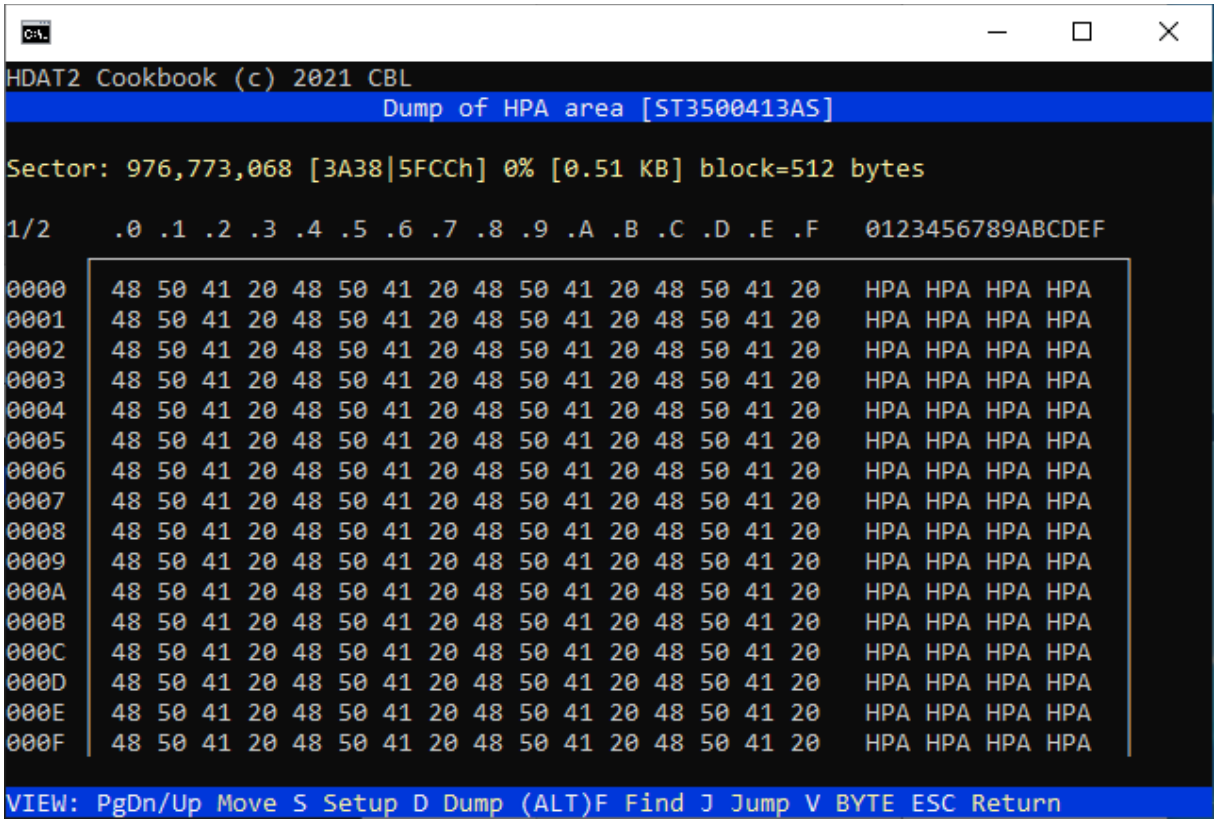
Dump of HPA area

Example: We have created an HPA area of 100 sectors, which starts at LBA sector 976,773,068. This option allows you to view the contents of this HPA area.

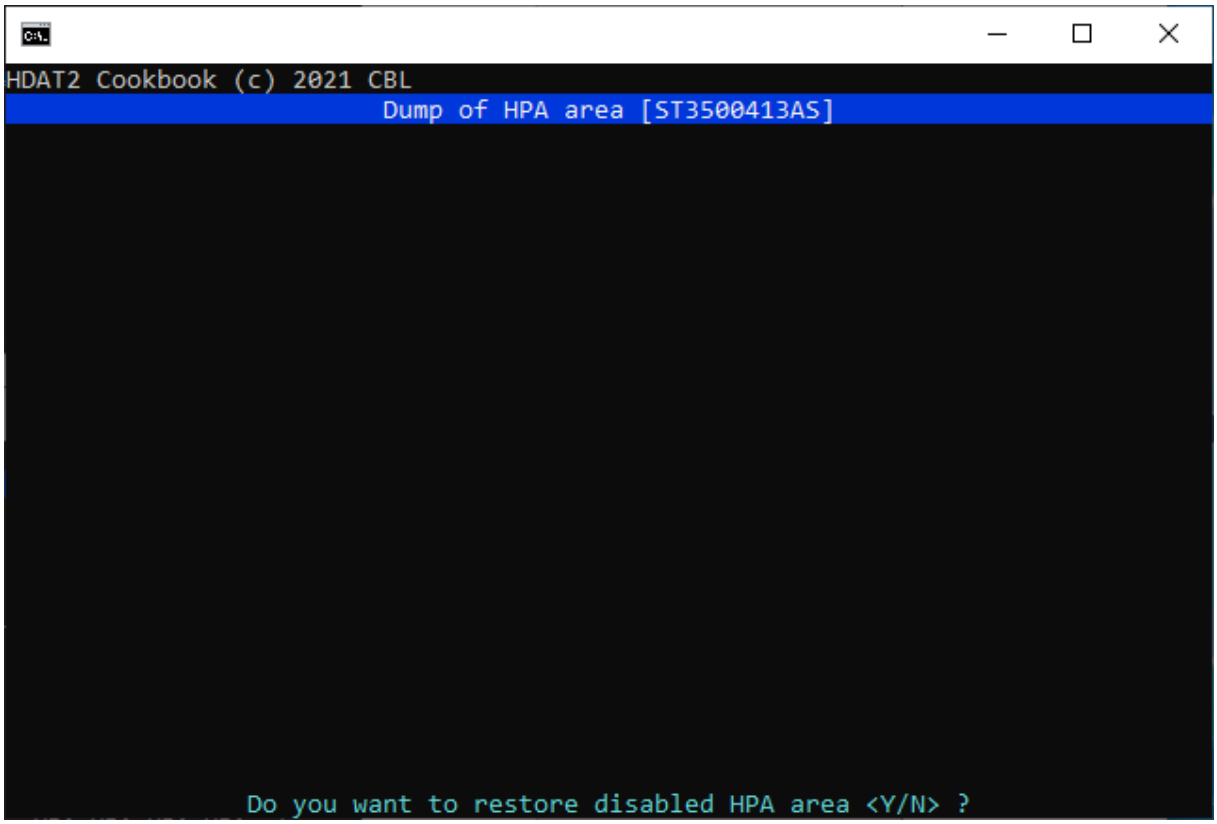


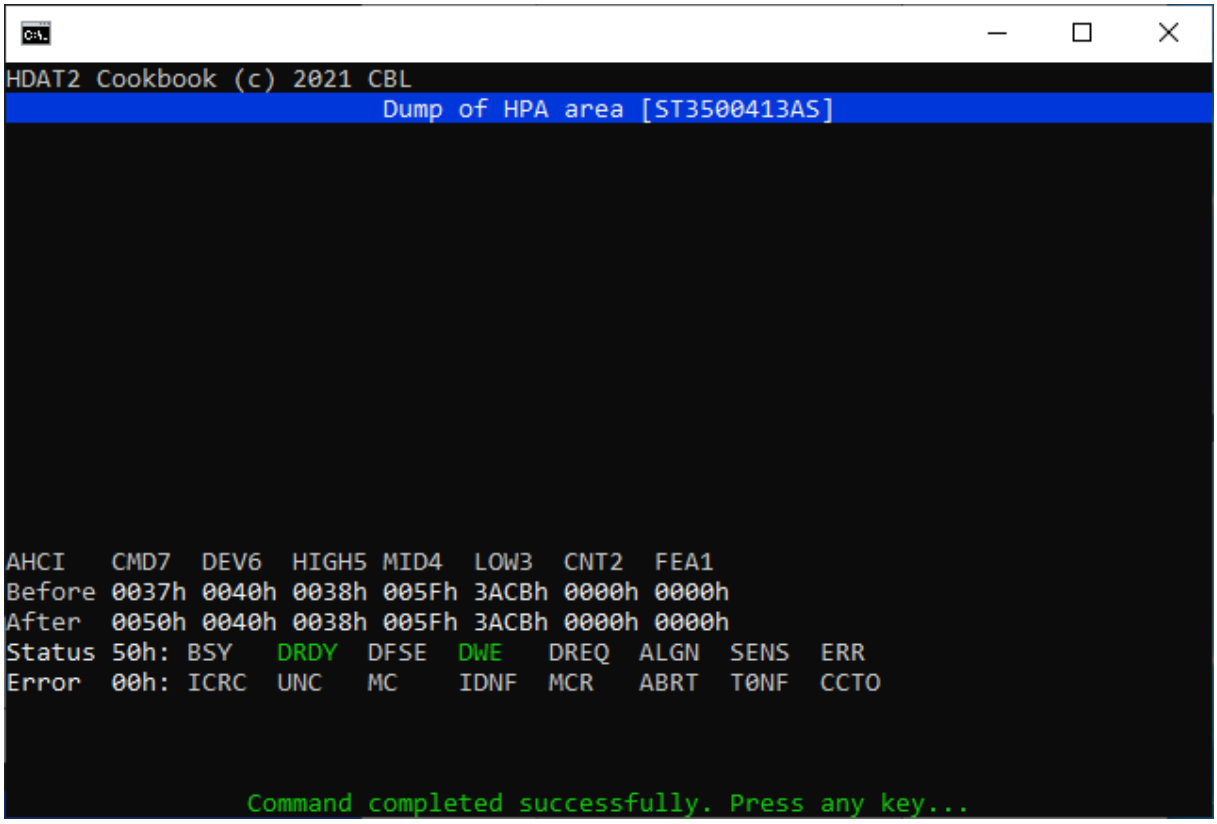

HDAT2 Cookbook (c) 2021 CBL
Hidden areas menu [ST3500413AS]
Overview of hidden areas
Auto remove hidden areas
Dump of HPA area
Detect BEER record
Active areas: HPA
To dump sectors the area will be temporarily disabled.
↑↓ Move ENTER Run ESC Return

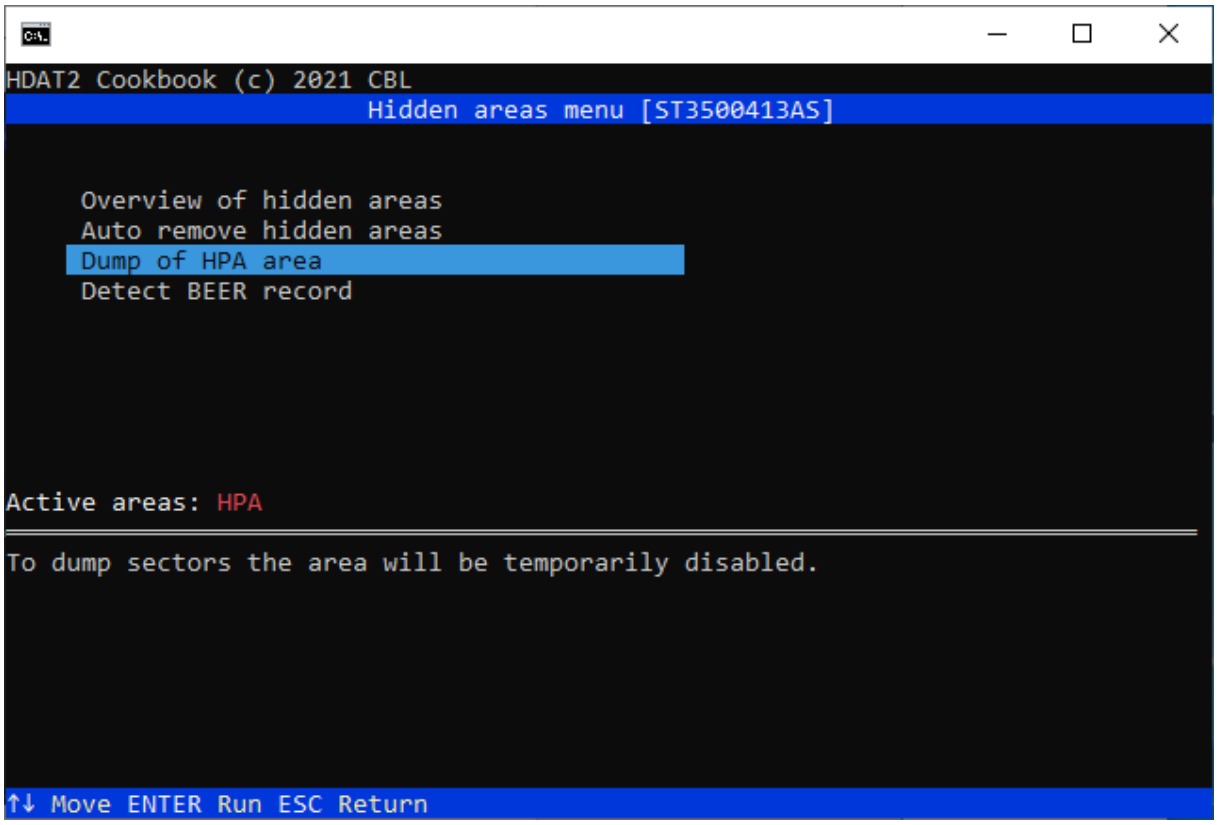

HDAT2 Cookbook (c) 2021 CBL
Dump of HPA area [ST3500413AS]
Overview of hidden areas
Auto remove hidden areas
Dump of HPA area
Detect BEER record
Active areas: HPA
To dump sectors the area will be temporarily disabled.
Do you want to temporarily disable HPA area <Y/N> ?



I saved the HPA text in the first sector of this area.





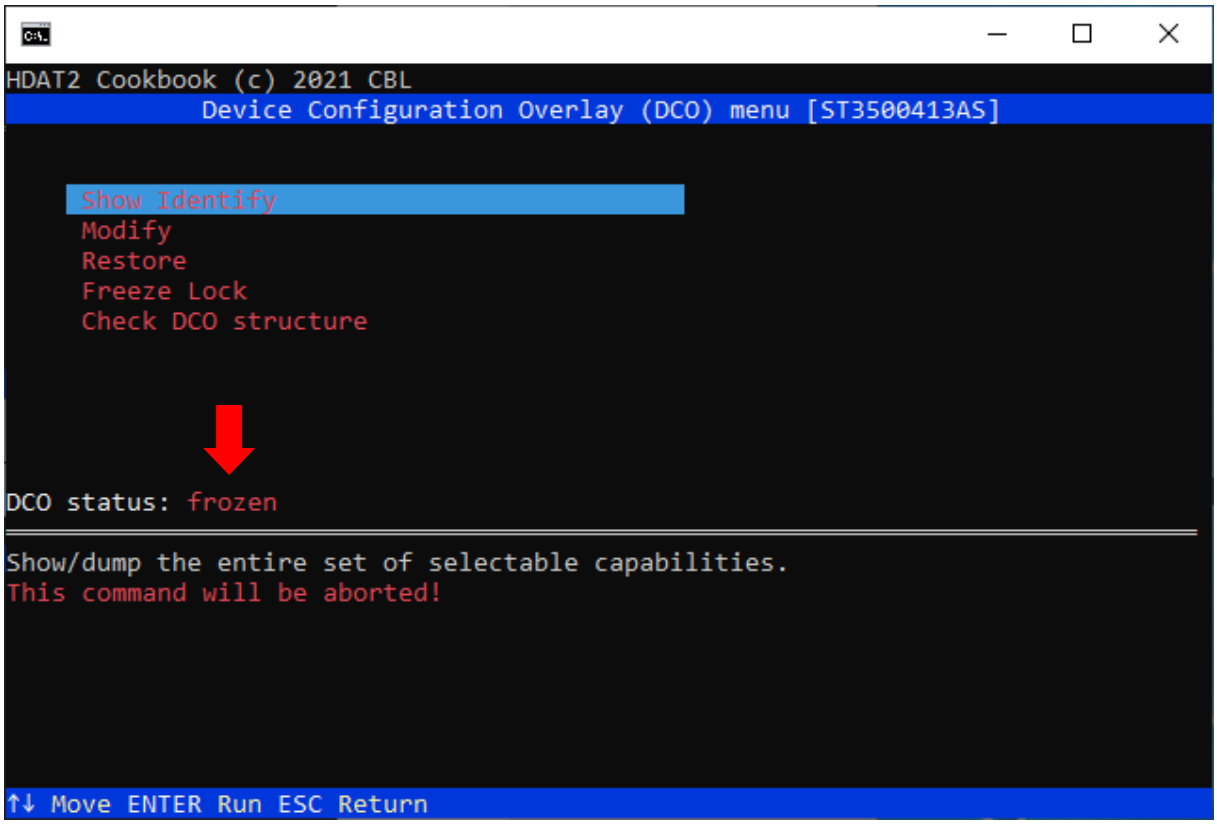


DCO area

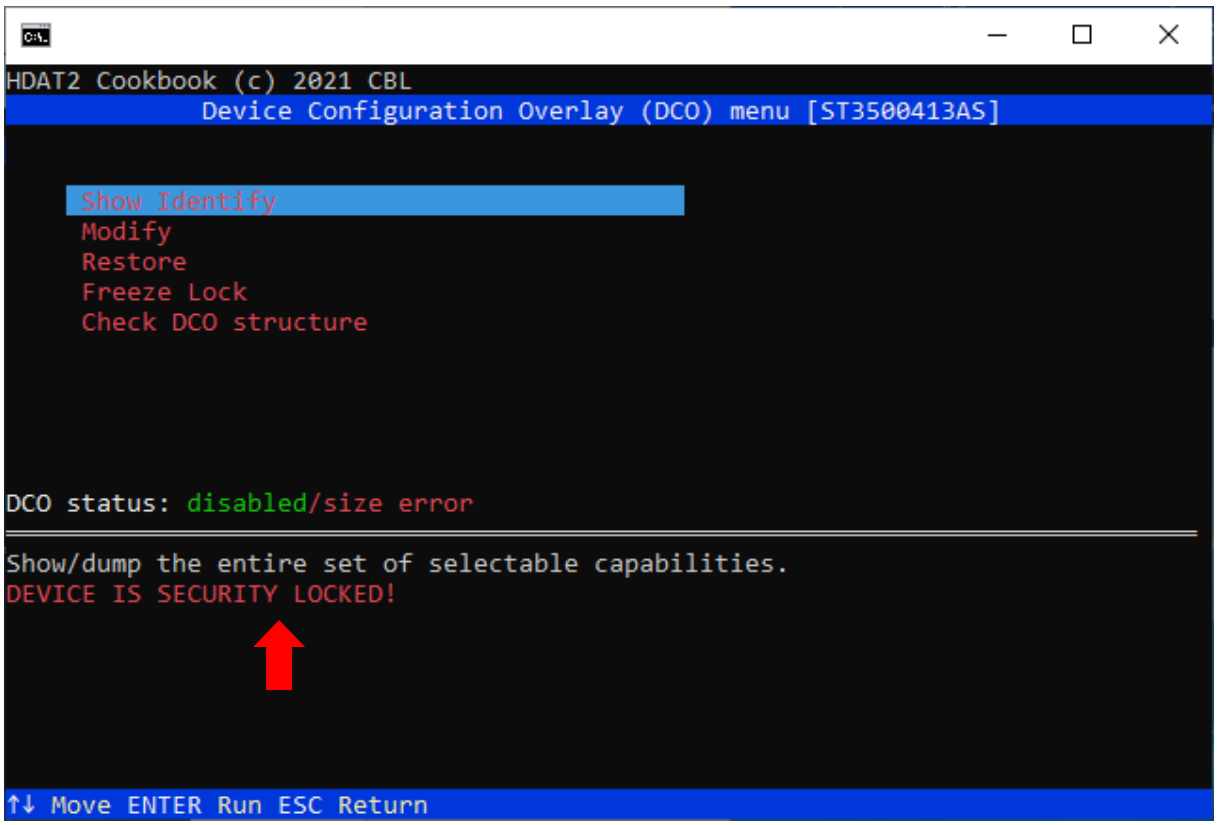
Device Configuration Overlay (DCO)

Create hidden DCO area

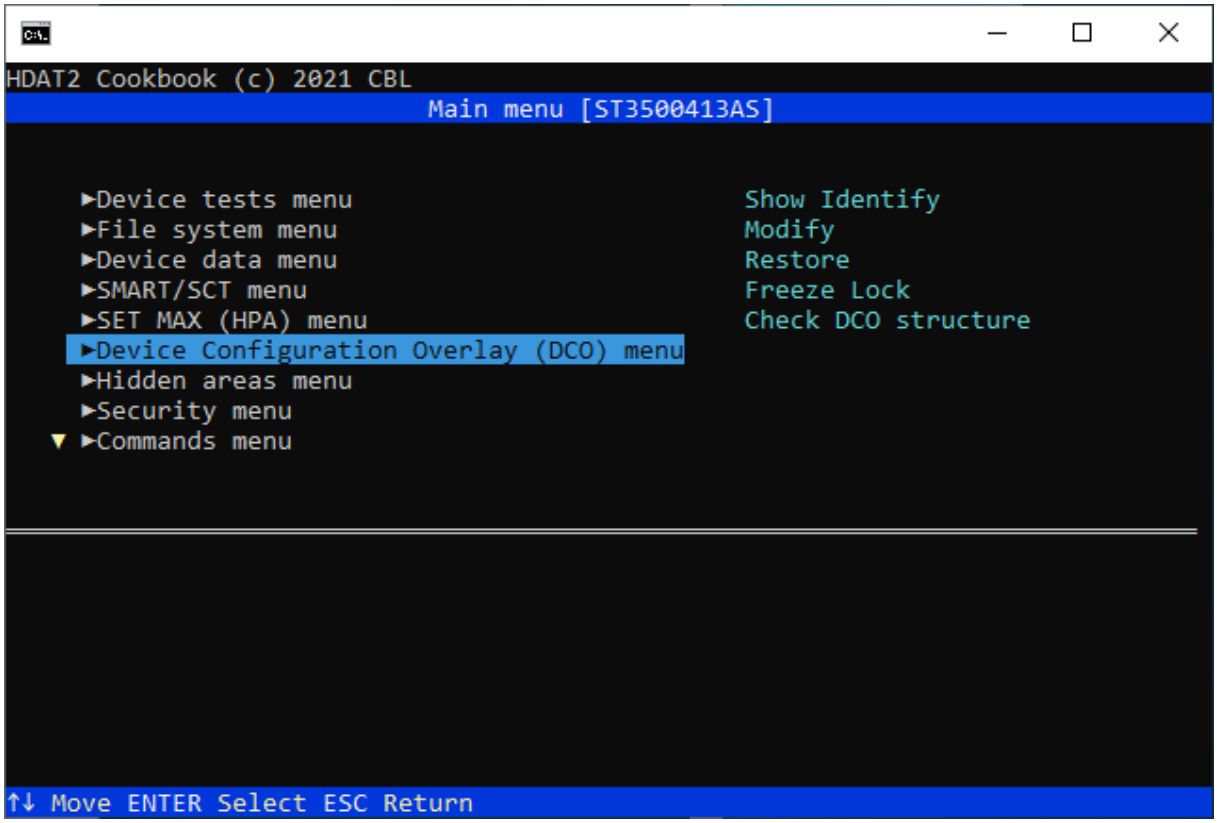
If the device is in DCO frozen state the device shall return command aborted for all DCO commands. In this case see FAQ "**How to bypass a Security and/or DCO frozen state?**"

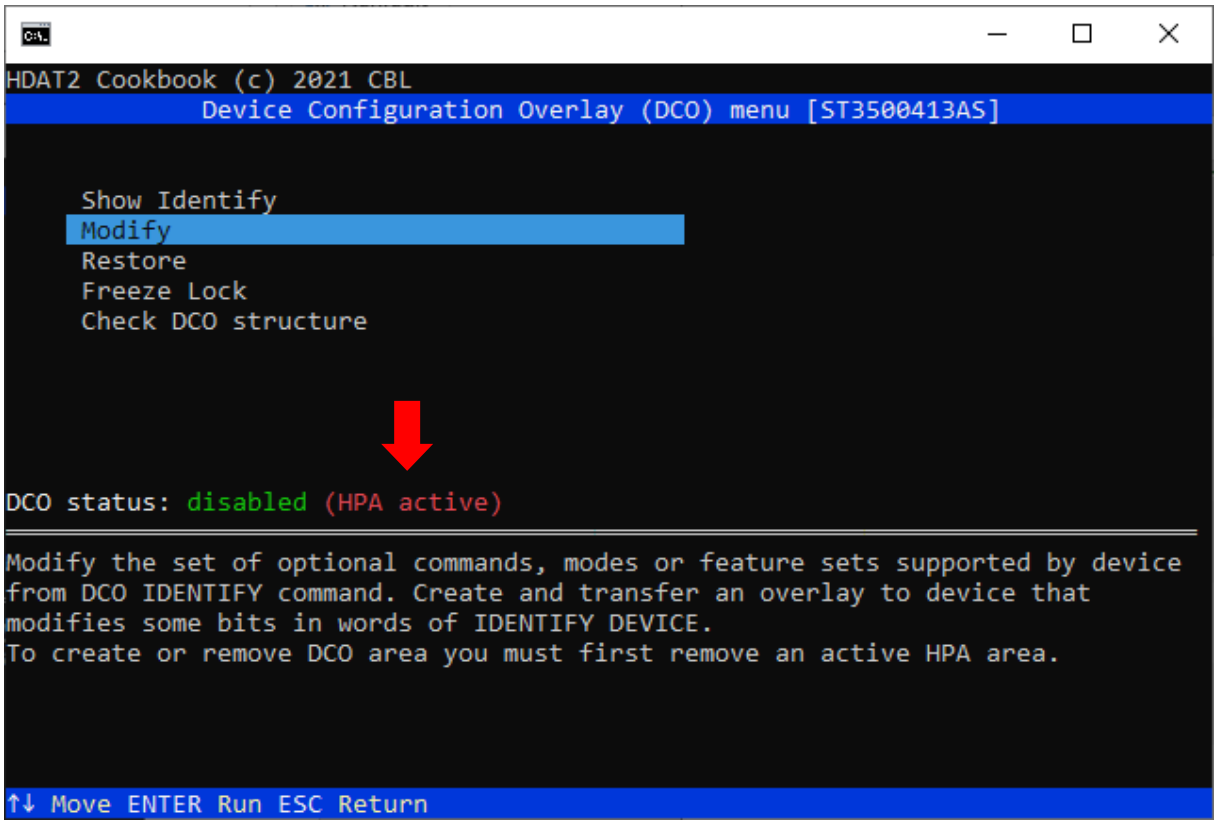


If the device is in security lock mode the device shall return command aborted for all DCO commands.

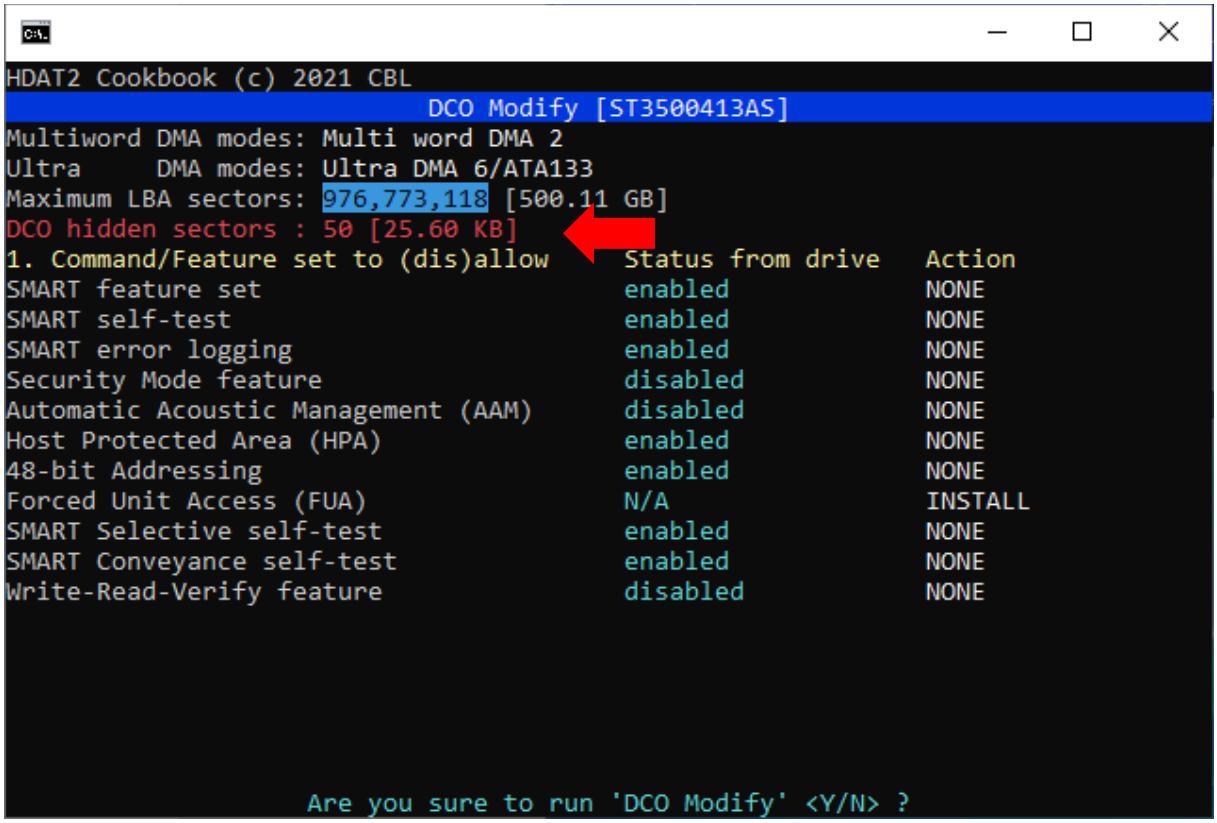


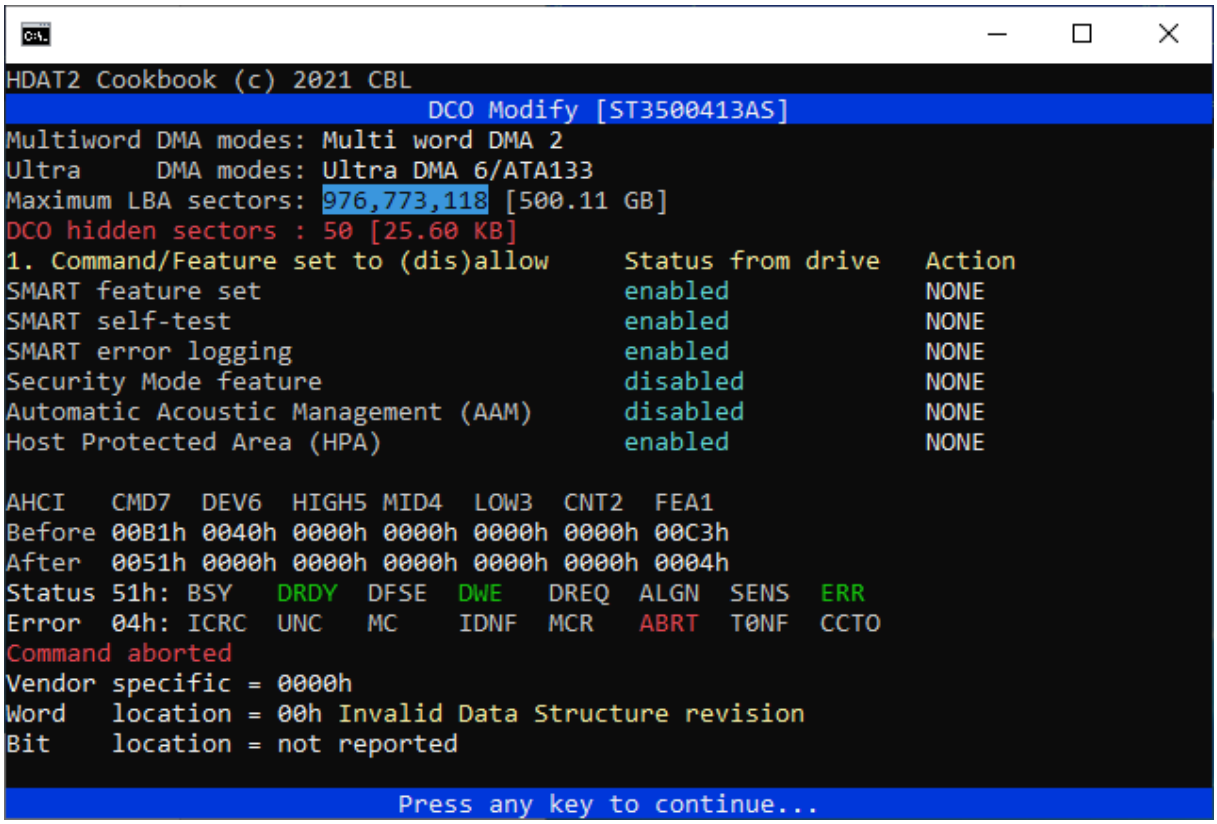
Example: We will try to create DCO area with a size of 50 sectors (25 KB) when device has a HPA area already.





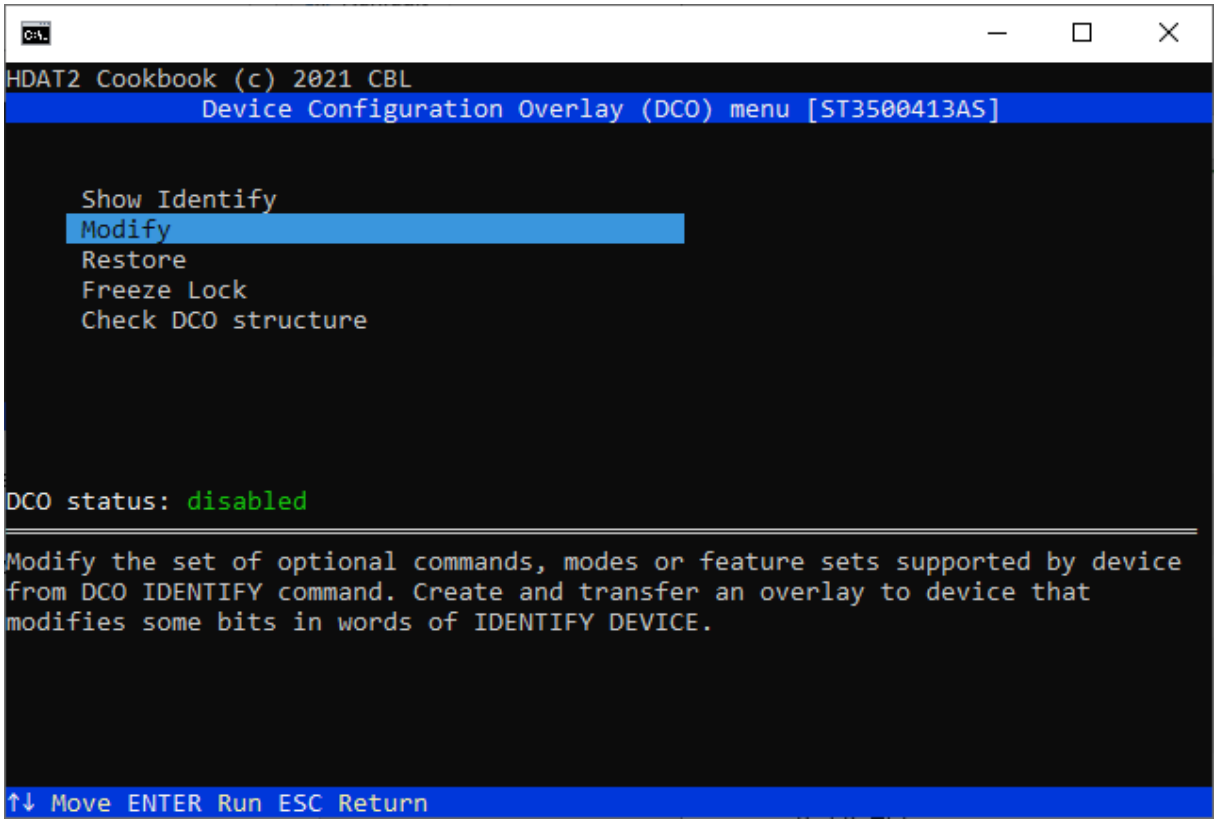
To create or remove DCO area you must first remove an active HPA area. See an error message later.

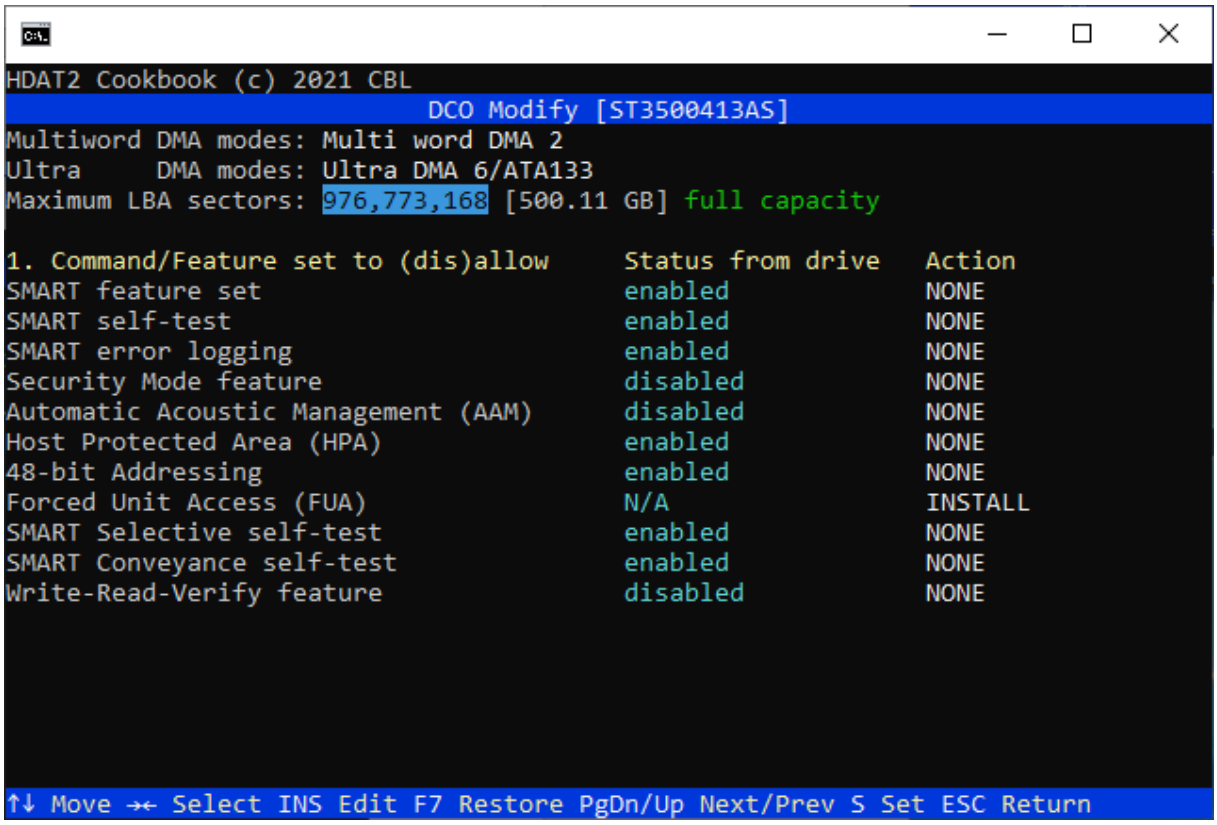


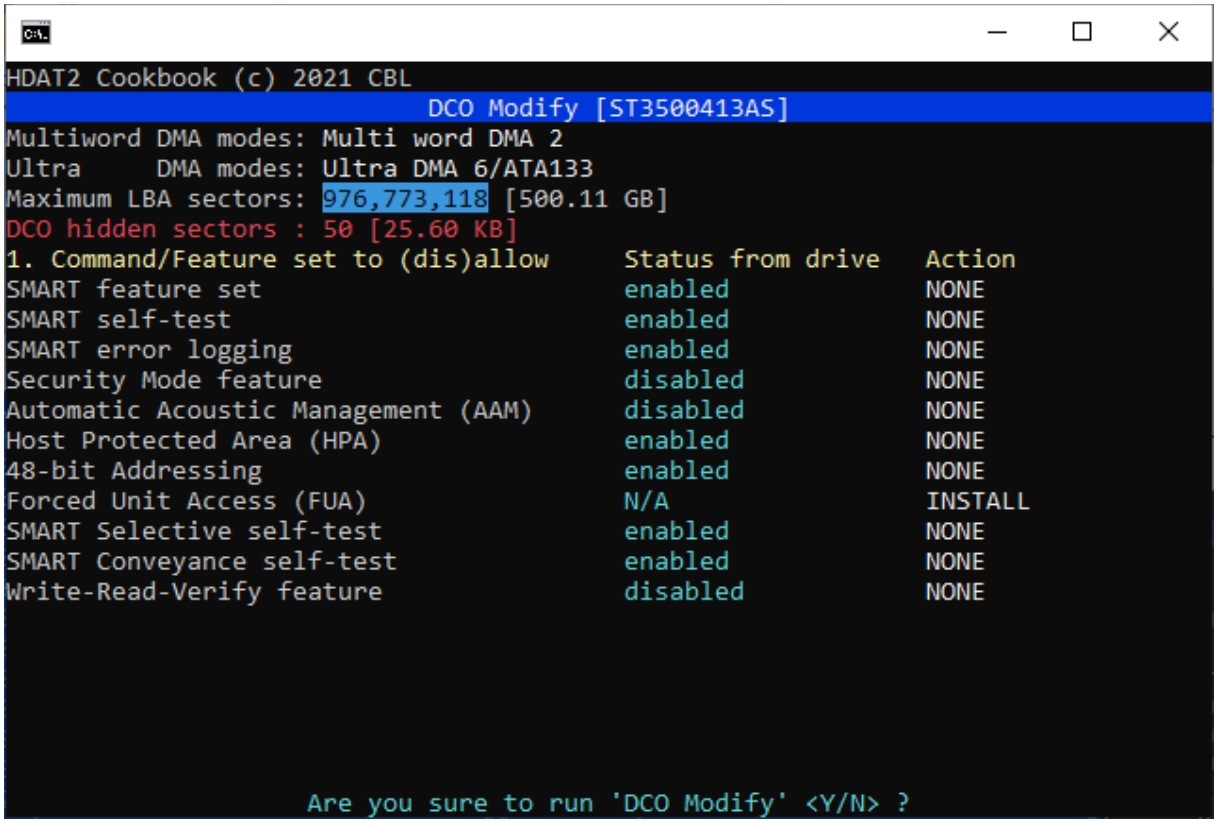


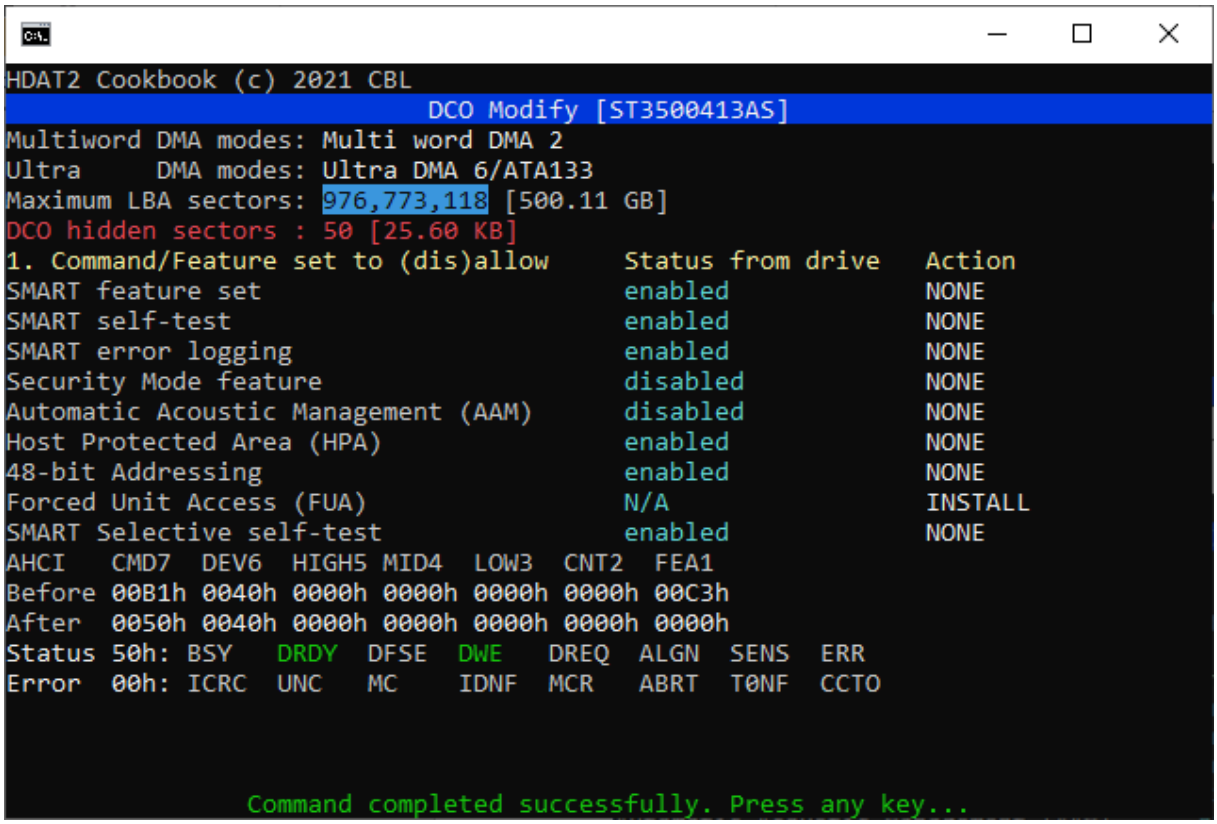
We got an error message, because we tried to create DCO area with a previously created HPA area. We must first remove an active HPA area before creating DCO area.

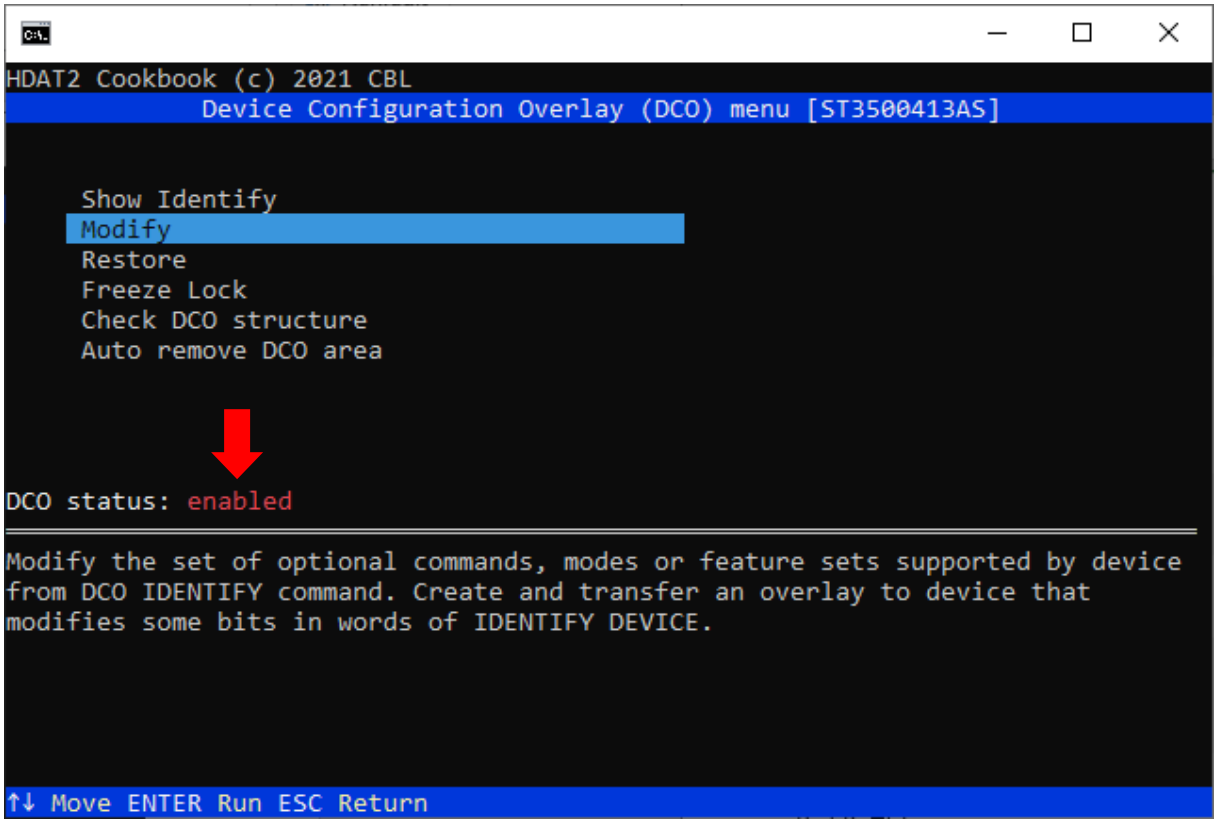
Example: Now we create DCO area with a size 50 sectors (25 KB) without HPA area.


HDAT2 Cookbook (c) 2021 CBL
Device Configuration Overlay (DCO) menu [ST3500413AS]
Show Identify
Modify
Restore
Freeze Lock
Check DCO structure
DCO status: disabled
Modify the set of optional commands, modes or feature sets supported by device from DCO IDENTIFY command. Create and transfer an overlay to device that modifies some bits in words of IDENTIFY DEVICE.
↑↓ Move ENTER Run ESC Return


HDAT2 Cookbook (c) 2021 CBL
DCO Modify [ST3500413AS]
Multiword DMA modes: Multi word DMA 2
Ultra DMA modes: Ultra DMA 6/ATA133
Maximum LBA sectors: 976,773,168 [500.11 GB] full capacity
1. Command/Feature set to (dis)allow Status from drive Action
SMART feature set enabled NONE
SMART self-test enabled NONE
SMART error logging enabled NONE
Security Mode feature disabled NONE
Automatic Acoustic Management (AAM) disabled NONE
Host Protected Area (HPA) enabled NONE
48-bit Addressing enabled NONE
Forced Unit Access (FUA) N/A INSTALL
SMART Selective self-test enabled NONE
SMART Conveyance self-test enabled NONE
Write-Read-Verify feature disabled NONE
↑↓ Move ↠ Select INS Edit F7 Restore PgDn/Up Next/Prev S Set ESC Return

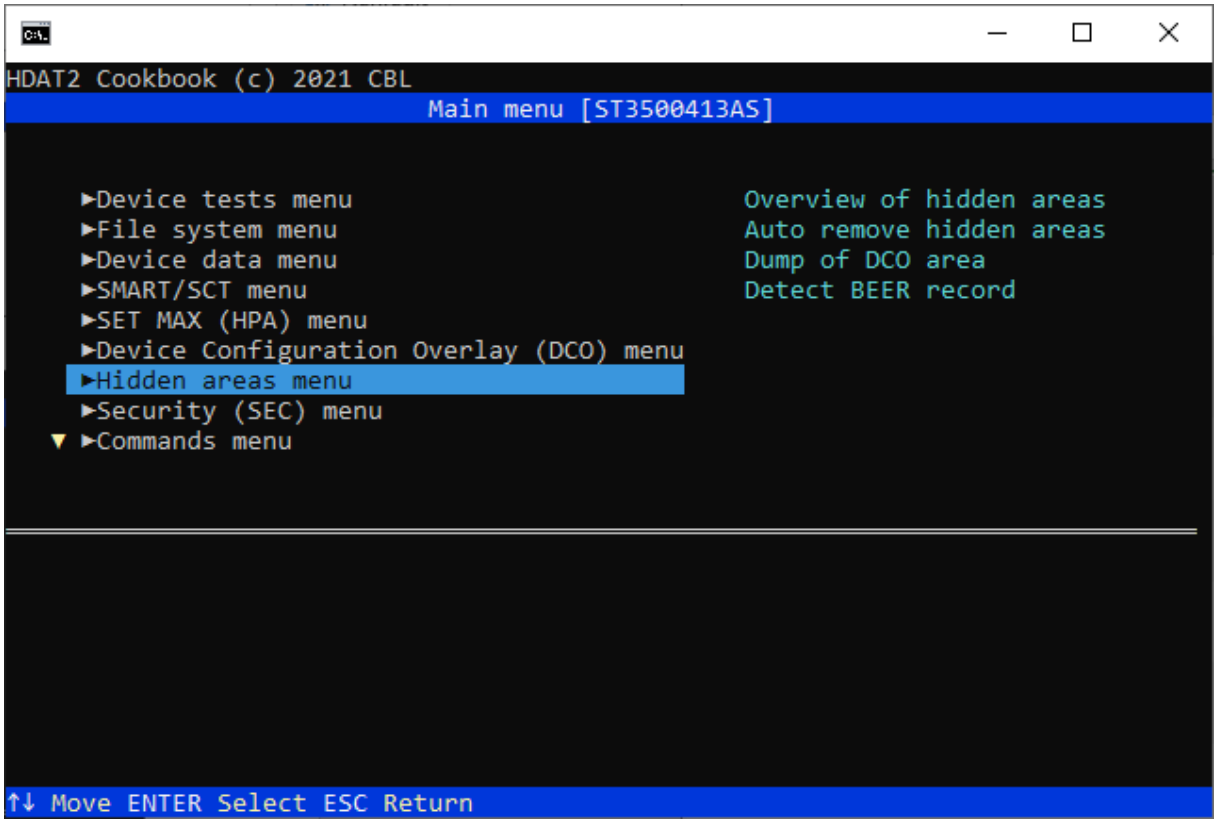

HDAT2 Cookbook (c) 2021 CBL
DCO Modify [ST3500413AS]
Multiword DMA modes: Multi word DMA 2
Ultra DMA modes: Ultra DMA 6/ATA133
Maximum LBA sectors: 976,773,118 [500.11 GB]
DCO hidden sectors : 50 [25.60 KB]
1. Command/Feature set to (dis)allow Status from drive Action
SMART feature set enabled NONE
SMART self-test enabled NONE
SMART error logging enabled NONE
Security Mode feature disabled NONE
Automatic Acoustic Management (AAM) disabled NONE
Host Protected Area (HPA) enabled NONE
48-bit Addressing enabled NONE
Forced Unit Access (FUA) N/A INSTALL
SMART Selective self-test enabled NONE
SMART Conveyance self-test enabled NONE
Write-Read-Verify feature disabled NONE
Are you sure to run 'DCO Modify' <Y/N> ?

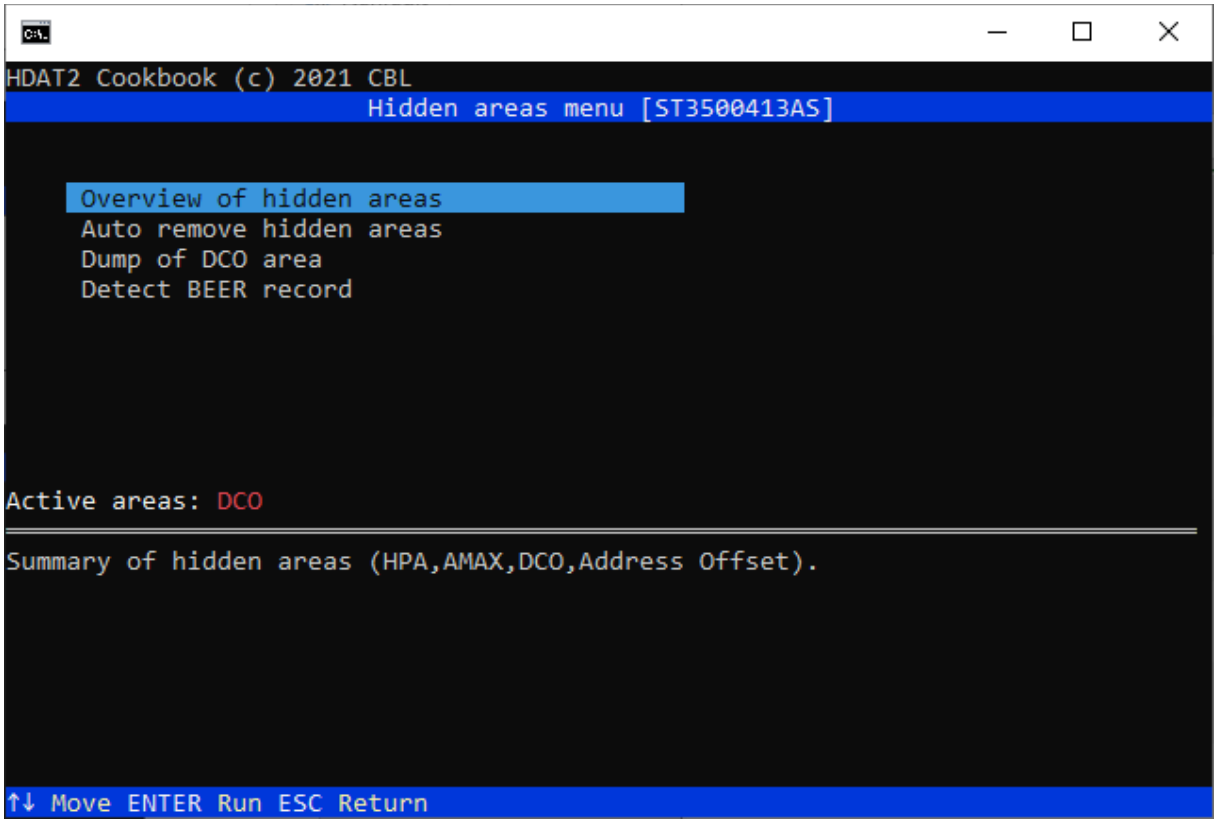

HDAT2 Cookbook (c) 2021 CBL
DCO Modify [ST3500413AS]
Multiword DMA modes: Multi word DMA 2
Ultra DMA modes: Ultra DMA 6/ATA133
Maximum LBA sectors: 976,773,118 [500.11 GB]
DCO hidden sectors : 50 [25.60 KB]
1. Command/Feature set to (dis)allow Status from drive Action
SMART feature set enabled NONE
SMART self-test enabled NONE
SMART error logging enabled NONE
Security Mode feature disabled NONE
Automatic Acoustic Management (AAM) disabled NONE
Host Protected Area (HPA) enabled NONE
48-bit Addressing enabled NONE
Forced Unit Access (FUA) N/A INSTALL
SMART Selective self-test enabled NONE
AHCI CMD7 DEV6 HIGH5 MID4 LOW3 CNT2 FEA1
Before 00B1h 0040h 0000h 0000h 0000h 0000h 00C3h
After 0050h 0040h 0000h 0000h 0000h 0000h 0000h
Status 50h: BSY DRDY DFSE DWE DREQ ALGN SENS ERR
Error 00h: ICRC UNC MC IDNF MCR ABRT T0NF CCTO
Command completed successfully. Press any key...

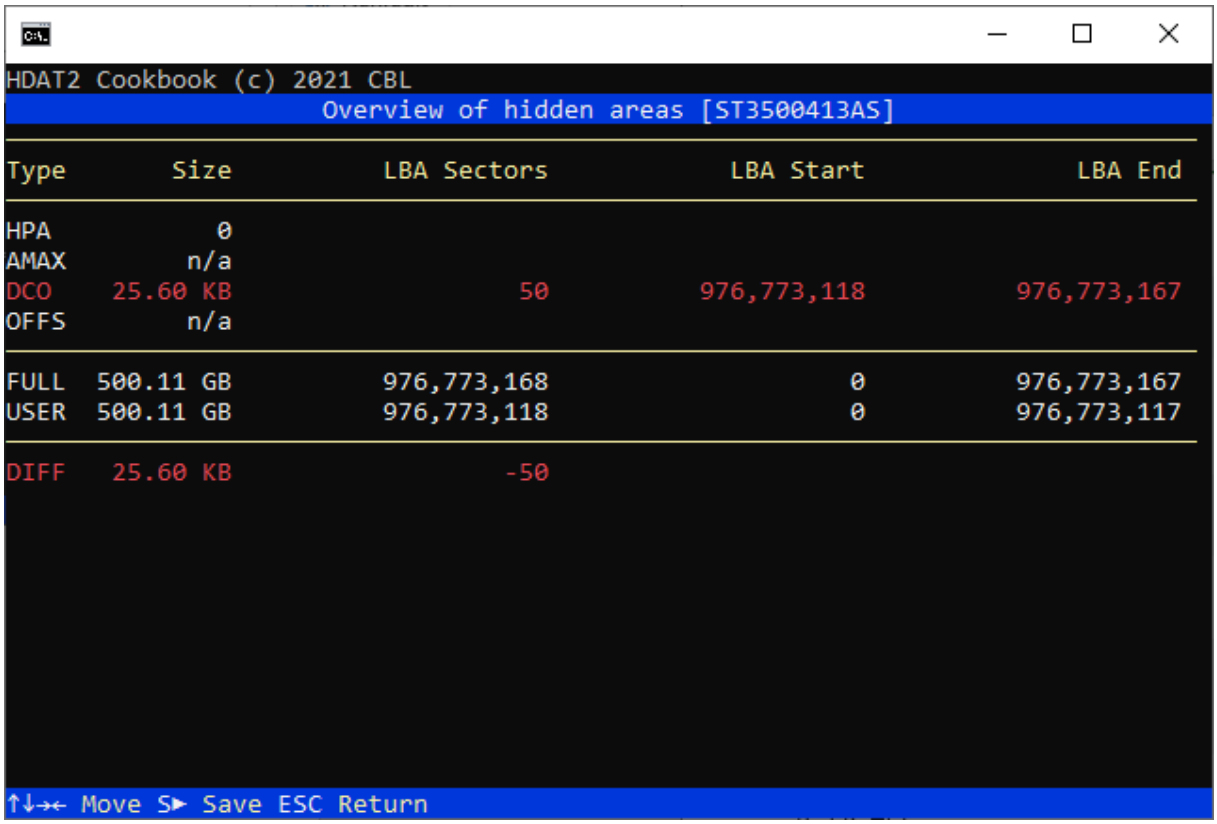


DCO area is enabled now.

You can check the settings of hidden areas in the '**Hidden areas menu**'.





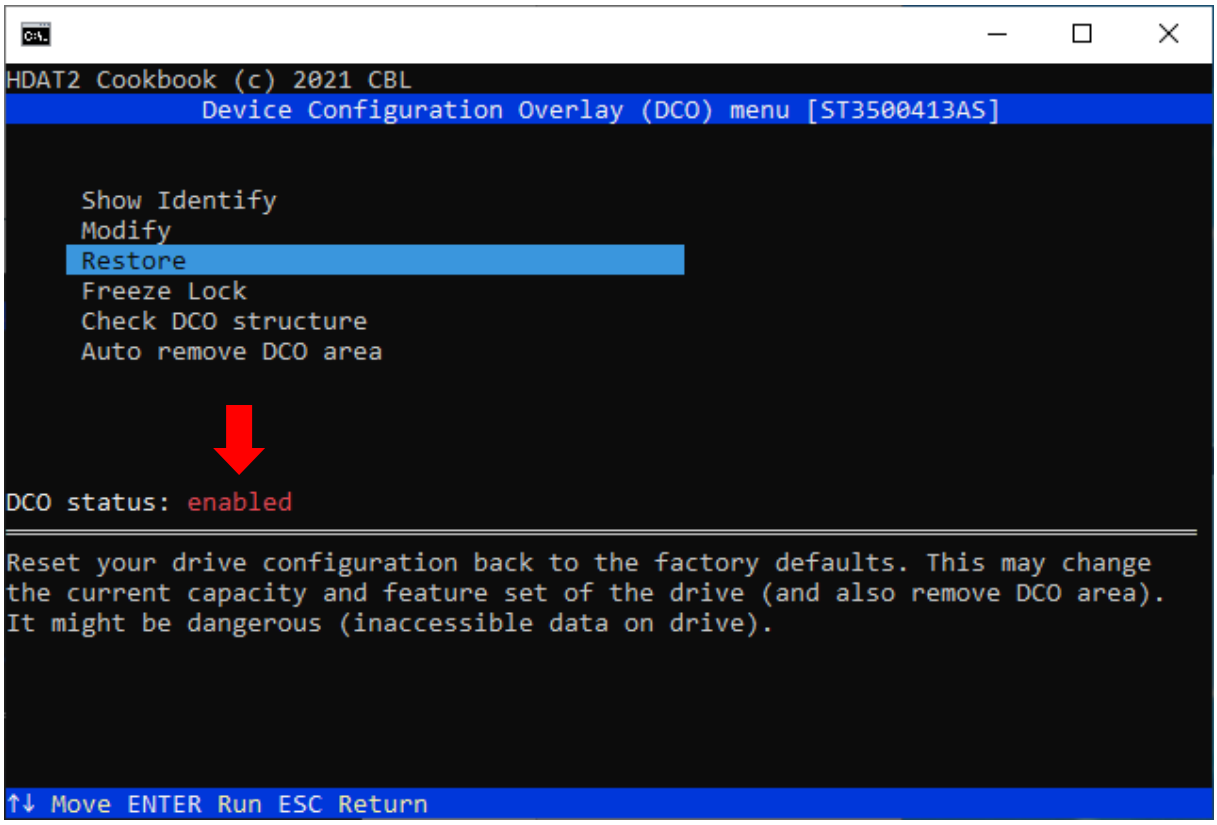


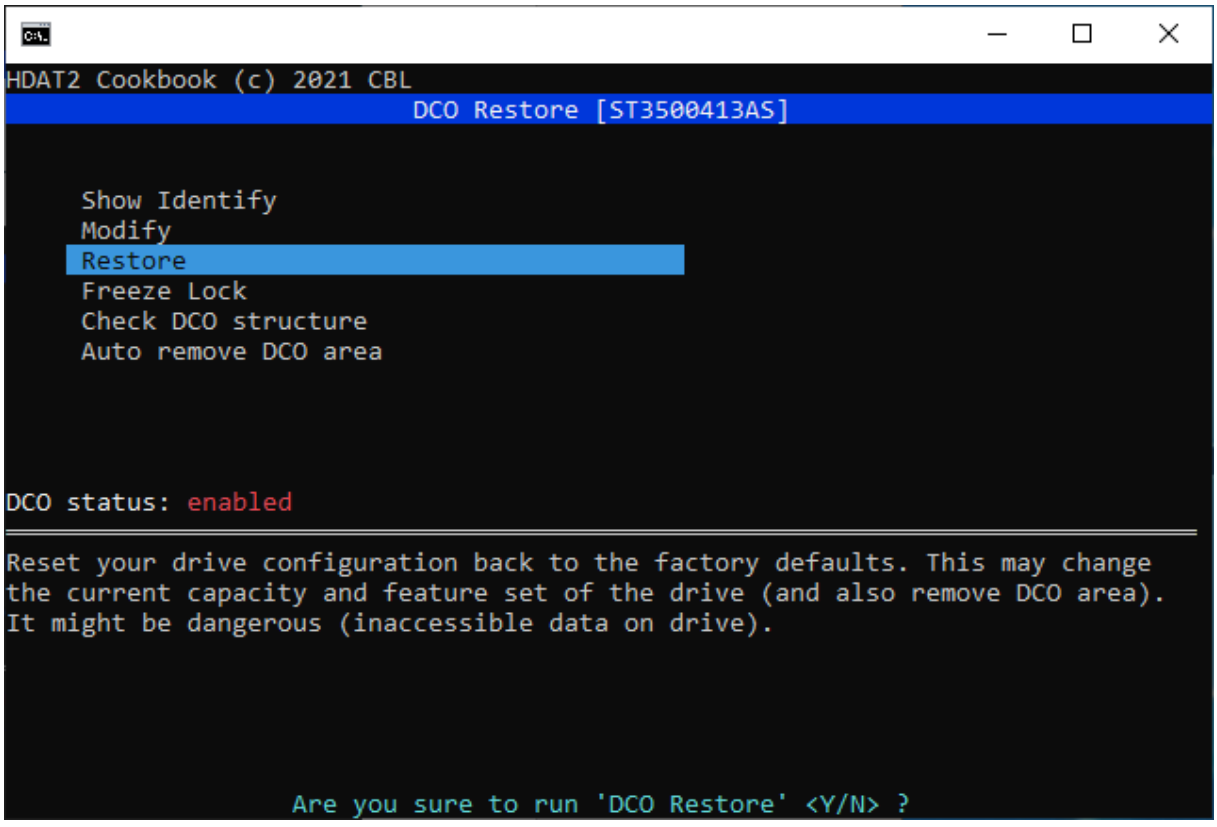
Remove hidden DCO area

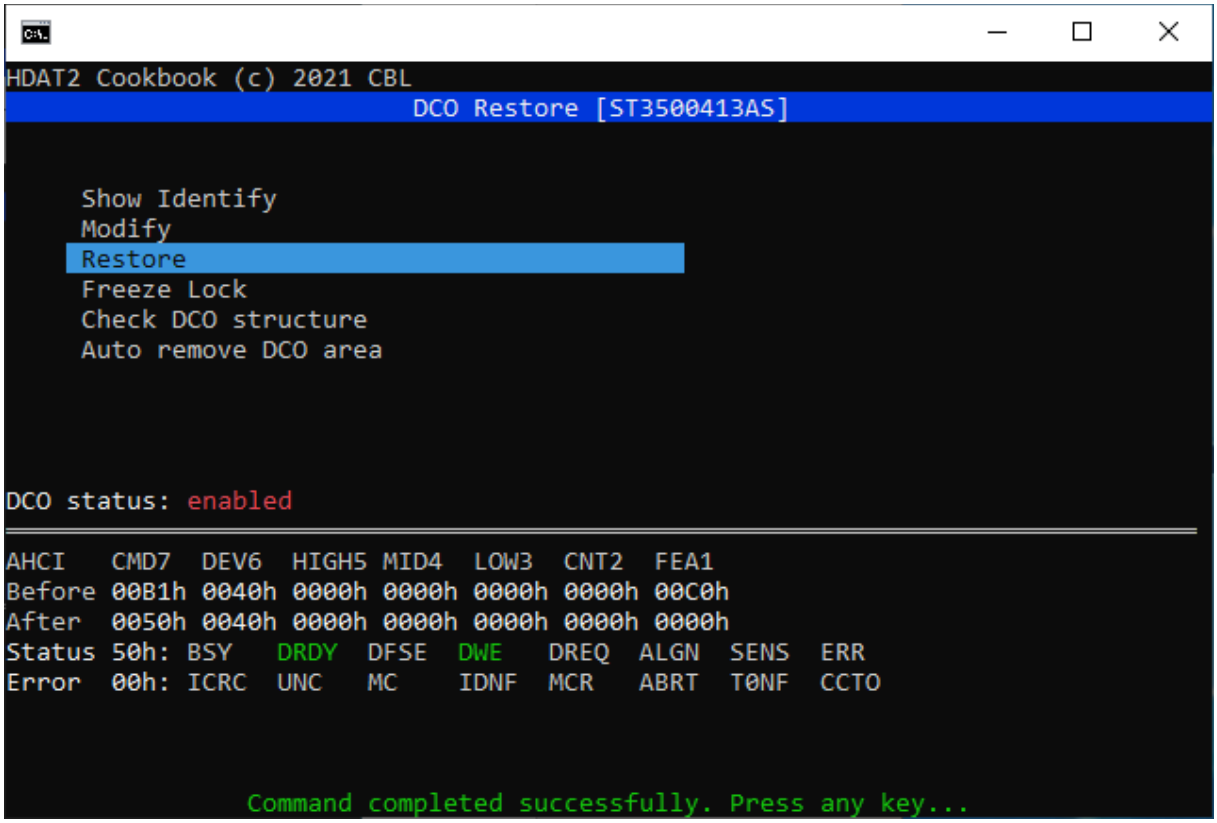
To remove DCO area you can use command DCO RESTORE or menu option Auto Remove Hidden Areas.

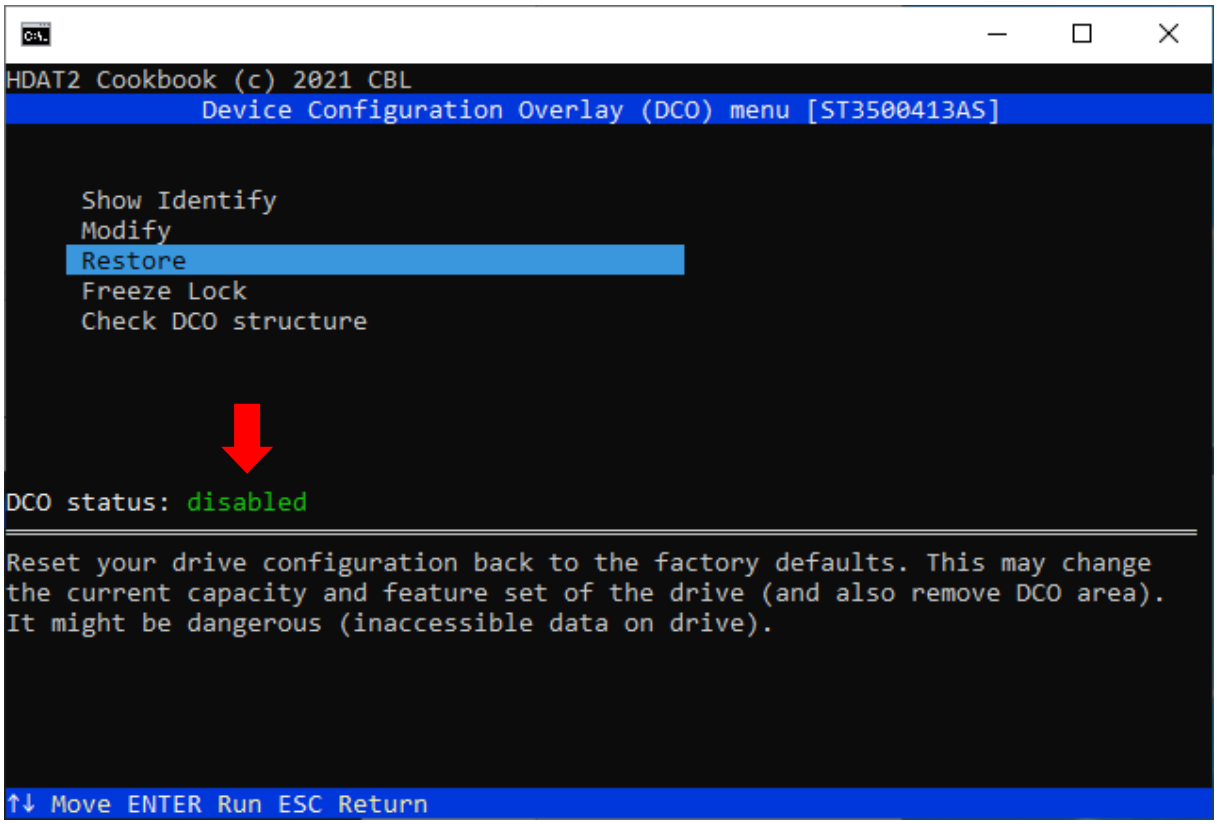
Remove hidden DCO area with DCO RESTORE

Example: We try to remove created DCO area of 50 sectors.



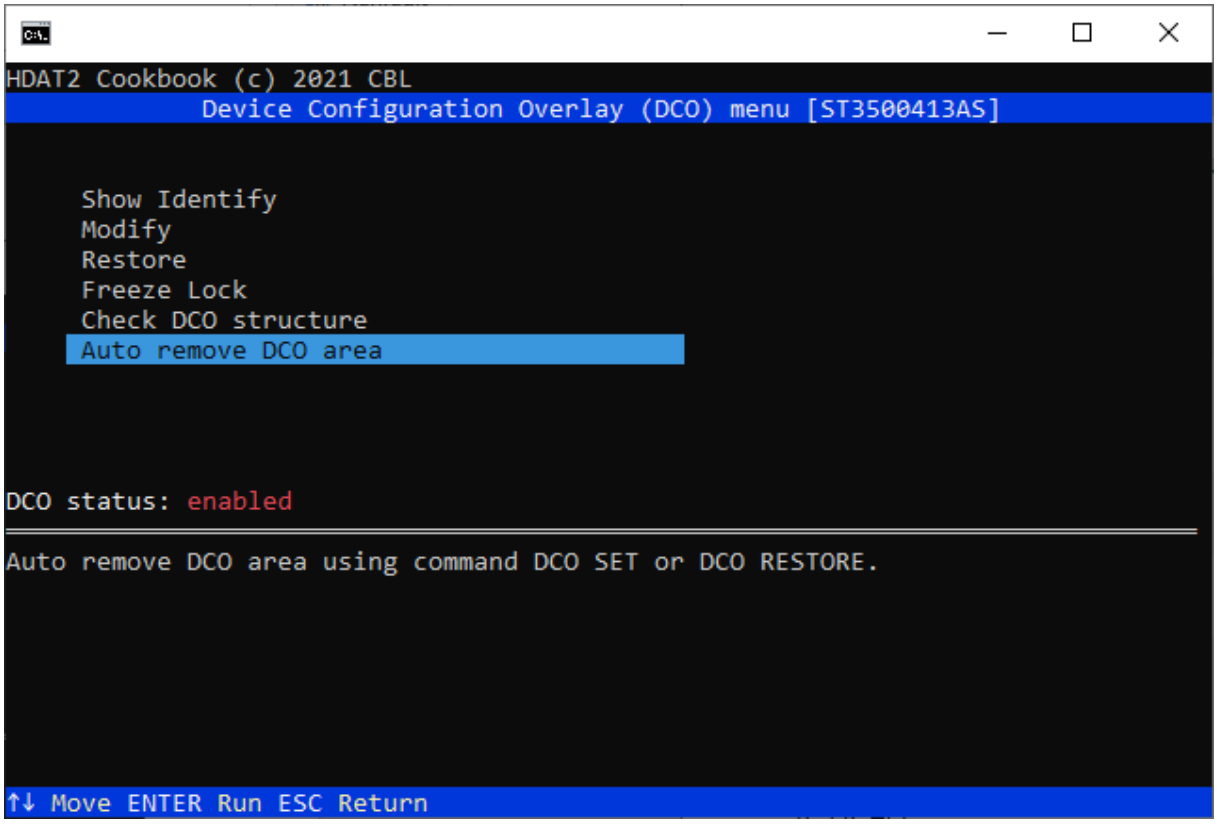


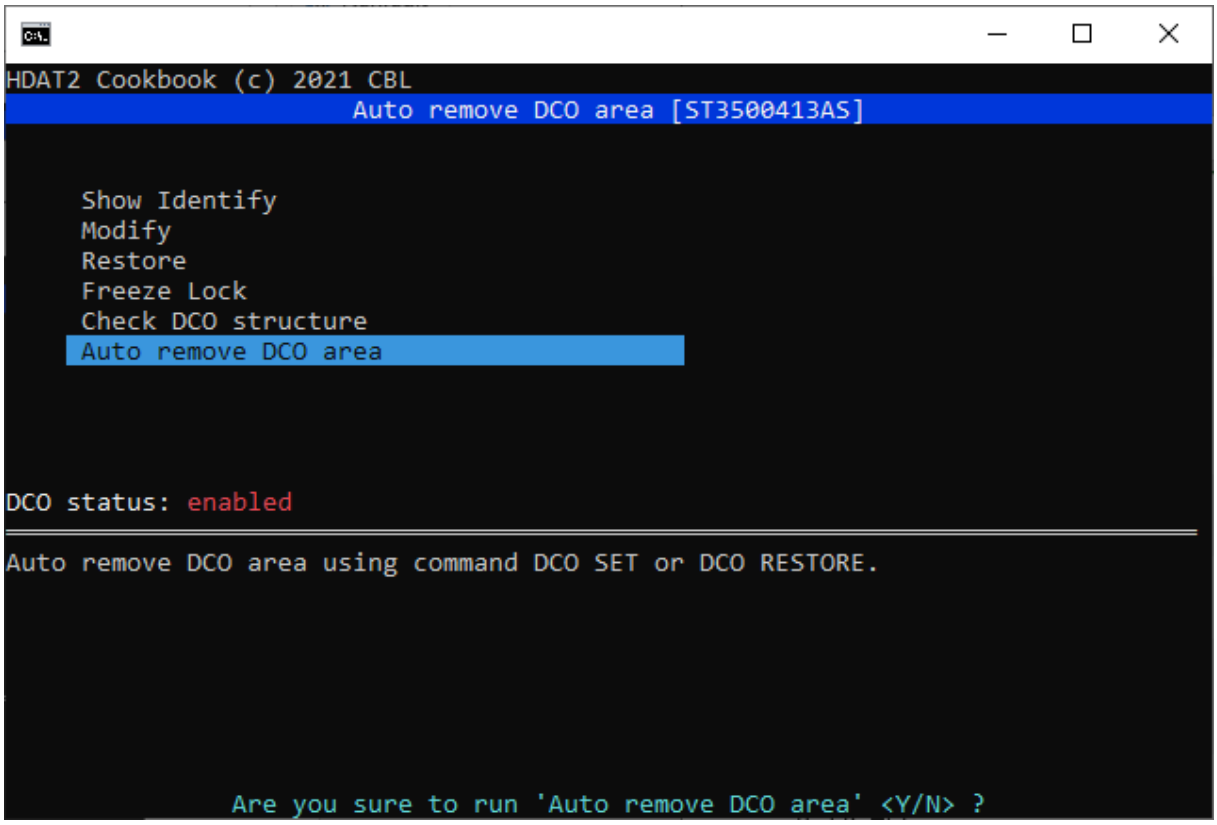


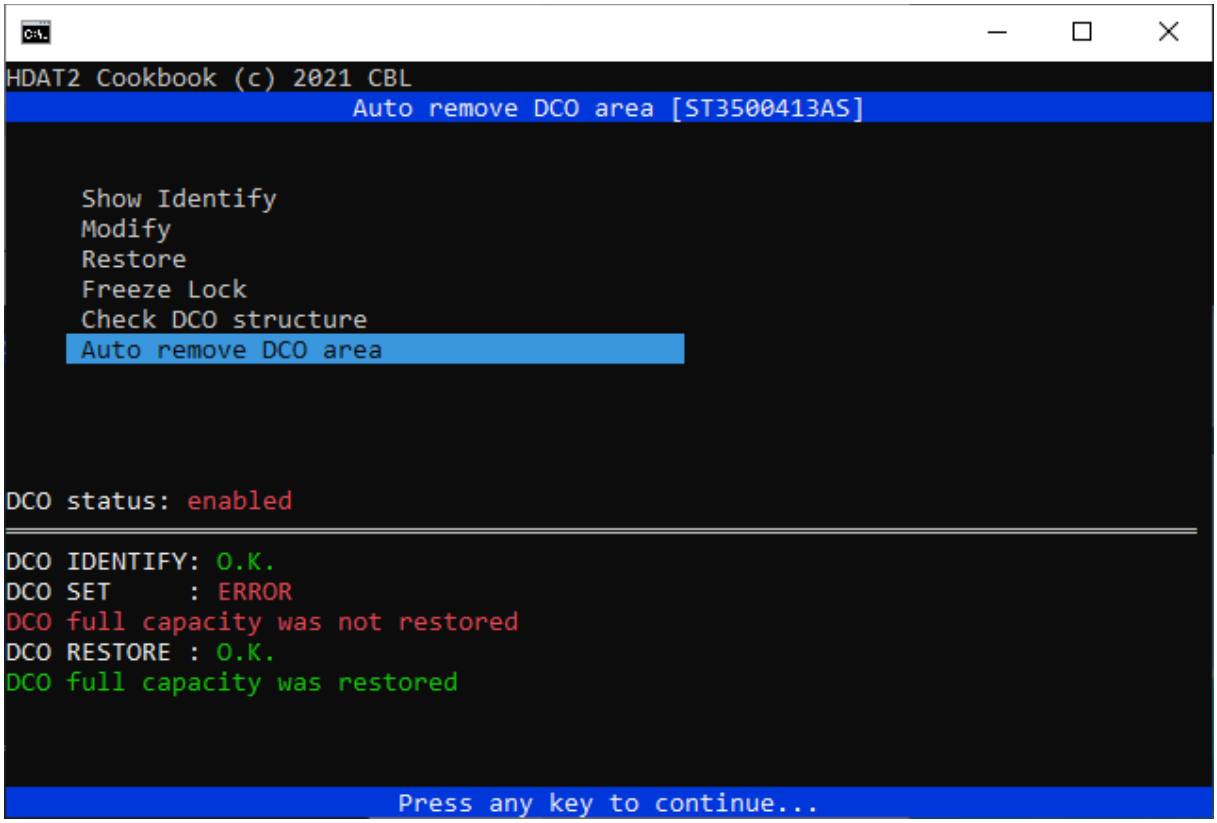


Auto remove DCO area

There are 2 options: 'Auto remove DCO area' in DCO menu or 'Auto remove hidden areas' in Hidden areas menu.


HDAT2 Cookbook (c) 2021 CBL
Device Configuration Overlay (DCO) menu [ST3500413AS]
Show Identify
Modify
Restore
Freeze Lock
Check DCO structure
Auto remove DCO area
DCO status: enabled
Auto remove DCO area using command DCO SET or DCO RESTORE.
↑↓ Move ENTER Run ESC Return

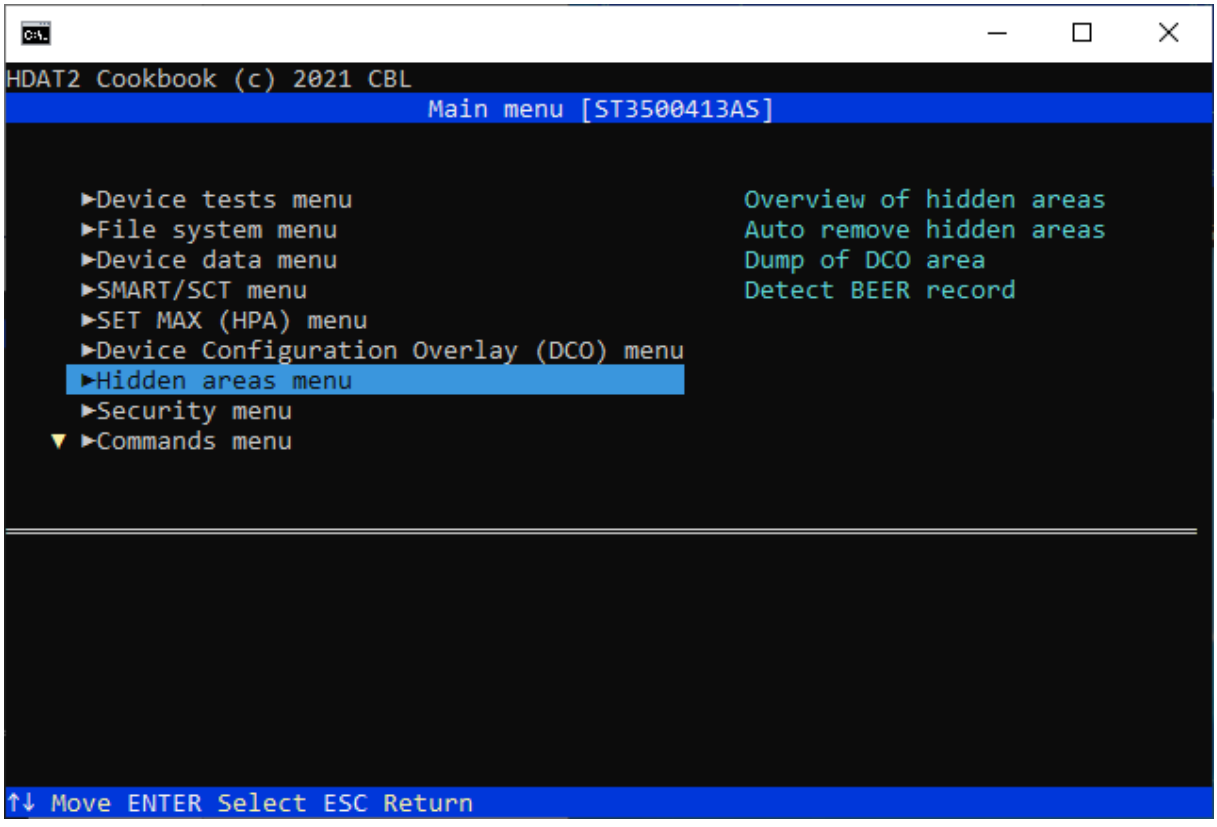

HDAT2 Cookbook (c) 2021 CBL
Auto remove DCO area [ST3500413AS]
Show Identify
Modify
Restore
Freeze Lock
Check DCO structure
Auto remove DCO area
DCO status: enabled
Auto remove DCO area using command DCO SET or DCO RESTORE.
Are you sure to run 'Auto remove DCO area' <Y/N> ?

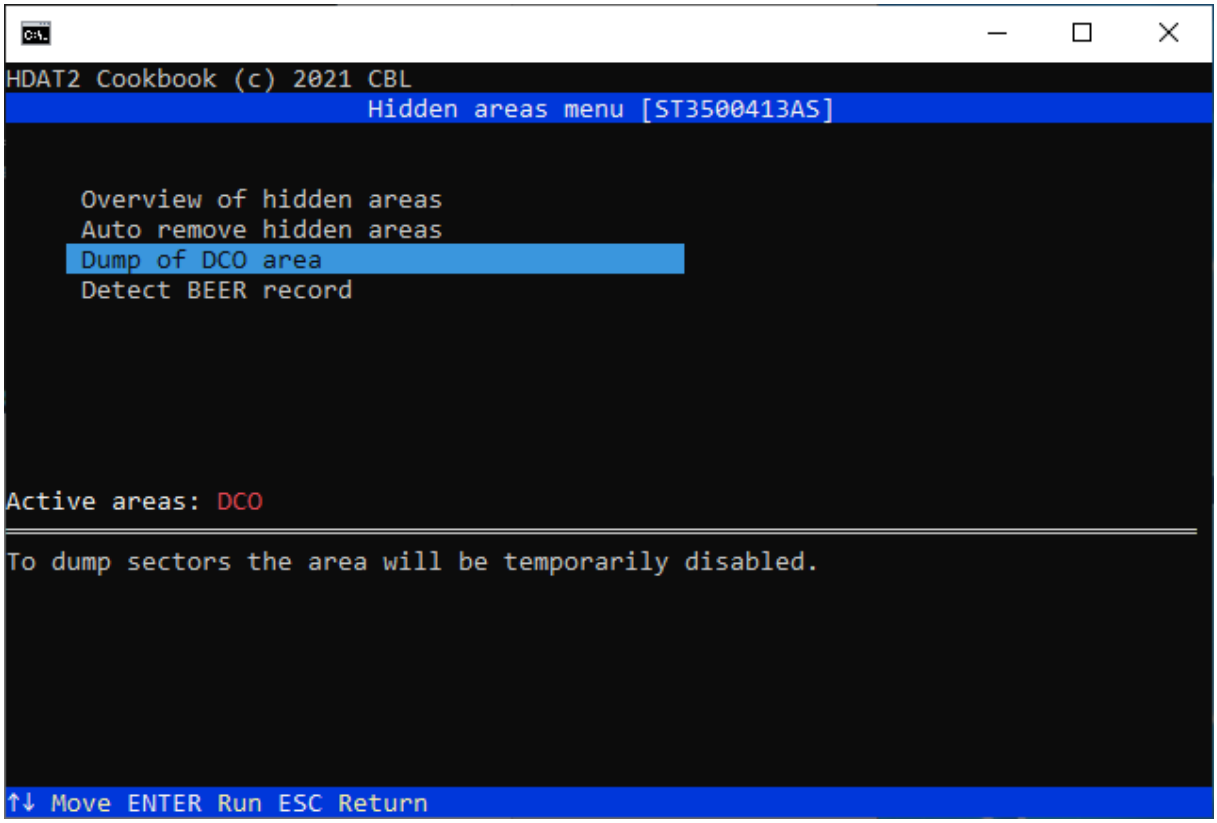


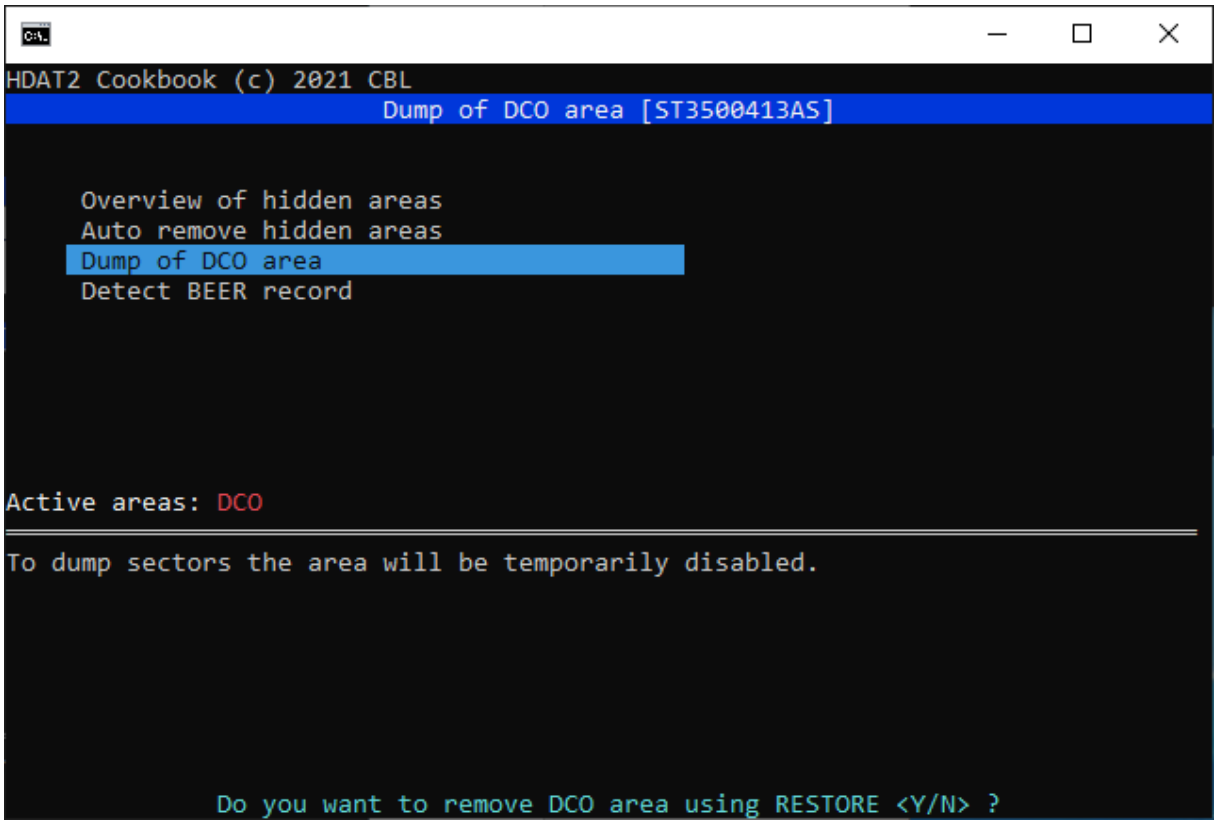
The error message for the command DCO SET means that the original (native) capacity cannot be restored in this way. The DCO RESTORE command must be used.

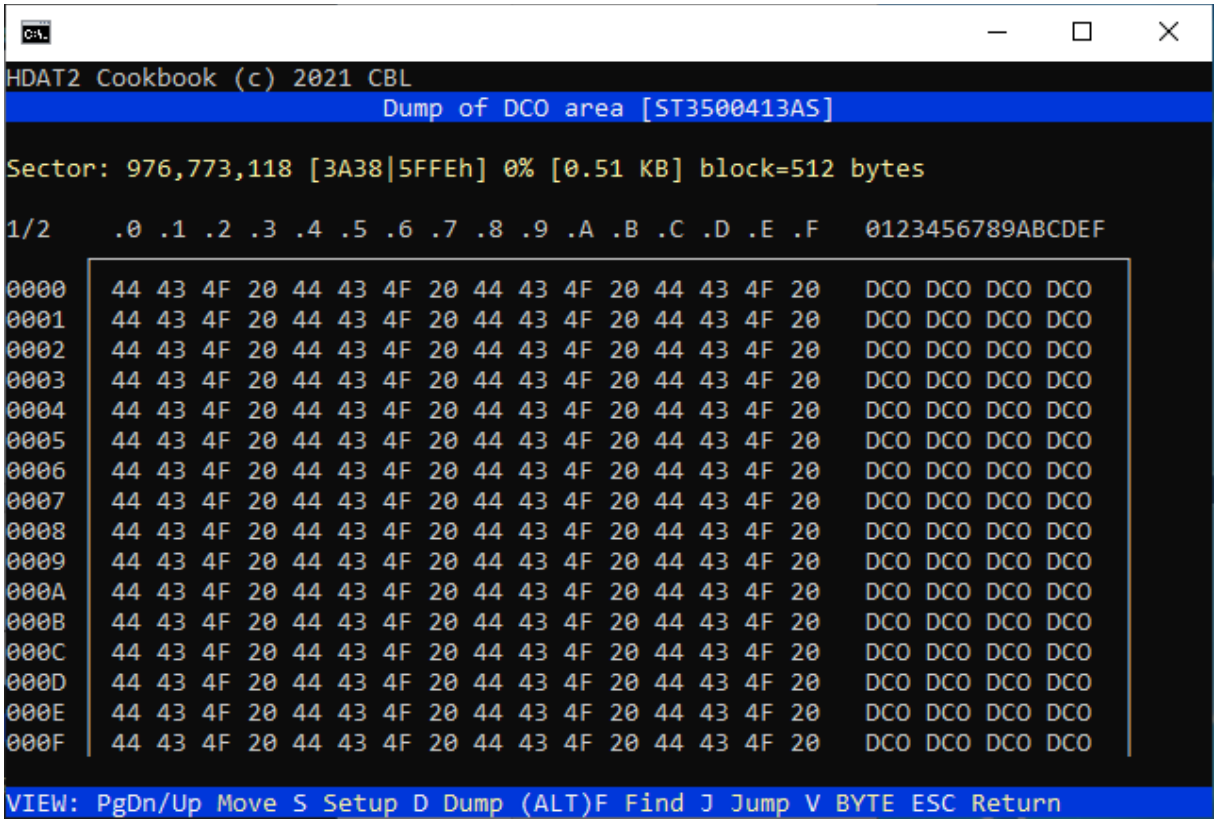
Dump of DCO area

Example: We have created an DCO area of 50 sectors, which starts at LBA sector 976,773,118. This option allows you to view the contents of this DCO area.

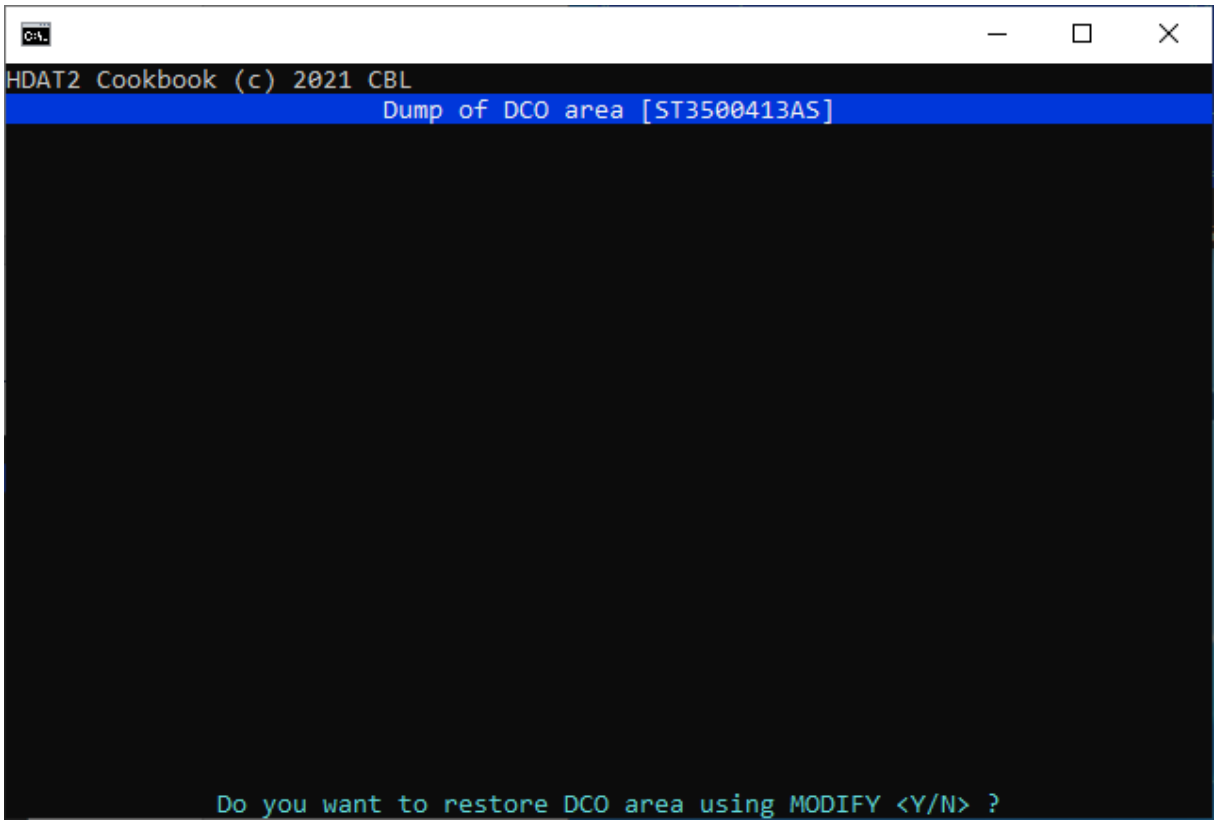


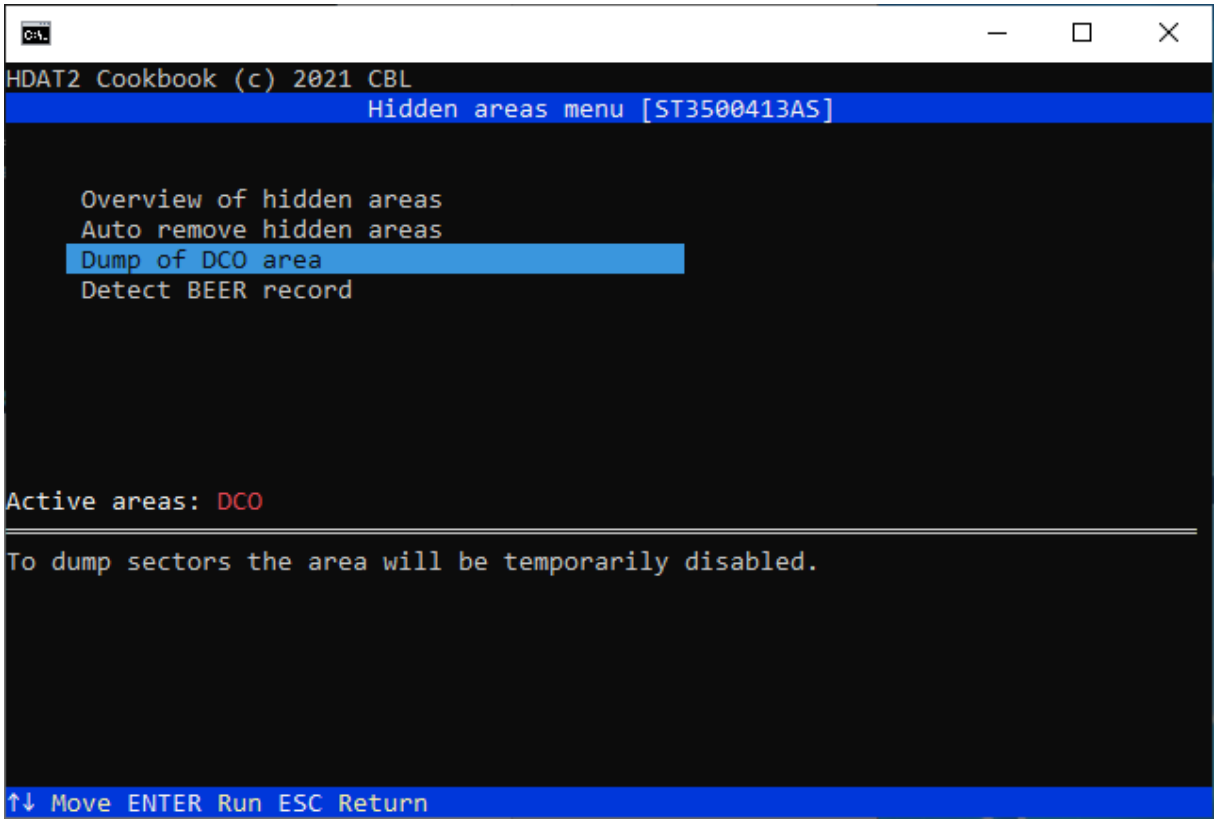

HDAT2 Cookbook (c) 2021 CBL
Hidden areas menu [ST3500413AS]
Overview of hidden areas
Auto remove hidden areas
Dump of DCO area
Detect BEER record
Active areas: DCO
To dump sectors the area will be temporarily disabled.
↑↓ Move ENTER Run ESC Return


HDAT2 Cookbook (c) 2021 CBL
Dump of DCO area [ST3500413AS]
Overview of hidden areas
Auto remove hidden areas
Dump of DCO area
Detect BEER record
Active areas: DCO
To dump sectors the area will be temporarily disabled.
Do you want to remove DCO area using RESTORE <Y/N> ?



I saved the DCO text in the first sector of this area.



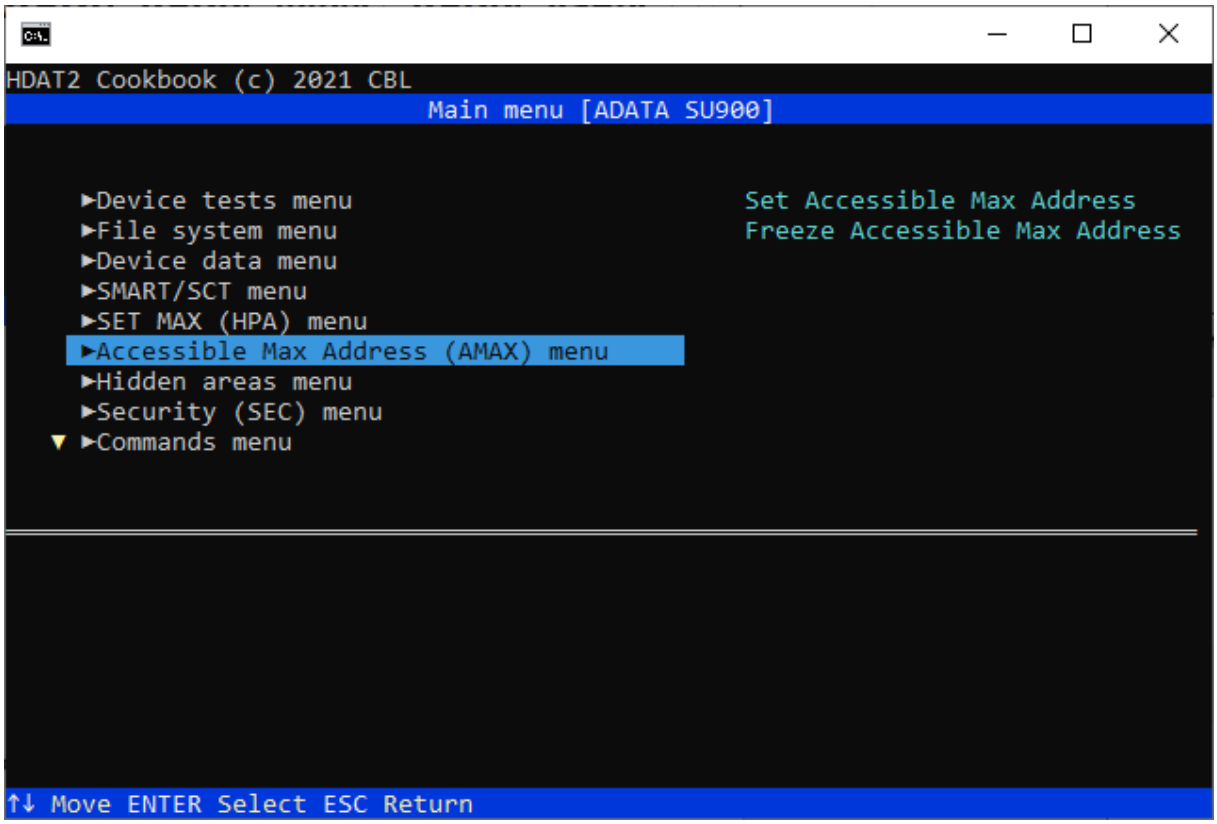


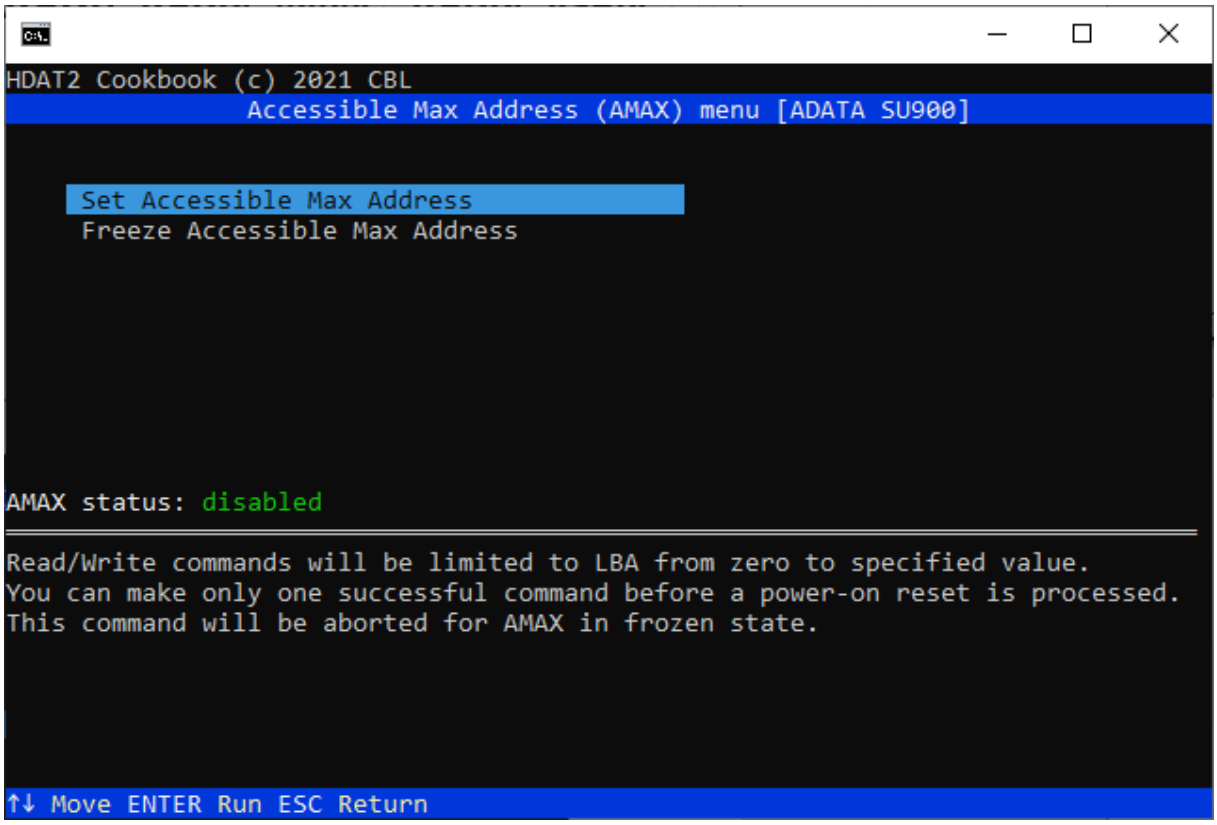
AMAX area

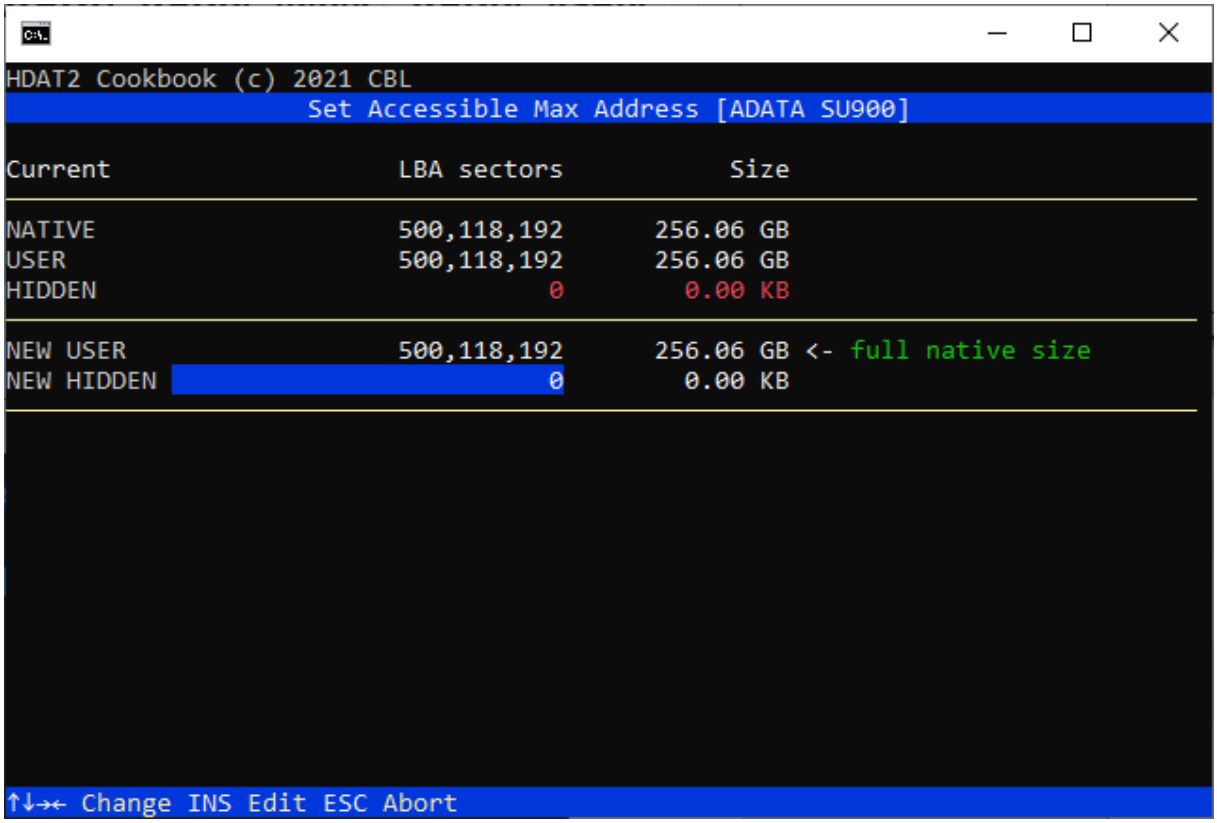
Accessible Max Address (AMAX)

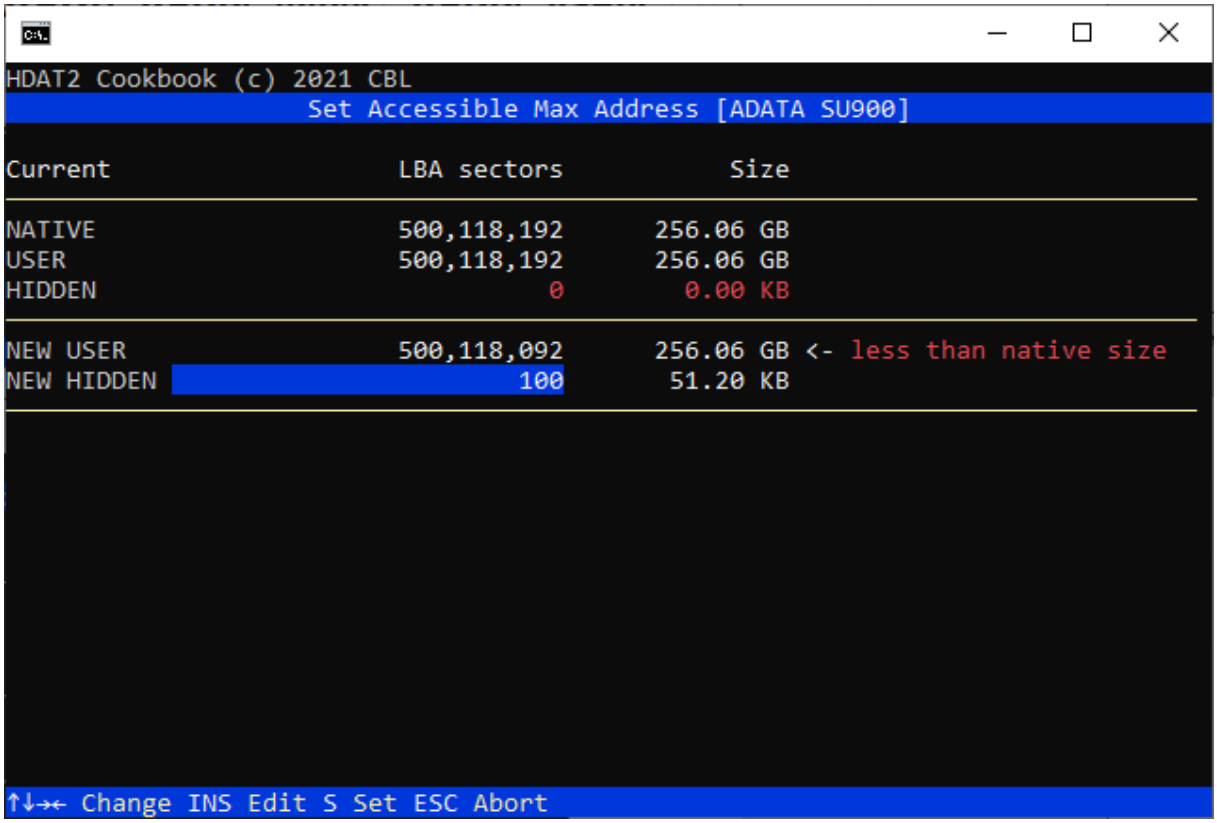
Create AMAX area

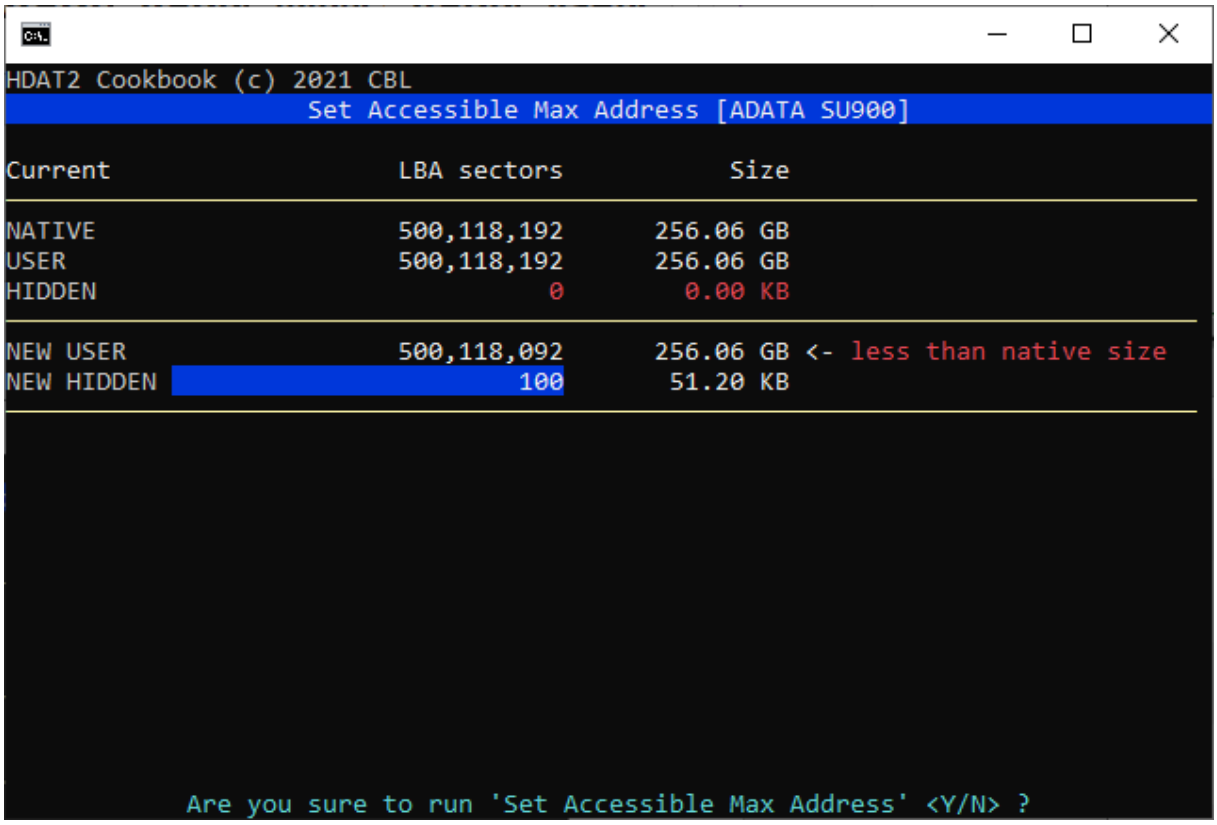
Example: We create AMAX area with a size of 100 sectors (50 KB).

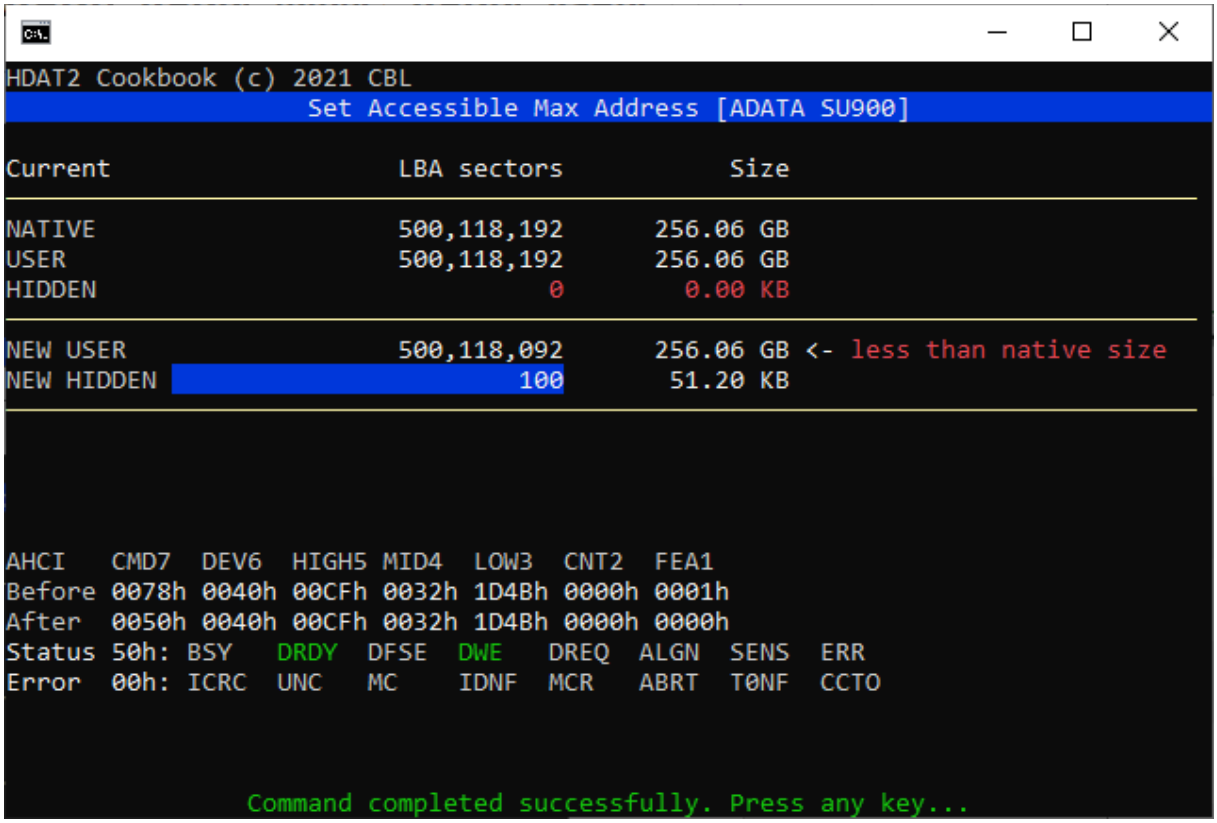


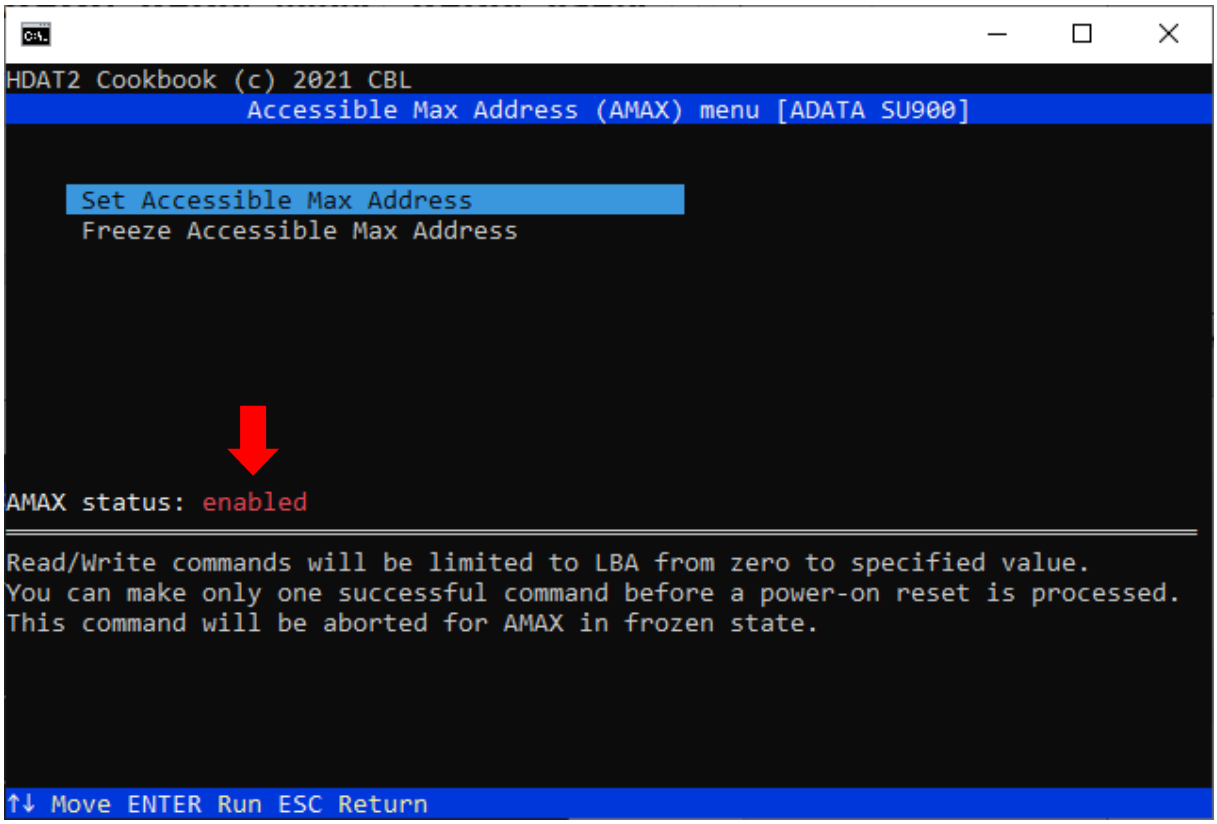

HDAT2 Cookbook (c) 2021 CBL
Accessible Max Address (AMAX) menu [ADATA SU900]
Set Accessible Max Address
Freeze Accessible Max Address
AMAX status: disabled
Read/Write commands will be limited to LBA from zero to specified value.
You can make only one successful command before a power-on reset is processed.
This command will be aborted for AMAX in frozen state.
↑↓ Move ENTER Run ESC Return


HDAT2 Cookbook (c) 2021 CBL
Set Accessible Max Address [ADATA SU900]
Current LBA sectors Size
NATIVE 500,118,192 256.06 GB
USER 500,118,192 256.06 GB
HIDDEN 0 0.00 KB
NEW USER 500,118,192 256.06 GB <- full native size
NEW HIDDEN 0 0.00 KB
↑↓→← Change INS Edit ESC Abort

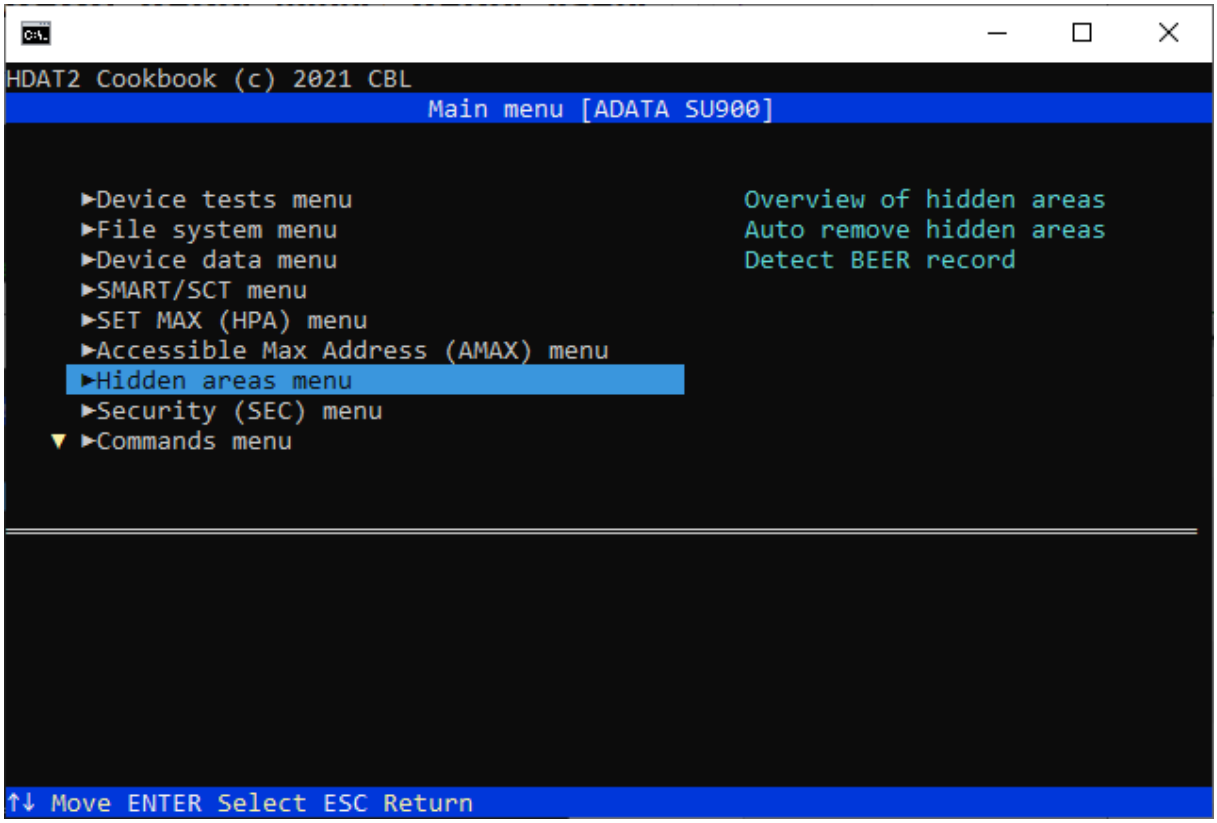

HDAT2 Cookbook (c) 2021 CBL
Set Accessible Max Address [ADATA SU900]
Current LBA sectors Size
NATIVE 500,118,192 256.06 GB
USER 500,118,192 256.06 GB
HIDDEN 0 0.00 KB
NEW USER 500,118,092 256.06 GB <- less than native size
NEW HIDDEN 100 51.20 KB
↑↓→← Change INS Edit S Set ESC Abort

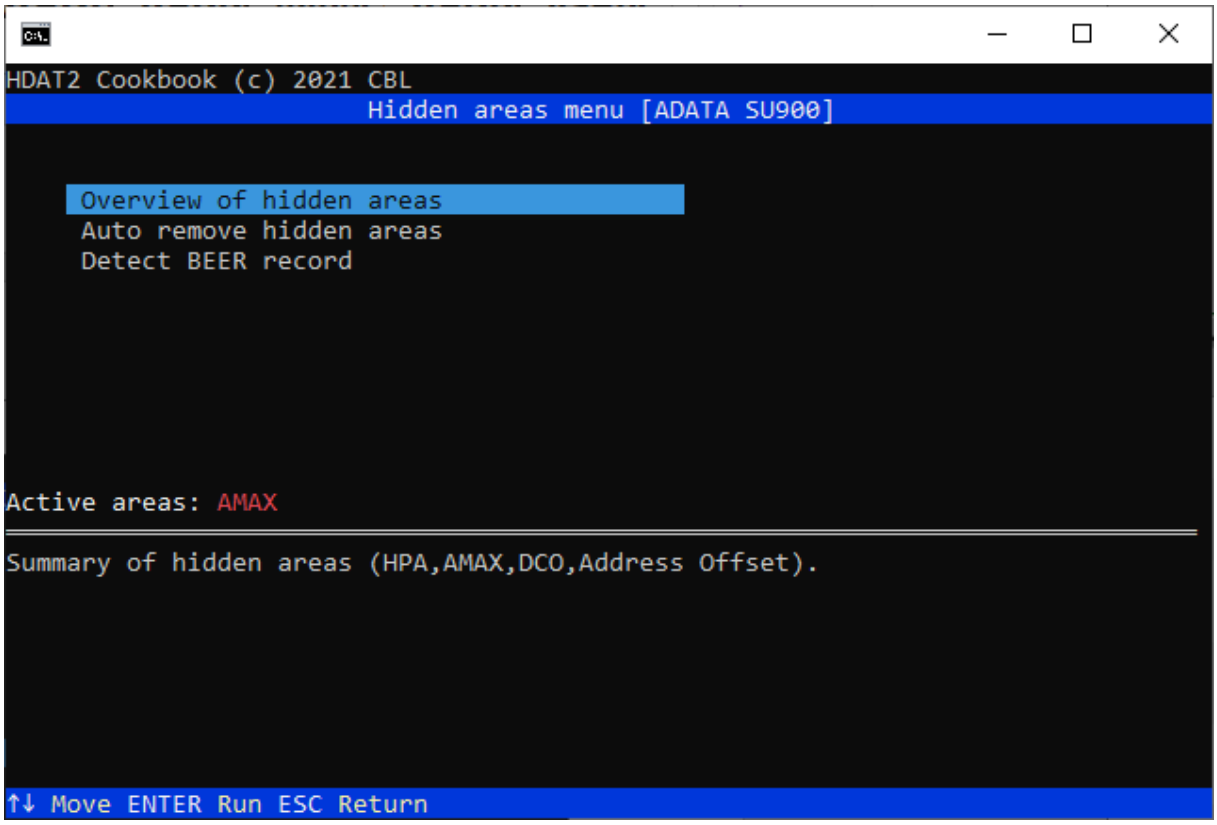

HDAT2 Cookbook (c) 2021 CBL
Set Accessible Max Address [ADATA SU900]
Current LBA sectors Size
NATIVE 500,118,192 256.06 GB
USER 500,118,192 256.06 GB
HIDDEN 0 0.00 KB
NEW USER 500,118,092 256.06 GB <- less than native size
NEW HIDDEN 100 51.20 KB
Are you sure to run 'Set Accessible Max Address' <Y/N> ?

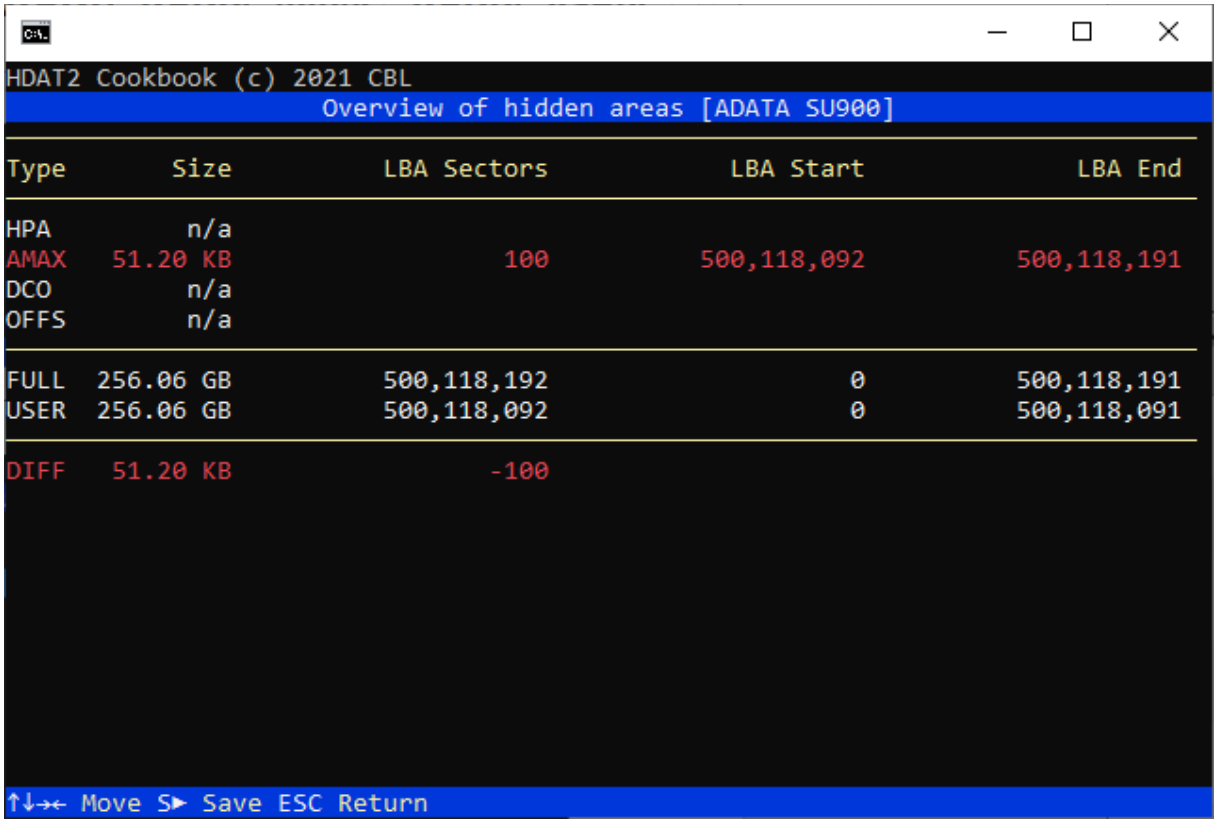




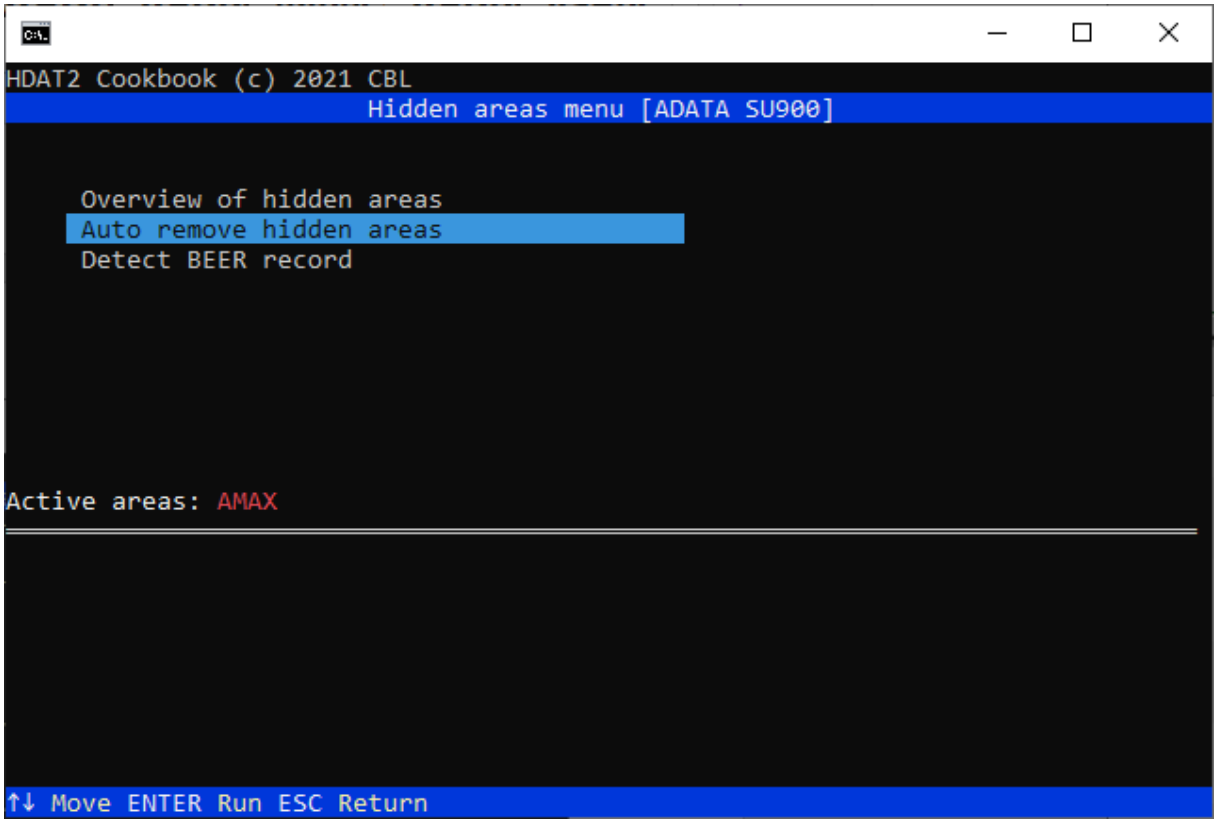
Check AMAX area settings:

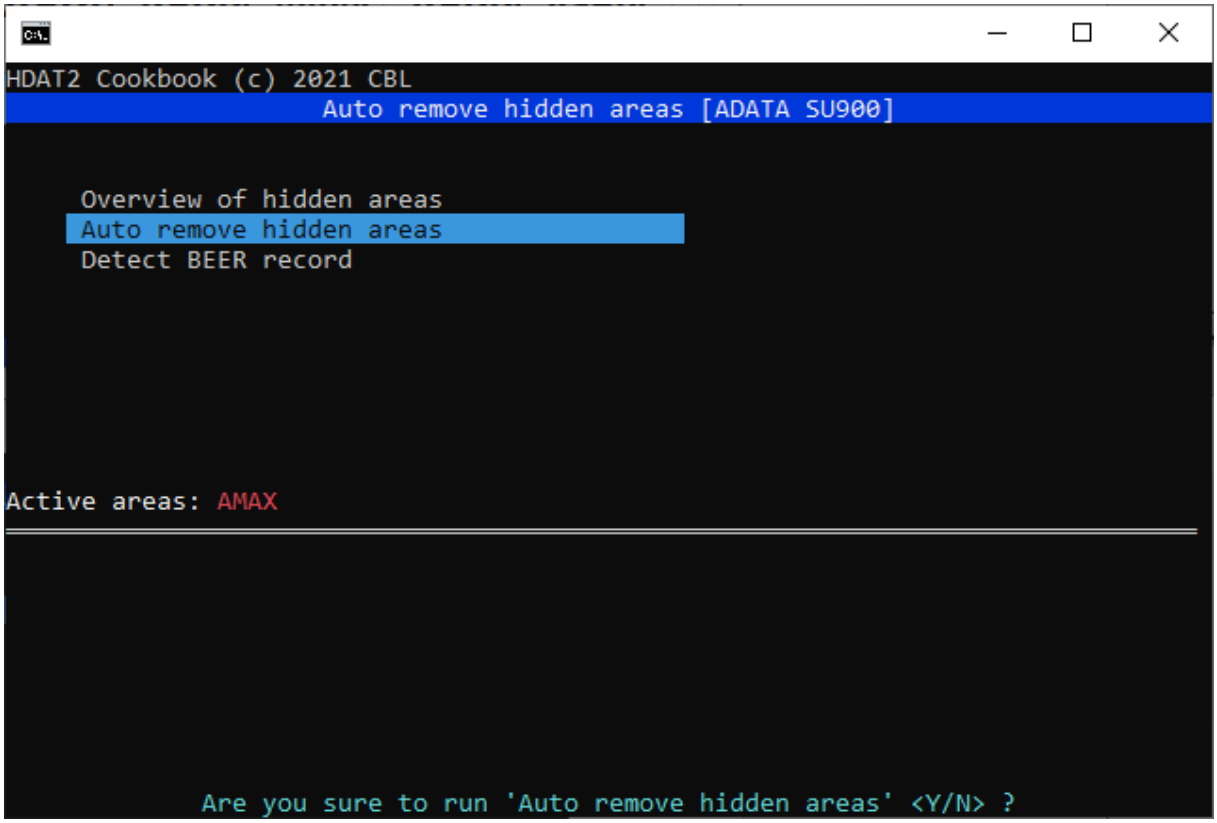

HDAT2 Cookbook (c) 2021 CBL
Main menu [ADATA SU900]
►Device tests menu
►File system menu
►Device data menu
►SMART/SCT menu
►SET MAX (HPA) menu
►Accessible Max Address (AMAX) menu
►Hidden areas menu
►Security (SEC) menu
►Commands menu
Overview of hidden areas
Auto remove hidden areas
Detect BEER record
↑↓ Move ENTER Select ESC Return

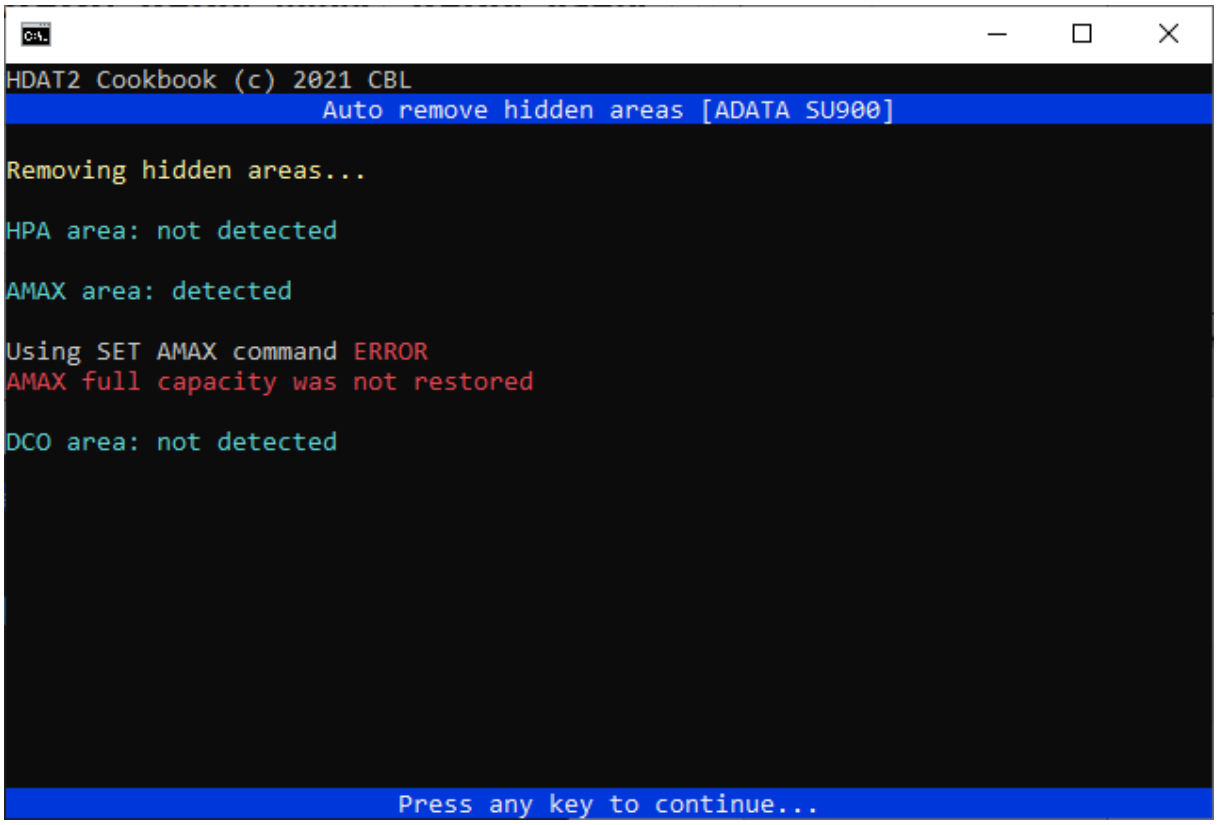

HDAT2 Cookbook (c) 2021 CBL
Hidden areas menu [ADATA SU900]
Overview of hidden areas
Auto remove hidden areas
Detect BEER record
Active areas: AMAX
Summary of hidden areas (HPA,AMAX,DCO,Address Offset).
↑↓ Move ENTER Run ESC Return

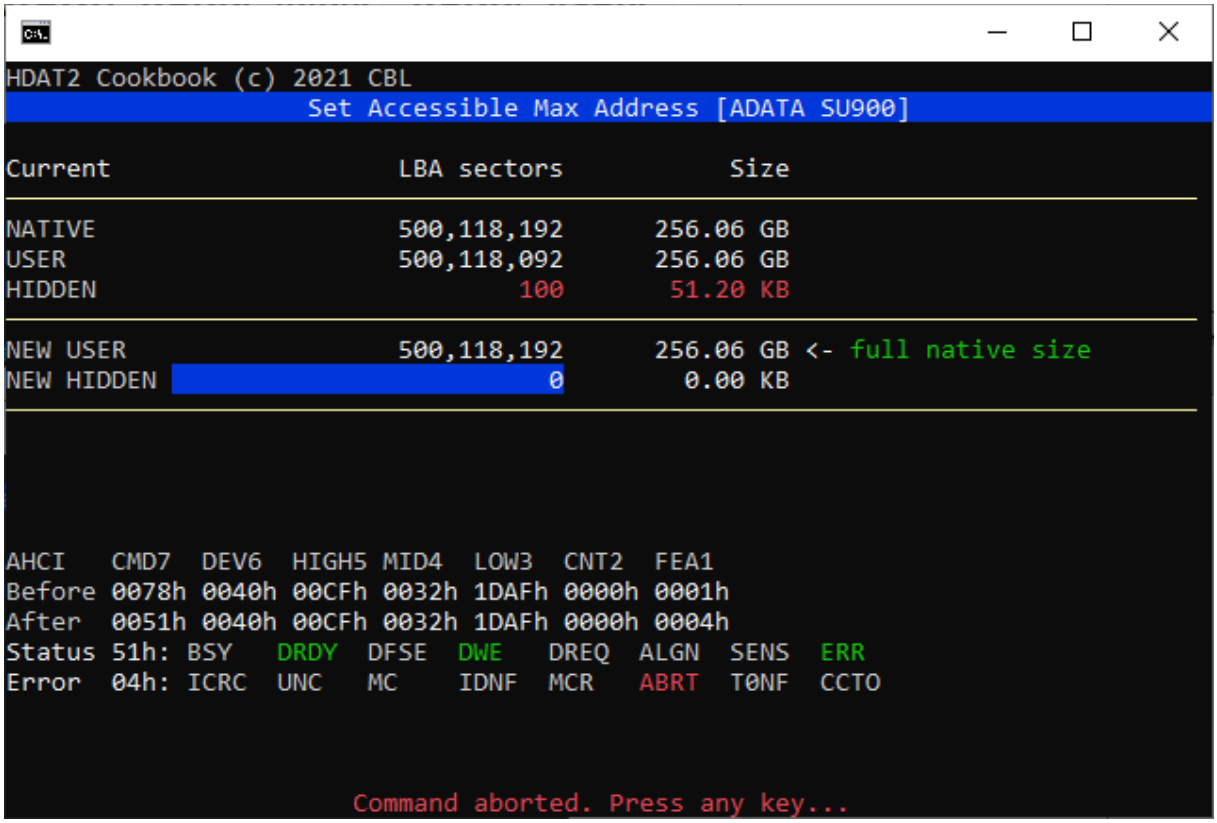


Remove AMAX area

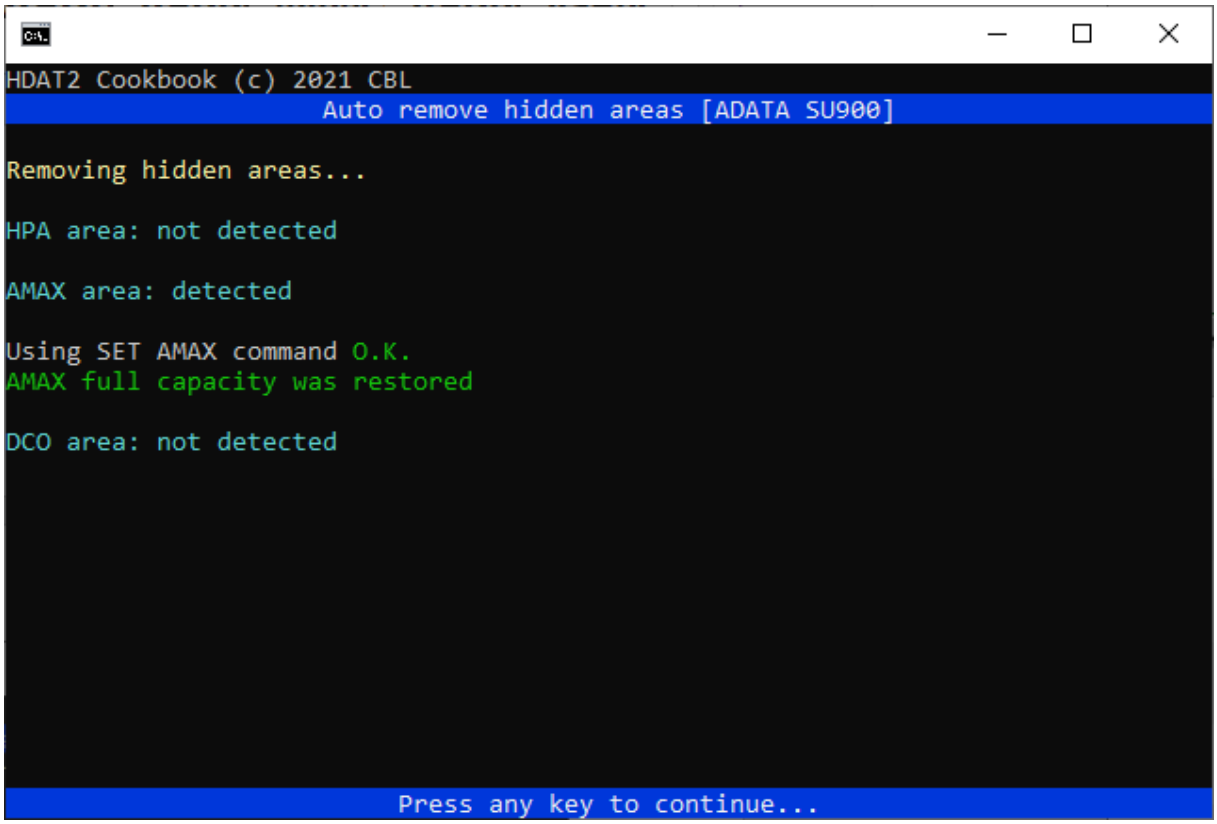


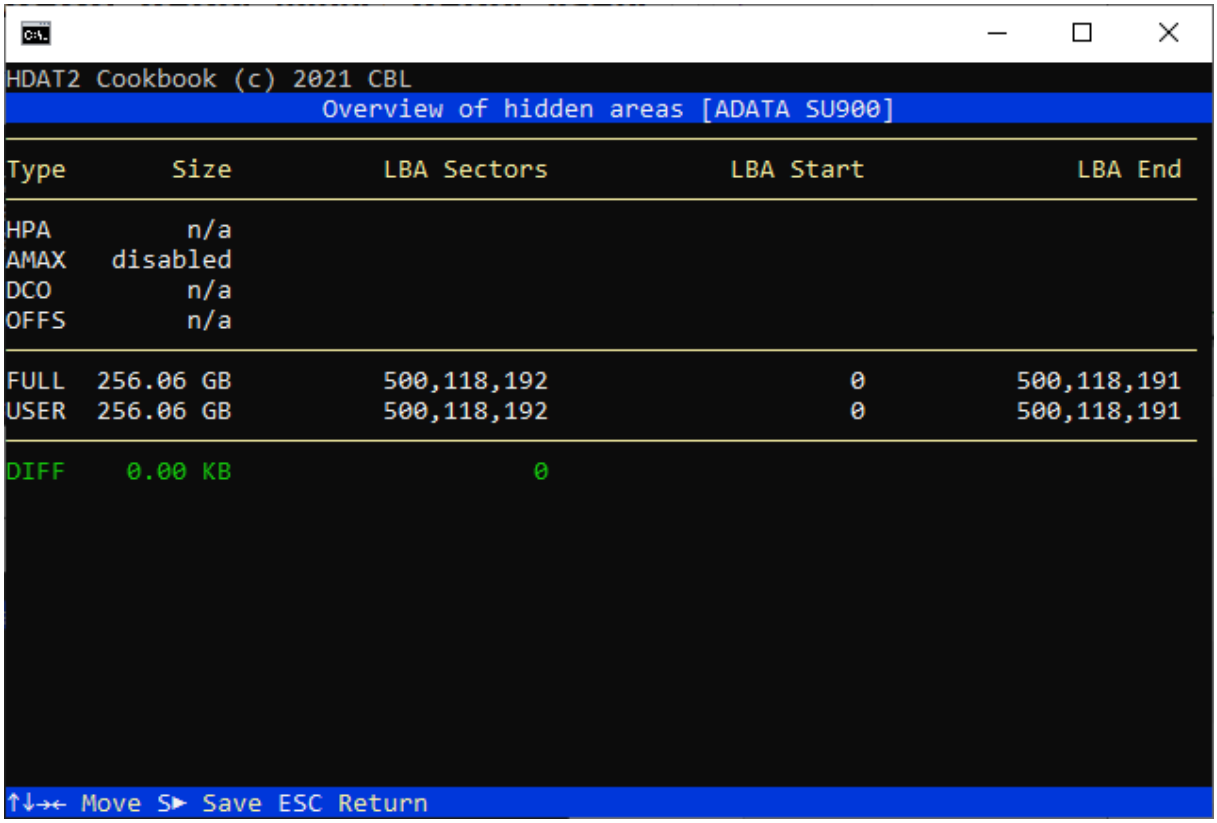

HDAT2 Cookbook (c) 2021 CBL
Auto remove hidden areas [ADATA SU900]
Overview of hidden areas
Auto remove hidden areas
Detect BEER record
Active areas: AMAX
Are you sure to run 'Auto remove hidden areas' <Y/N> ?


HDAT2 Cookbook (c) 2021 CBL
Auto remove hidden areas [ADATA SU900]
Removing hidden areas...
HPA area: not detected
AMAX area: detected
Using SET AMAX command ERROR
AMAX full capacity was not restored
DCO area: not detected
Press any key to continue...



This error message you will see if you try to call the second SET AMAX command without power off (e.g. immediately after the first creation of AMAX area). So we turn power off and on and try it again.





ADDRESS OFFSET area

Address Offset mode Reserved Area Boot (OFFS)

Computer systems perform initial code loading (booting) by reading from a predefined address on a disk drive. To allow an alternate bootable operating system to exist in a system reserved area on a disk drive this feature provides a Set Features function to temporarily offset the drive address space. The offset address space wraps around so that the entire disk drive address space remains addressable in offset mode. Max LBA in offset mode is set to the end of the system reserved area to protect the data in the user area when operating in offset mode. The Max LBA can be changed by an Set Max Address command, but any commands which access sectors across the original native maximum LBA are rejected with error, even if this protection is removed by an Set Max Address command.

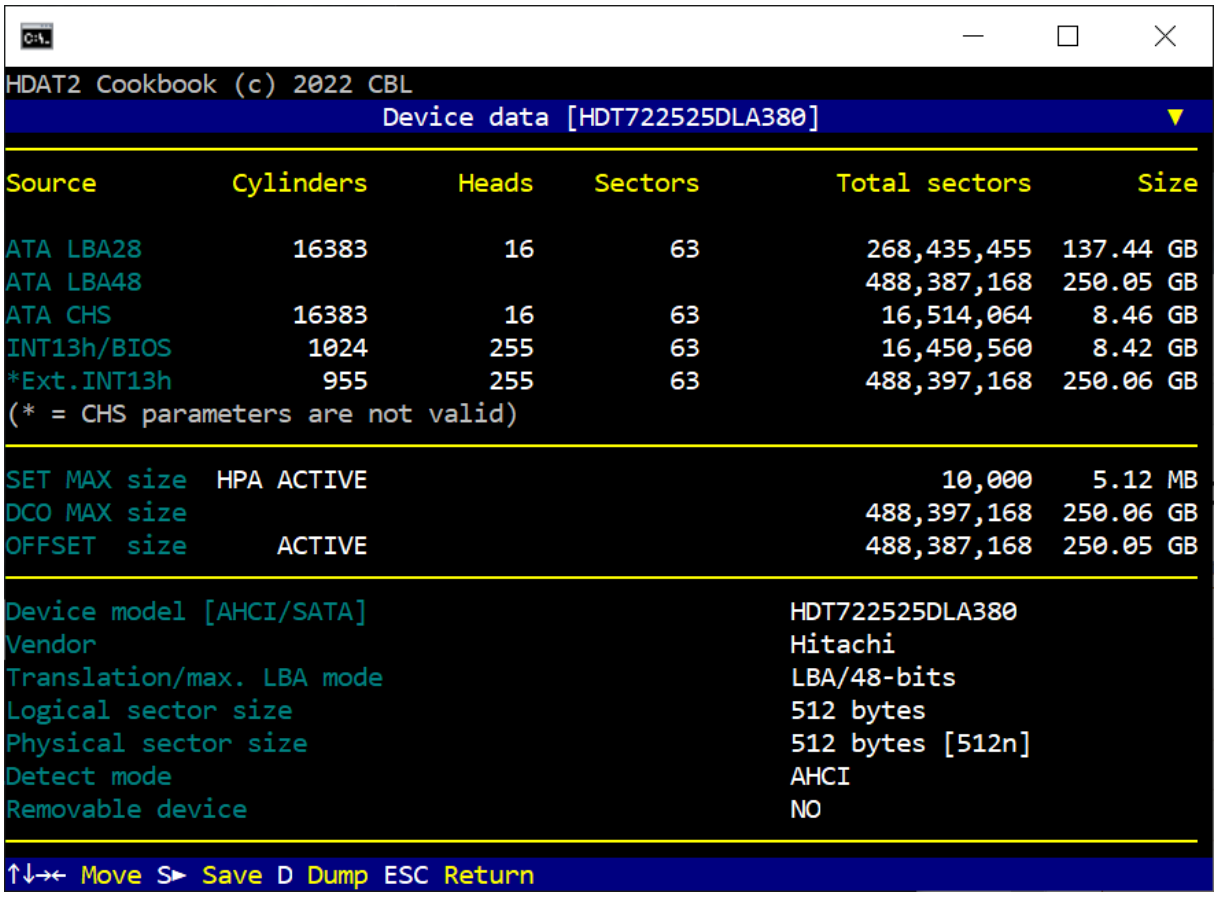
Enable OFFS area

Set Features subcommand code 09h Enable Address Offset Mode offsets address Cylinder 0, Head 0, Sector 1, and LBA 0, to the start of the non-volatile protected area established using the Set Max Address command. The offset condition is cleared by Subcommand 89h Disable Address Offset Mode, Hardware reset or Power on Reset. If Reverting to Power on Defaults has been enabled by Set Features command, it is cleared by Soft reset as well. Upon entering offset mode the capacity of the drive returned in the Identify Device data is the size of the former protected area. A subsequent Set Max Address command with the address returned by Read Max Address command allows access to the entire drive. Addresses wrap so the entire drive remains addressable.

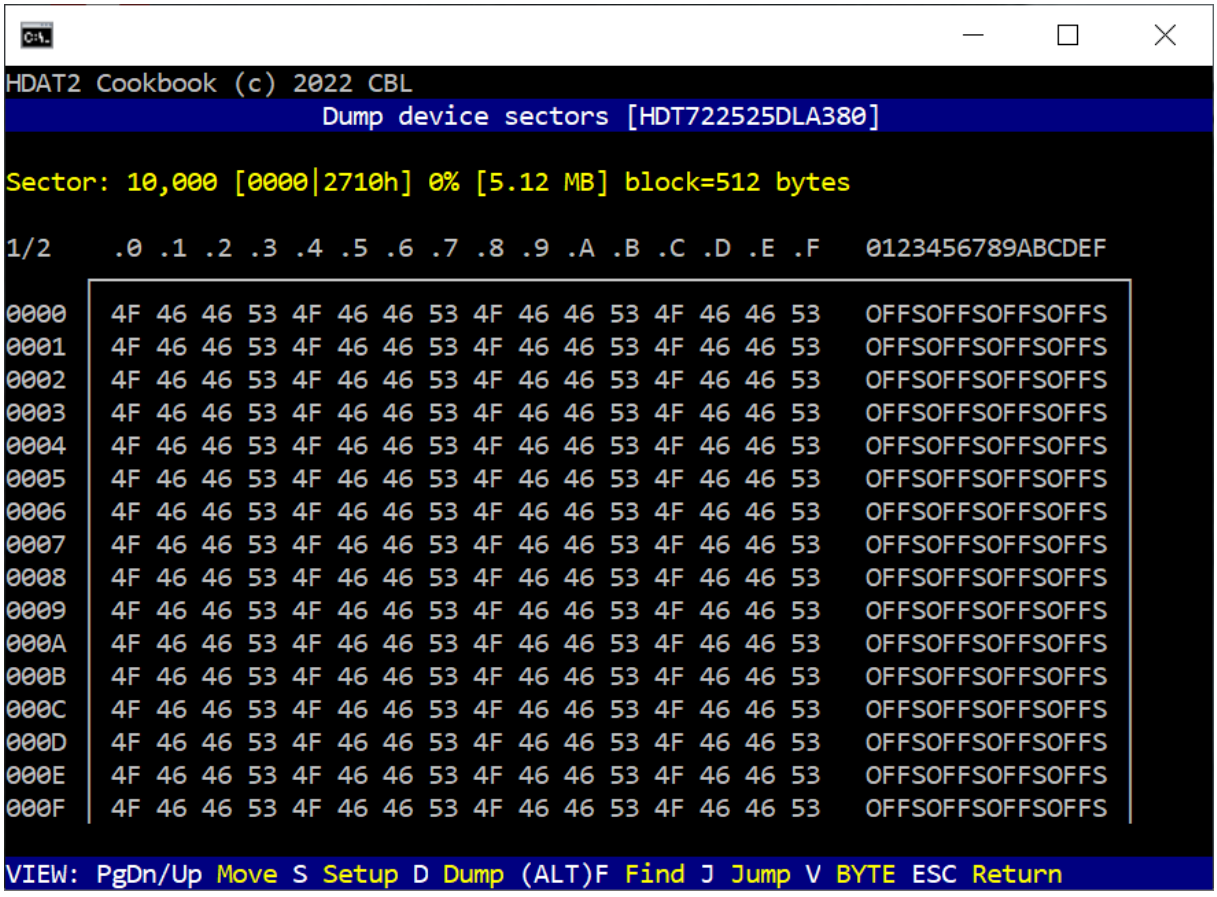
If a non-volatile protected area has not been established before the device receives a Set Features Enable Address Offset Mode command, the command fails with Abort error status.

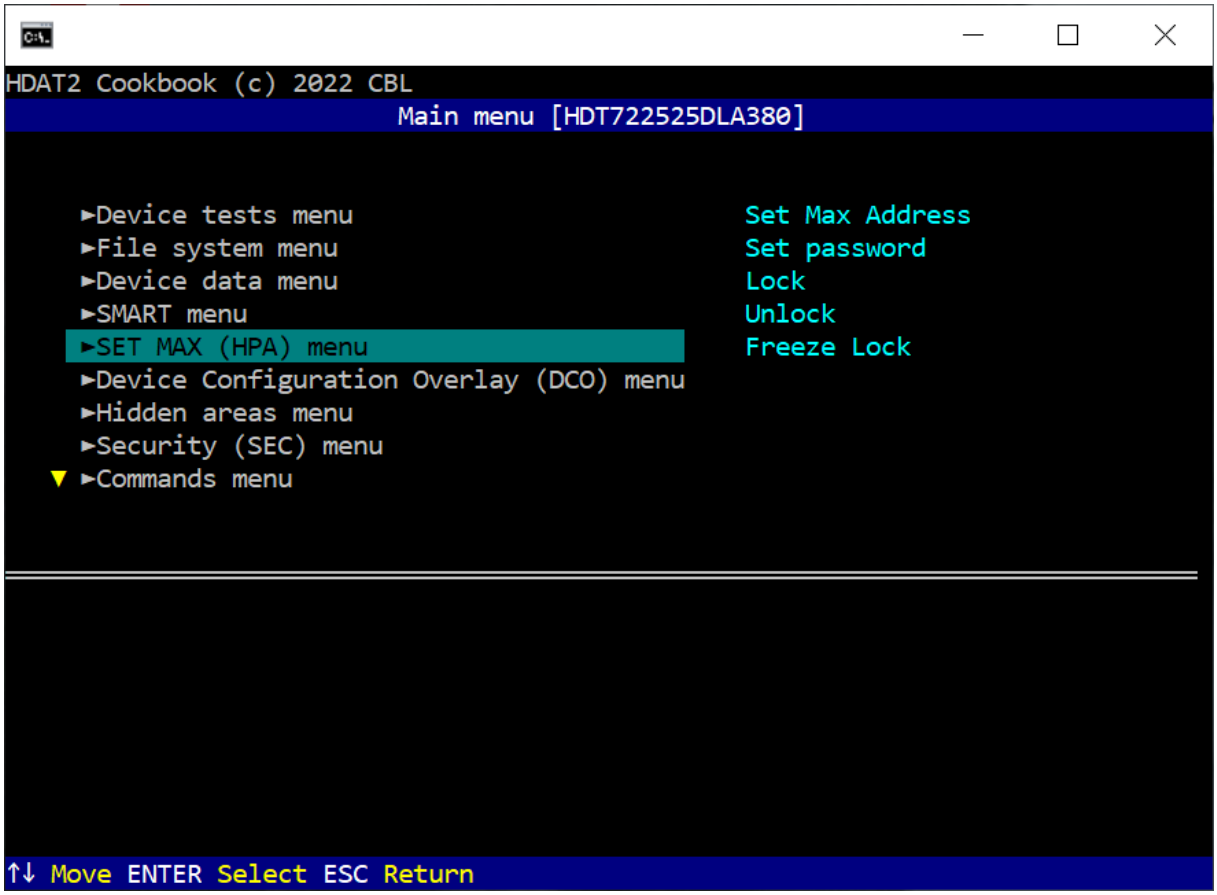
First we create non-volatile HPA area of 10000 sectors using SET MAX command.

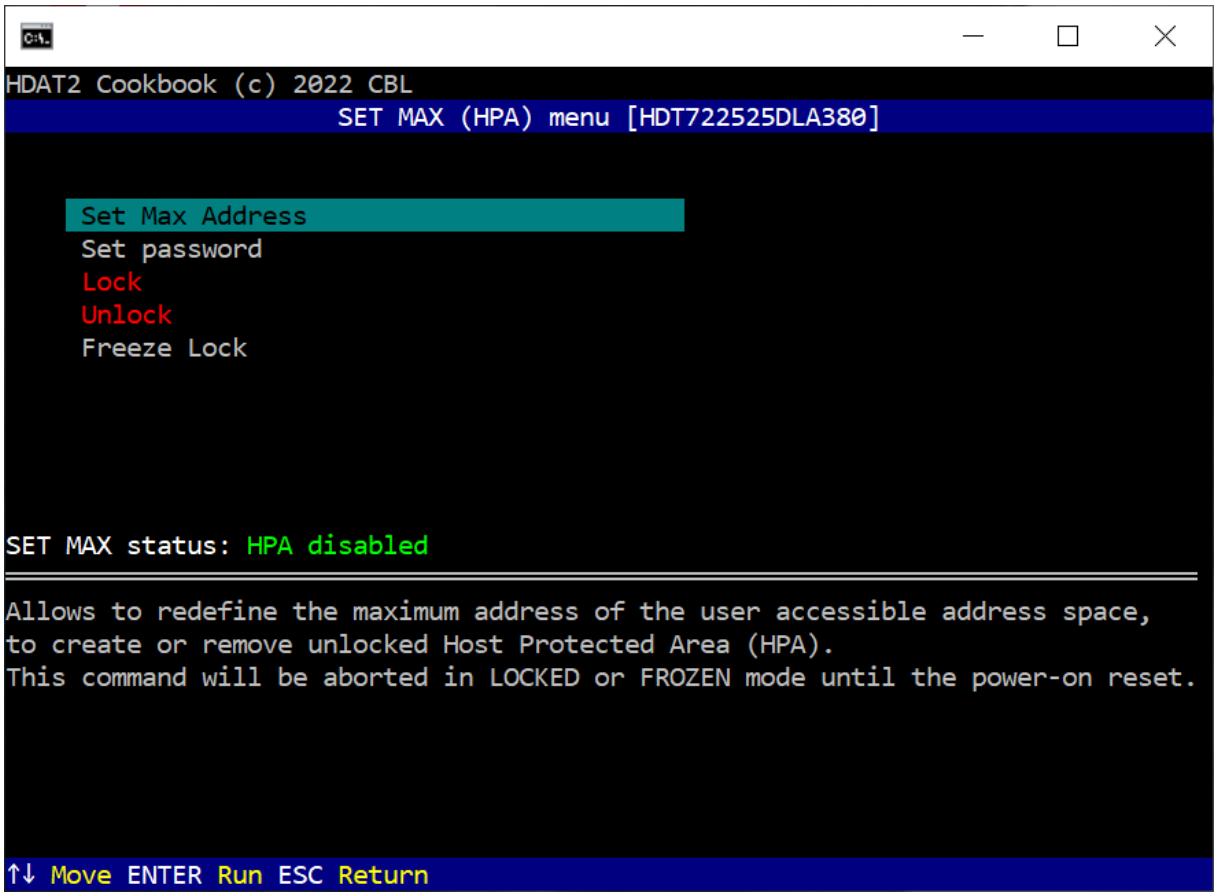
For checking, we will list the contents of LBA sector 0.

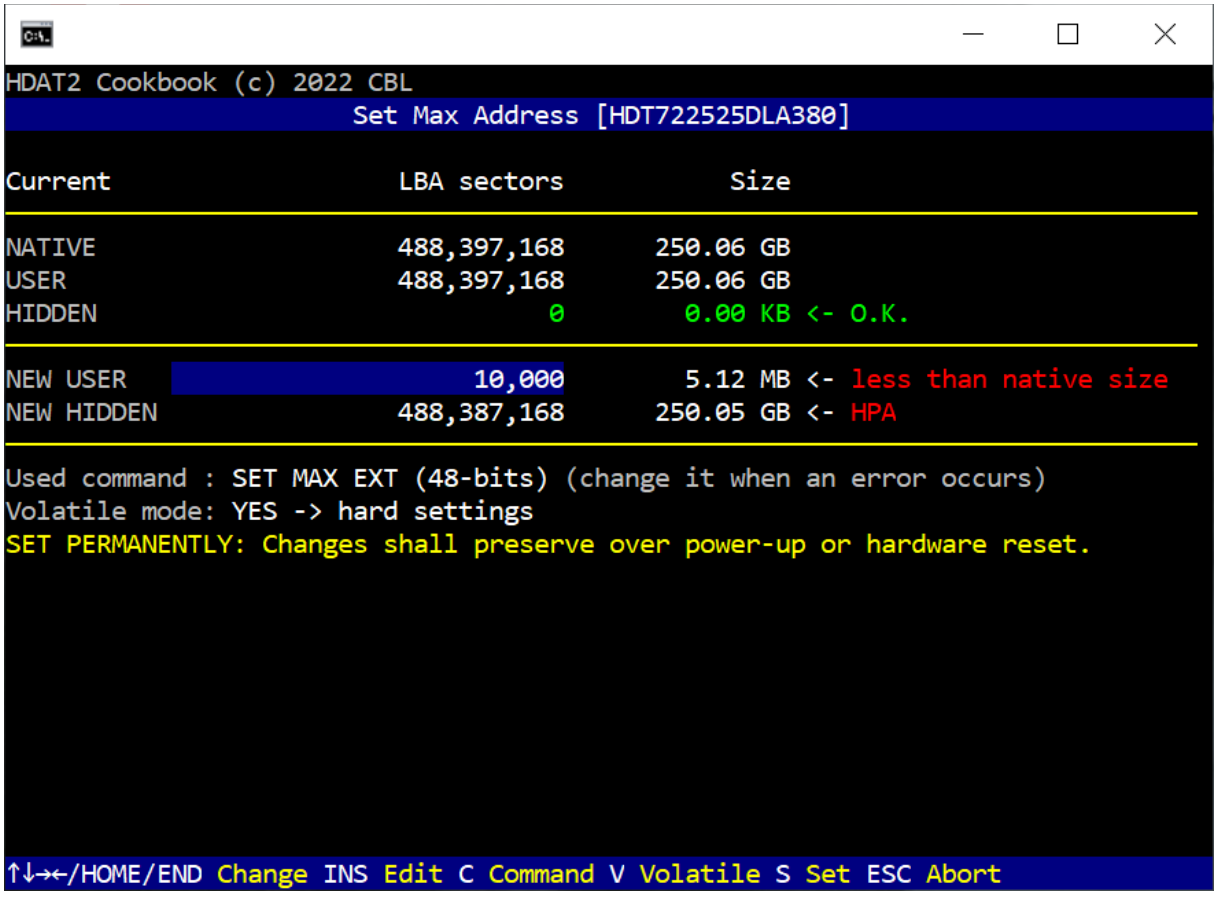


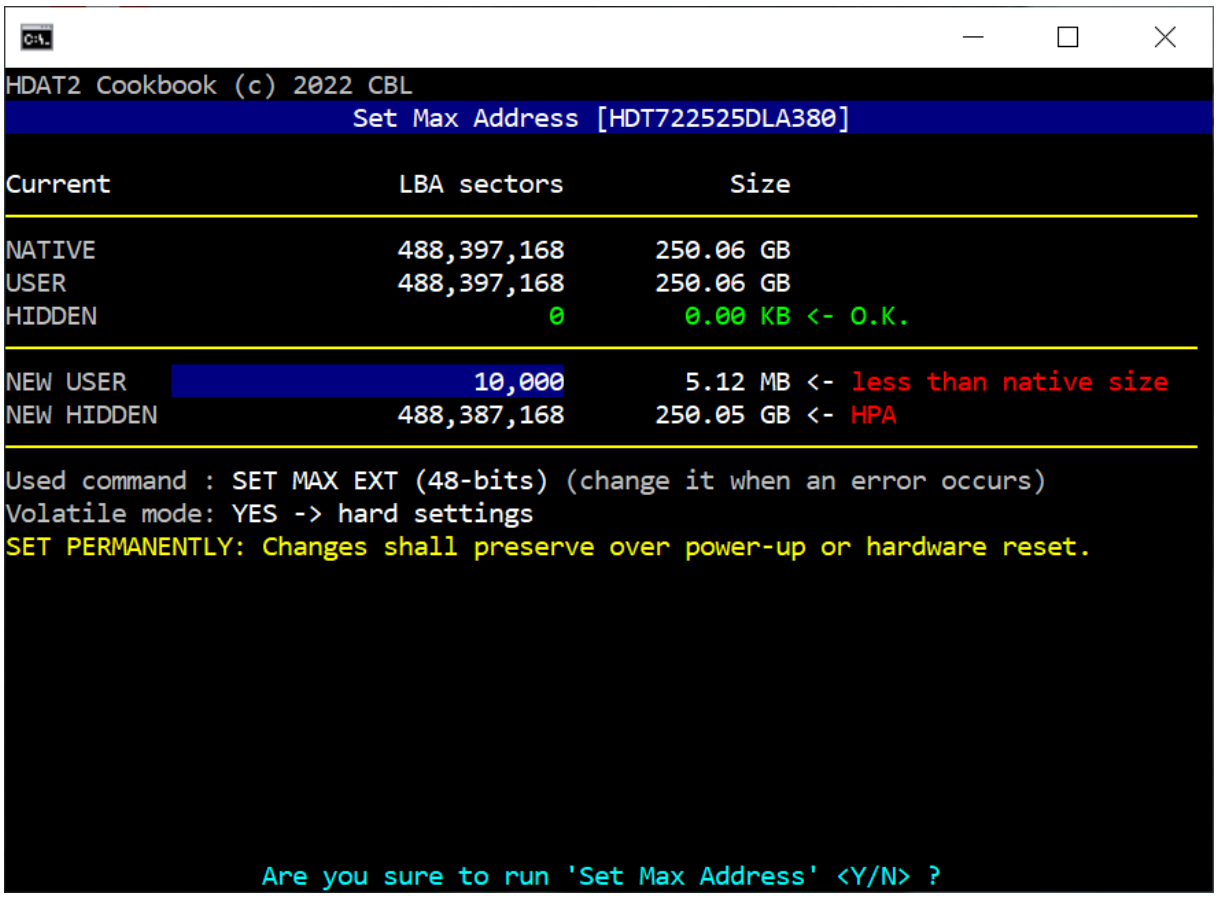
For the follow-up check with dump sector, I filled the first sector of the HPA area (LBA 10000) with the text OFFS.

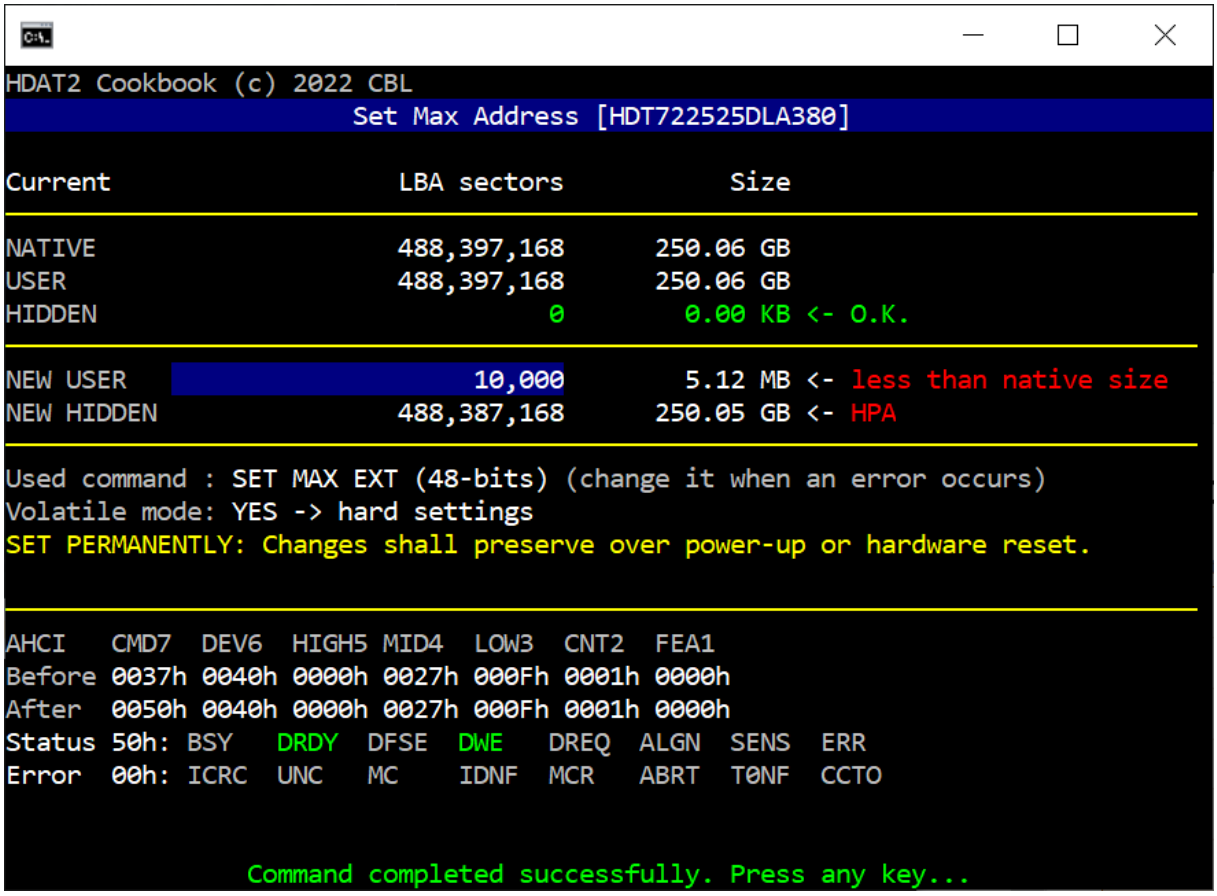



HDAT2 Cookbook (c) 2022 CBL
Main menu [HDT722525DLA380]
►Device tests menu
►File system menu
►Device data menu
►SMART menu
►SET MAX (HPA) menu
►Device Configuration Overlay (DCO) menu
►Hidden areas menu
►Security (SEC) menu
►Commands menu
Set Max Address
Set password
Lock
Unlock
Freeze Lock
↑↓ Move ENTER Select ESC Return

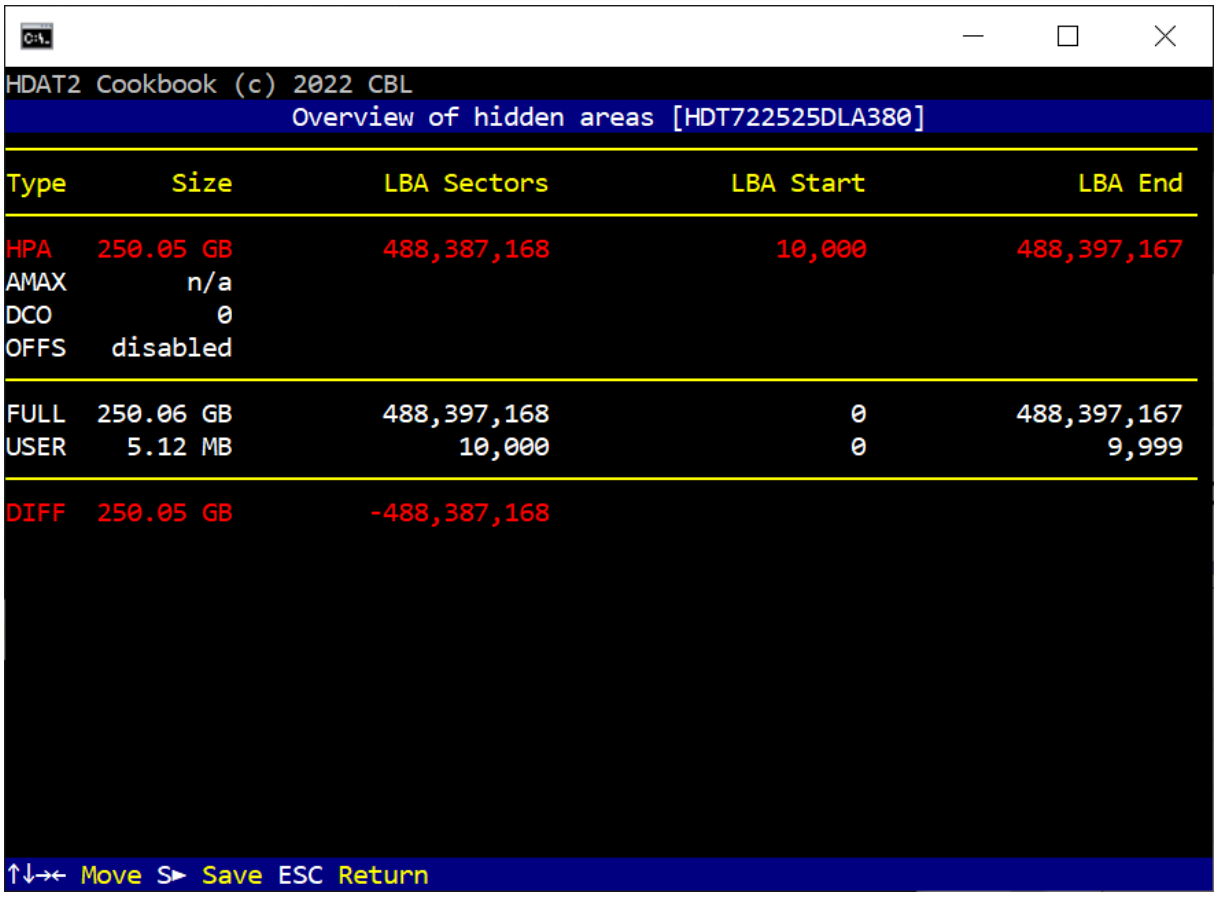

HDAT2 Cookbook (c) 2022 CBL
SET MAX (HPA) menu [HDT722525DLA380]
Set Max Address
Set password
Lock
Unlock
Freeze Lock
SET MAX status: HPA disabled
Allows to redefine the maximum address of the user accessible address space,
to create or remove unlocked Host Protected Area (HPA).
This command will be aborted in LOCKED or FROZEN mode until the power-on reset.
↑↓ Move ENTER Run ESC Return


HDAT2 Cookbook (c) 2022 CBL
Set Max Address [HDT722525DLA380]
Current LBA sectors Size
NATIVE 488,397,168 250.06 GB
USER 488,397,168 250.06 GB
HIDDEN 0 0.00 KB <- O.K.
NEW USER 10,000 5.12 MB <- less than native size
NEW HIDDEN 488,387,168 250.05 GB <- HPA
Used command : SET MAX EXT (48-bits) (change it when an error occurs)
Volatile mode: YES -> hard settings
SET PERMANENTLY: Changes shall preserve over power-up or hardware reset.
↑↓→←/HOME/END Change INS Edit C Command V Volatile S Set ESC Abort

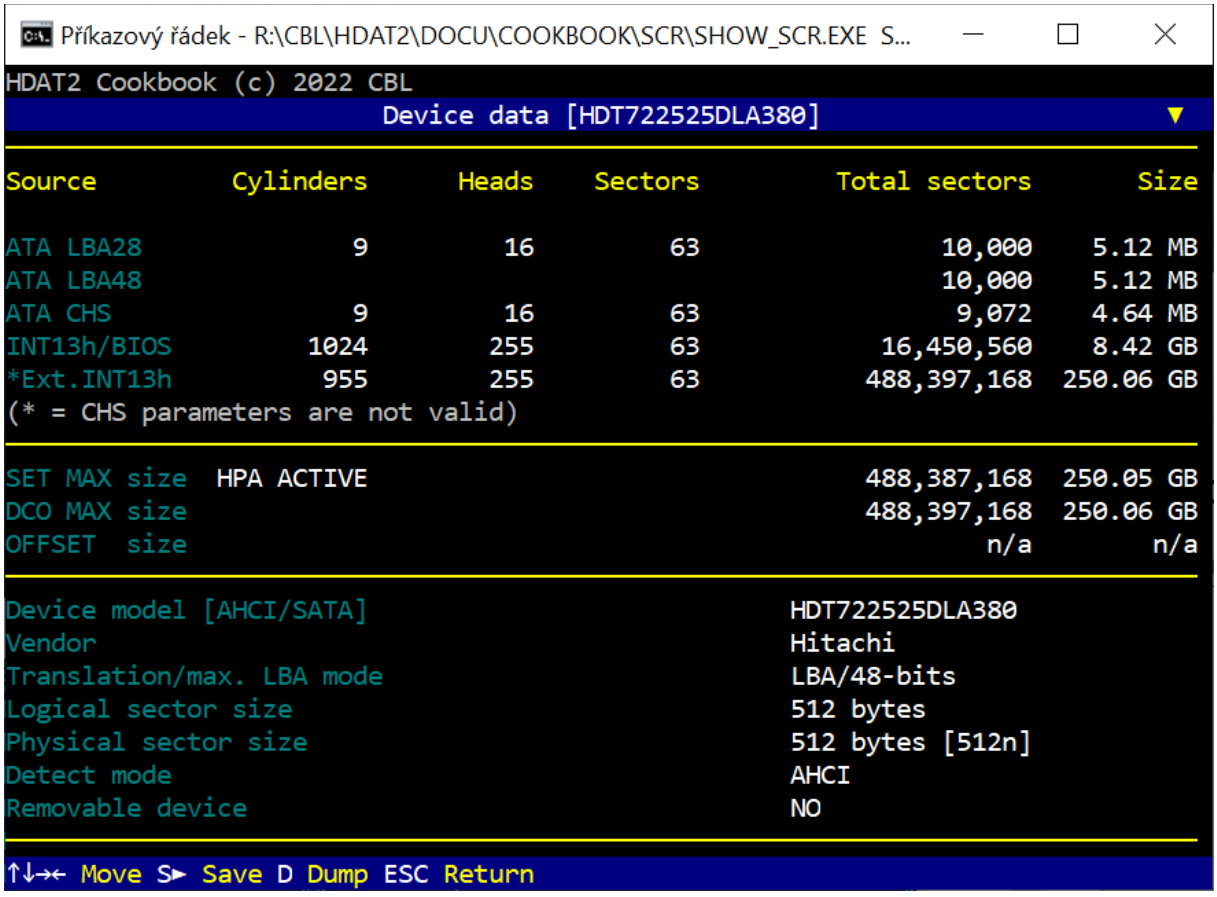

HDAT2 Cookbook (c) 2022 CBL
Set Max Address [HDT722525DLA380]
Current LBA sectors Size
NATIVE 488,397,168 250.06 GB
USER 488,397,168 250.06 GB
HIDDEN 0 0.00 KB <- O.K.
NEW USER 10,000 5.12 MB <- less than native size
NEW HIDDEN 488,387,168 250.05 GB <- HPA
Used command : SET MAX EXT (48-bits) (change it when an error occurs)
Volatile mode: YES -> hard settings
SET PERMANENTLY: Changes shall preserve over power-up or hardware reset.
Are you sure to run 'Set Max Address' <Y/N> ?



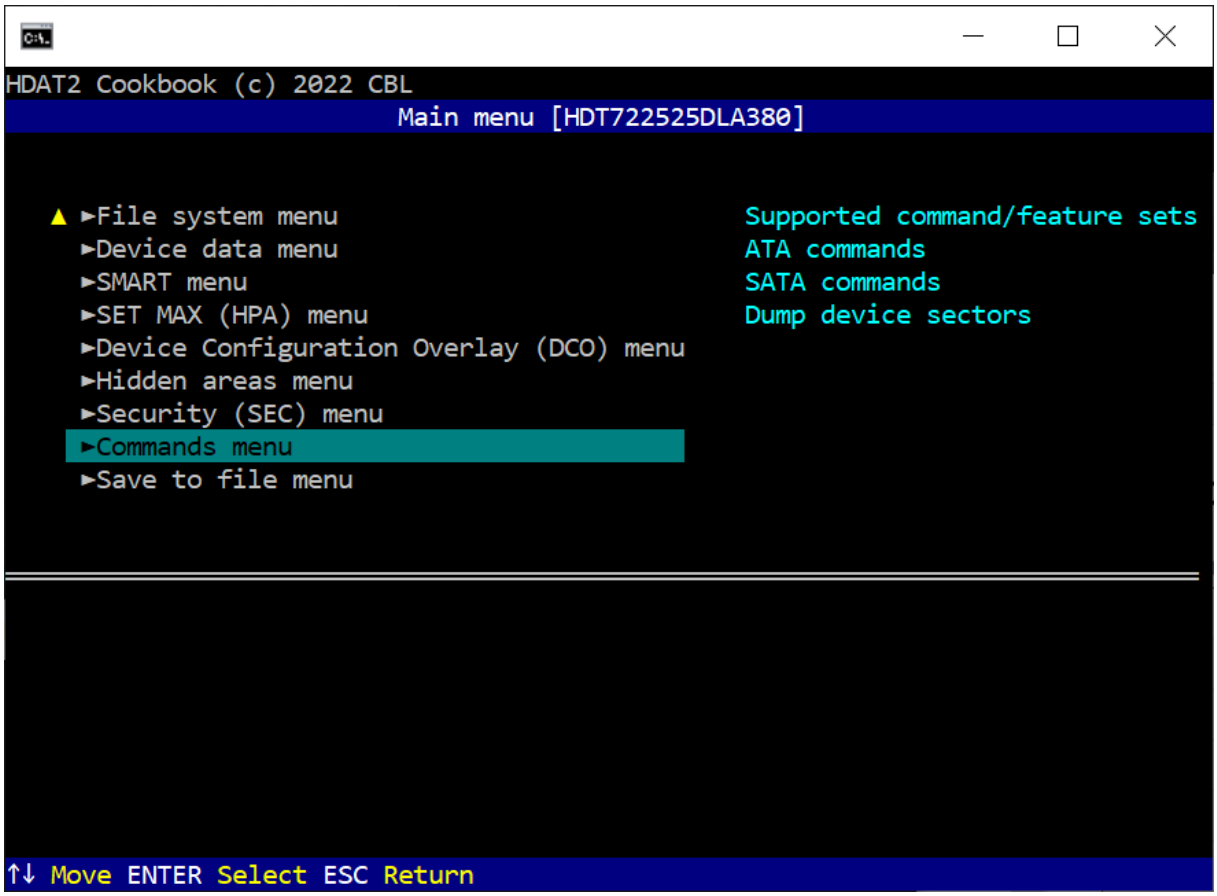
Check settings in 'Overview of hidden areas'.

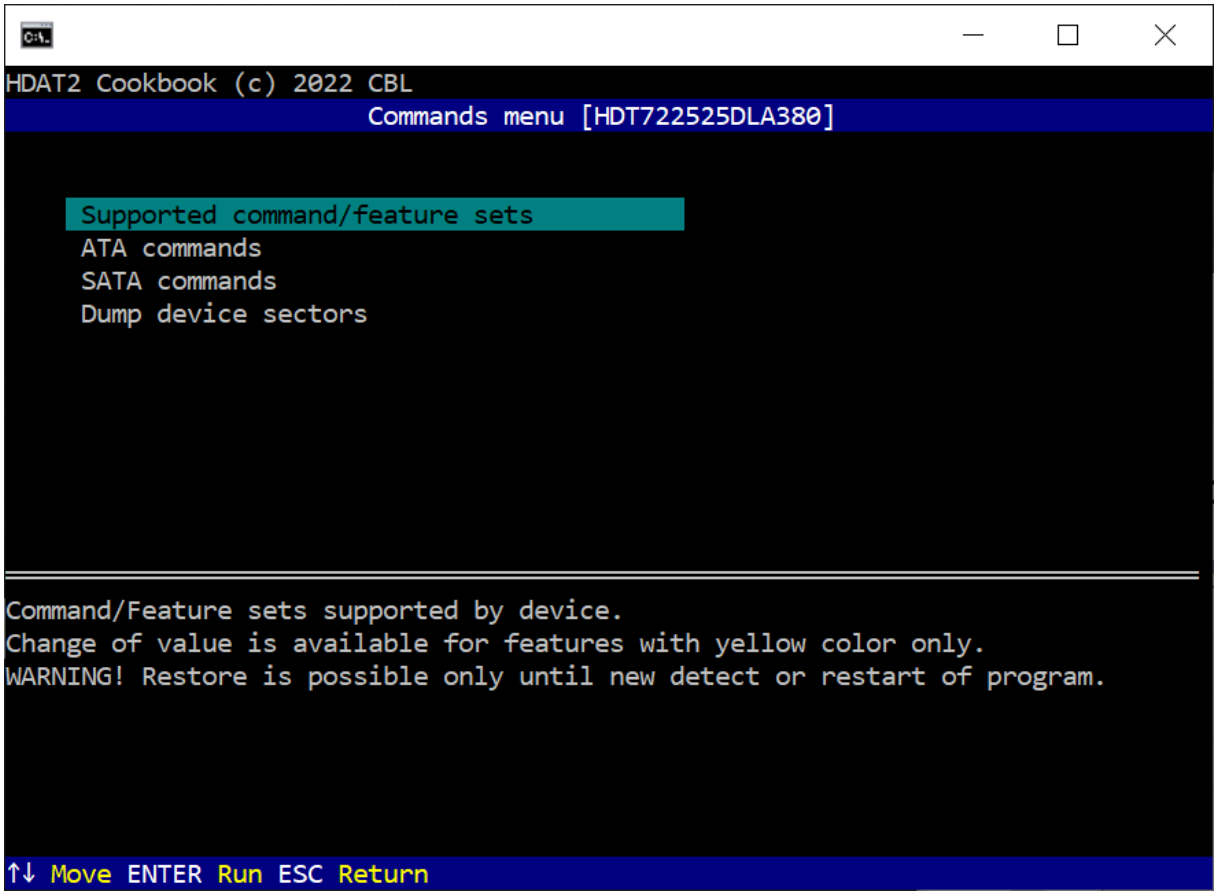


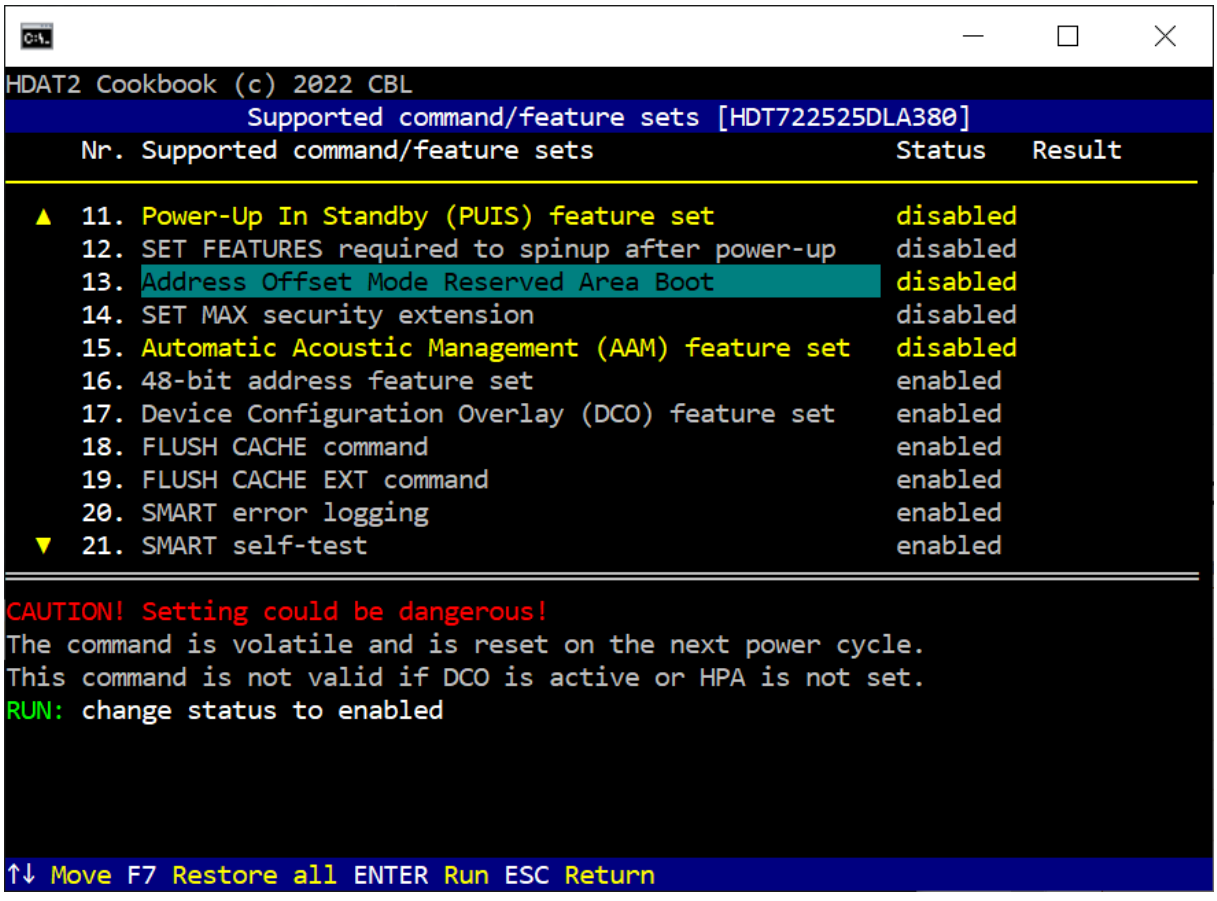
Listing for setting disk sectors from 'Device data' after setting HPA area.

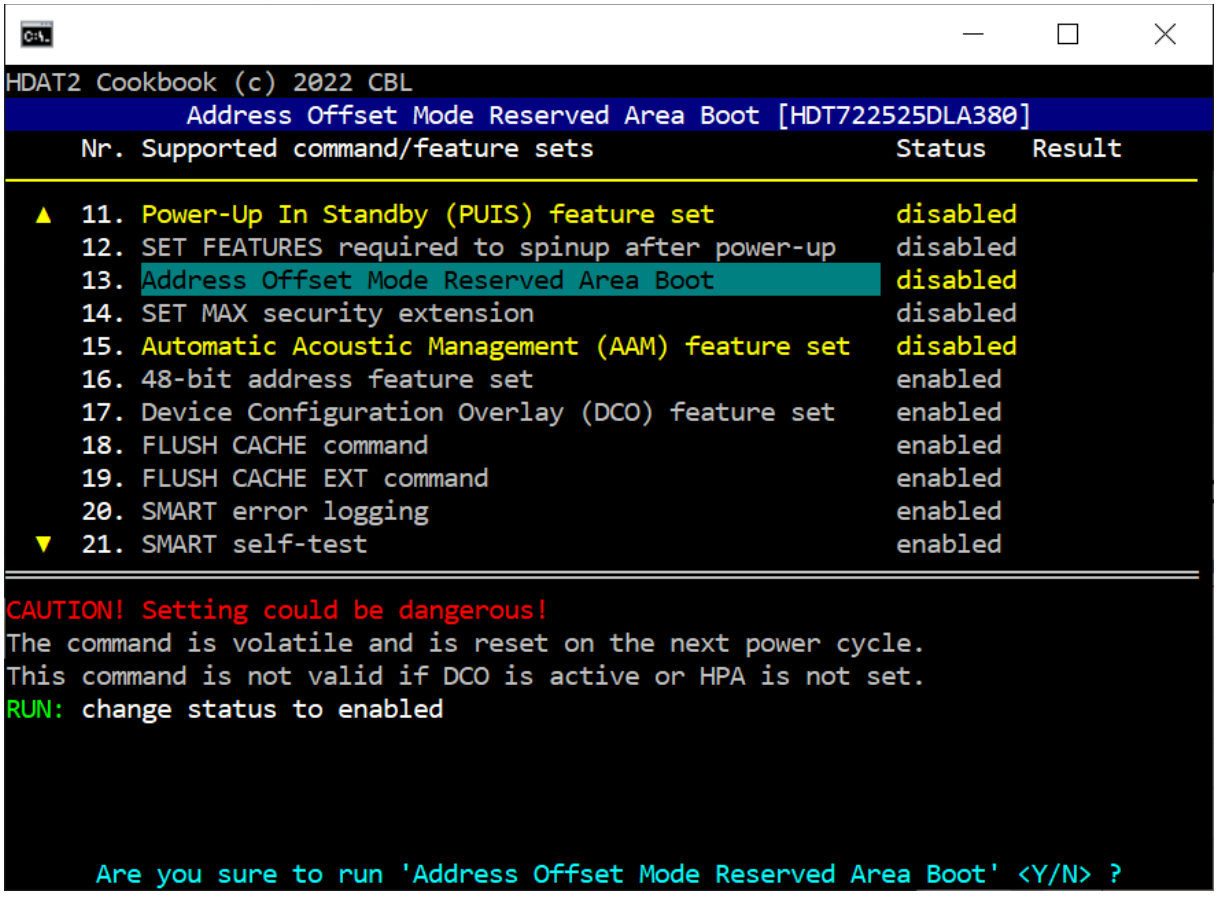


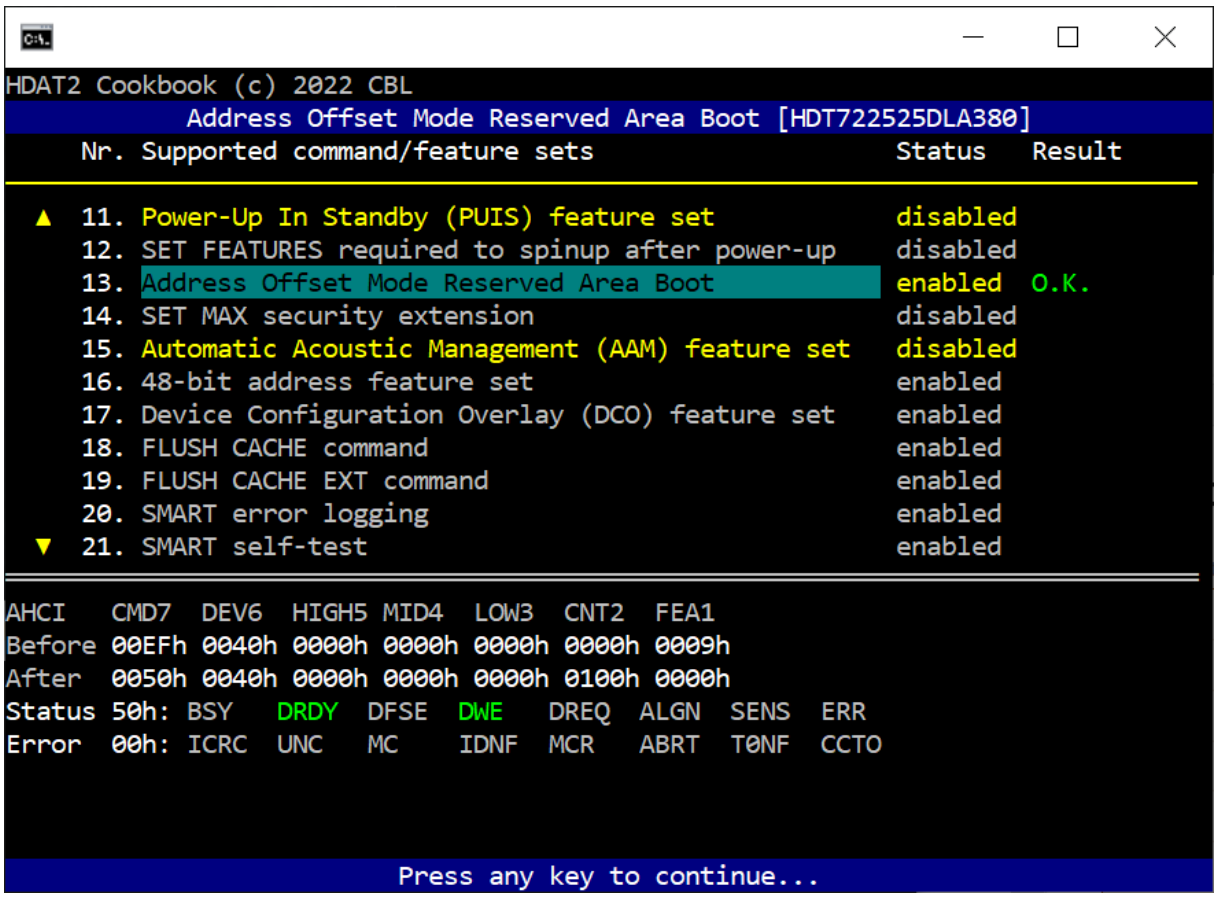
Now we enable Address Offset Mode feature.



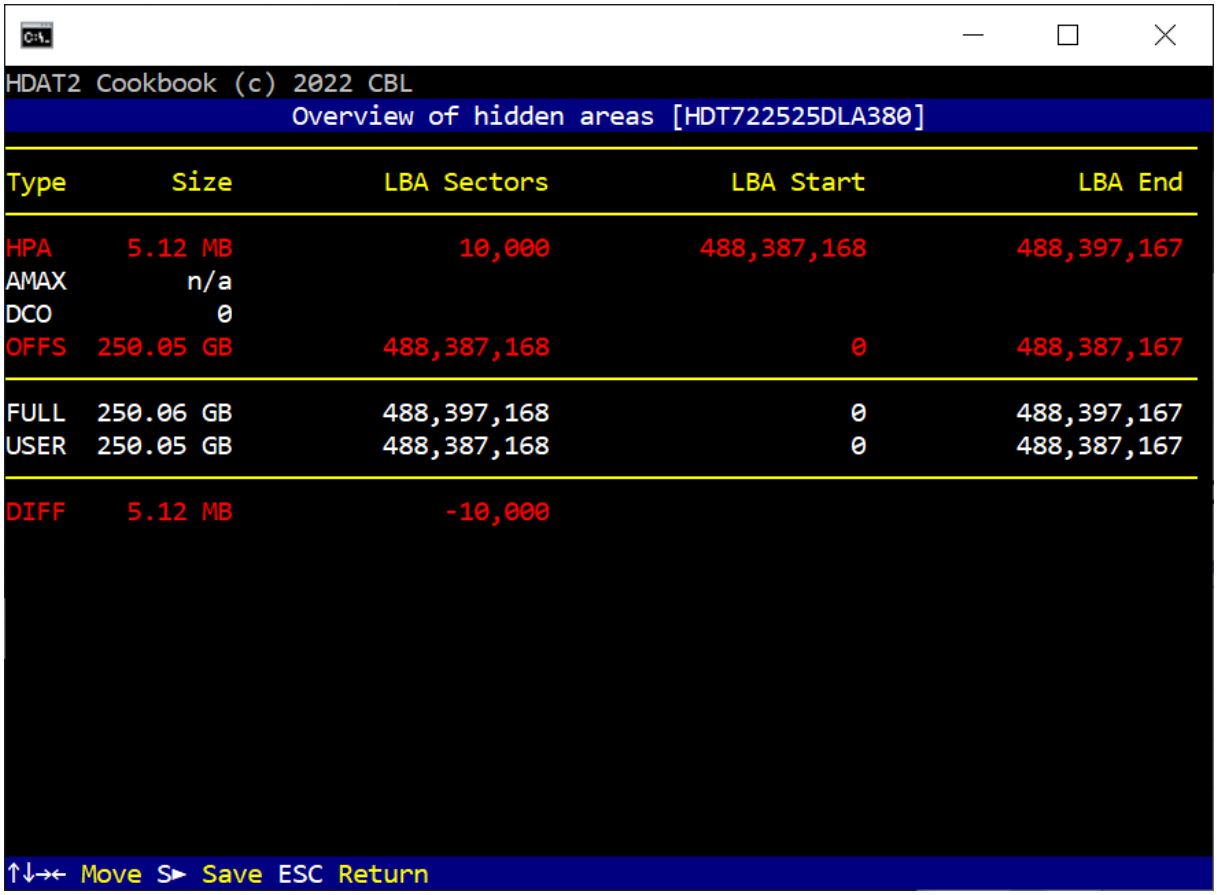

HDAT2 Cookbook (c) 2022 CBL
Commands menu [HDT722525DLA380]
Supported command/feature sets
ATA commands
SATA commands
Dump device sectors
Command/Feature sets supported by device.
Change of value is available for features with yellow color only.
WARNING! Restore is possible only until new detect or restart of program.
↑↓ Move ENTER Run ESC Return


HDAT2 Cookbook (c) 2022 CBL
Supported command/feature sets [HDT722525DLA380]
Nr. Supported command/feature sets Status Result
▲ 11. Power-Up In Standby (PUIS) feature set disabled
12. SET FEATURES required to spinup after power-up disabled
13. Address Offset Mode Reserved Area Boot disabled
14. SET MAX security extension disabled
15. Automatic Acoustic Management (AAM) feature set disabled
16. 48-bit address feature set enabled
17. Device Configuration Overlay (DCO) feature set enabled
18. FLUSH CACHE command enabled
19. FLUSH CACHE EXT command enabled
20. SMART error logging enabled
▼ 21. SMART self-test enabled
CAUTION! Setting could be dangerous!
The command is volatile and is reset on the next power cycle.
This command is not valid if DCO is active or HPA is not set.
RUN: change status to enabled
↑↓ Move F7 Restore all ENTER Run ESC Return

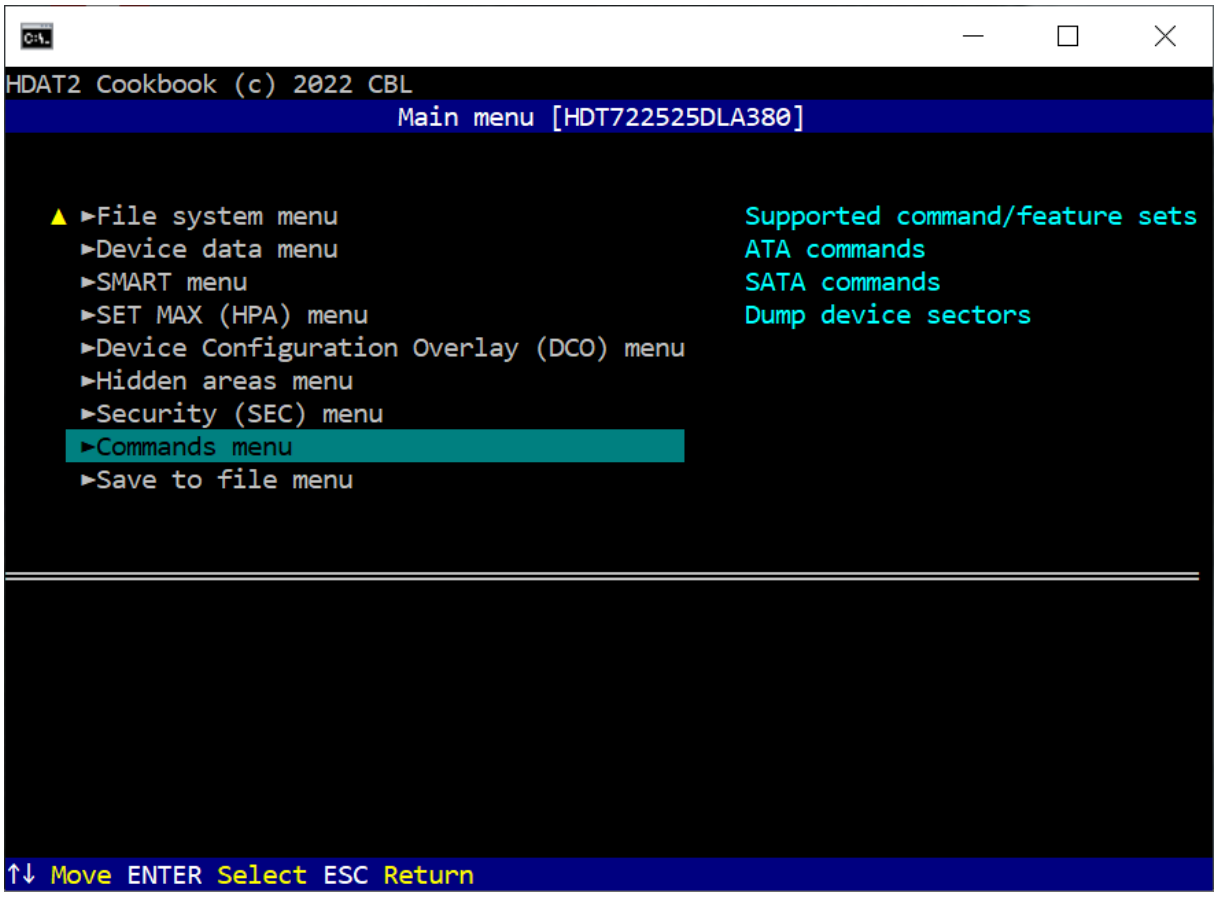


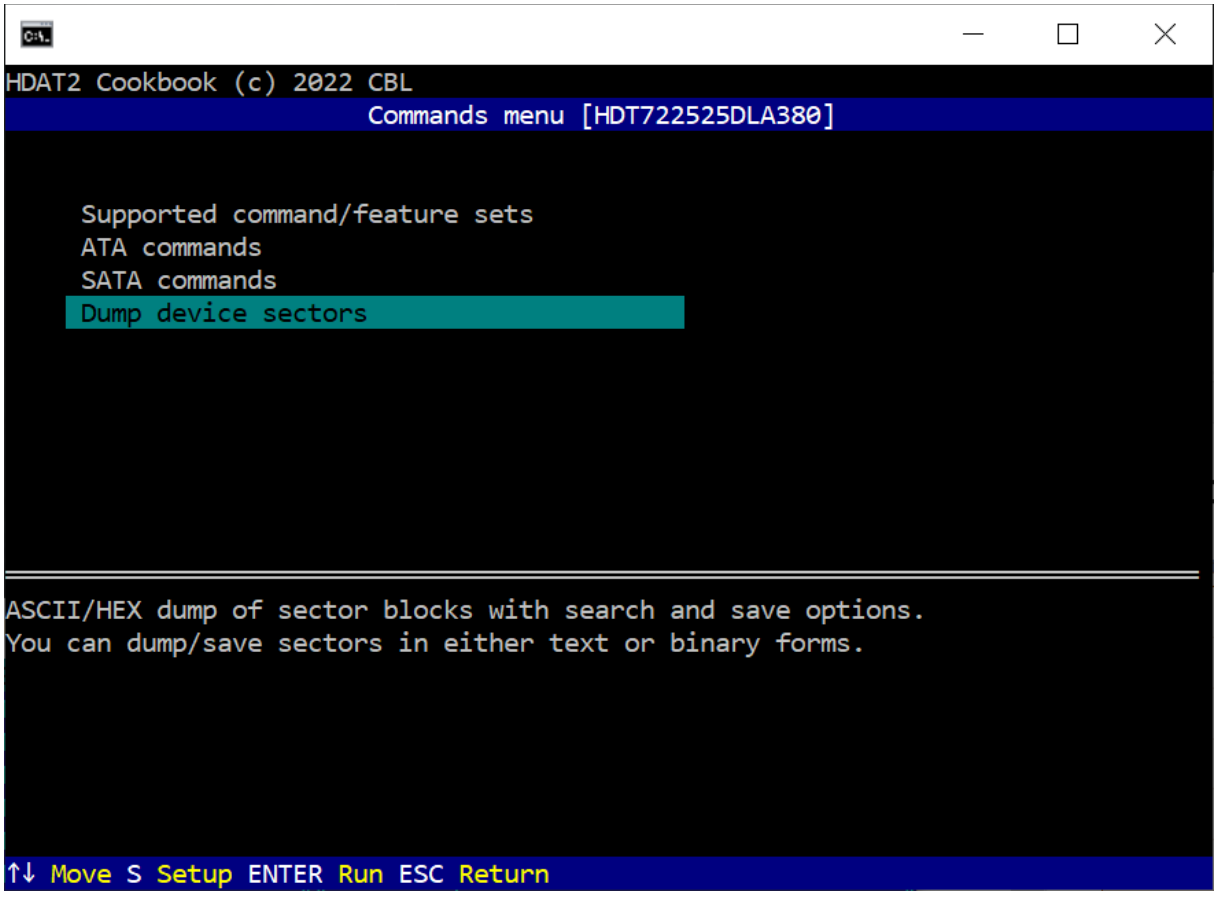


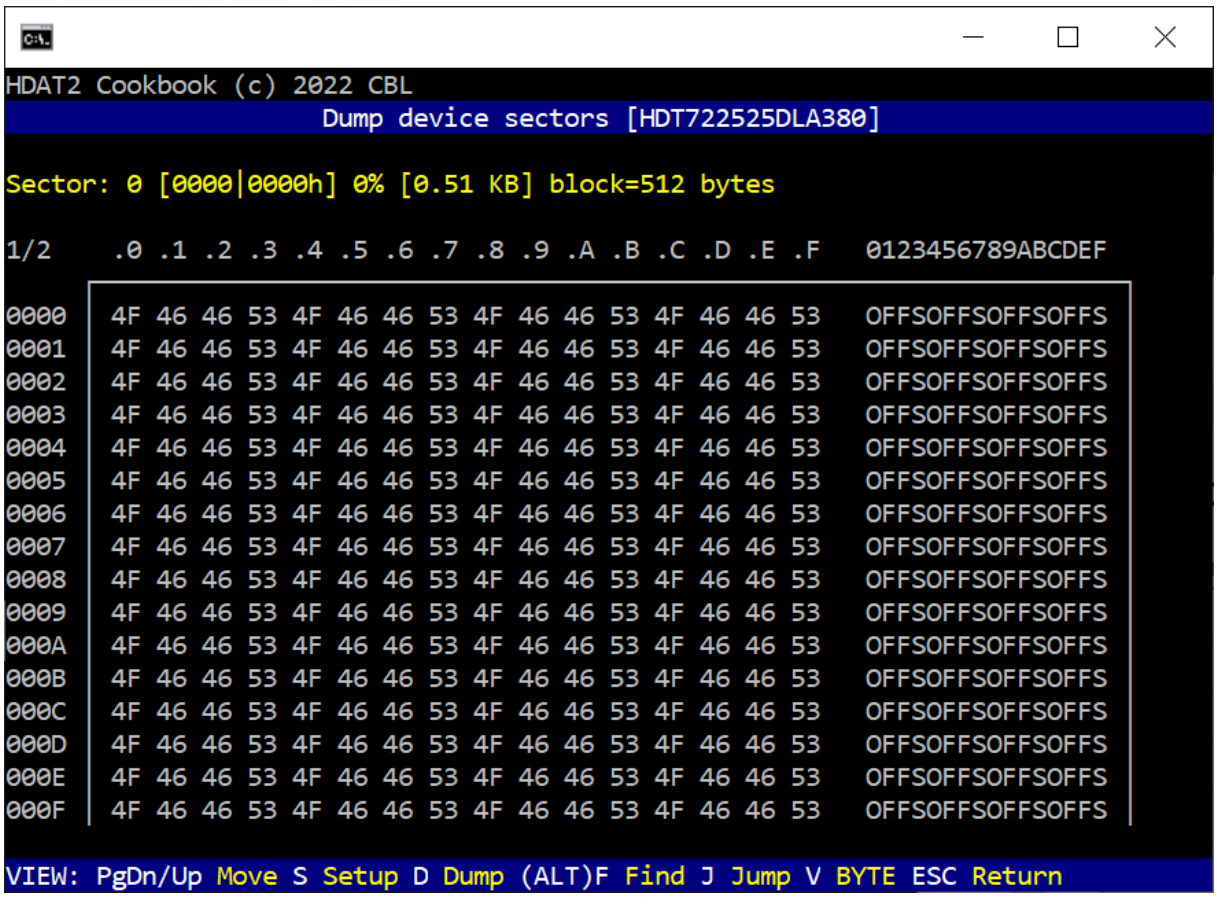
Check settings in 'Overview of hidden areas'.



We will check the content of LBA sector 0 with 'Dump device sectors'.

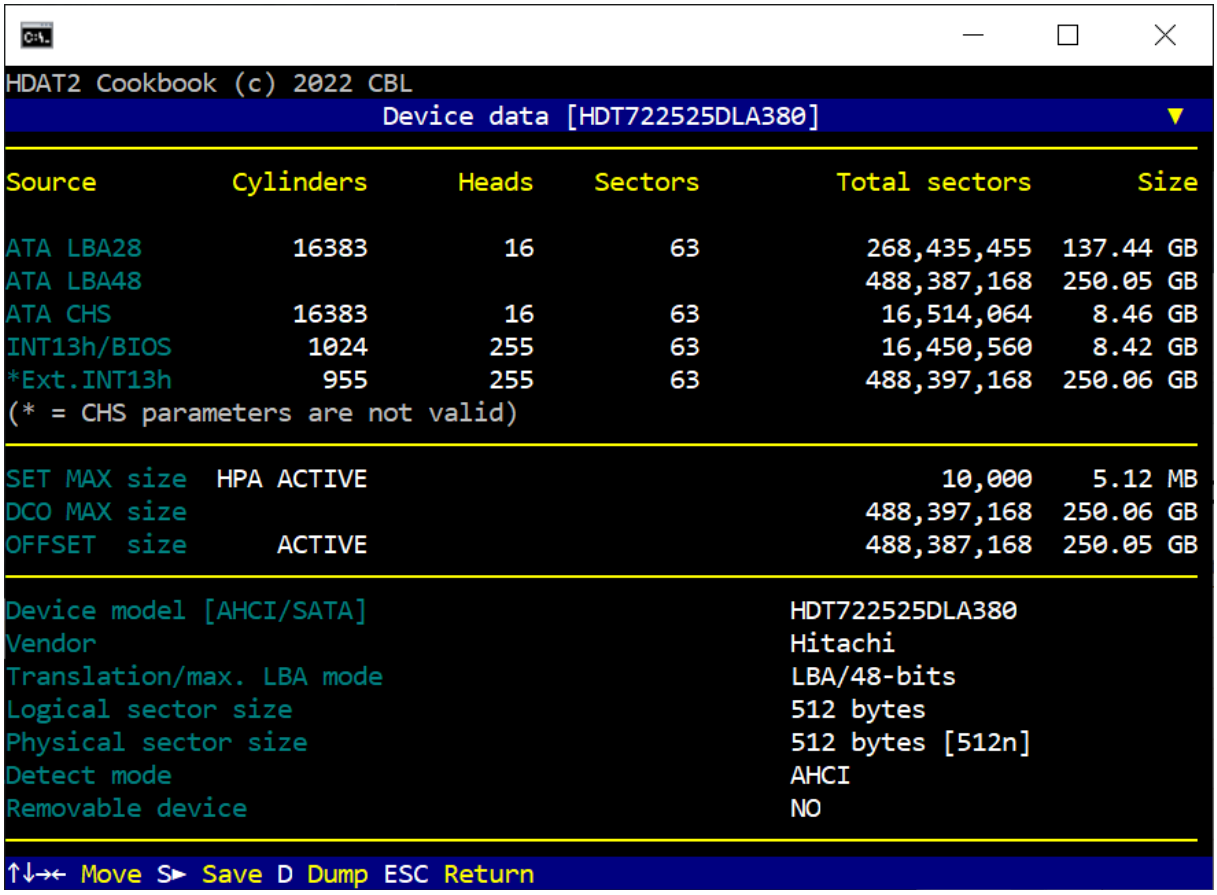






Now LBA sector 0 is set to the first sector of the HPA area (LBA 10000).
The original LBA sectors in the range 0 to 9999 are now inaccessible.

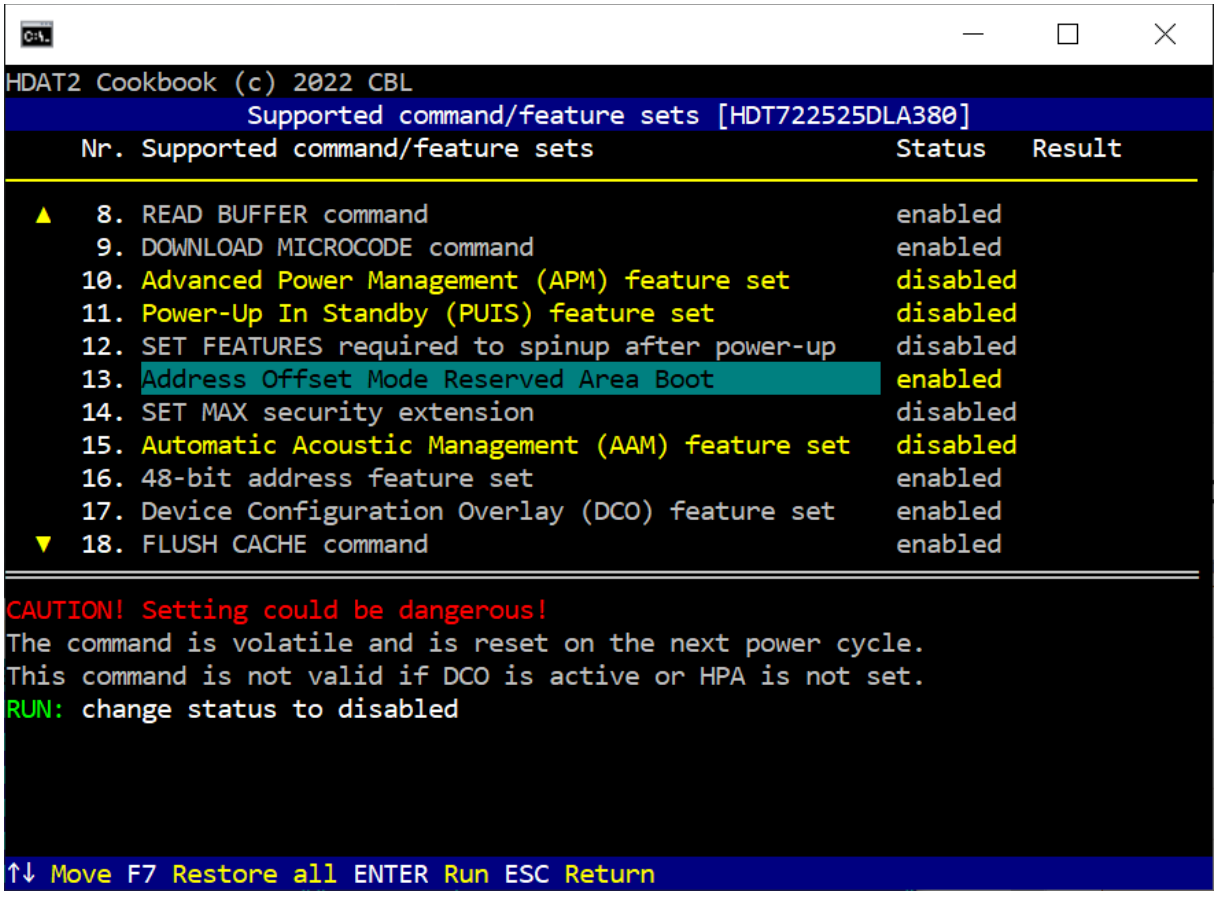
Listing for setting disk sectors from 'Device data'.

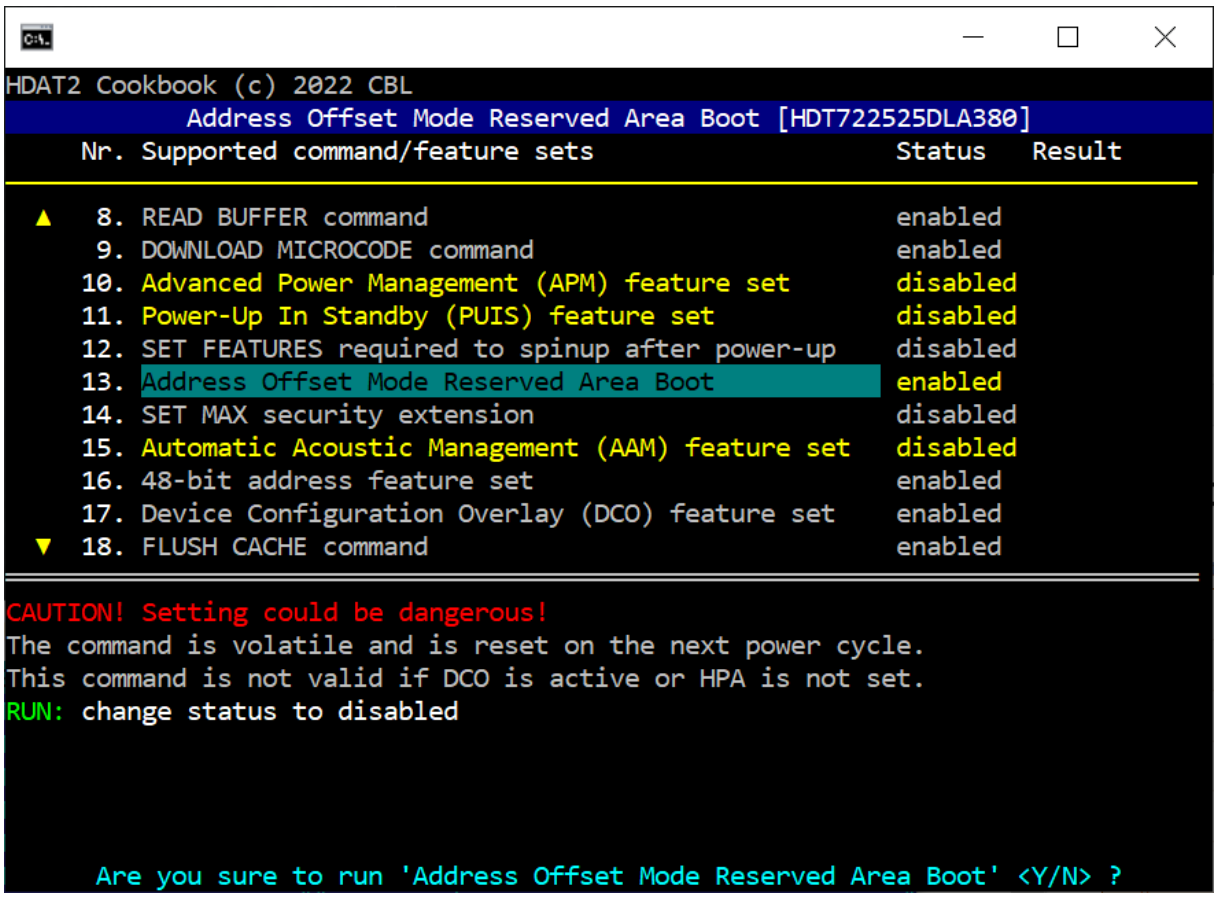


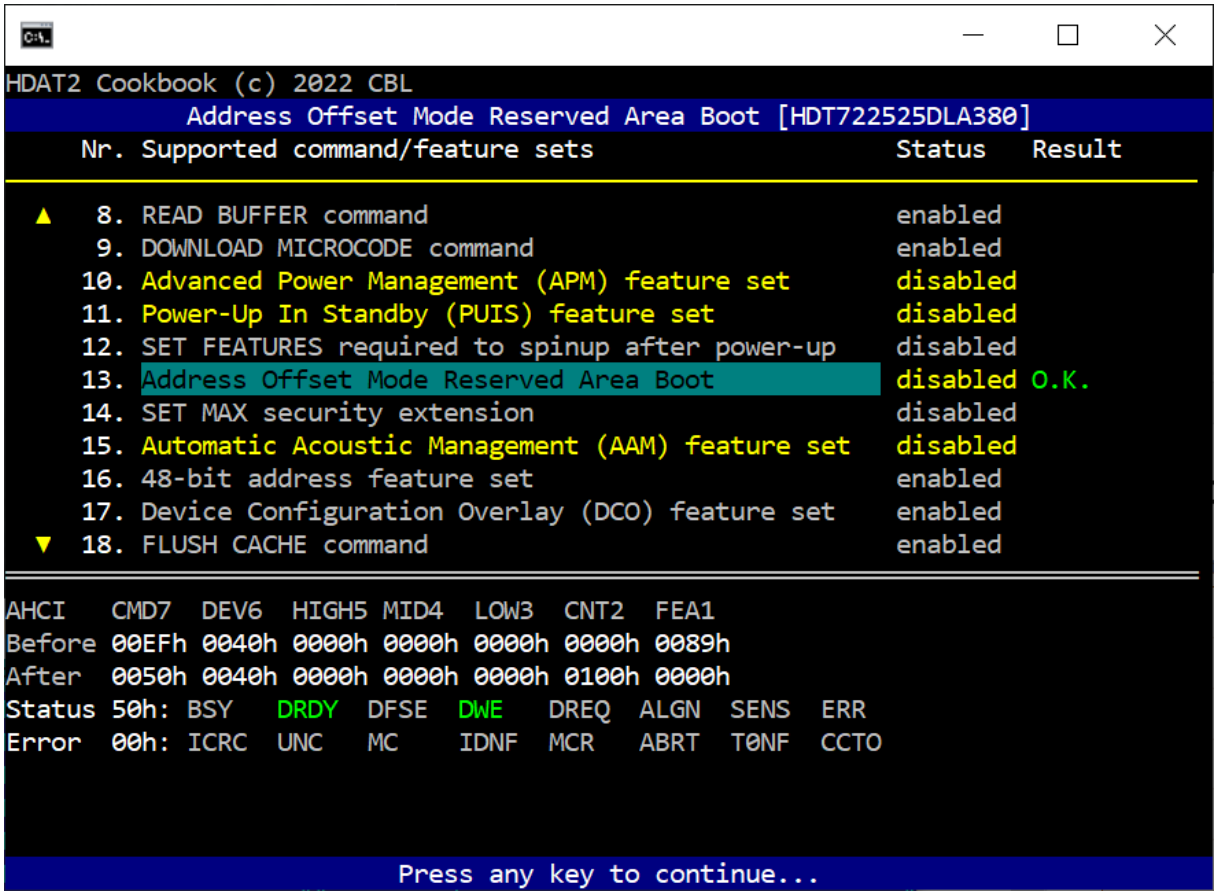
Disable OFFS area

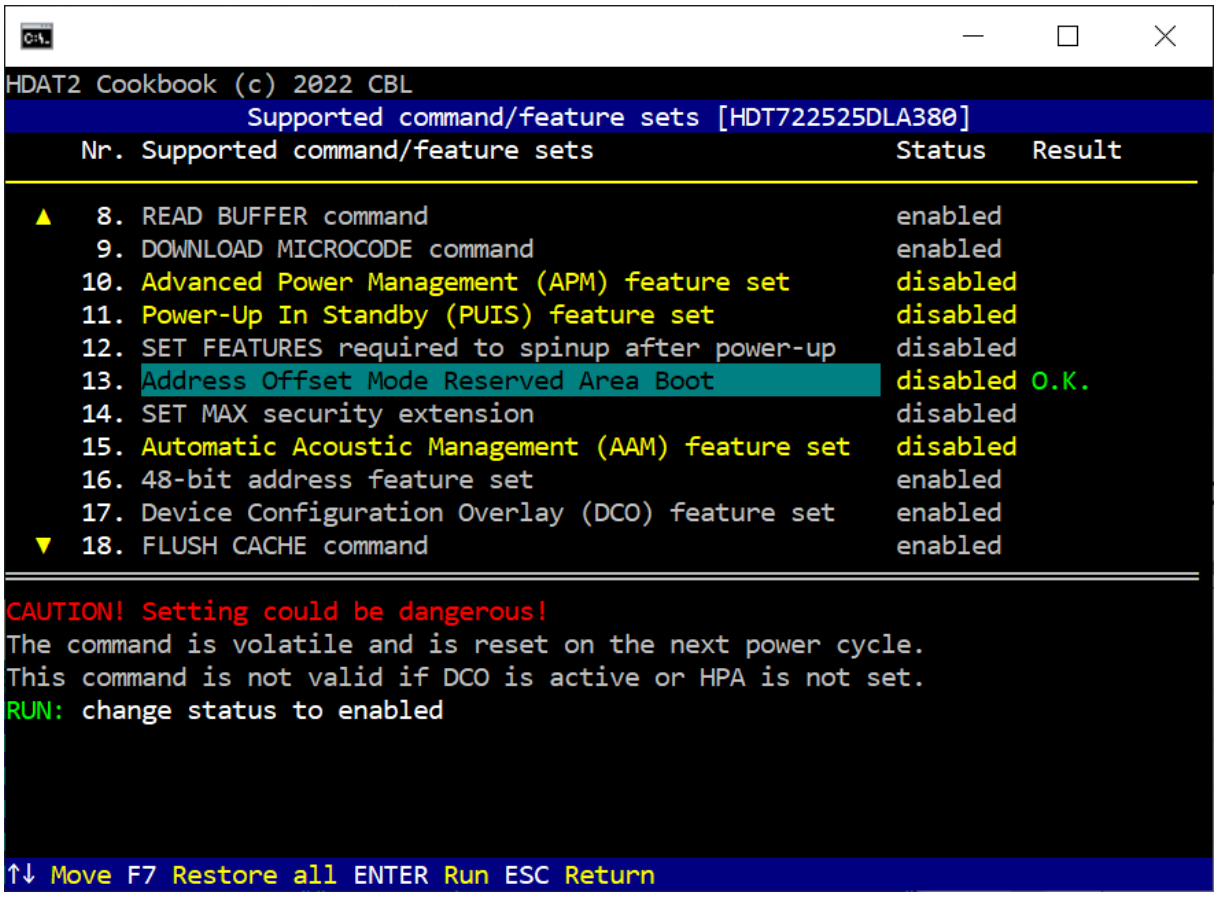
Disable Address Offset Feature removes the address offset and sets the size of the drive reported by the Identify Device command back to the size specified in the last non-volatile Set Max Address command.

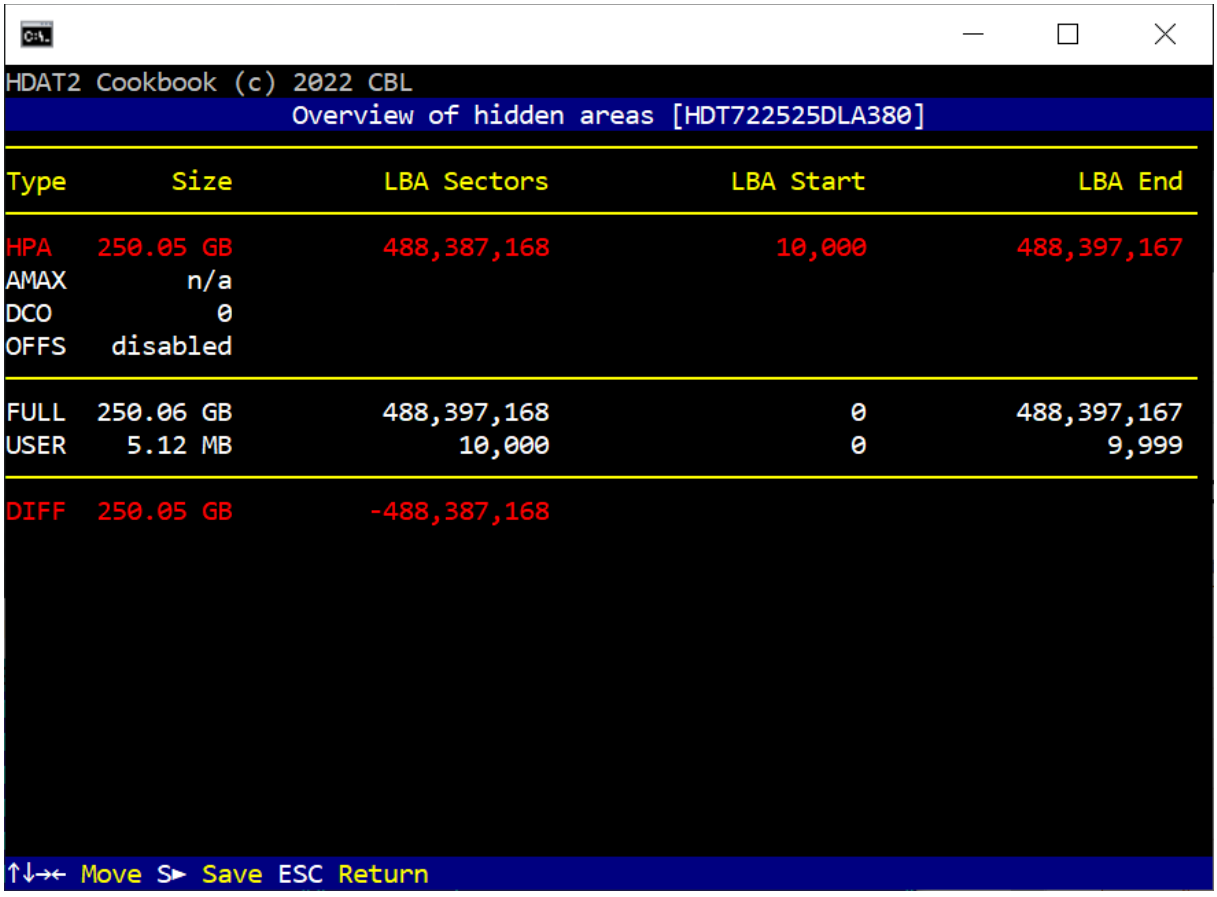
First we turn off the Address Offset Mode setting.


HDAT2 Cookbook (c) 2022 CBL
Supported command/feature sets [HDT722525DLA380]
Nr. Supported command/feature sets Status Result
8. READ BUFFER command enabled
9. DOWNLOAD MICROCODE command enabled
10. Advanced Power Management (APM) feature set disabled
11. Power-Up In Standby (PUIS) feature set disabled
12. SET FEATURES required to spinup after power-up disabled
13. Address Offset Mode Reserved Area Boot enabled
14. SET MAX security extension disabled
15. Automatic Acoustic Management (AAM) feature set disabled
16. 48-bit address feature set enabled
17. Device Configuration Overlay (DCO) feature set enabled
18. FLUSH CACHE command enabled
CAUTION! Setting could be dangerous!
The command is volatile and is reset on the next power cycle.
This command is not valid if DCO is active or HPA is not set.
RUN: change status to disabled
↑↓ Move F7 Restore all ENTER Run ESC Return

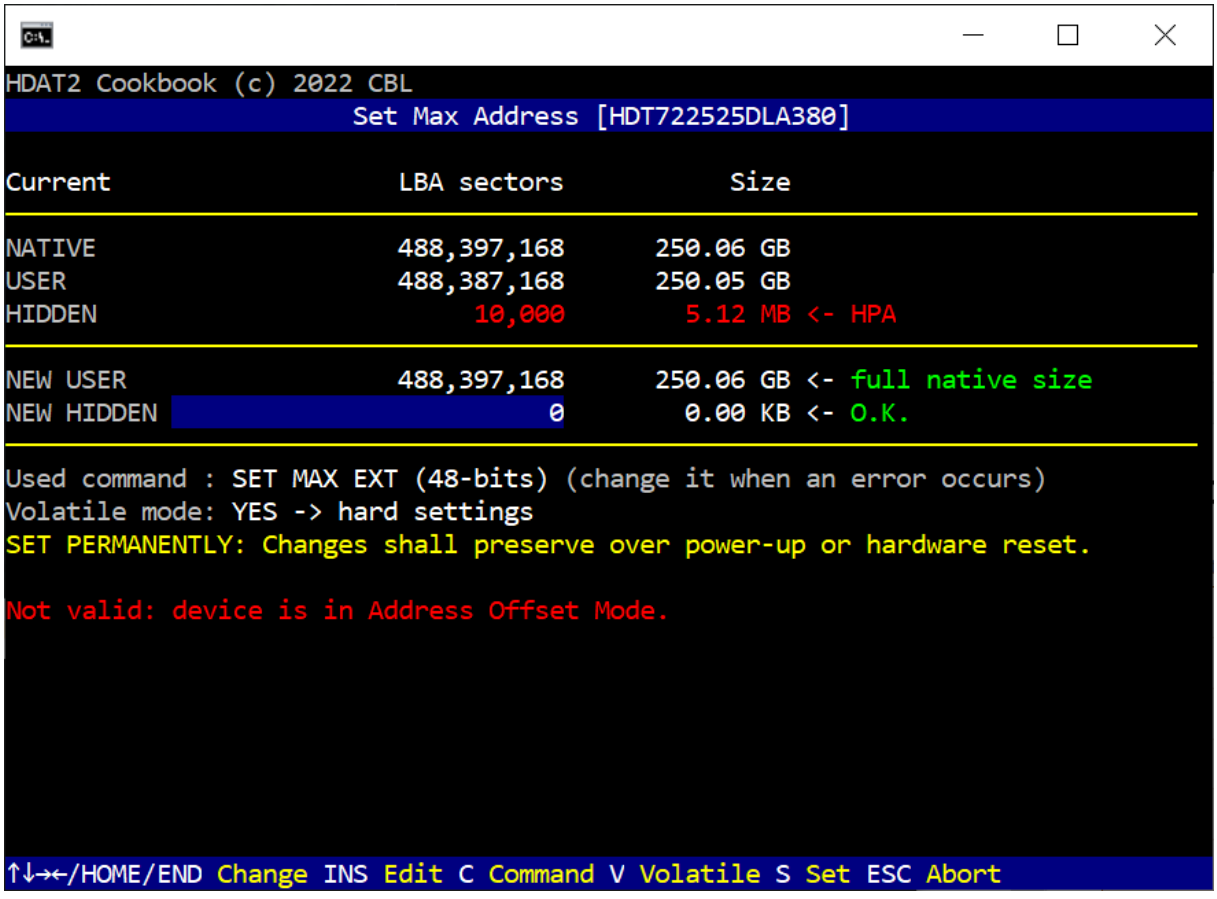

HDAT2 Cookbook (c) 2022 CBL
Address Offset Mode Reserved Area Boot [HDT722525DLA380]
Nr. Supported command/feature sets Status Result
8. READ BUFFER command enabled
9. DOWNLOAD MICROCODE command enabled
10. Advanced Power Management (APM) feature set disabled
11. Power-Up In Standby (PUIS) feature set disabled
12. SET FEATURES required to spinup after power-up disabled
13. Address Offset Mode Reserved Area Boot enabled
14. SET MAX security extension disabled
15. Automatic Acoustic Management (AAM) feature set disabled
16. 48-bit address feature set enabled
17. Device Configuration Overlay (DCO) feature set enabled
18. FLUSH CACHE command enabled
CAUTION! Setting could be dangerous!
The command is volatile and is reset on the next power cycle.
This command is not valid if DCO is active or HPA is not set.
RUN: change status to disabled
Are you sure to run 'Address Offset Mode Reserved Area Boot' <Y/N> ?


HDAT2 Cookbook (c) 2022 CBL
Address Offset Mode Reserved Area Boot [HDT722525DLA380]
Nr. Supported command/feature sets Status Result
8. READ BUFFER command enabled
9. DOWNLOAD MICROCODE command enabled
10. Advanced Power Management (APM) feature set disabled
11. Power-Up In Standby (PUIS) feature set disabled
12. SET FEATURES required to spinup after power-up disabled
13. Address Offset Mode Reserved Area Boot disabled O.K.
14. SET MAX security extension disabled
15. Automatic Acoustic Management (AAM) feature set disabled
16. 48-bit address feature set enabled
17. Device Configuration Overlay (DCO) feature set enabled
18. FLUSH CACHE command enabled
AHCI CMD7 DEV6 HIGH5 MID4 LOW3 CNT2 FEA1
Before 00EFh 0040h 0000h 0000h 0000h 0000h 0089h
After 0050h 0040h 0000h 0000h 0000h 0100h 0000h
Status 50h: BSY DRDY DFSE DWE DREQ ALGN SENS ERR
Error 00h: ICRC UNC MC IDNF MCR ABRT T0NF CCTO
Press any key to continue...

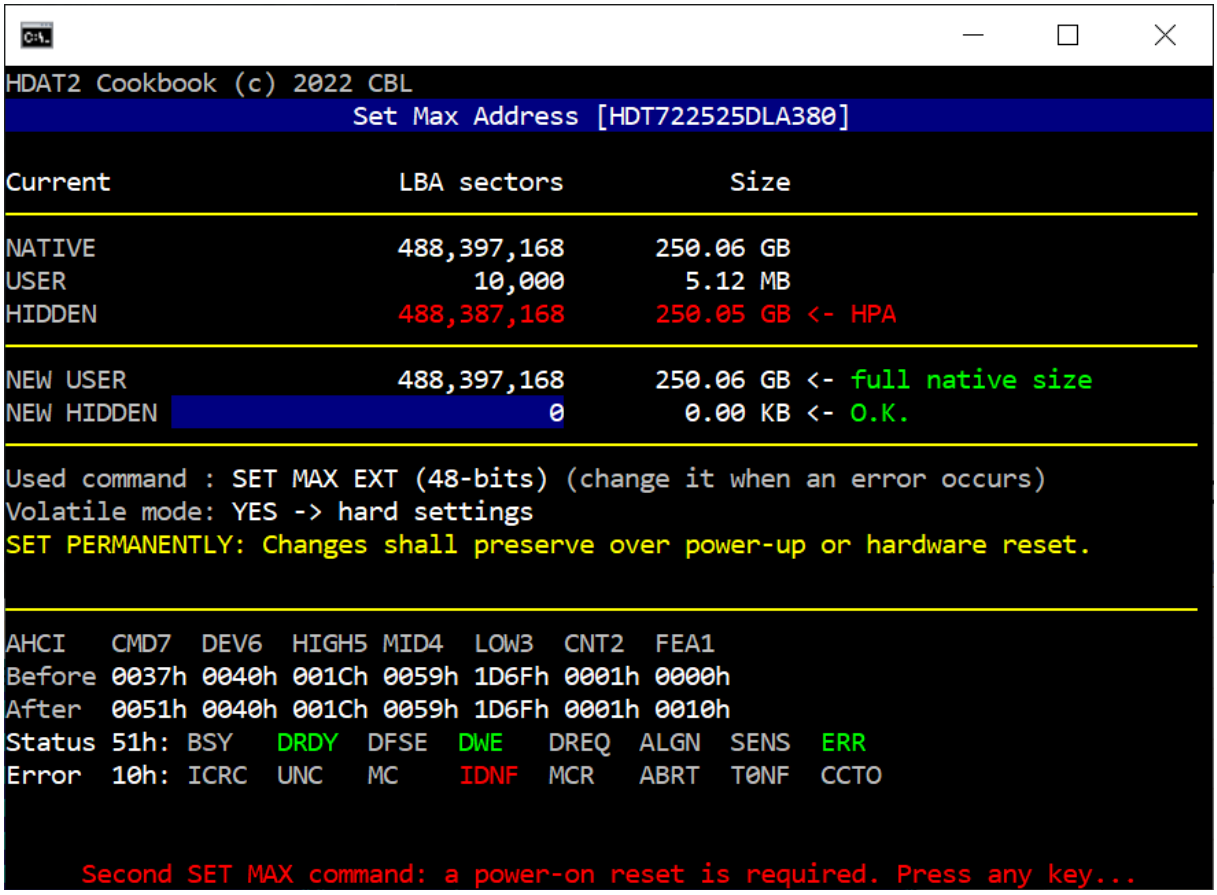

HDAT2 Cookbook (c) 2022 CBL
Supported command/feature sets [HDT722525DLA380]
Nr. Supported command/feature sets Status Result
8. READ BUFFER command enabled
9. DOWNLOAD MICROCODE command enabled
10. Advanced Power Management (APM) feature set disabled
11. Power-Up In Standby (PUIS) feature set disabled
12. SET FEATURES required to spinup after power-up disabled
13. Address Offset Mode Reserved Area Boot disabled O.K.
14. SET MAX security extension disabled
15. Automatic Acoustic Management (AAM) feature set disabled
16. 48-bit address feature set enabled
17. Device Configuration Overlay (DCO) feature set enabled
18. FLUSH CACHE command enabled
CAUTION! Setting could be dangerous!
The command is volatile and is reset on the next power cycle.
This command is not valid if DCO is active or HPA is not set.
RUN: change status to enabled
↑↓ Move F7 Restore all ENTER Run ESC Return



An error message appears when you try to remove the HPA area when the Address Offset is set.

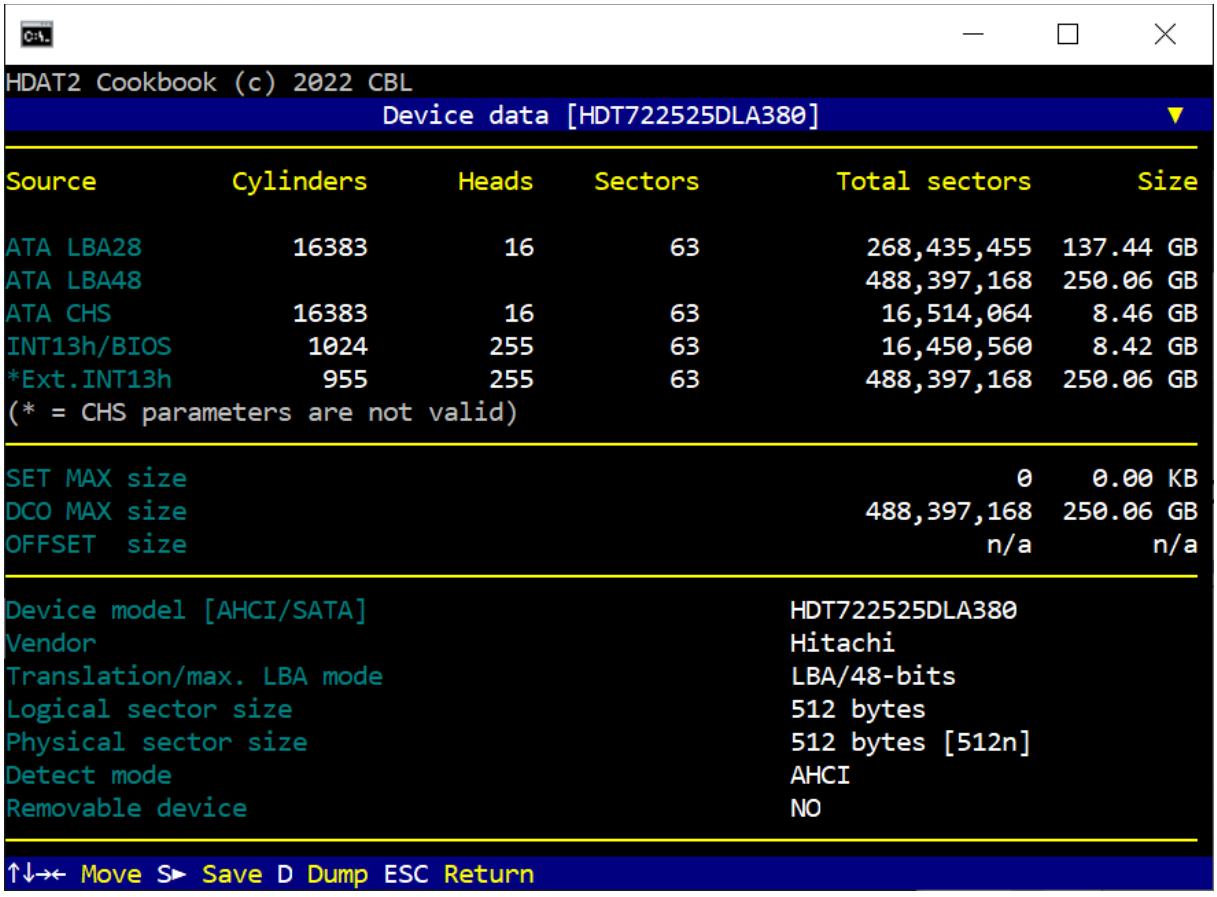


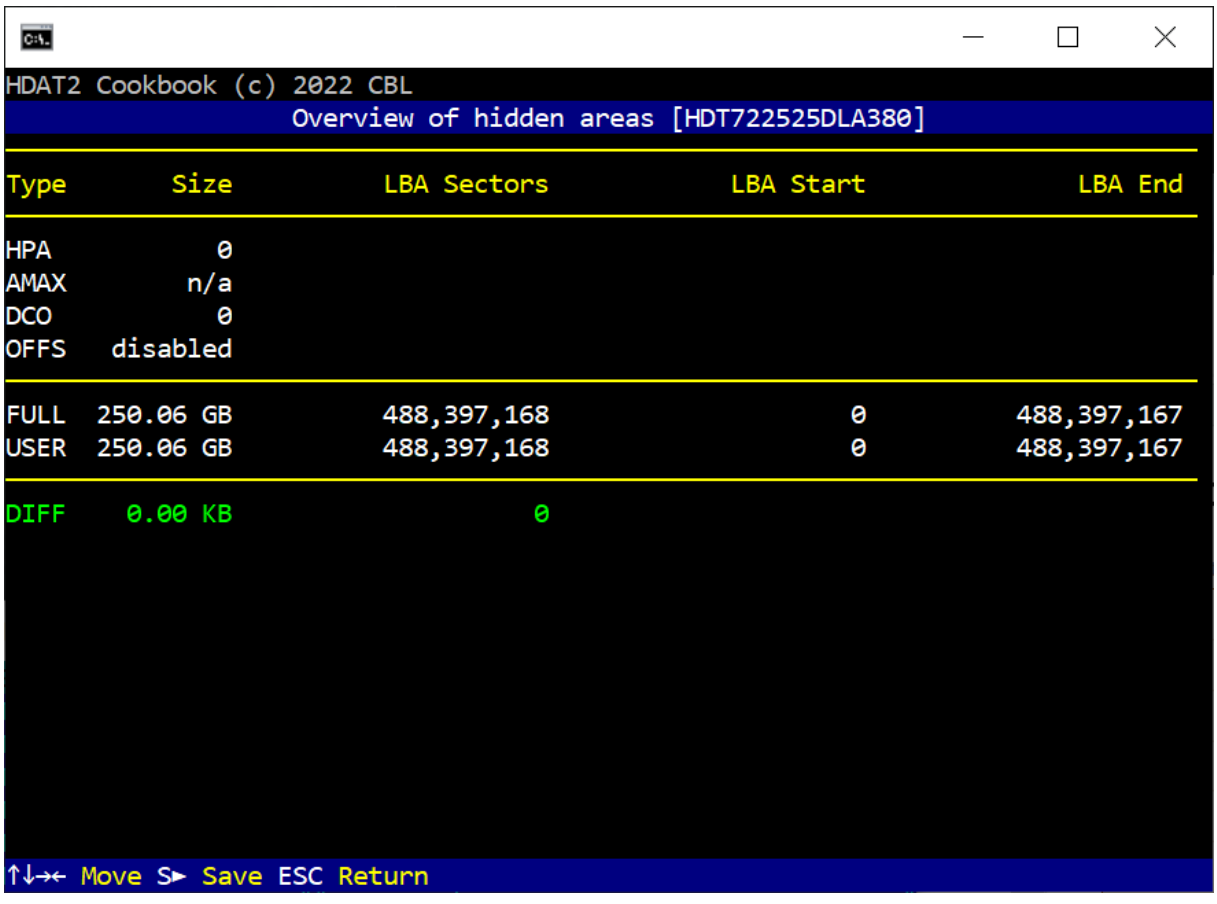
An error message appears when you try to remove a non-volatile HPA area without restarting.



This error message you will see if you try to call the second non-volatile command without power off (e.g. immediately after the first creation of HPA area). So we turn power off and on and try it again.

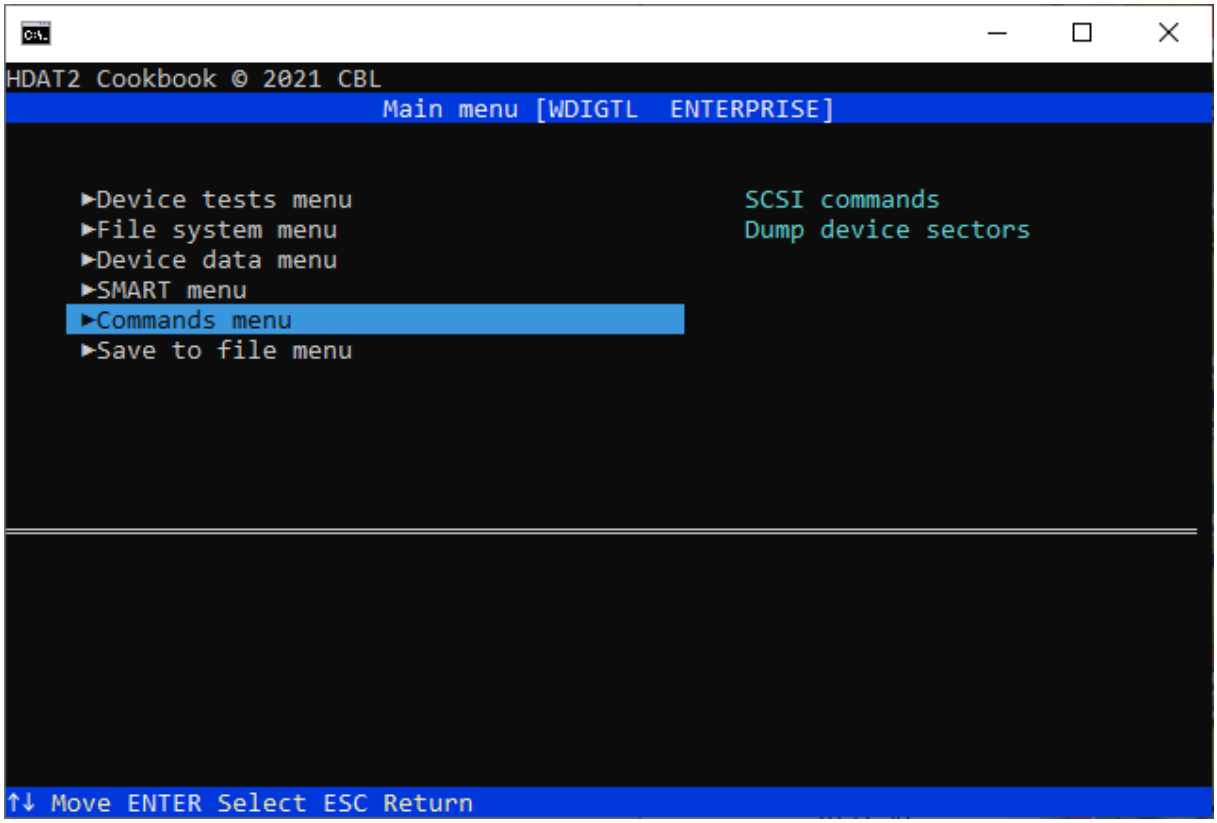
Status after removing HPA area and Address Offset Mode.

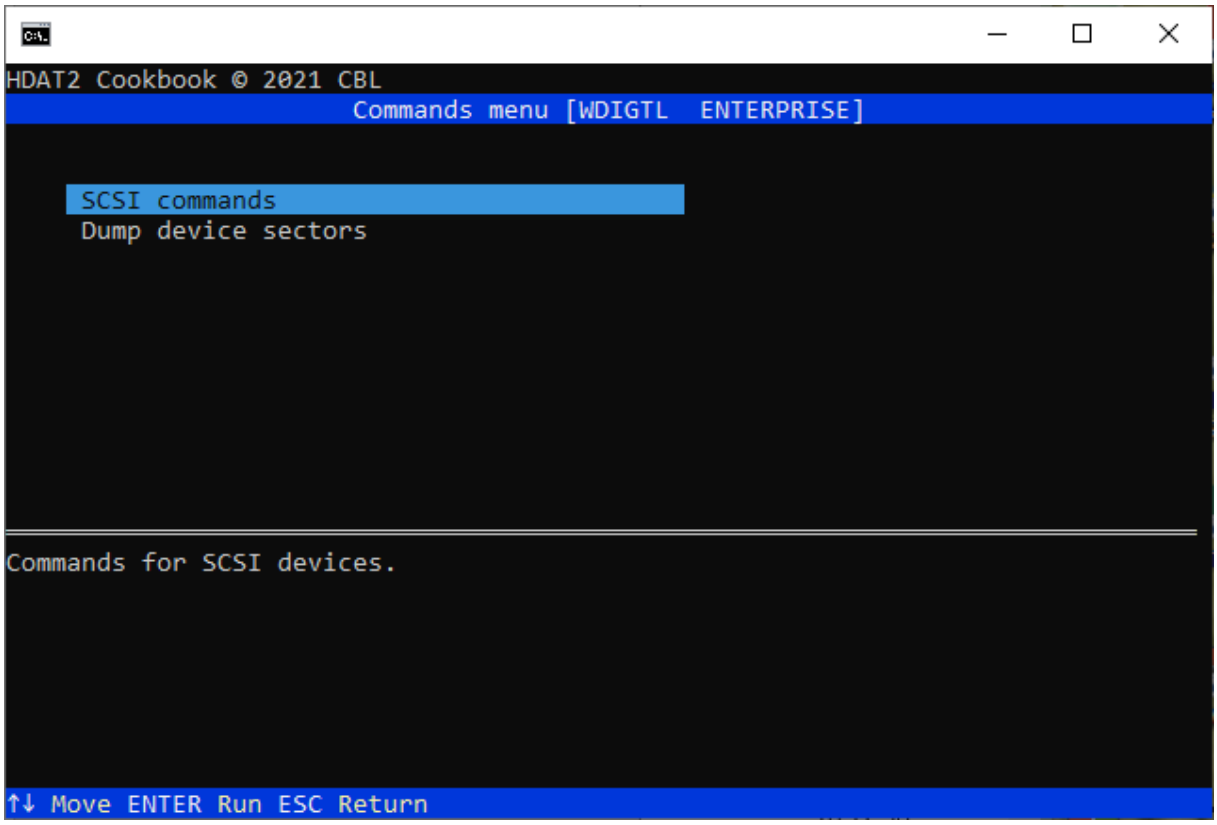


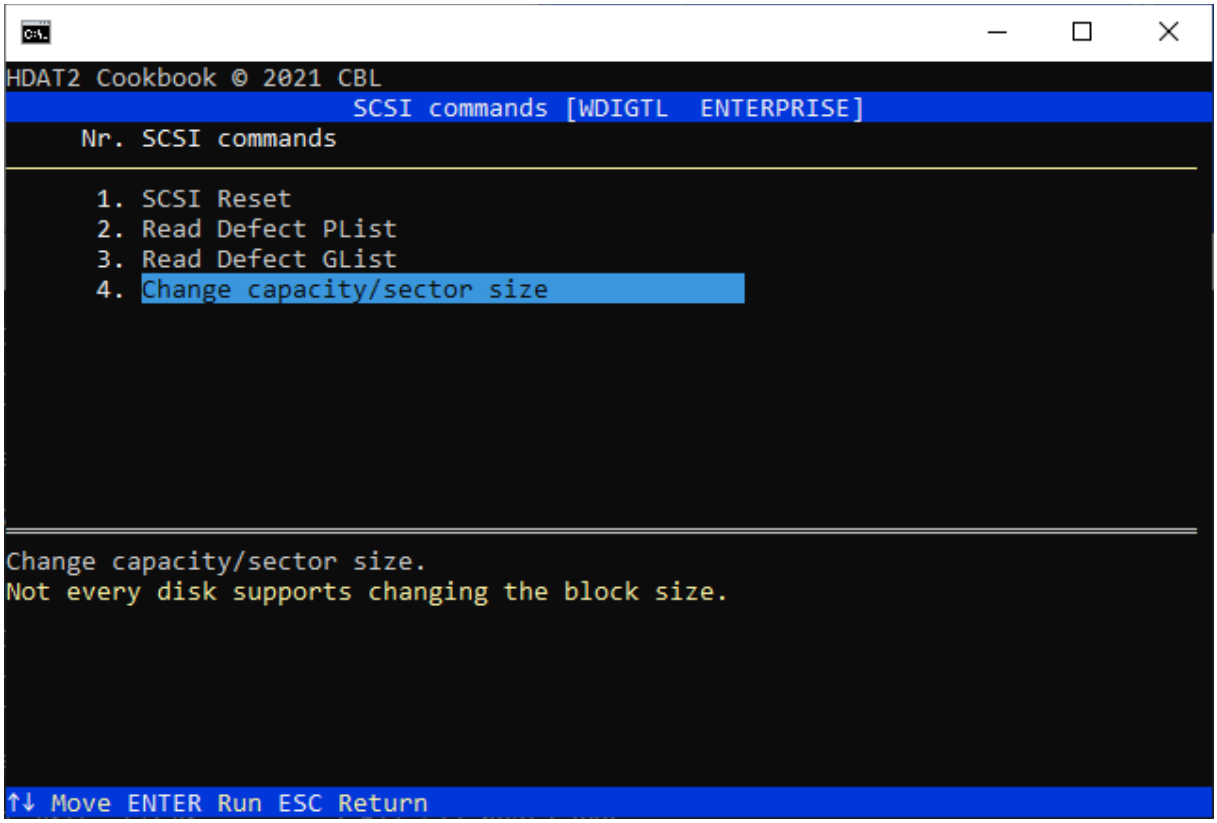


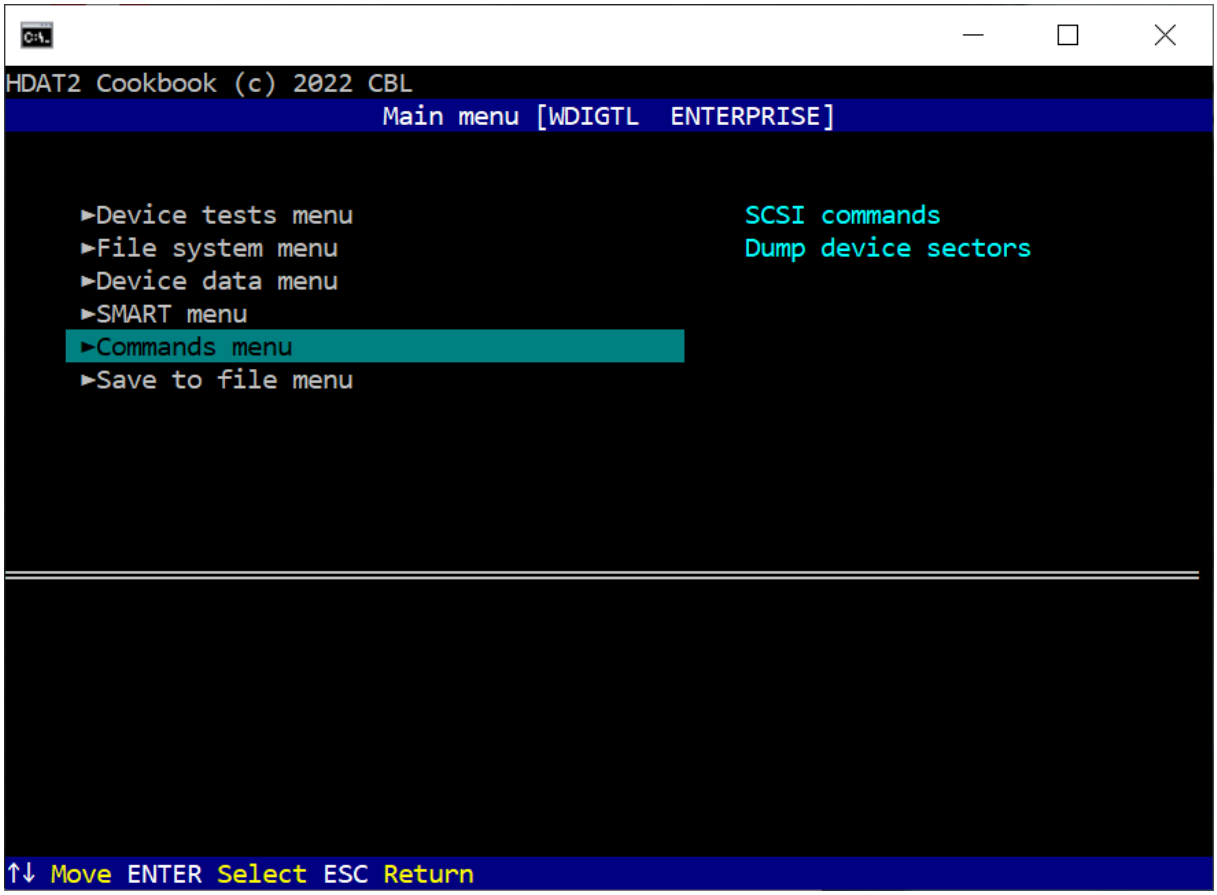
SCSI capacity

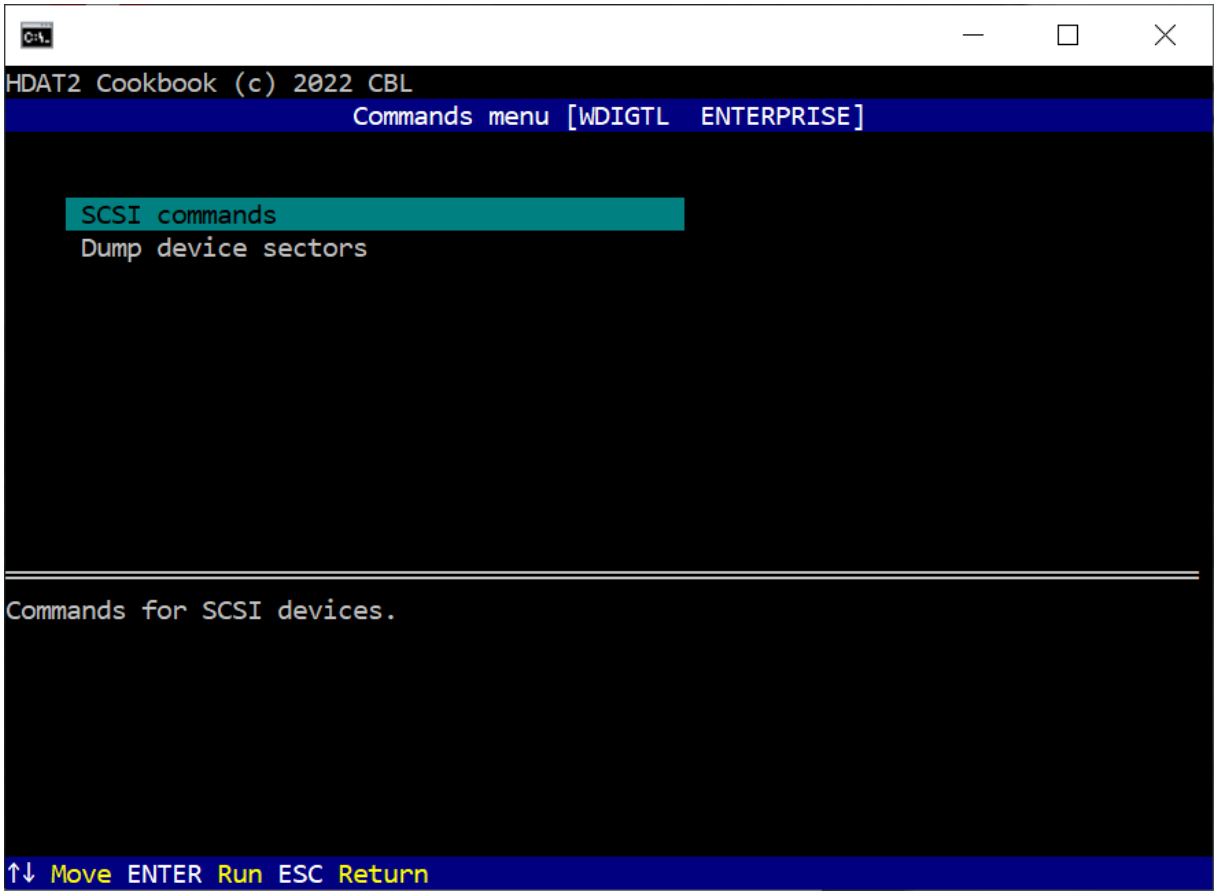
To change the sector size of SCSI disk see option SCSI drives.

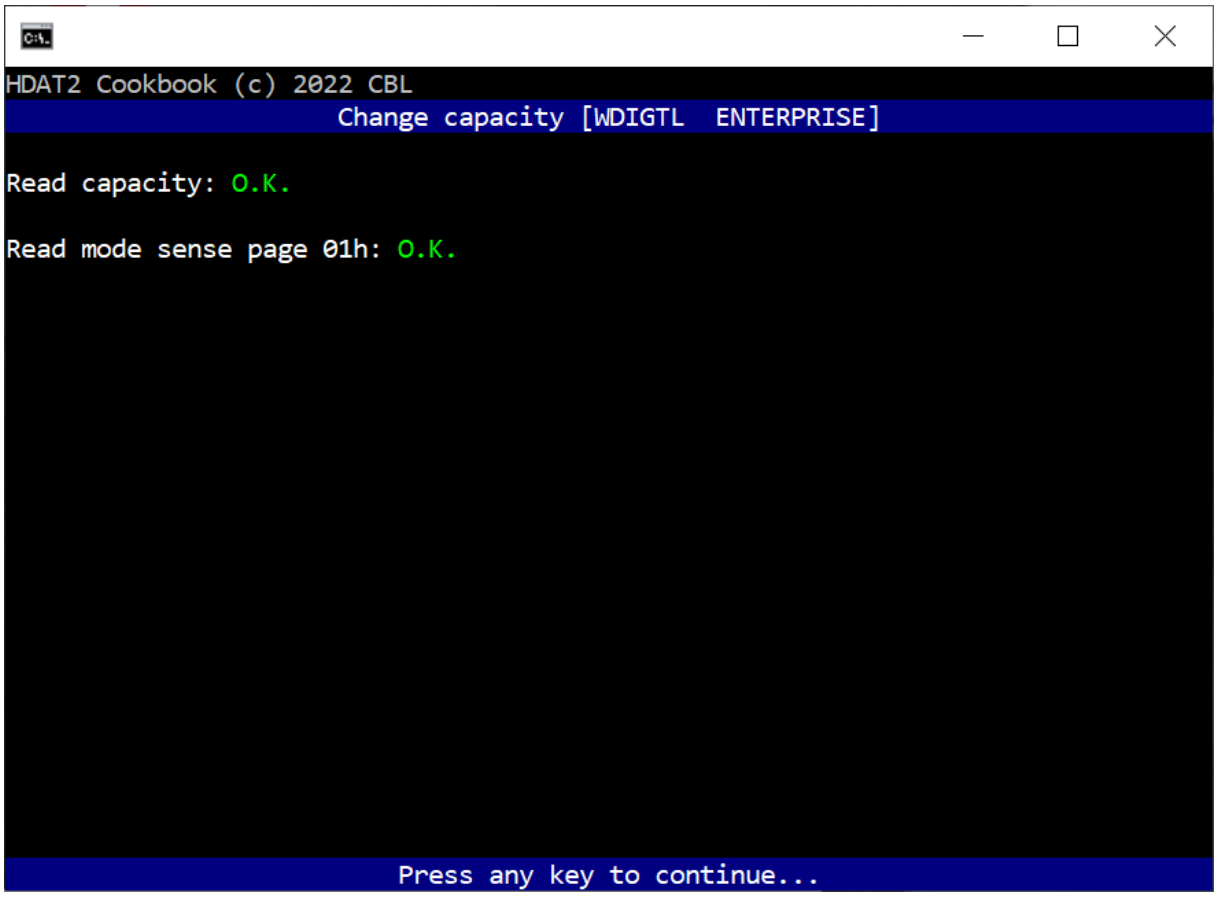

HDAT2 Cookbook © 2021 CBL
Main menu [WDIGTL ENTERPRISE]
►Device tests menu
►File system menu
►Device data menu
►SMART menu
►Commands menu
►Save to file menu
SCSI commands
Dump device sectors
↑↓ Move ENTER Select ESC Return

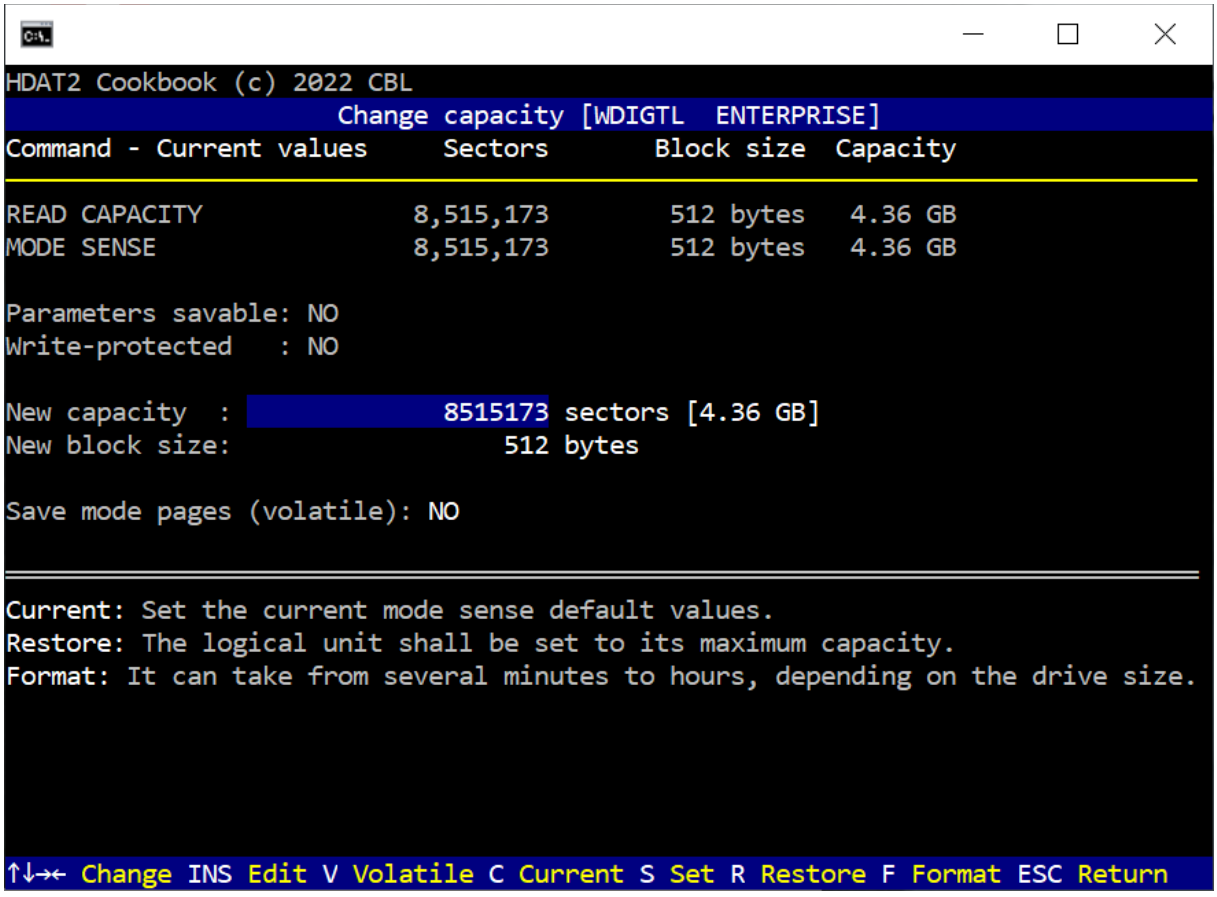

HDAT2 Cookbook © 2021 CBL
Commands menu [WDIGTL ENTERPRISE]
SCSI commands
Dump device sectors
Commands for SCSI devices.
↑↓ Move ENTER Run ESC Return


HDAT2 Cookbook © 2021 CBL
SCSI commands [WDIGTL ENTERPRISE]
Nr. SCSI commands
1. SCSI Reset
2. Read Defect PList
3. Read Defect GList
4. Change capacity/sector size
Change capacity/sector size.
Not every disk supports changing the block size.
↑↓ Move ENTER Run ESC Return

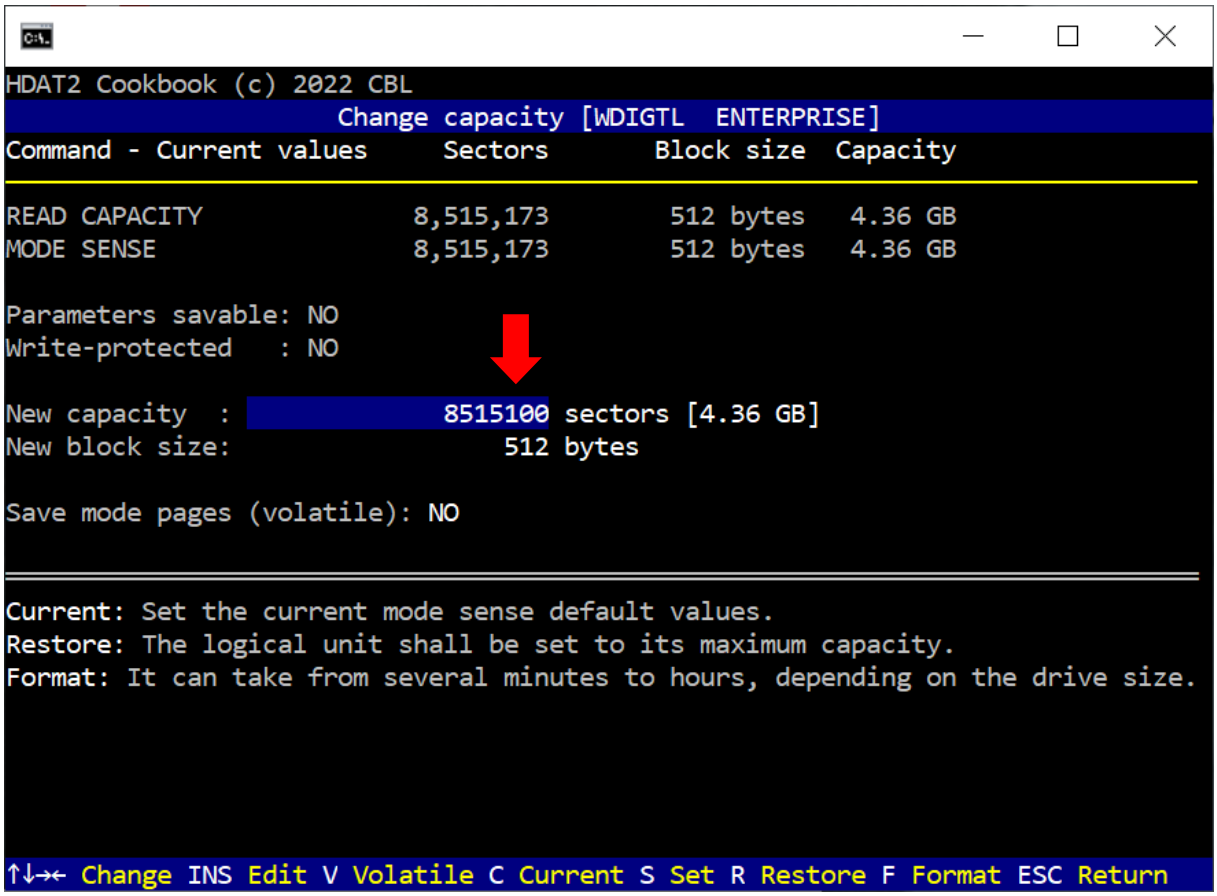

HDAT2 Cookbook (c) 2022 CBL
Main menu [WDIGTL ENTERPRISE]
►Device tests menu
►File system menu
►Device data menu
►SMART menu
►Commands menu
►Save to file menu
SCSI commands
Dump device sectors
↑↓ Move ENTER Select ESC Return

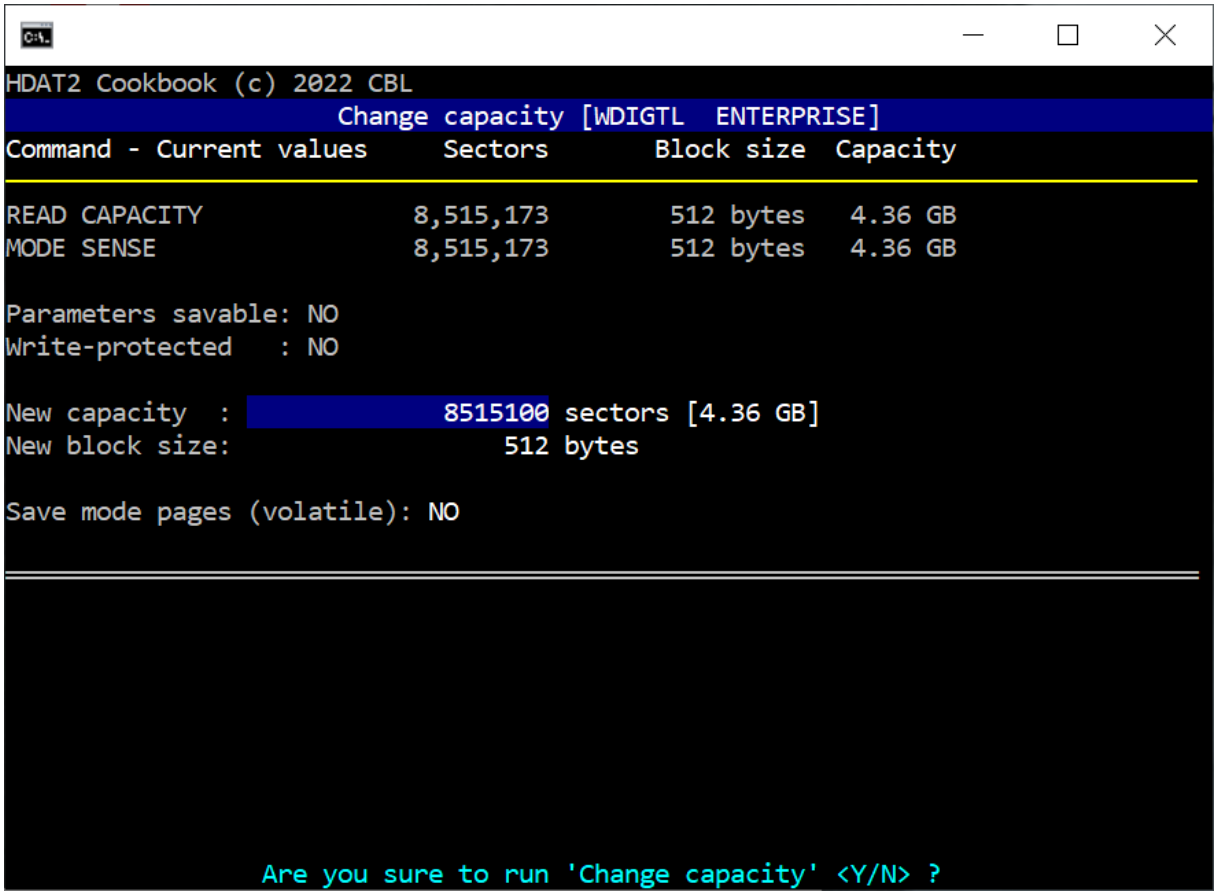

HDAT2 Cookbook (c) 2022 CBL
Commands menu [WDIGTL ENTERPRISE]
SCSI commands
Dump device sectors
Commands for SCSI devices.
↑↓ Move ENTER Run ESC Return

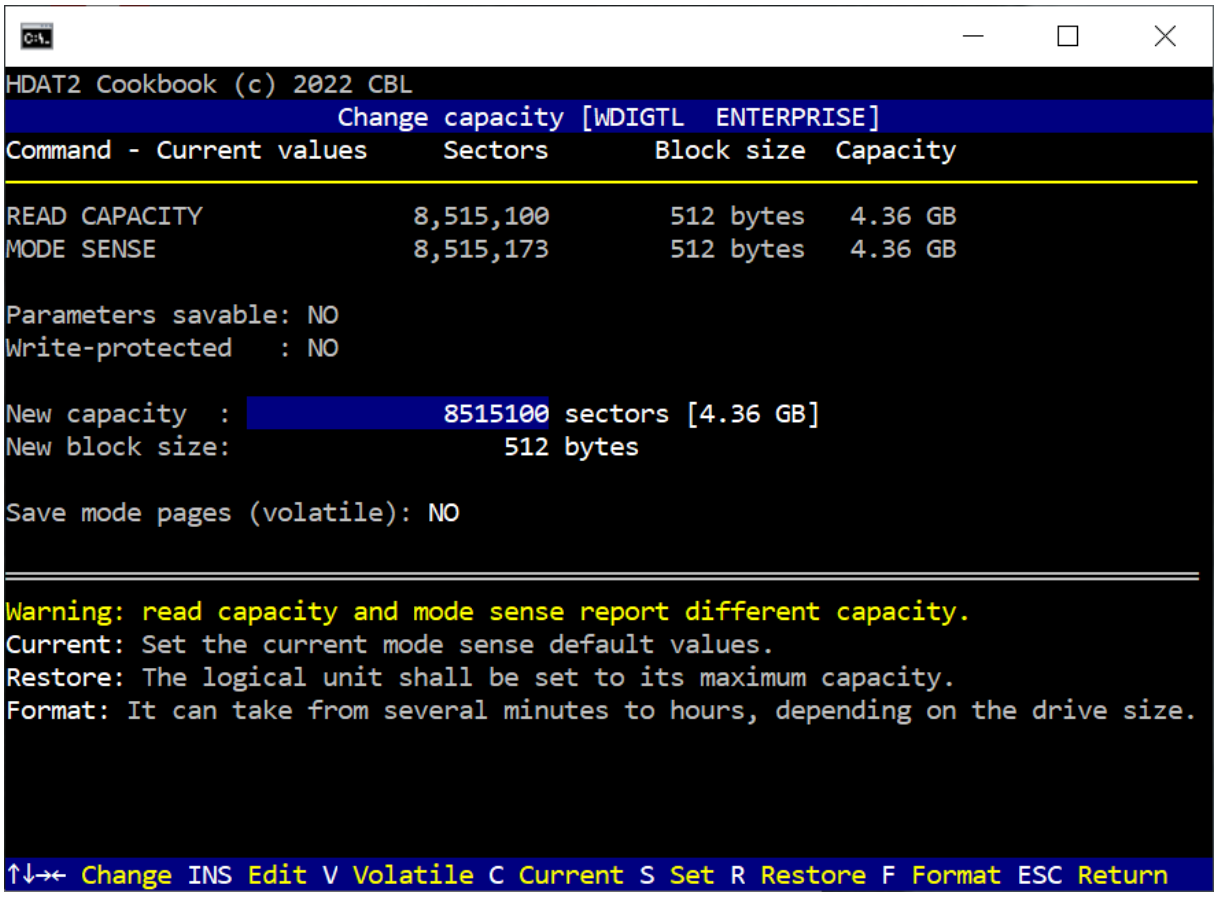

HDAT2 Cookbook (c) 2022 CBL
Change capacity [WDIGTL ENTERPRISE]
Read capacity: O.K.
Read mode sense page 01h: O.K.
Press any key to continue...



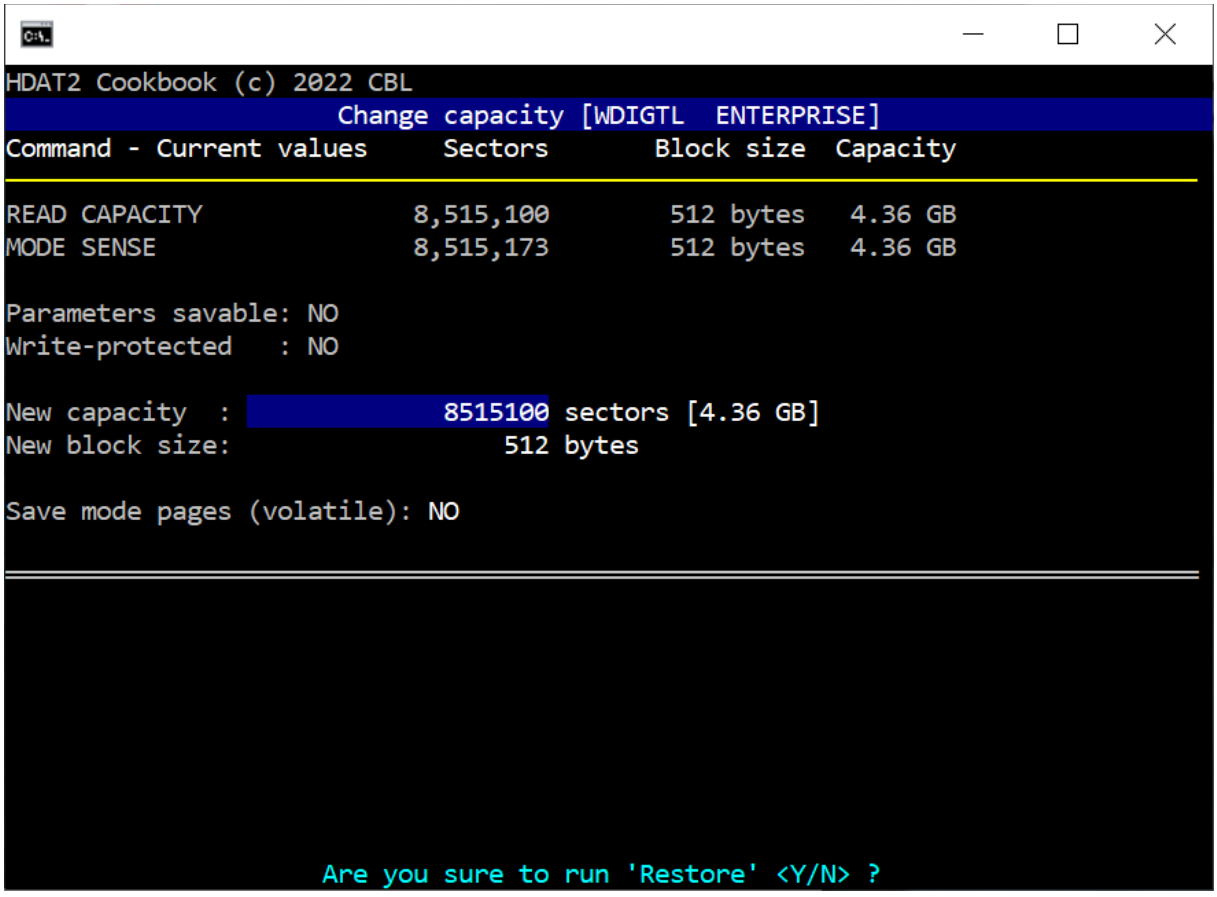
We will reduce the capacity of the SCSI disk.

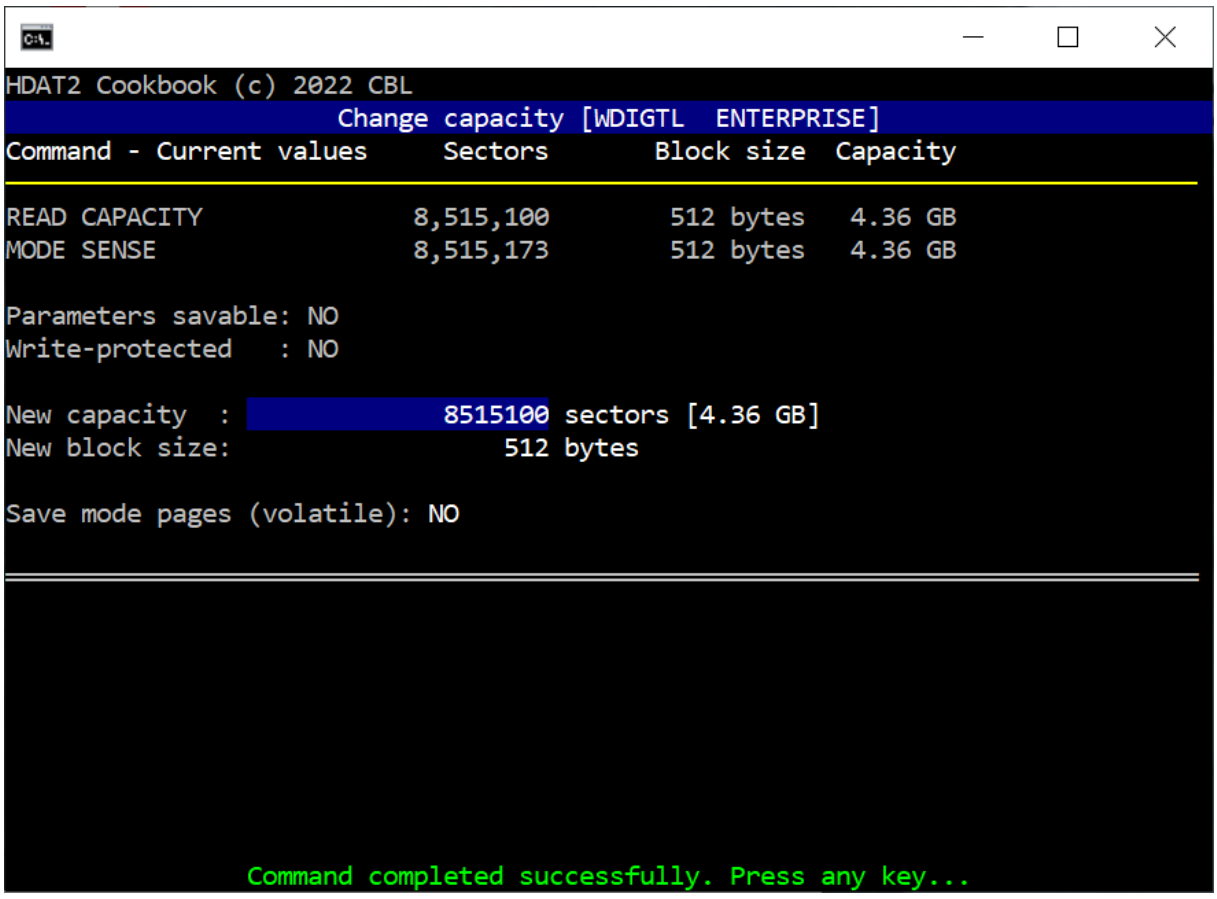


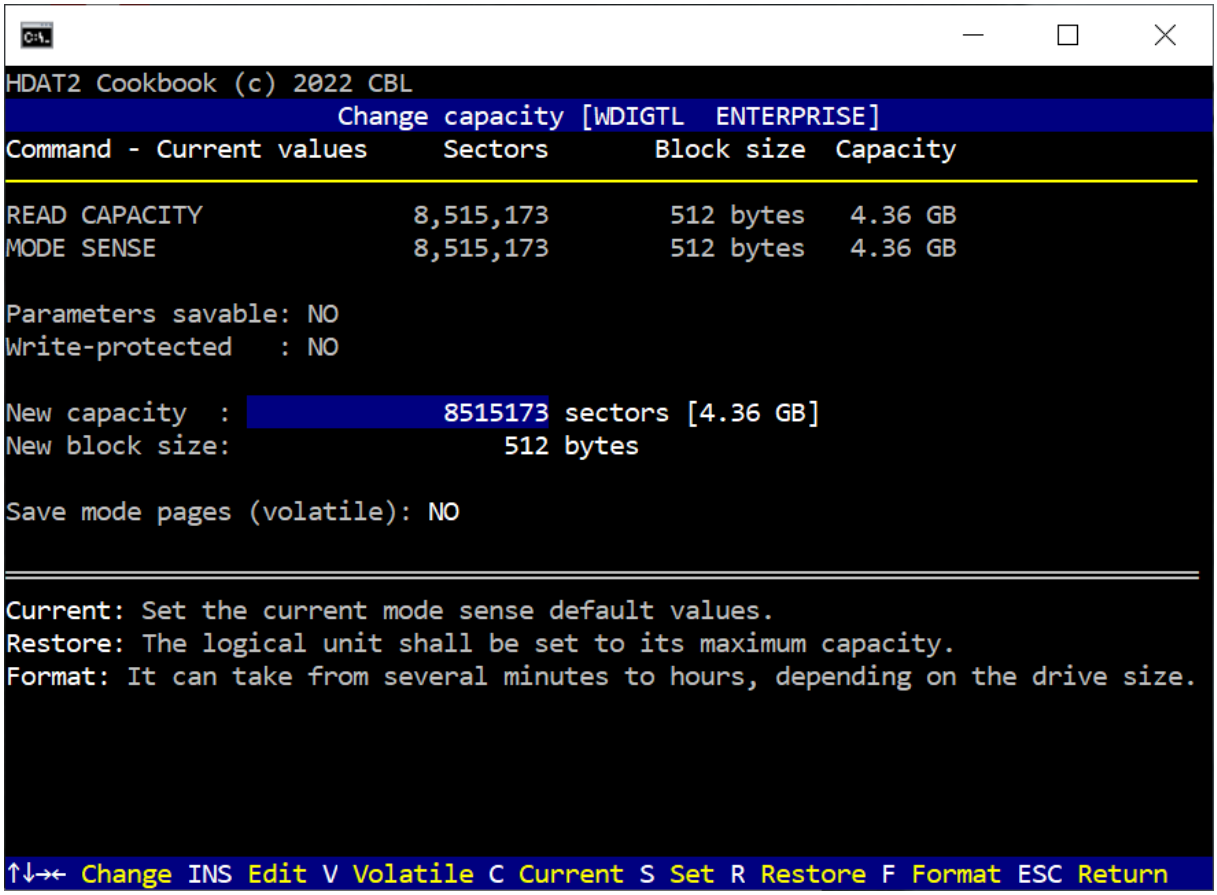




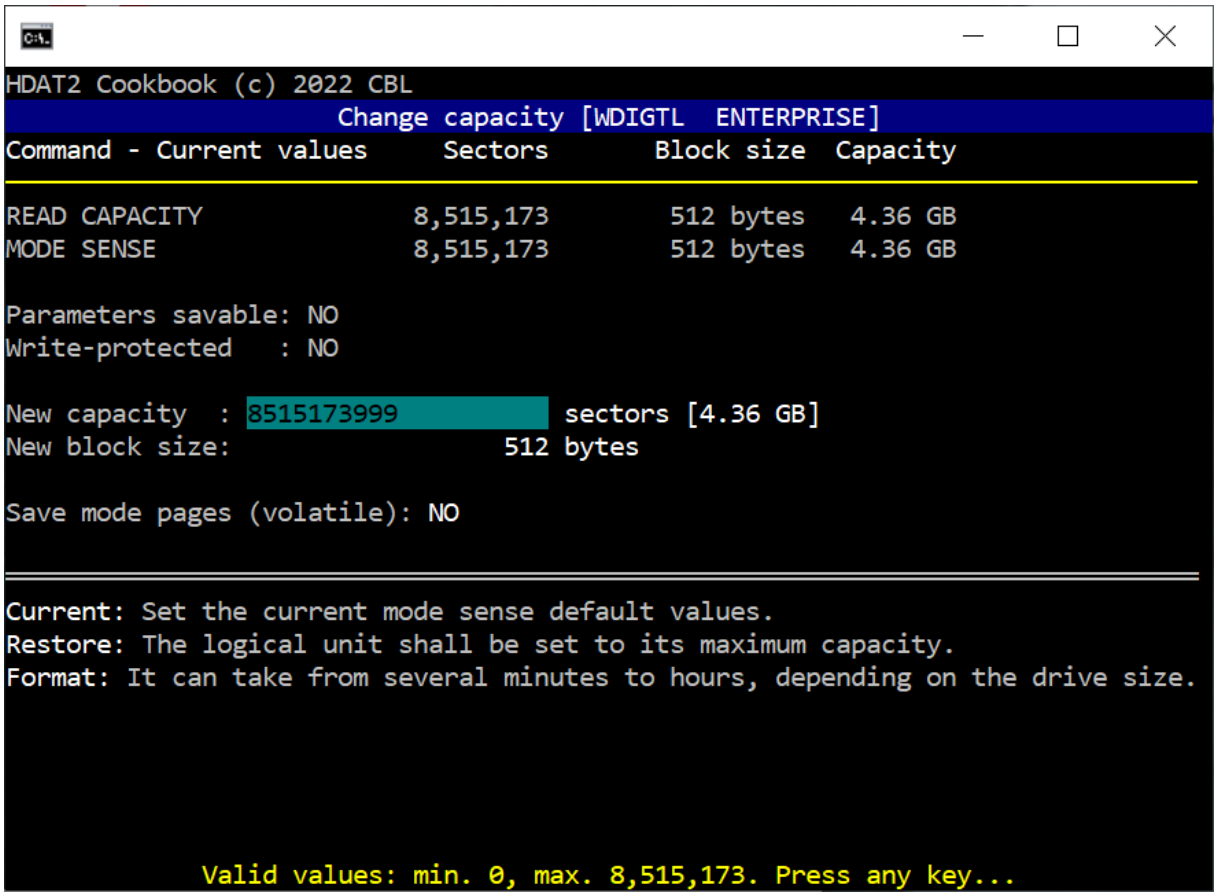
Restore the original SCSI disk capacity using 'Restore'.


HDAT2 Cookbook (c) 2022 CBL
Change capacity [WDIGTL ENTERPRISE]
Command - Current values Sectors Block size Capacity
READ CAPACITY 8,515,100 512 bytes 4.36 GB
MODE SENSE 8,515,173 512 bytes 4.36 GB
Parameters savable: NO
Write-protected : NO
New capacity : 8515100 sectors [4.36 GB]
New block size: 512 bytes
Save mode pages (volatile): NO
Are you sure to run 'Restore' <Y/N> ?


HDAT2 Cookbook (c) 2022 CBL
Change capacity [WDIGTL ENTERPRISE]
Command - Current values Sectors Block size Capacity
READ CAPACITY 8,515,100 512 bytes 4.36 GB
MODE SENSE 8,515,173 512 bytes 4.36 GB
Parameters savable: NO
Write-protected : NO
New capacity : 8515100 sectors [4.36 GB]
New block size: 512 bytes
Save mode pages (volatile): NO
Command completed successfully. Press any key...

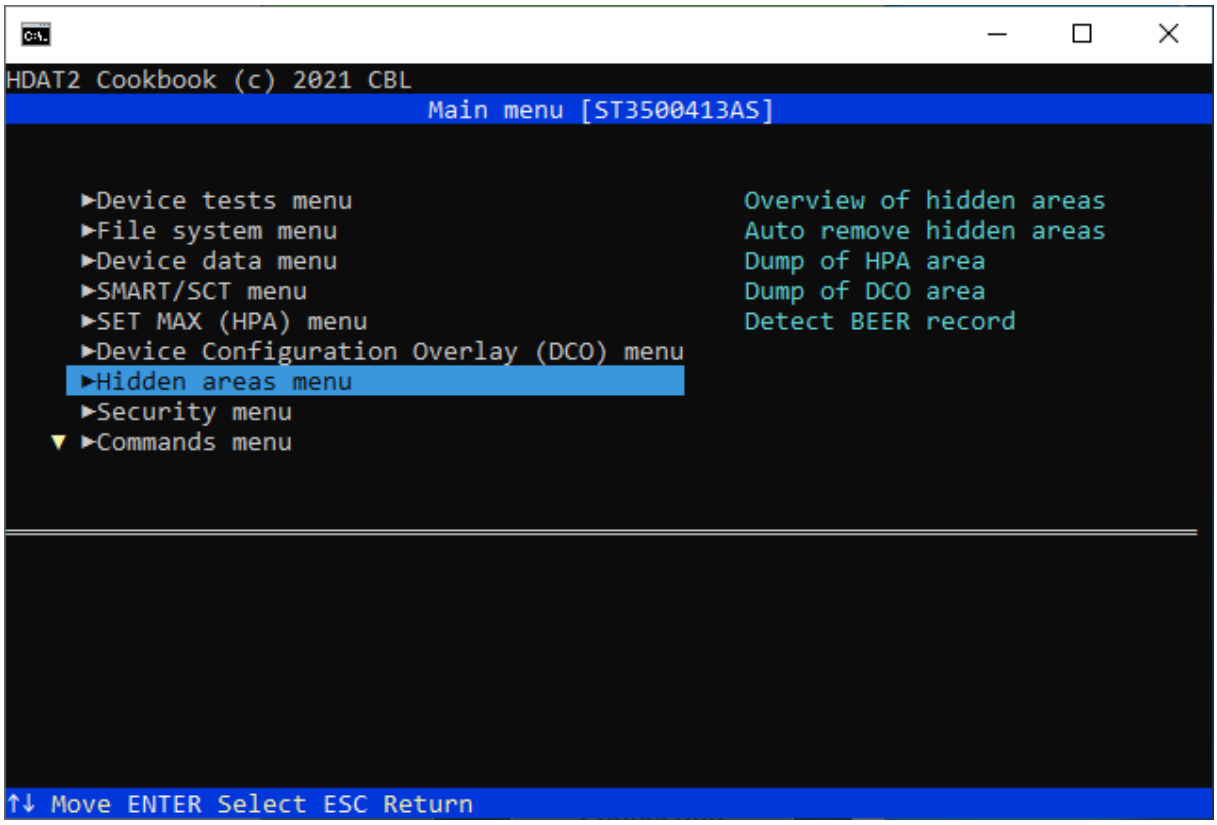


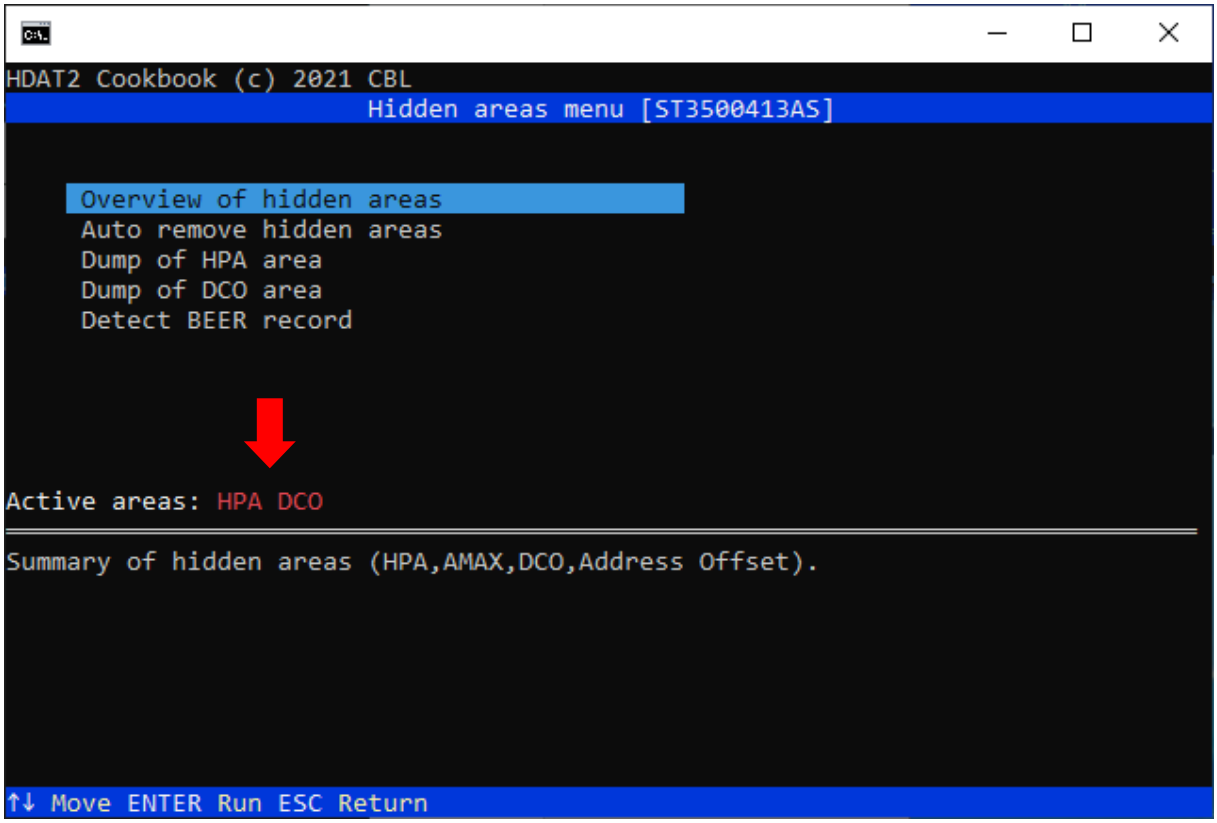
Restoring the original SCSI disk capacity using 'Restore' does not work for some disks. In this case, you must set the capacity manually via the INS key (Edit).

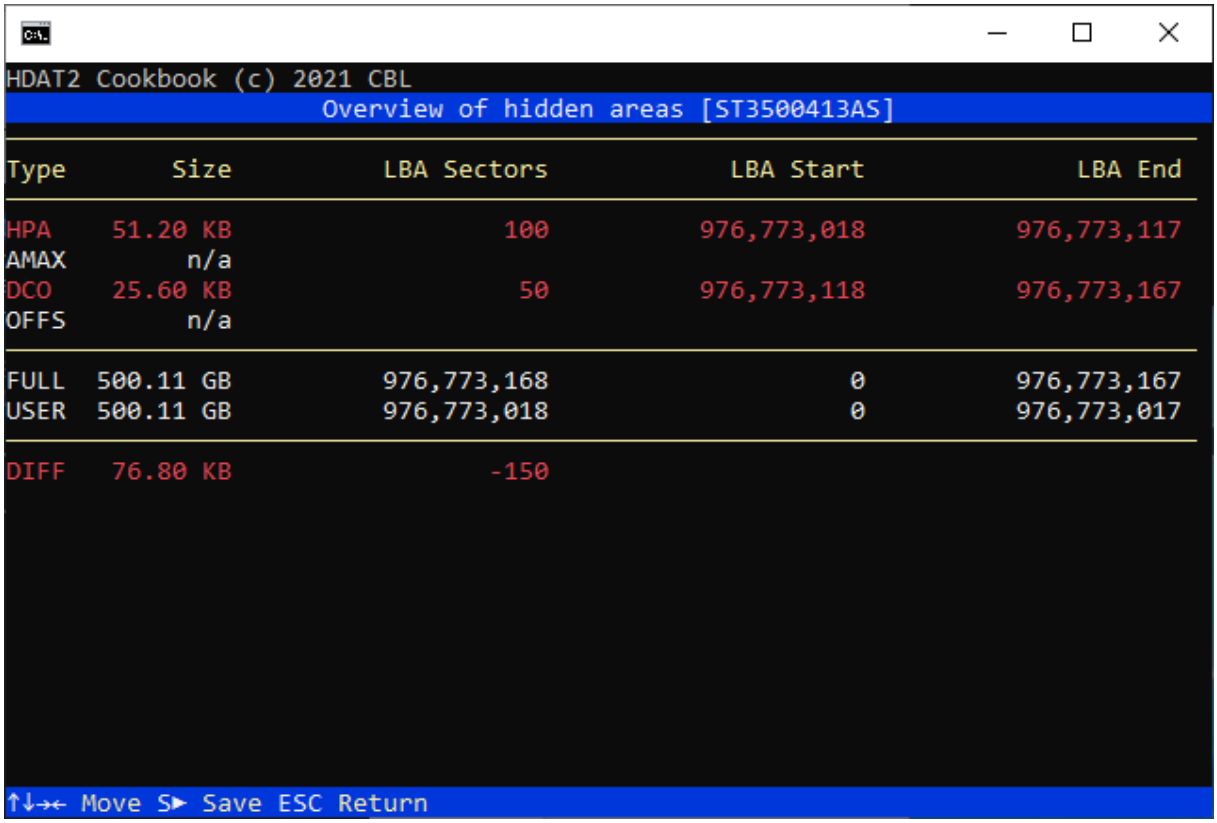


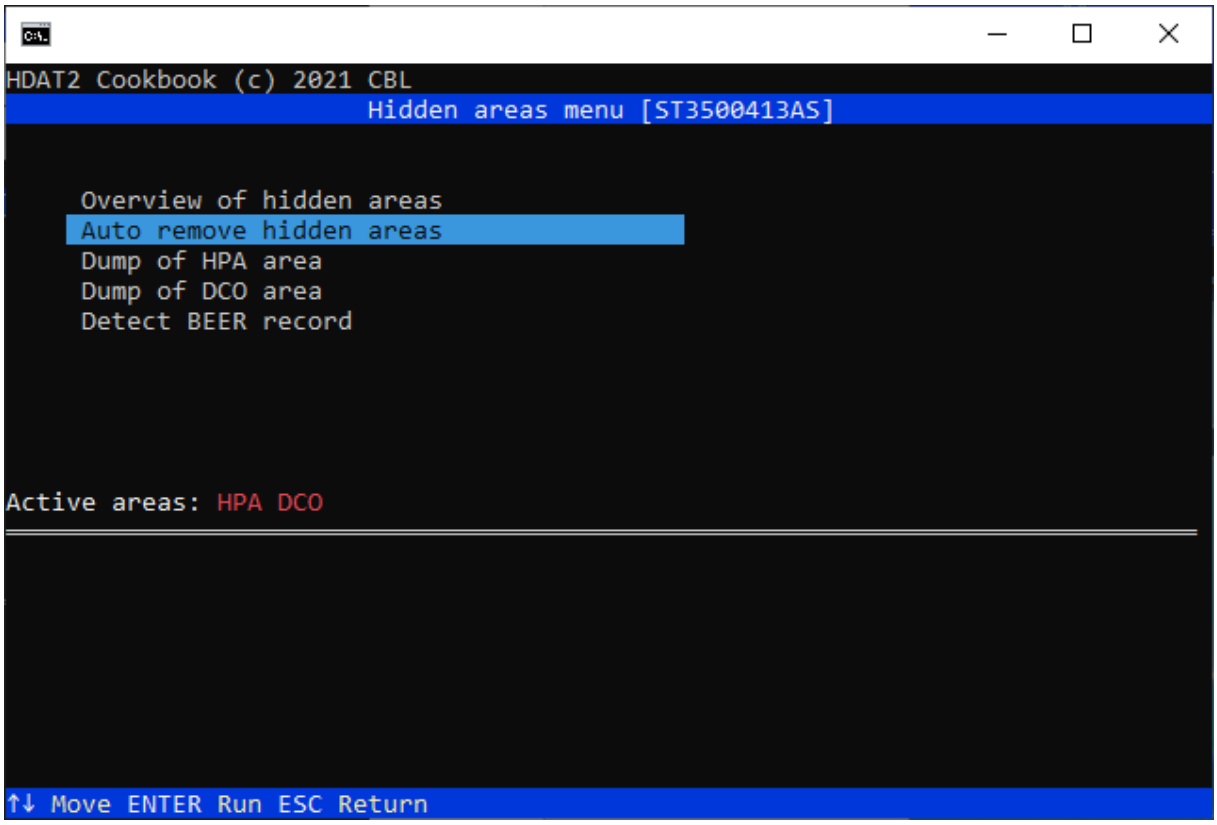
Auto remove hidden areas

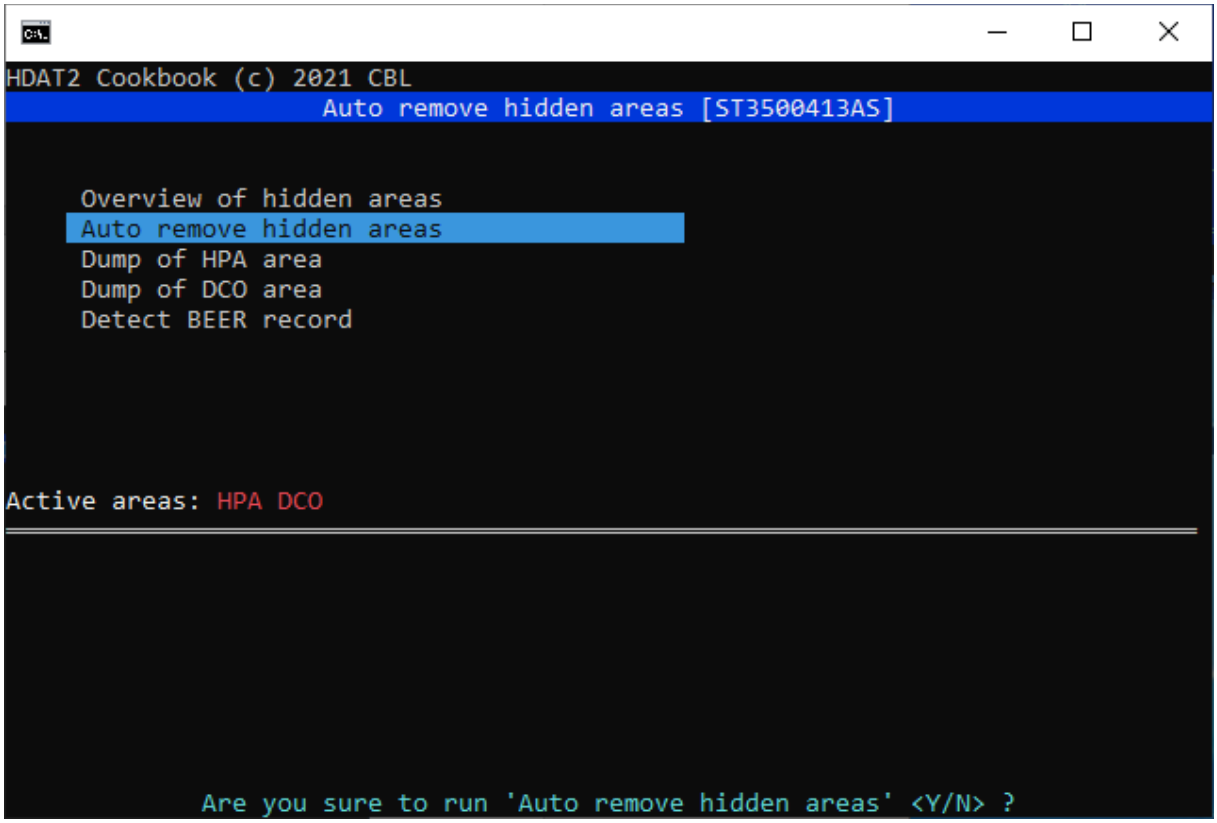
Example: We have set both hidden HPA and DCO areas, which we will now try to remove.

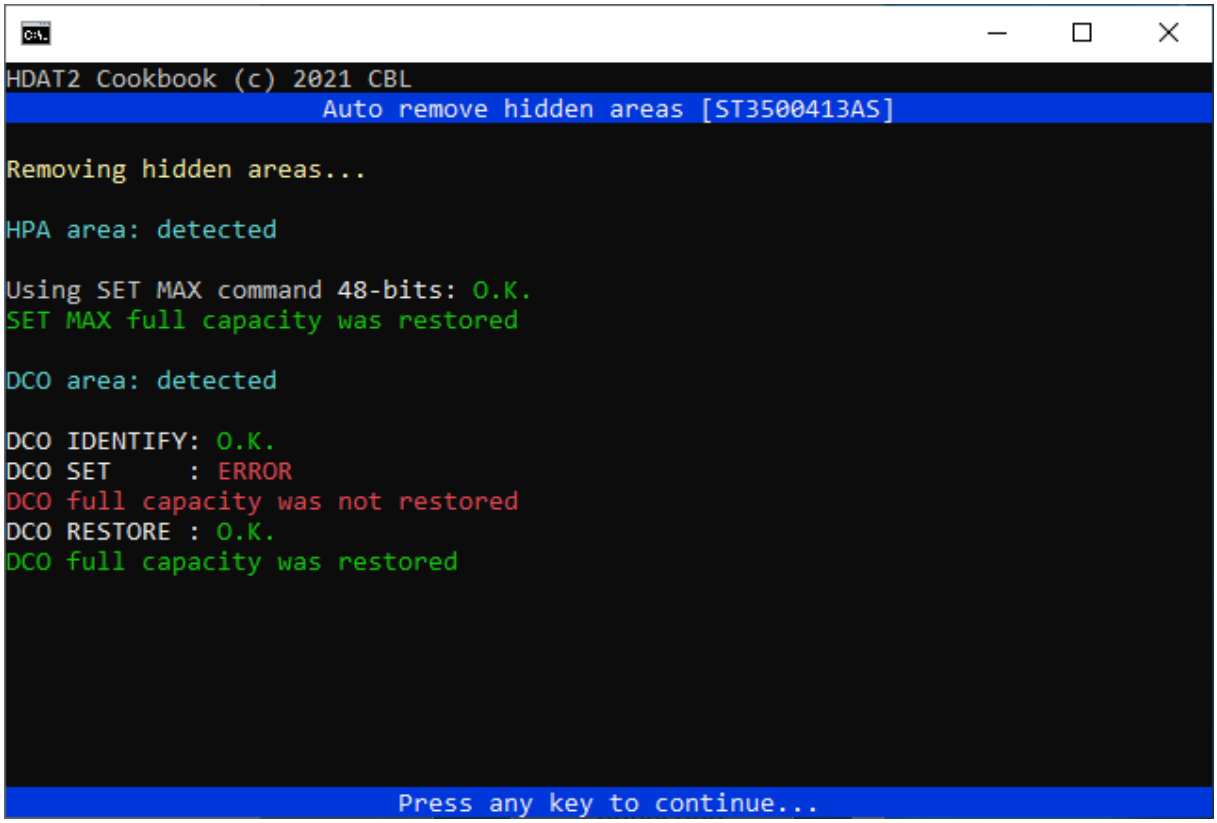





HDAT2 Cookbook (c) 2021 CBL
Overview of hidden areas [ST3500413AS]
Type Size LBA Sectors LBA Start LBA End
HPA 51.20 KB 100 976,773,018 976,773,117
AMAX n/a
DCO 25.60 KB 50 976,773,118 976,773,167
OFFS n/a
FULL 500.11 GB 976,773,168 0 976,773,167
USER 500.11 GB 976,773,018 0 976,773,017
DIFF 76.80 KB -150
↑↓→← Move S► Save ESC Return


HDAT2 Cookbook (c) 2021 CBL
Hidden areas menu [ST3500413AS]
Overview of hidden areas
Auto remove hidden areas
Dump of HPA area
Dump of DCO area
Detect BEER record
Active areas: HPA DCO
↑↓ Move ENTER Run ESC Return





An error message '**SET MAX full capacity was not restored**' appears in the case we call the second non-volatile command SET MAX without power off. Turn off and turn on the computer and try again.

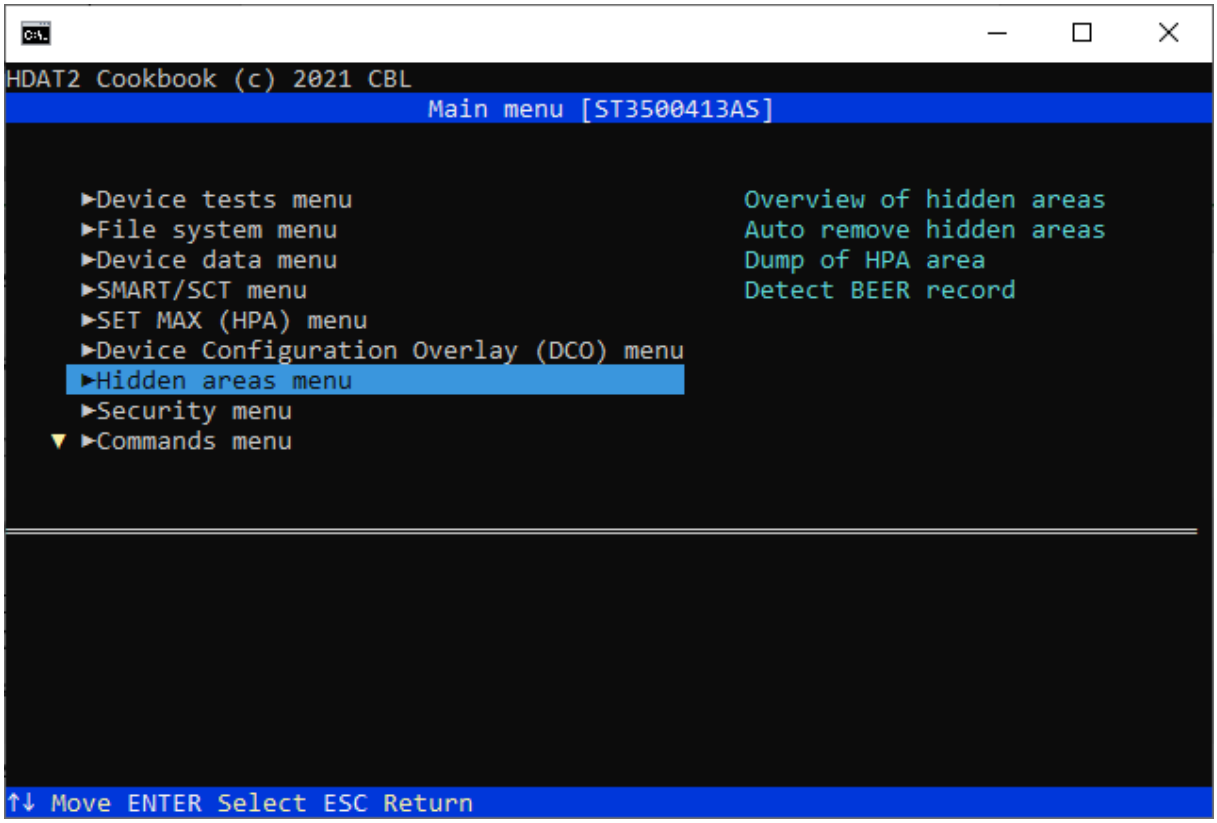
An error message '**DCO full capacity was not restored**' for the command DCO SET means that the original (native) capacity cannot be restored in this way. The DCO RESTORE command must be used.

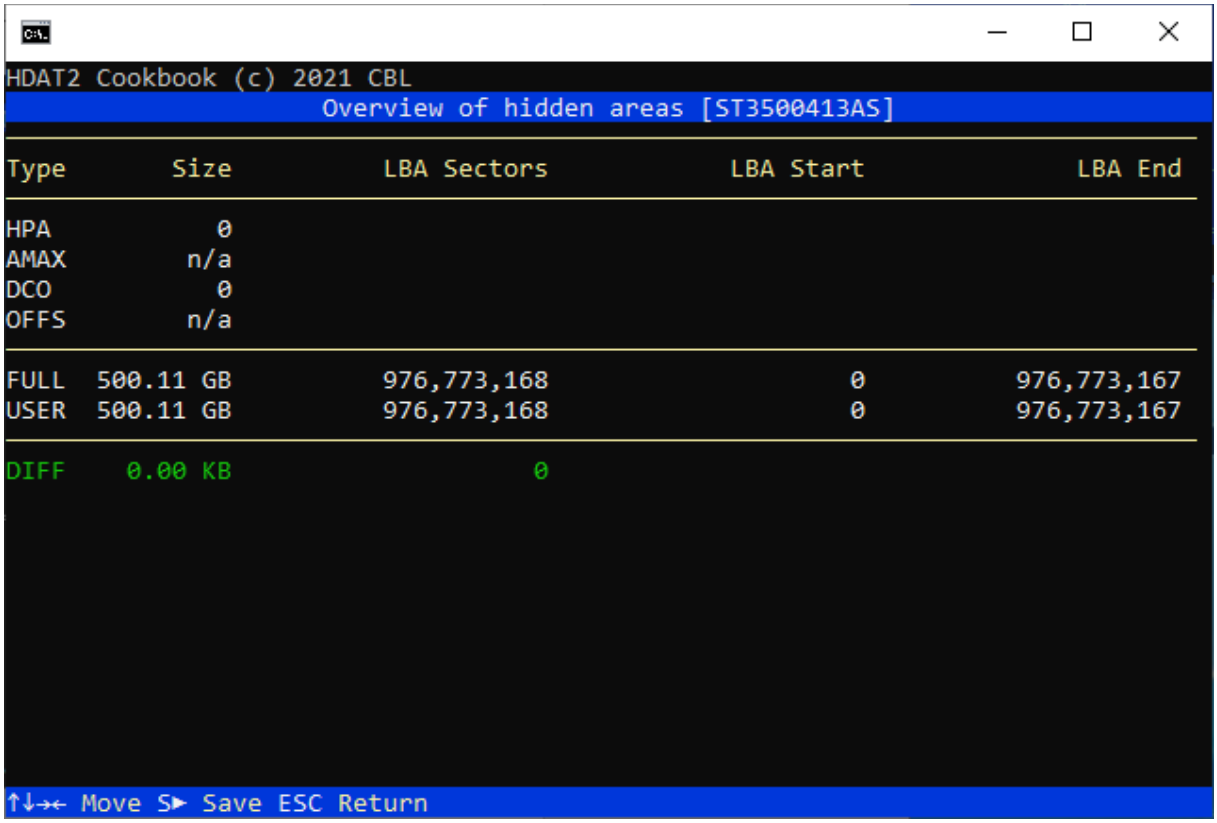
An error message '**DCO full capacity was not restored**' for the command DCO RESTORE appears if the HPA area is not removed first.

Now are both hidden areas HPA and DCO disabled.

Overview of hidden areas

Disk status with no hidden HPA and DCO areas.



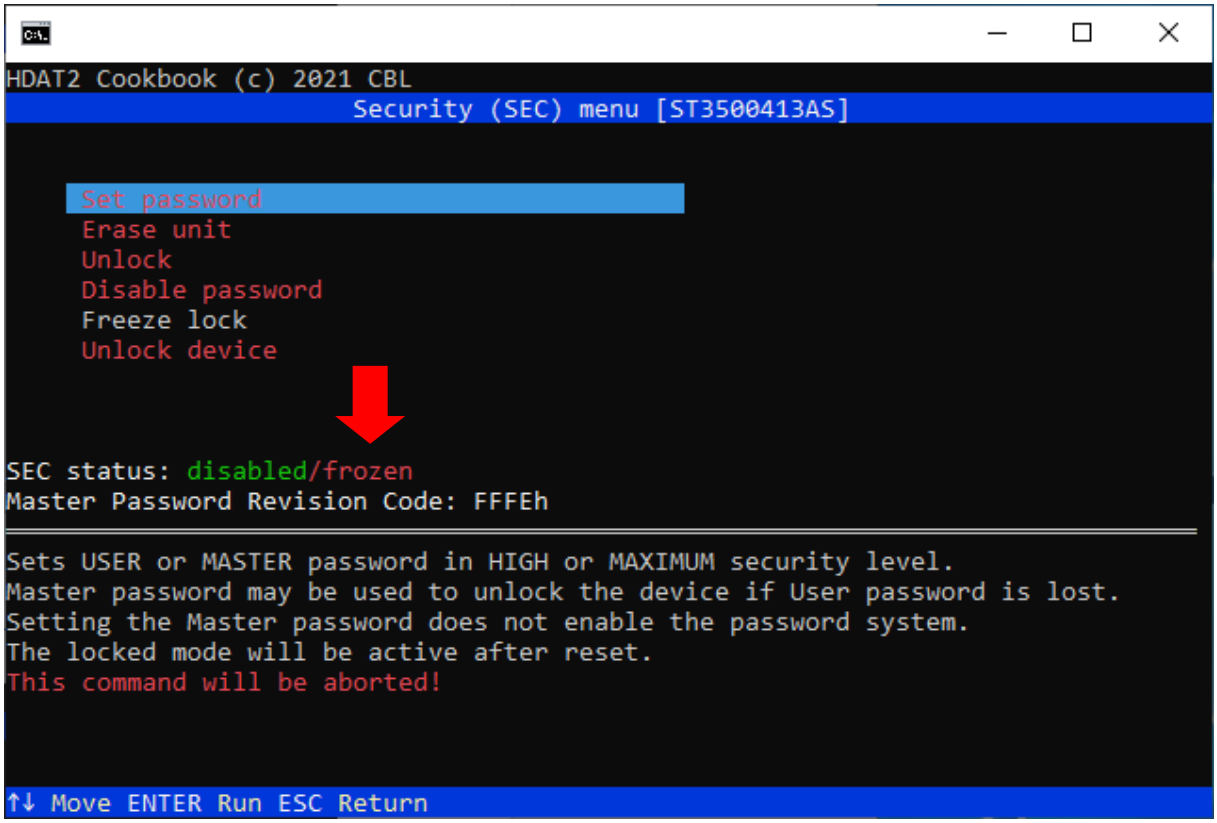

HDAT2 Cookbook (c) 2021 CBL
Overview of hidden areas [ST3500413AS]
Type Size LBA Sectors LBA Start LBA End
HPA 0
AMAX n/a
DCO 0
OFFS n/a
FULL 500.11 GB 976,773,168 0 976,773,167
USER 500.11 GB 976,773,168 0 976,773,167
DIFF 0.00 KB 0
↑↓→← Move S► Save ESC Return

Security Lock the device

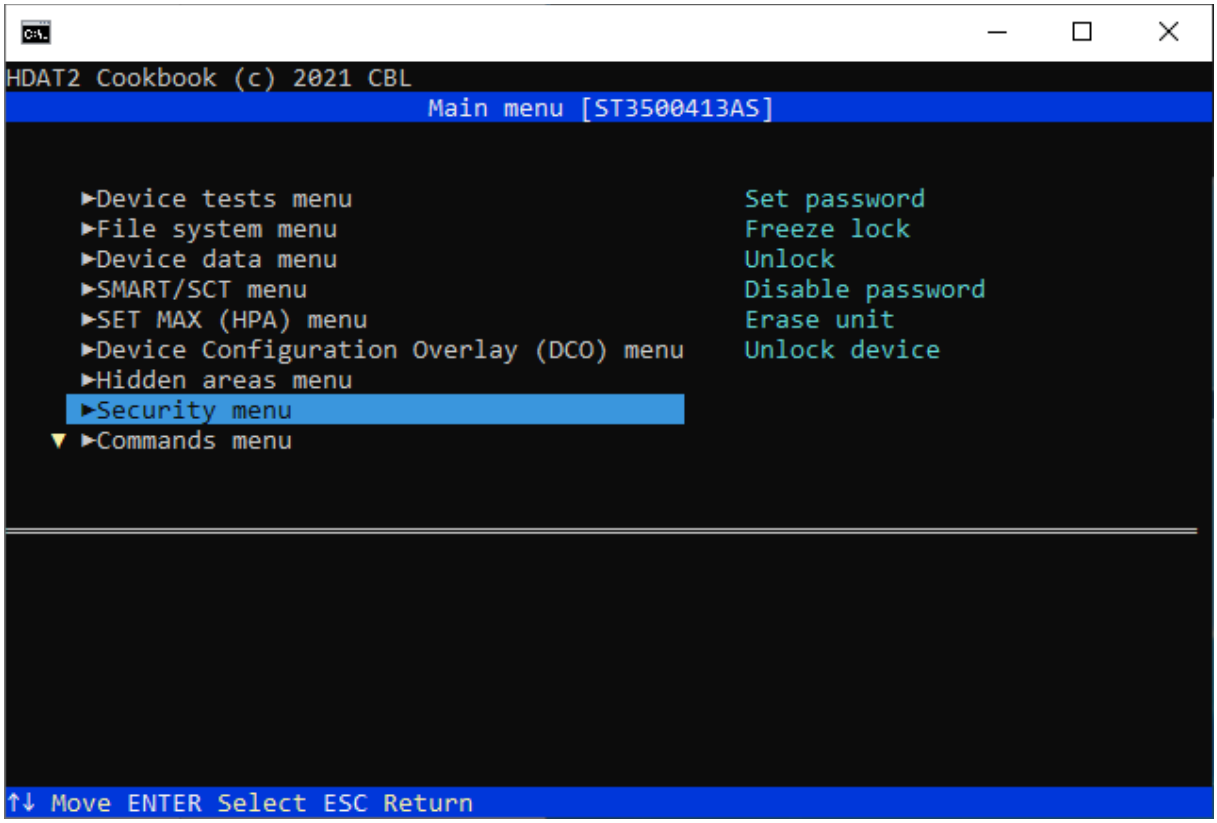
The security system is enabled (the device in a locked state) by sending a user password to the device with the SECURITY SET PASSWORD command. Setting the master password does not enable security system.

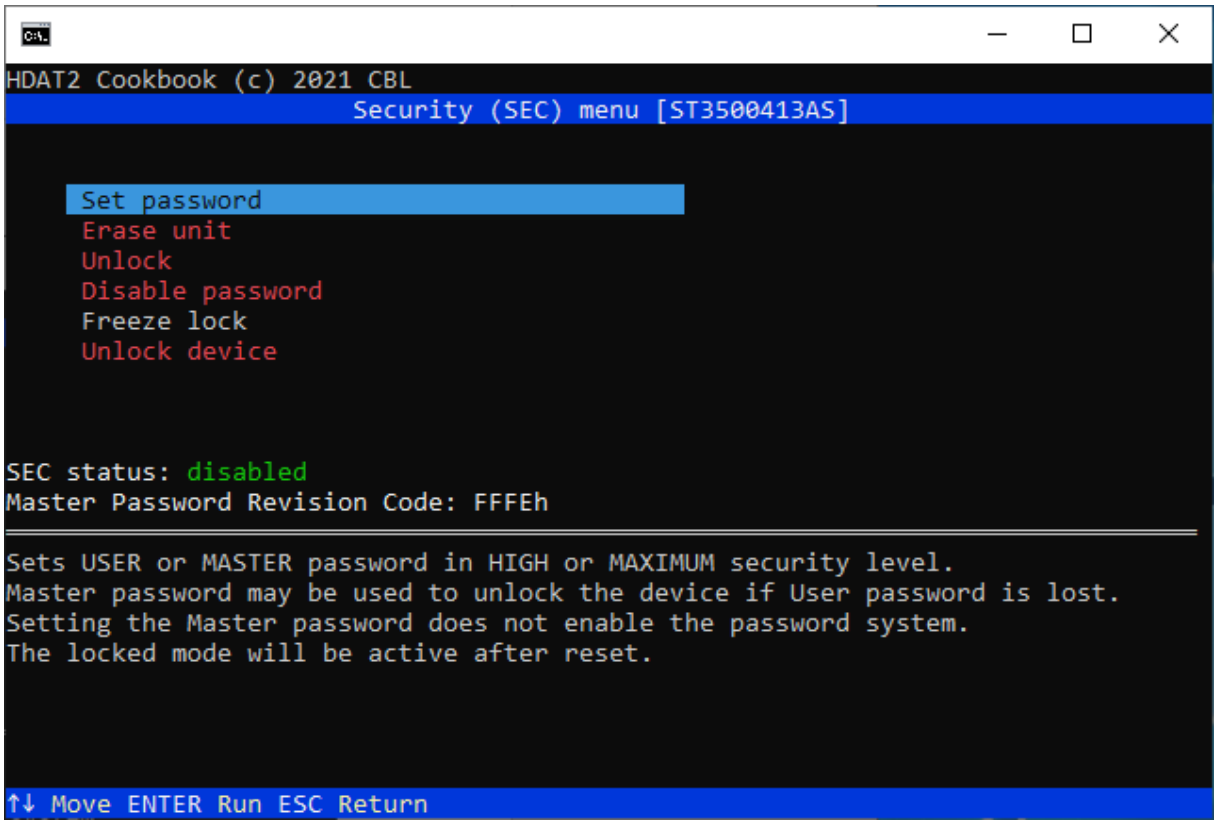
When a user password is set, the drive automatically enters lock mode by the next powered-on. In locked mode, device rejects media access commands until a SECURITY UNLOCK command is successfully completed.

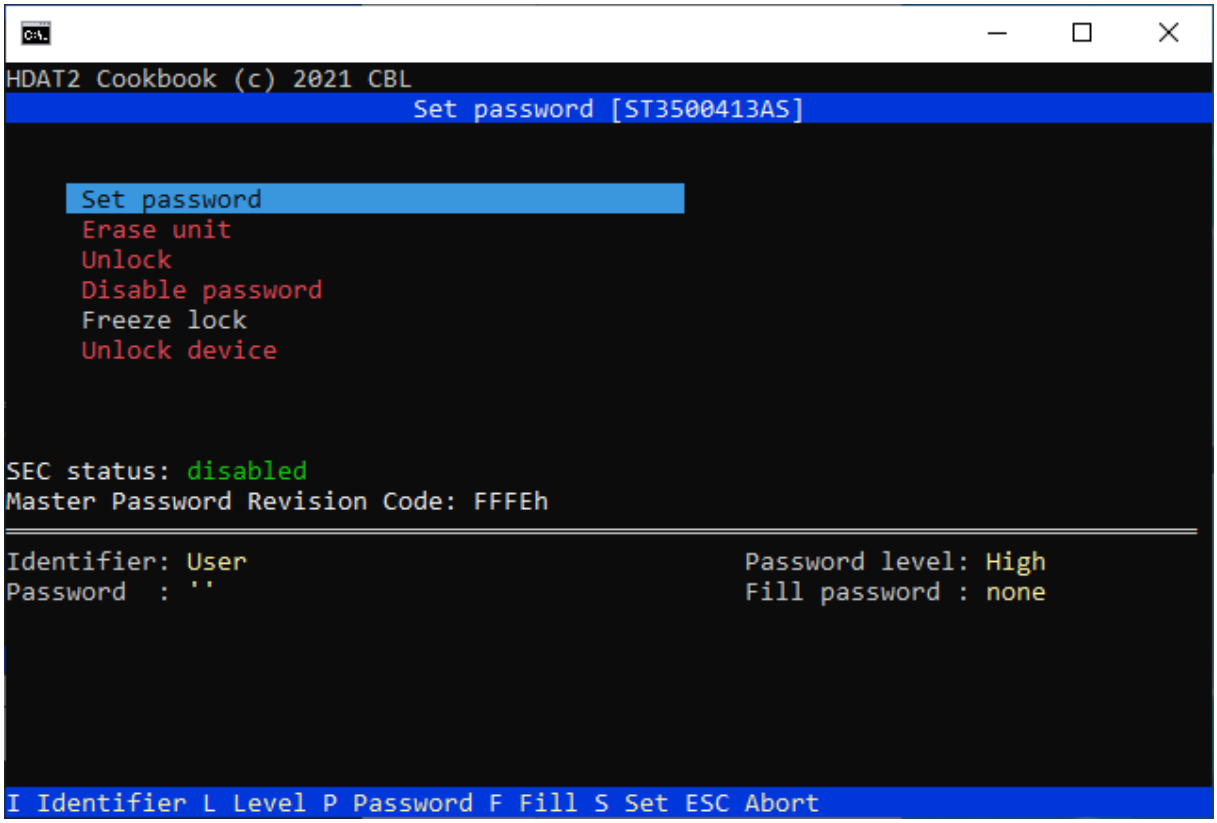
If the device is in security frozen state the device shall return command aborted for all security commands except 'Freeze lock'. In this case see FAQ "**How to bypass a Security and/or DCO frozen state?**"

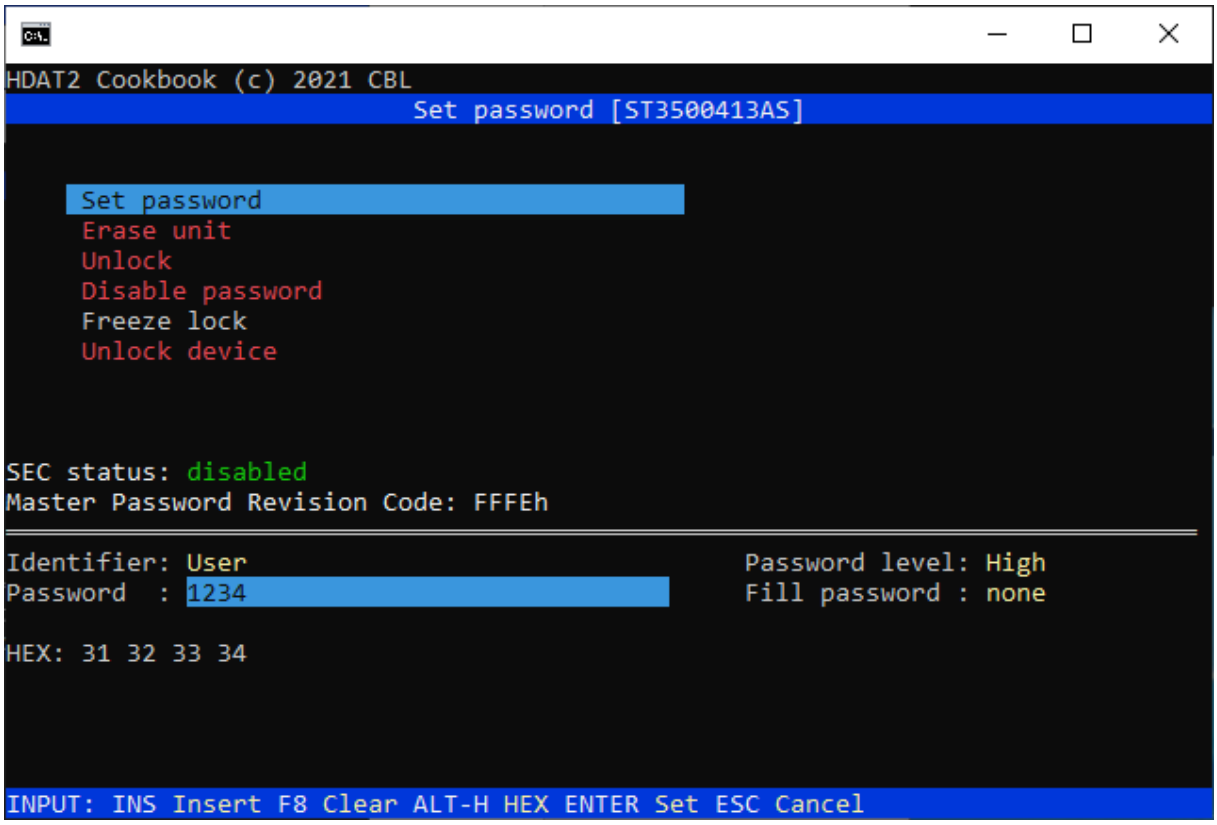


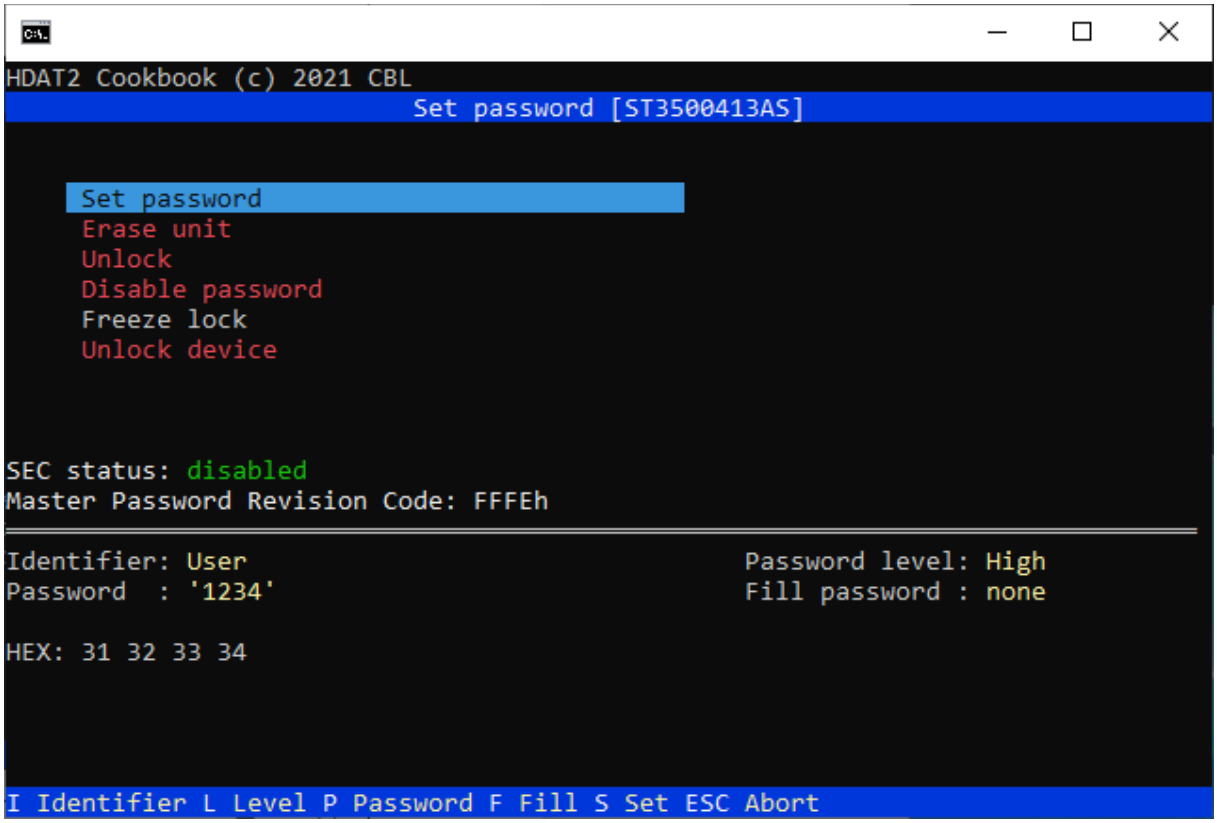
Example: We set the user password "1234" with the high security mode.

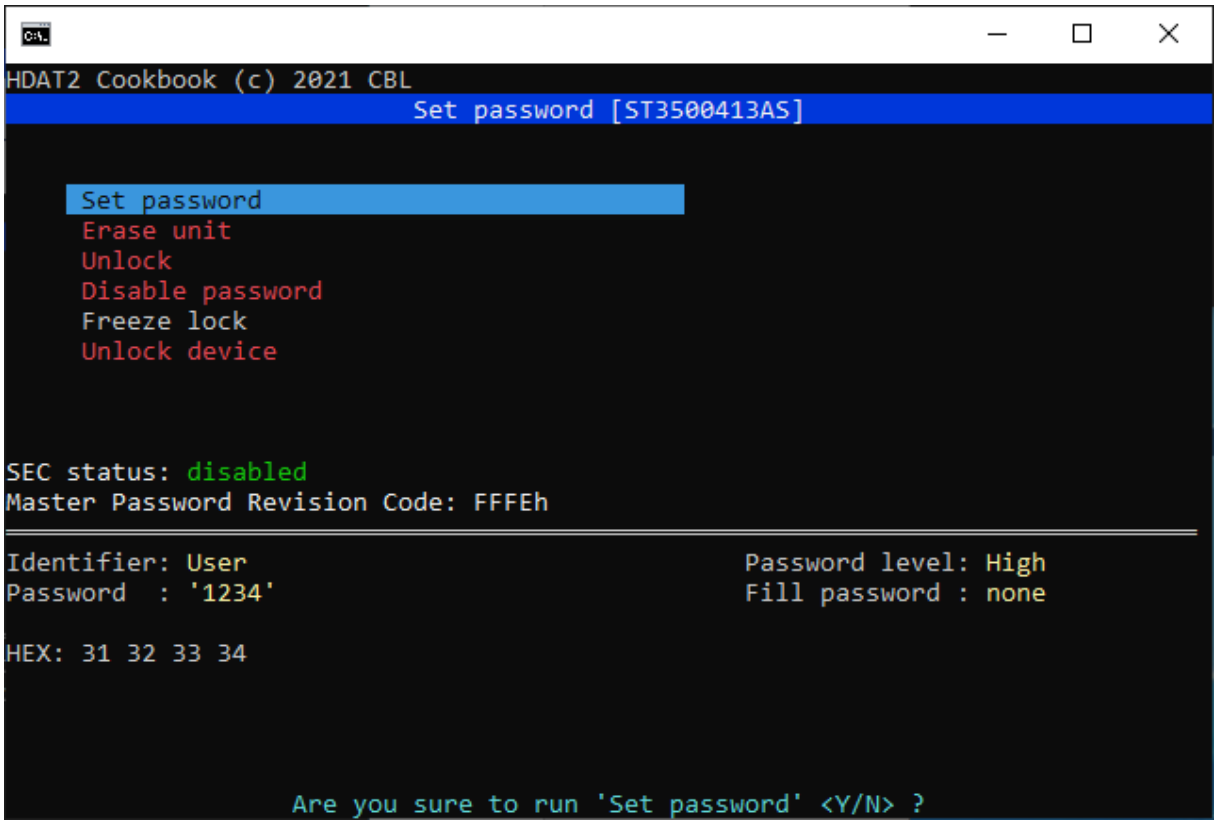

HDAT2 Cookbook (c) 2021 CBL
Main menu [ST3500413AS]
►Device tests menu
►File system menu
►Device data menu
►SMART/SCT menu
►SET MAX (HPA) menu
►Device Configuration Overlay (DCO) menu
►Hidden areas menu
►Security menu
►Commands menu
Set password
Freeze lock
Unlock
Disable password
Erase unit
Unlock device
↑↓ Move ENTER Select ESC Return

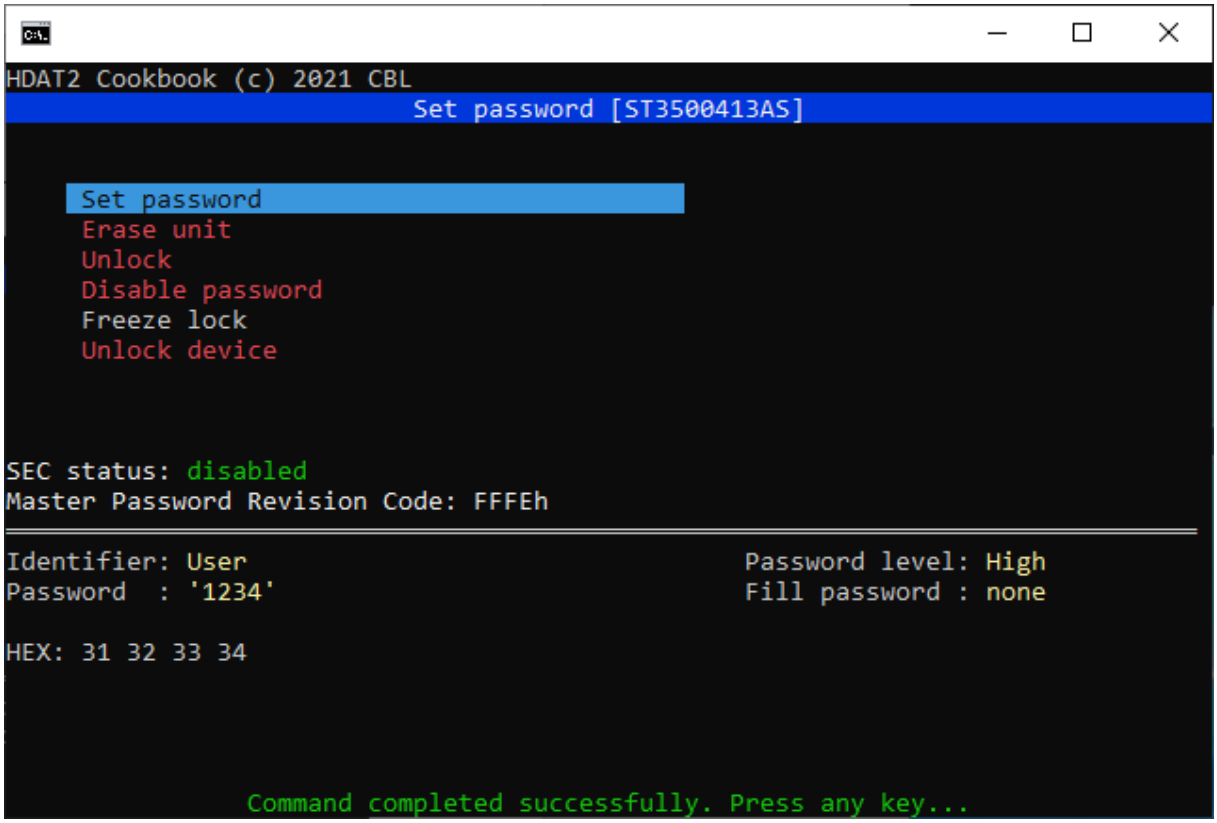

HDAT2 Cookbook (c) 2021 CBL
Security (SEC) menu [ST3500413AS]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: disabled
Master Password Revision Code: FFFEh
Sets USER or MASTER password in HIGH or MAXIMUM security level.
Master password may be used to unlock the device if User password is lost.
Setting the Master password does not enable the password system.
The locked mode will be active after reset.
↑↓ Move ENTER Run ESC Return

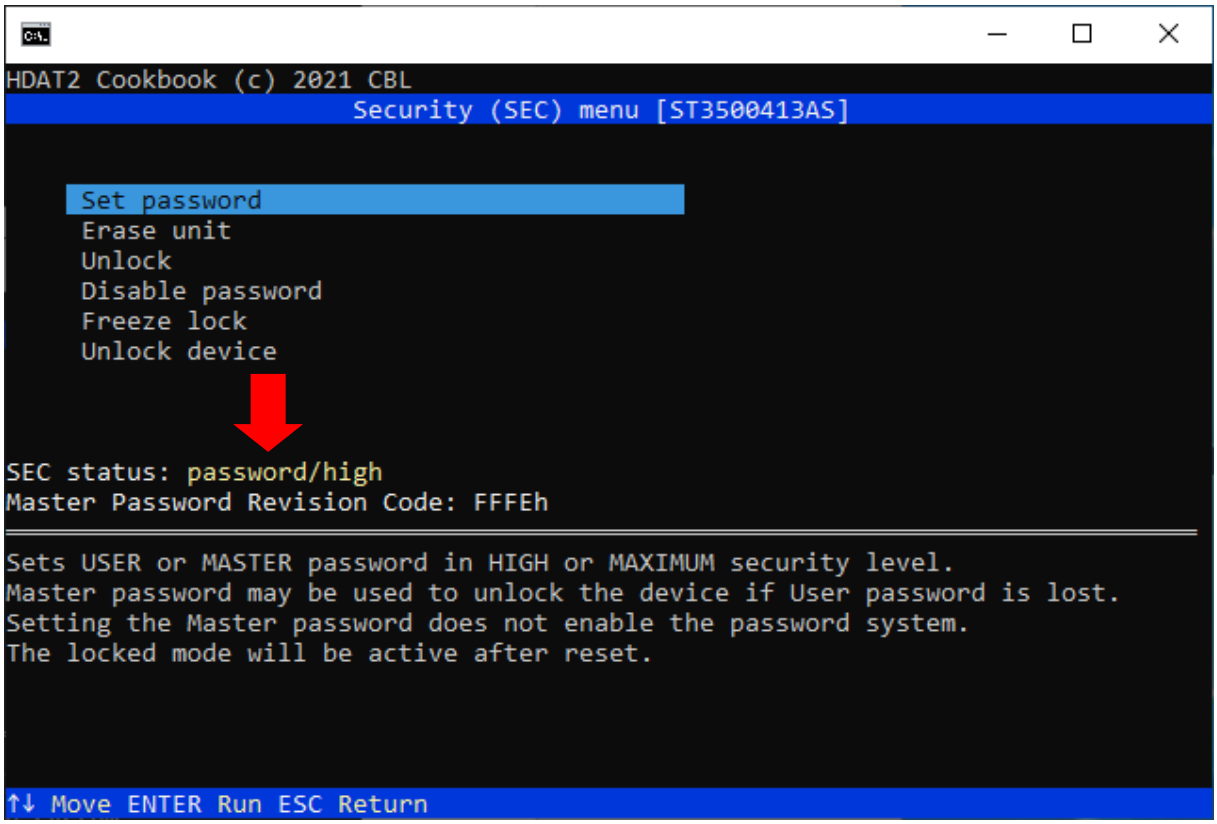

HDAT2 Cookbook (c) 2021 CBL
Set password [ST3500413AS]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: disabled
Master Password Revision Code: FFFEh
Identifier: User
Password : ''
Password level: High
Fill password : none
I Identifier L Level P Password F Fill S Set ESC Abort


HDAT2 Cookbook (c) 2021 CBL
Set password [ST3500413AS]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: disabled
Master Password Revision Code: FFFEh
Identifier: User
Password : 1234
Password level: High
Fill password : none
HEX: 31 32 33 34
INPUT: INS Insert F8 Clear ALT-H HEX ENTER Set ESC Cancel


HDAT2 Cookbook (c) 2021 CBL
Set password [ST3500413AS]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: disabled
Master Password Revision Code: FFFEh
Identifier: User
Password : '1234'
Password level: High
Fill password : none
HEX: 31 32 33 34
I Identifier L Level P Password F Fill S Set ESC Abort

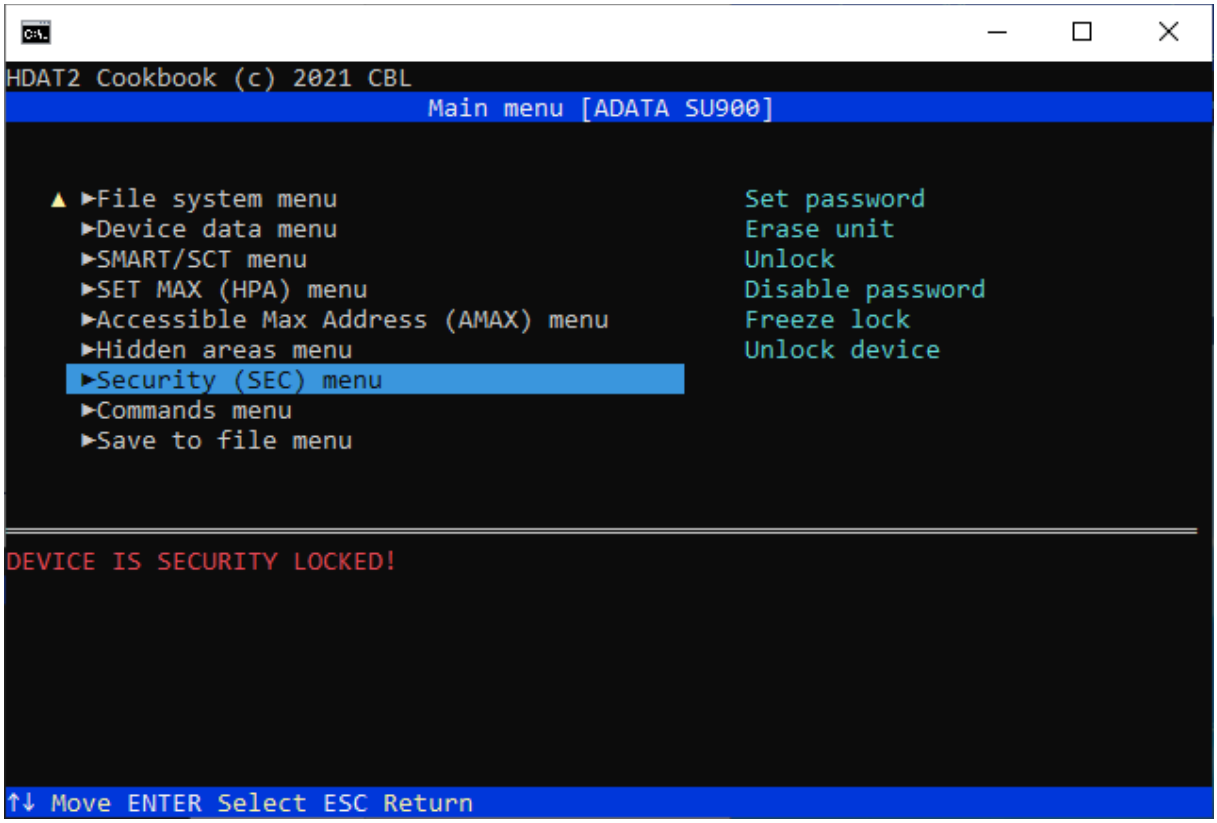

HDAT2 Cookbook (c) 2021 CBL
Set password [ST3500413AS]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: disabled
Master Password Revision Code: FFFEh
Identifier: User
Password : '1234'
Password level: High
Fill password : none
HEX: 31 32 33 34
Are you sure to run 'Set password' <Y/N> ?

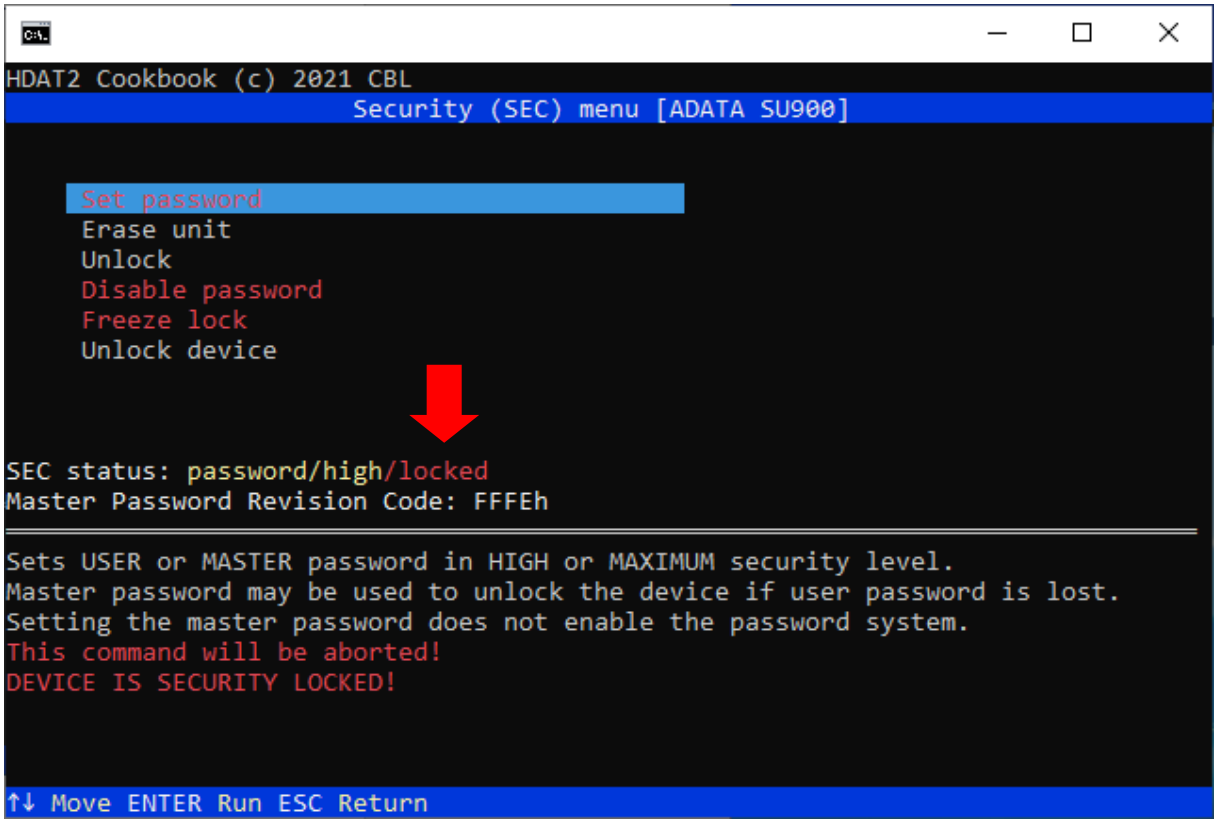


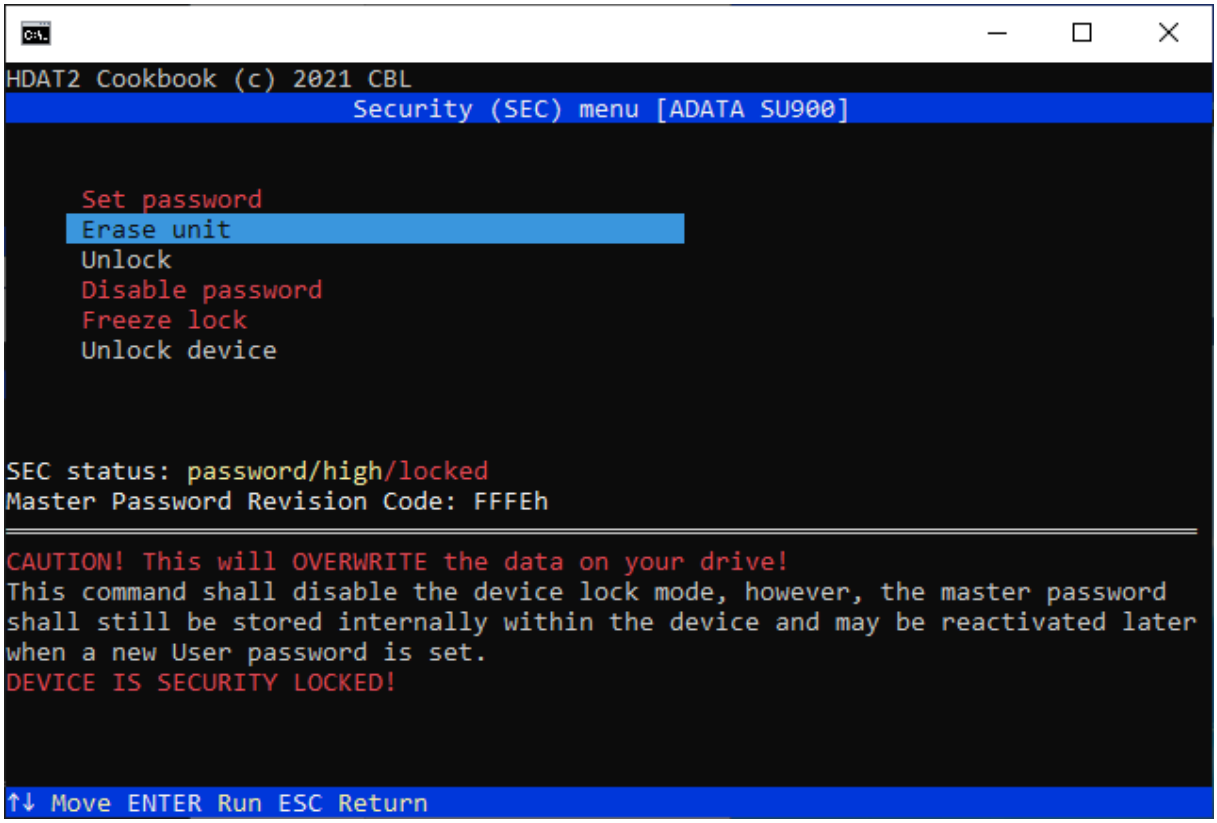


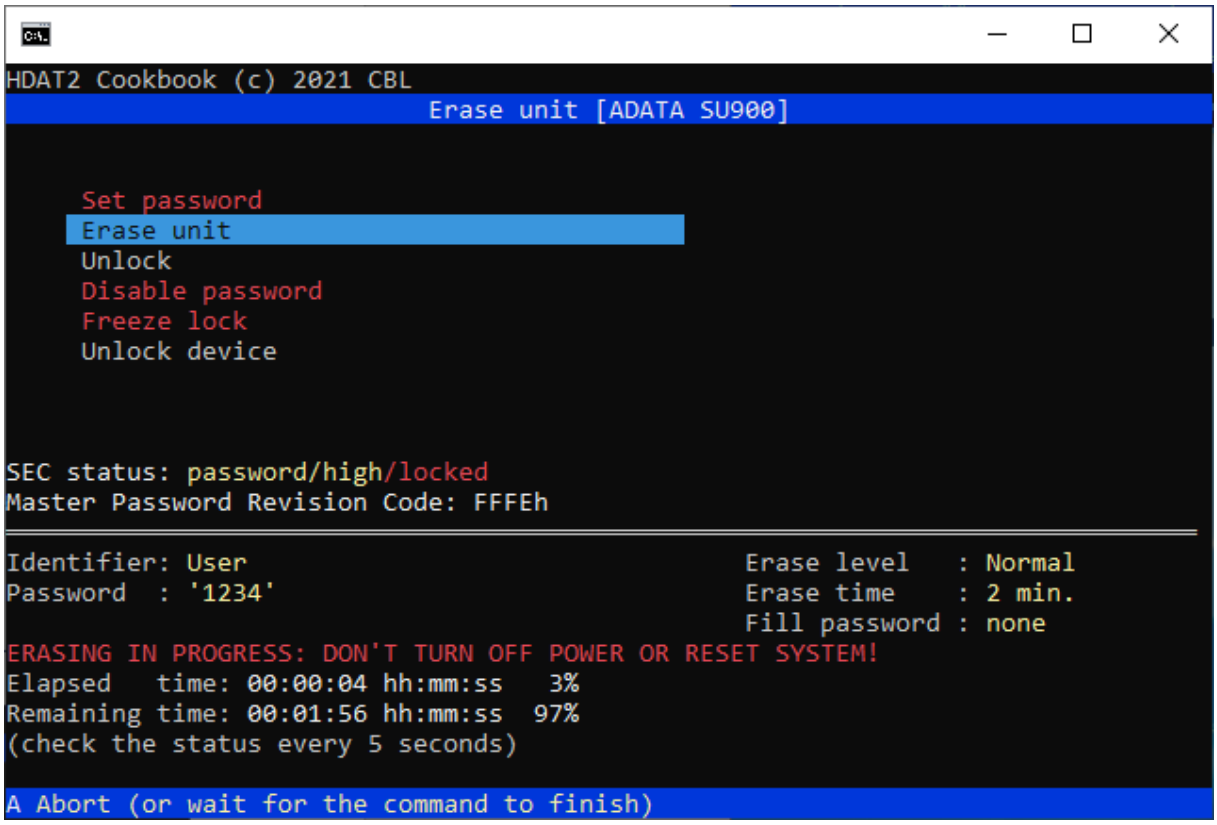
After setting the password the lock mode shall be enabled from the next power-on or hardware reset. In lock mode you can use the commands erase unit, unlock or unlock device only.

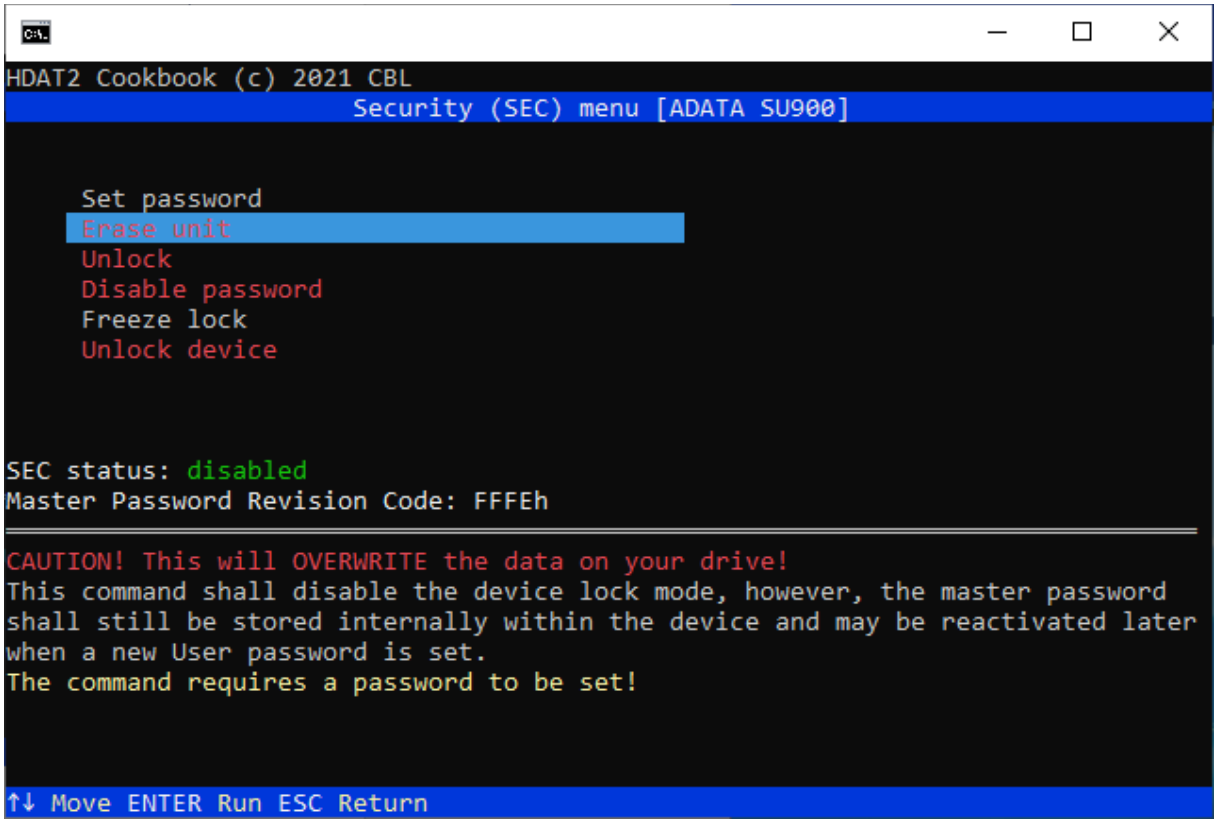
When the device is security locked many other commands shall be aborted until the device is unlocked.


HDAT2 Cookbook (c) 2021 CBL
Main menu [ADATA SU900]
▲ ►File system menu
►Device data menu
►SMART/SCT menu
►SET MAX (HPA) menu
►Accessible Max Address (AMAX) menu
►Hidden areas menu
►Security (SEC) menu
►Commands menu
►Save to file menu
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
DEVICE IS SECURITY LOCKED!
↑↓ Move ENTER Select ESC Return


HDAT2 Cookbook (c) 2021 CBL
Security (SEC) menu [ADATA SU900]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: password/high/locked
Master Password Revision Code: FFFEh
Sets USER or MASTER password in HIGH or MAXIMUM security level.
Master password may be used to unlock the device if user password is lost.
Setting the master password does not enable the password system.
This command will be aborted!
DEVICE IS SECURITY LOCKED!
↑↓ Move ENTER Run ESC Return


HDAT2 Cookbook (c) 2021 CBL
Security (SEC) menu [ADATA SU900]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: password/high/locked
Master Password Revision Code: FFFEh
CAUTION! This will OVERWRITE the data on your drive!
This command shall disable the device lock mode, however, the master password shall still be stored internally within the device and may be reactivated later when a new User password is set.
DEVICE IS SECURITY LOCKED!
↑↓ Move ENTER Run ESC Return


HDAT2 Cookbook (c) 2021 CBL
Erase unit [ADATA SU900]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: password/high/locked
Master Password Revision Code: FFFEh
Identifier: User
Password : '1234'
Erase level : Normal
Erase time : 2 min.
Fill password : none
ERASING IN PROGRESS: DON'T TURN OFF POWER OR RESET SYSTEM!
Elapsed time: 00:00:04 hh:mm:ss 3%
Remaining time: 00:01:56 hh:mm:ss 97%
(check the status every 5 seconds)
A Abort (or wait for the command to finish)


HDAT2 Cookbook (c) 2021 CBL
Security (SEC) menu [ADATA SU900]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: disabled
Master Password Revision Code: FFFEh
CAUTION! This will OVERWRITE the data on your drive!
This command shall disable the device lock mode, however, the master password shall still be stored internally within the device and may be reactivated later when a new User password is set.
The command requires a password to be set!
↑↓ Move ENTER Run ESC Return

Security Unlock the device

In **High security mode**, the disk can be unlocked with either the User or Master password, using the SECURITY UNLOCK command.

In **Maximum security mode**, the disk can be unlocked with the User password only. Without the User password the device requires a SECURITY ERASE PREPARE command and a SECURITY ERASE UNIT command with the Master password to unlock. Execution of the SECURITY ERASE UNIT command erases all user data on the device. See Security erase the device.

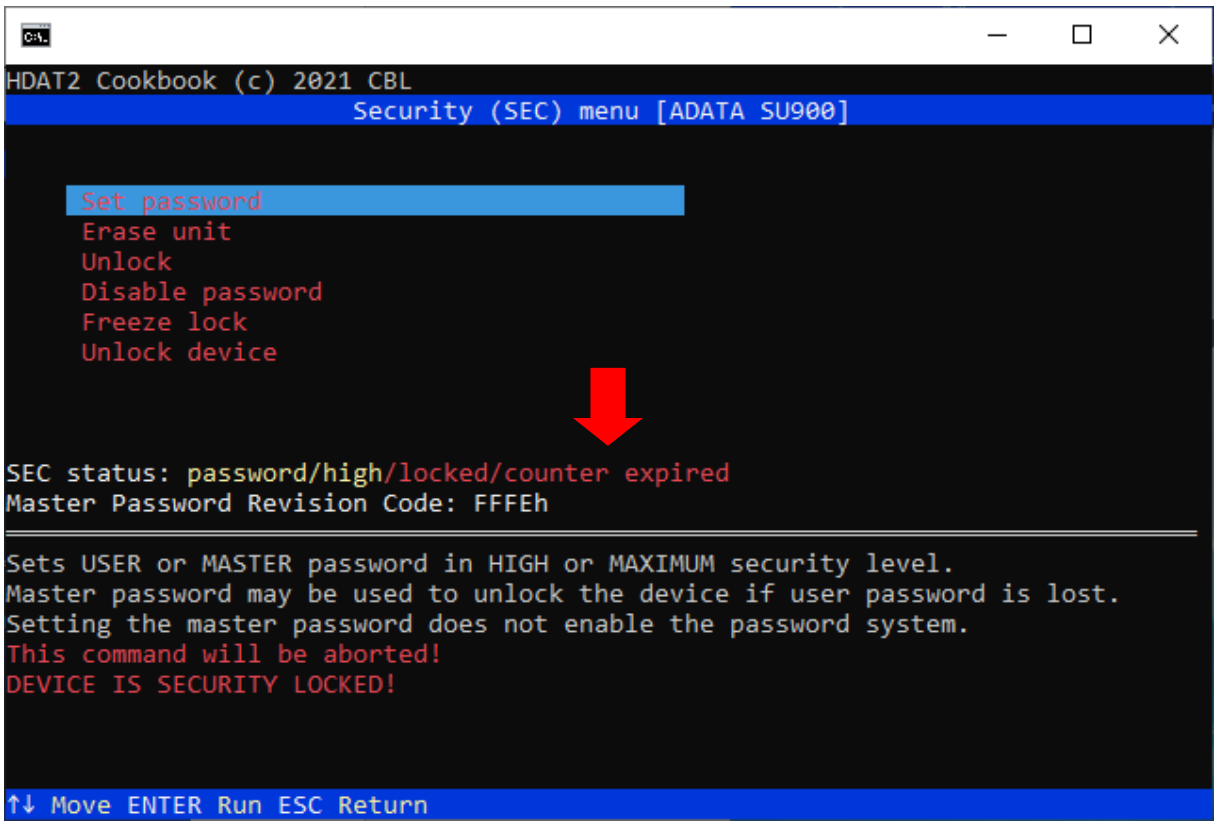
Password lost

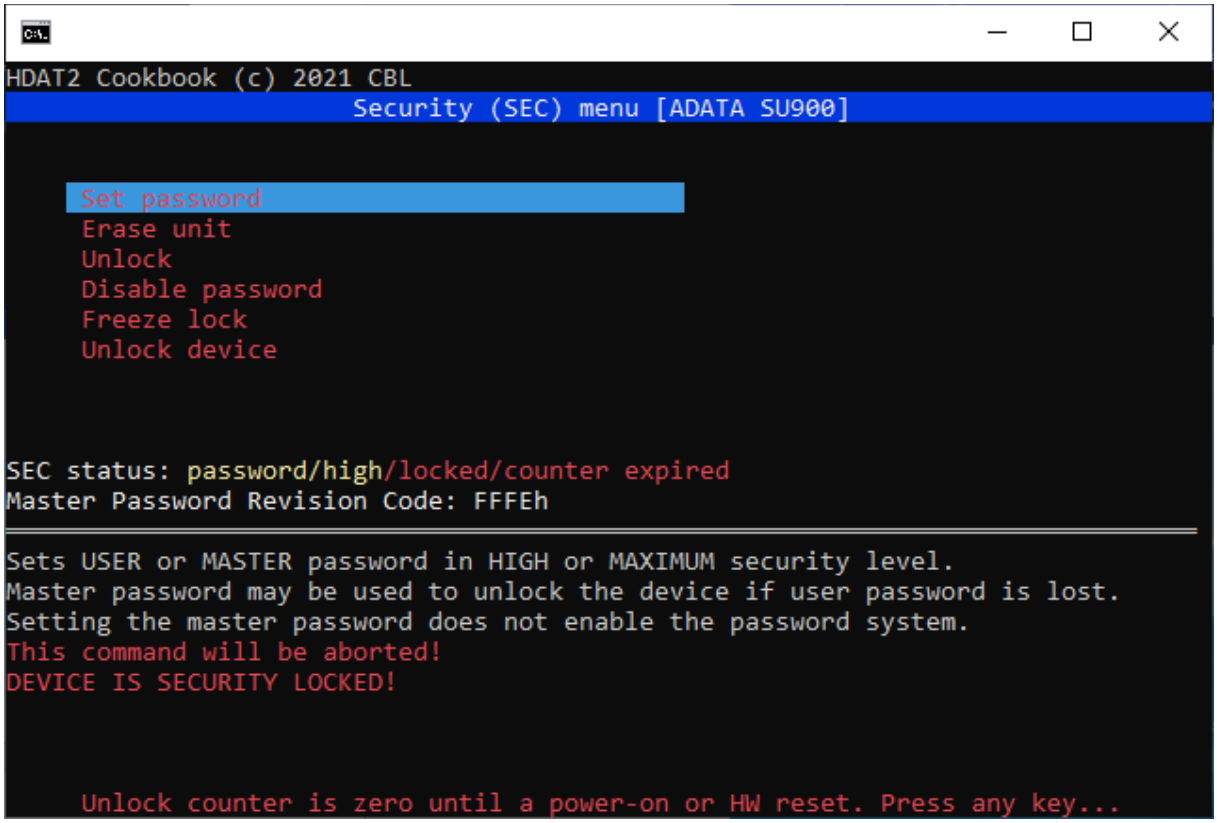
If the user password is lost and High level security is set, the drive does not allow the user to access any data. However, the drive can be unlocked using the master password. If the user password is lost and Maximum security level is set, it is impossible to access data. However, the drive can be unlocked using the ERASE UNIT command with the master password. The drive will erase all user data and unlock the drive.

Unlock counter

If the password compare fails then the device shall return command aborted to the host and decrements the unlock counter. This counter shall be initially set to five and shall be decremented for each password mismatch when SECURITY UNLOCK is issued and the device is locked.

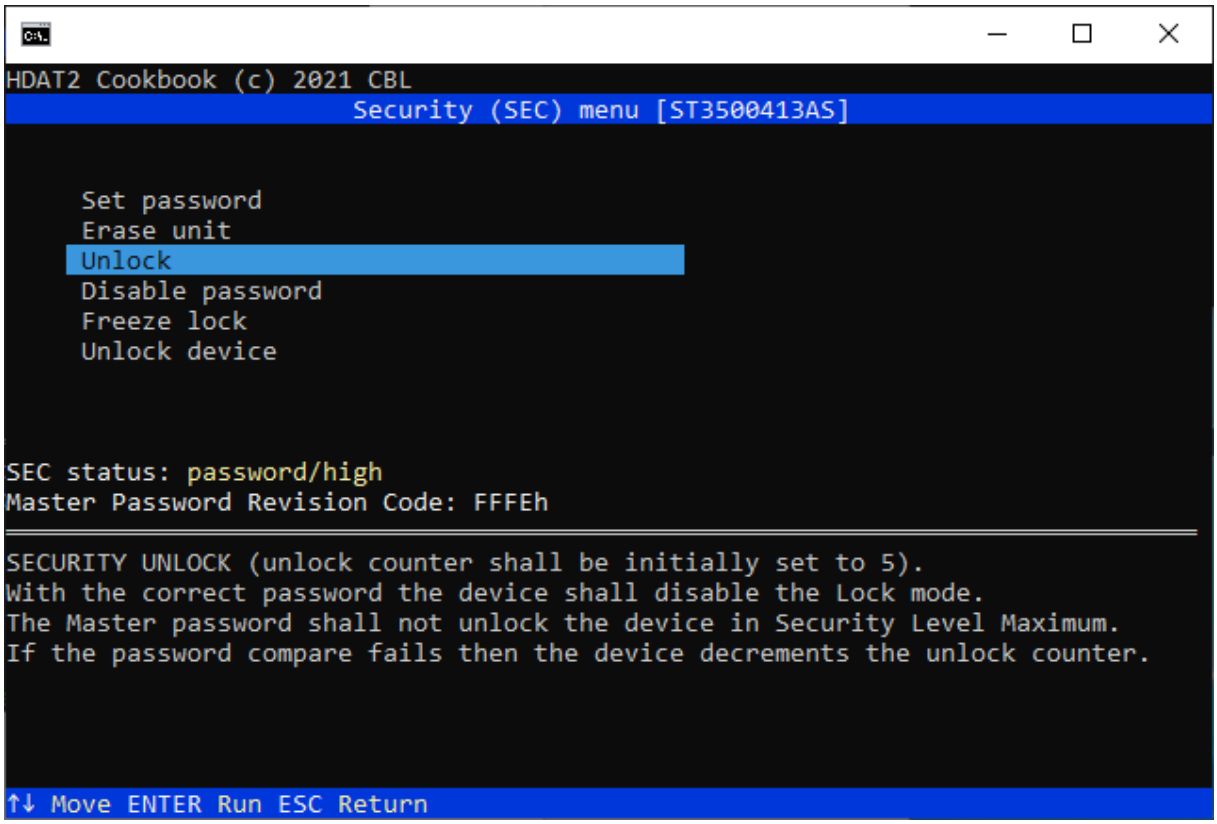
When this counter reaches zero then SECURITY UNLOCK and SECURITY ERASE UNIT commands shall be command aborted until a power-on reset or a hardware reset. SECURITY UNLOCK commands issued when the device is unlocked have no effect on the unlock counter.

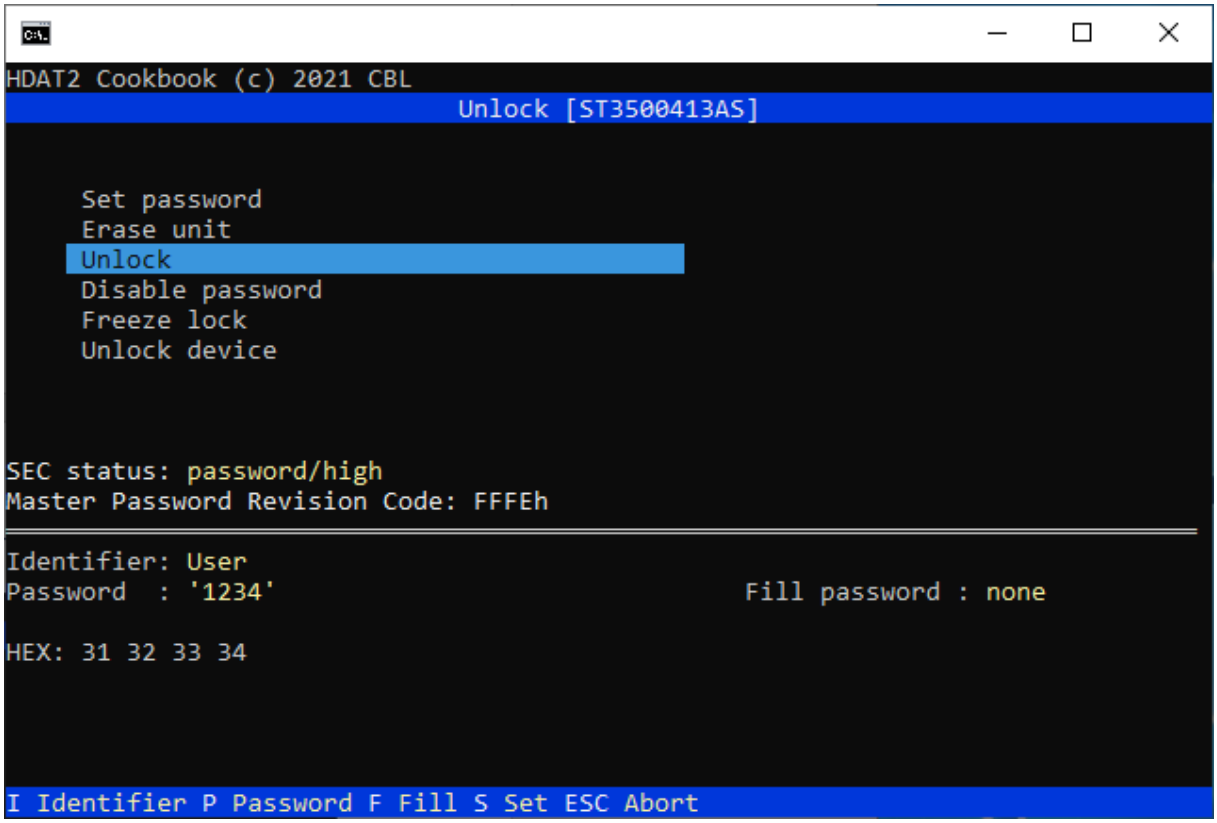


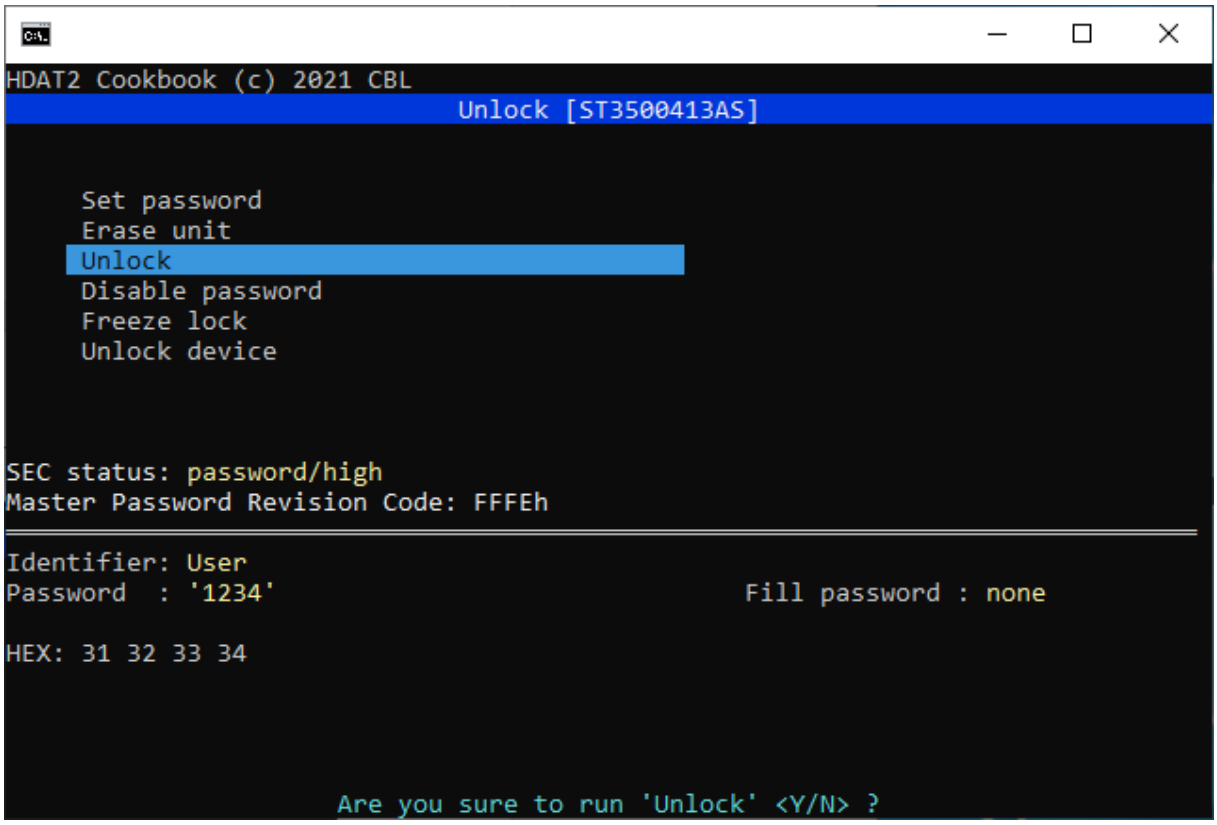


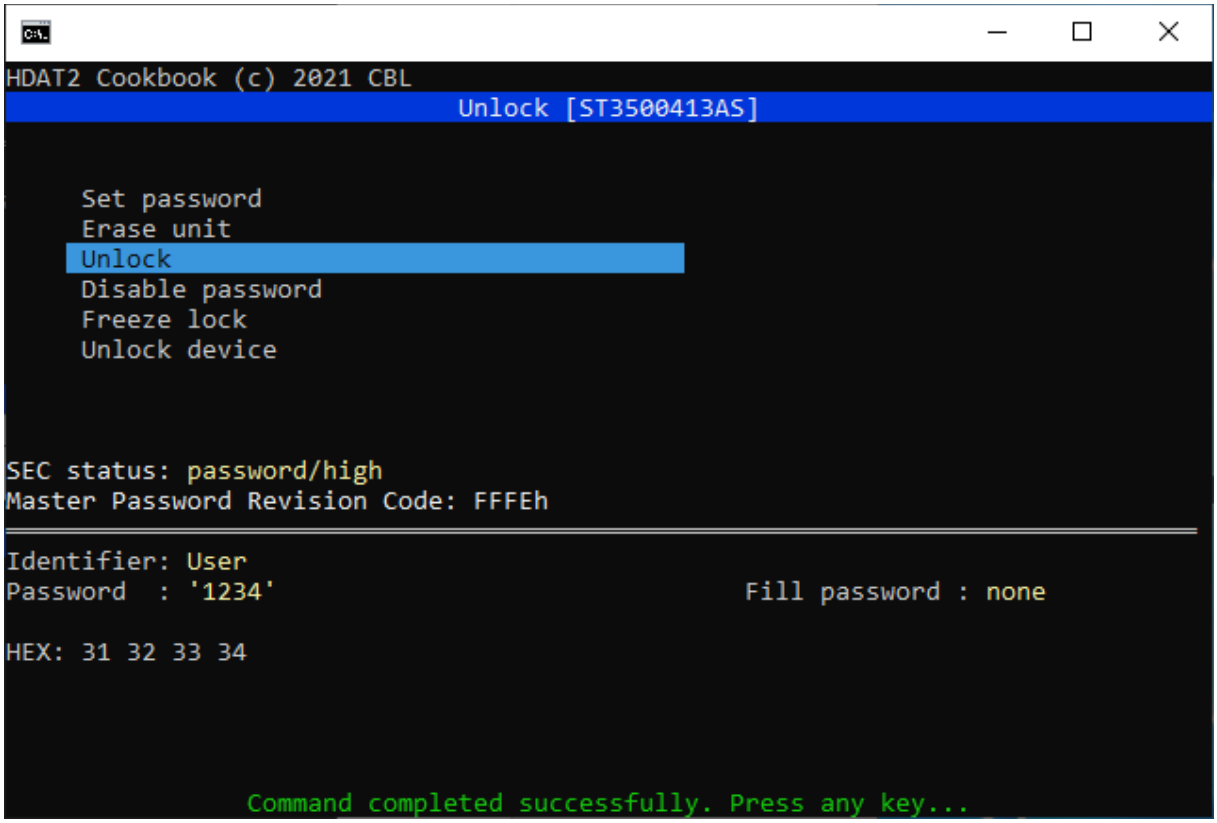
Unlock and disable password

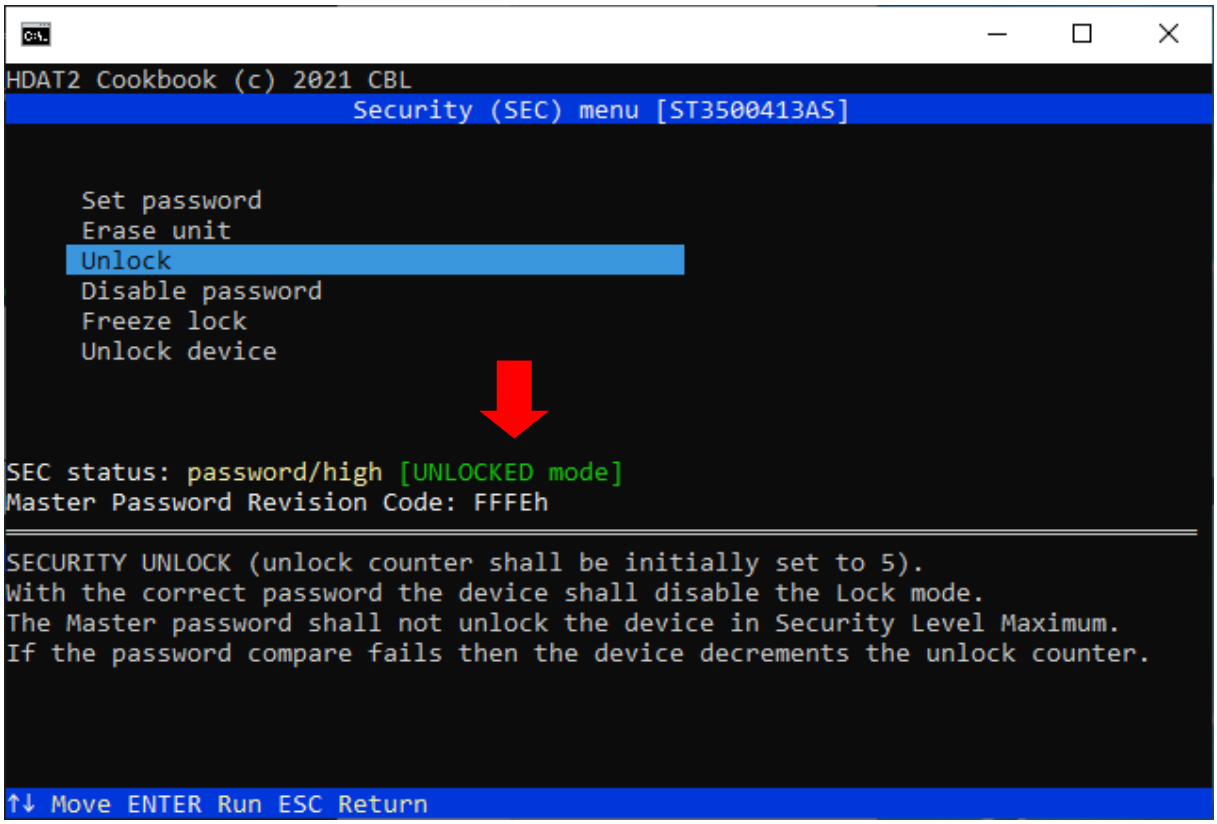
Example: To disable the high security mode of the device we have to unlock and disable password with the user password "1234".

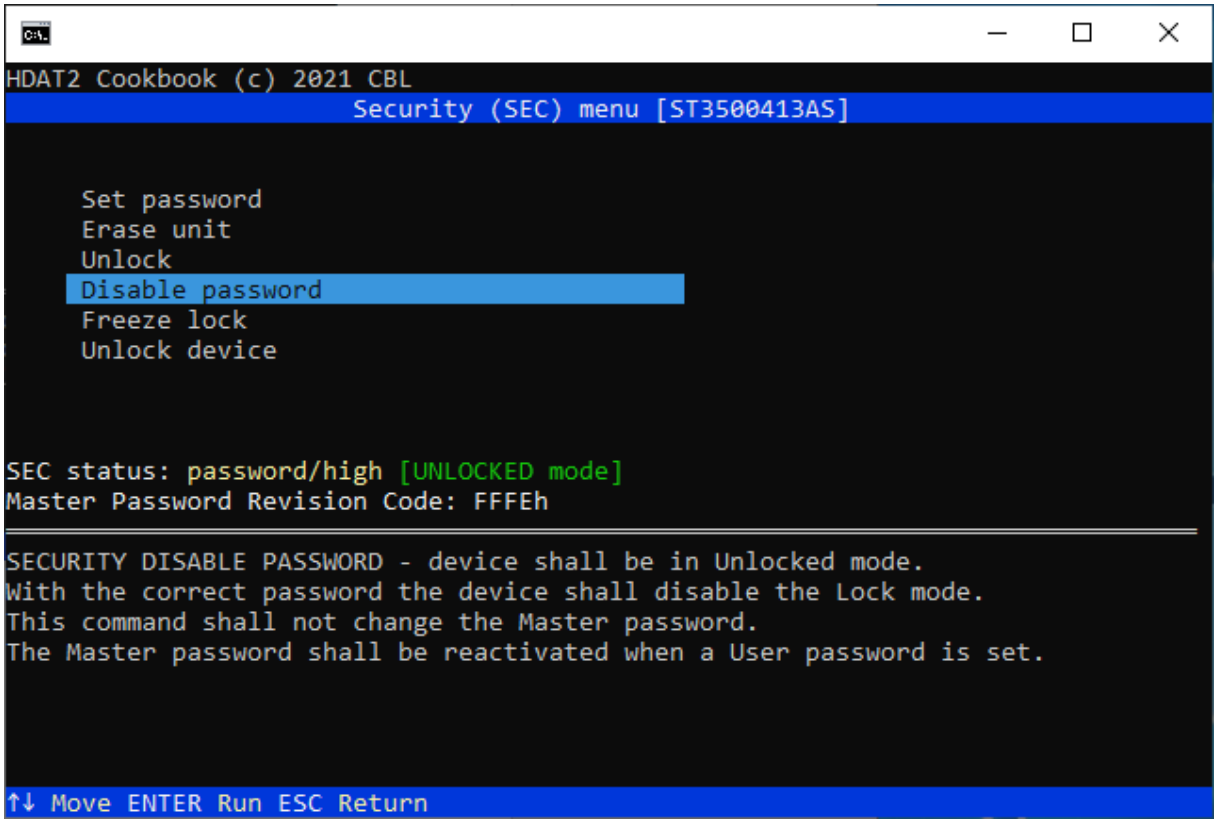


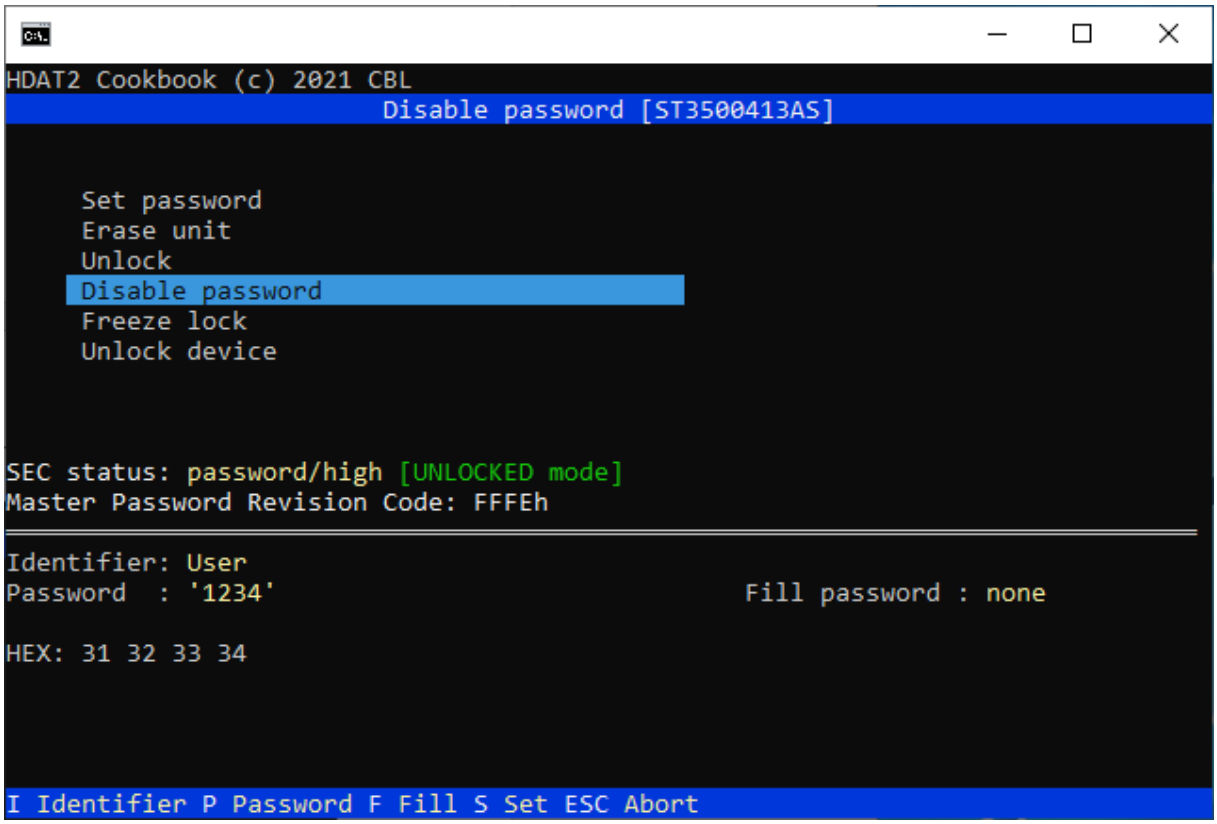

HDAT2 Cookbook (c) 2021 CBL
Unlock [ST3500413AS]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: password/high
Master Password Revision Code: FFFEh
Identifier: User
Password : '1234'
Fill password : none
HEX: 31 32 33 34
I Identifier P Password F Fill S Set ESC Abort

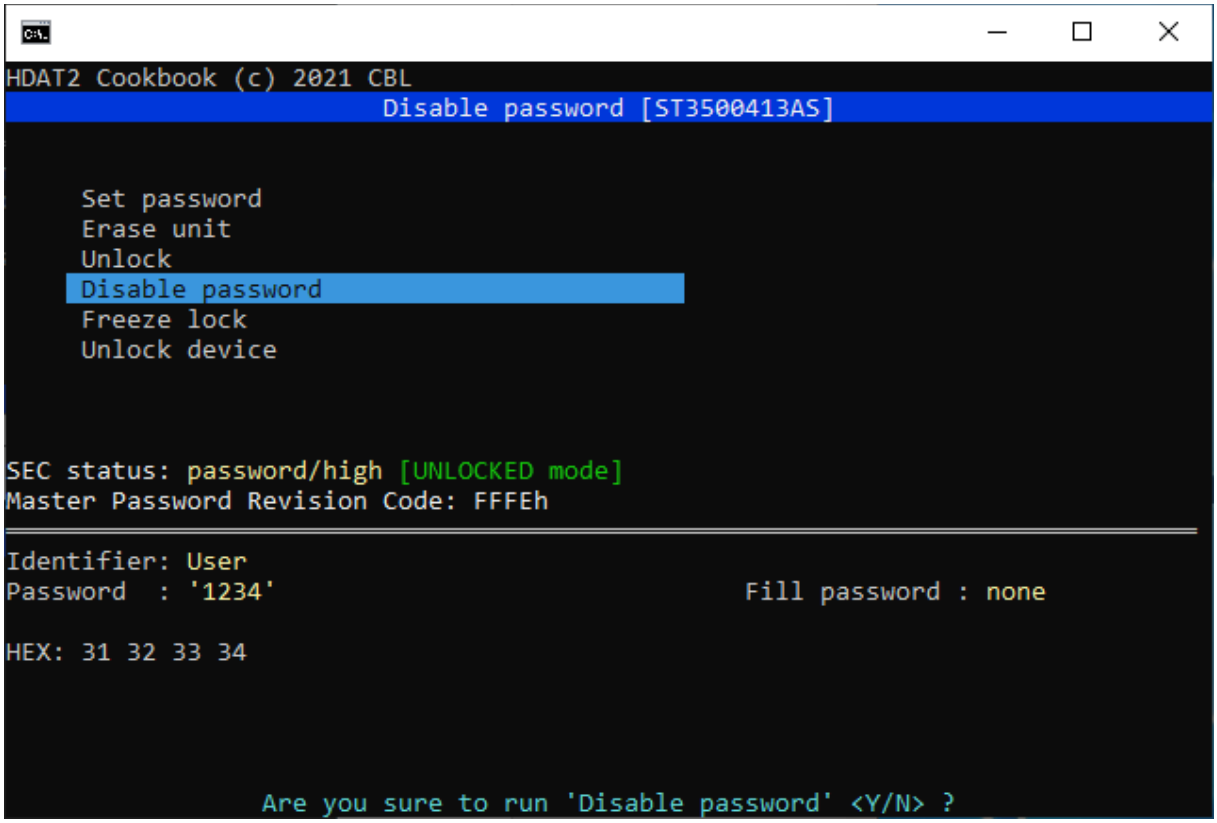

HDAT2 Cookbook (c) 2021 CBL
Unlock [ST3500413AS]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: password/high
Master Password Revision Code: FFFEh
Identifier: User
Password : '1234'
Fill password : none
HEX: 31 32 33 34
Are you sure to run 'Unlock' <Y/N> ?

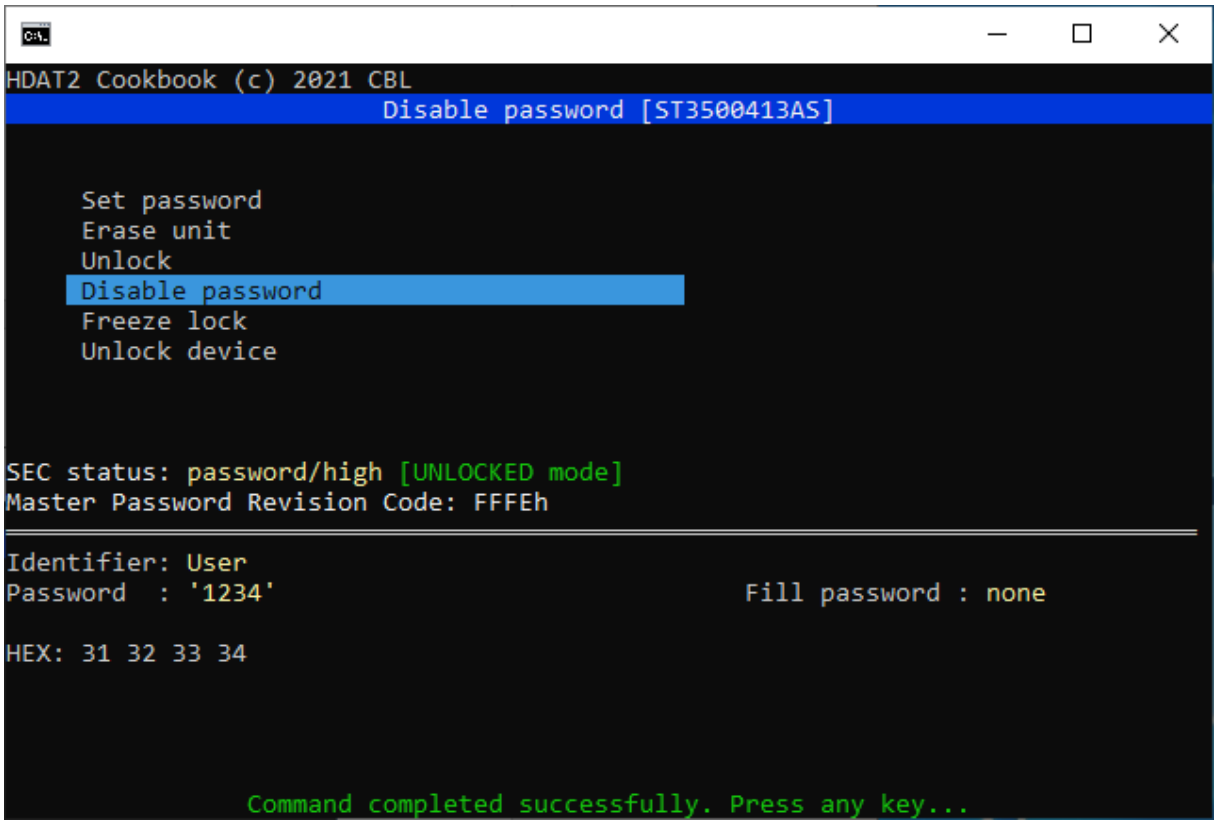

HDAT2 Cookbook (c) 2021 CBL
Unlock [ST3500413AS]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: password/high
Master Password Revision Code: FFFEh
Identifier: User
Password : '1234'
Fill password : none
HEX: 31 32 33 34
Command completed successfully. Press any key...

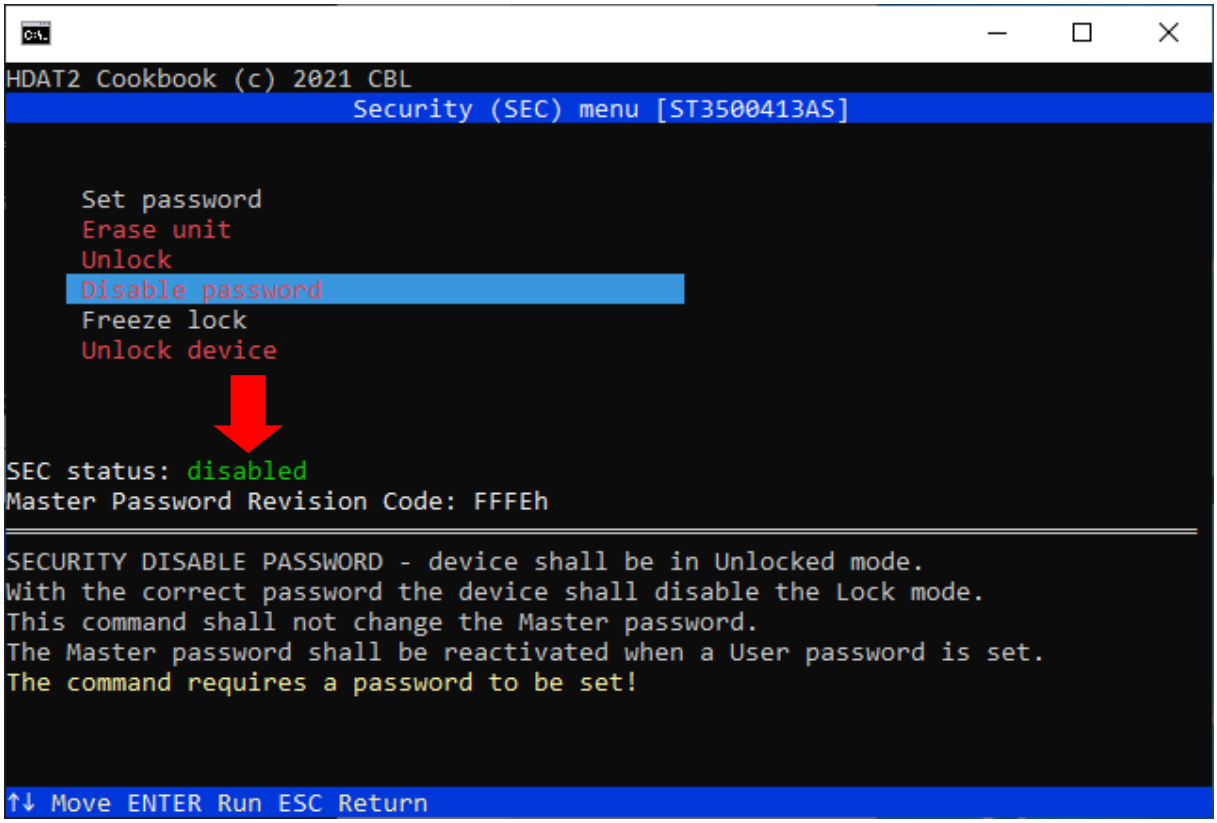

HDAT2 Cookbook (c) 2021 CBL
Security (SEC) menu [ST3500413AS]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: password/high [UNLOCKED mode]
Master Password Revision Code: FFFEh
SECURITY UNLOCK (unlock counter shall be initially set to 5).
With the correct password the device shall disable the Lock mode.
The Master password shall not unlock the device in Security Level Maximum.
If the password compare fails then the device decrements the unlock counter.
↑↓ Move ENTER Run ESC Return


HDAT2 Cookbook (c) 2021 CBL
Security (SEC) menu [ST3500413AS]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: password/high [UNLOCKED mode]
Master Password Revision Code: FFFEh
SECURITY DISABLE PASSWORD - device shall be in Unlocked mode.
With the correct password the device shall disable the Lock mode.
This command shall not change the Master password.
The Master password shall be reactivated when a User password is set.
↑↓ Move ENTER Run ESC Return


HDAT2 Cookbook (c) 2021 CBL
Disable password [ST3500413AS]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: password/high [UNLOCKED mode]
Master Password Revision Code: FFFEh
Identifier: User
Password : '1234'
Fill password : none
HEX: 31 32 33 34
I Identifier P Password F Fill S Set ESC Abort

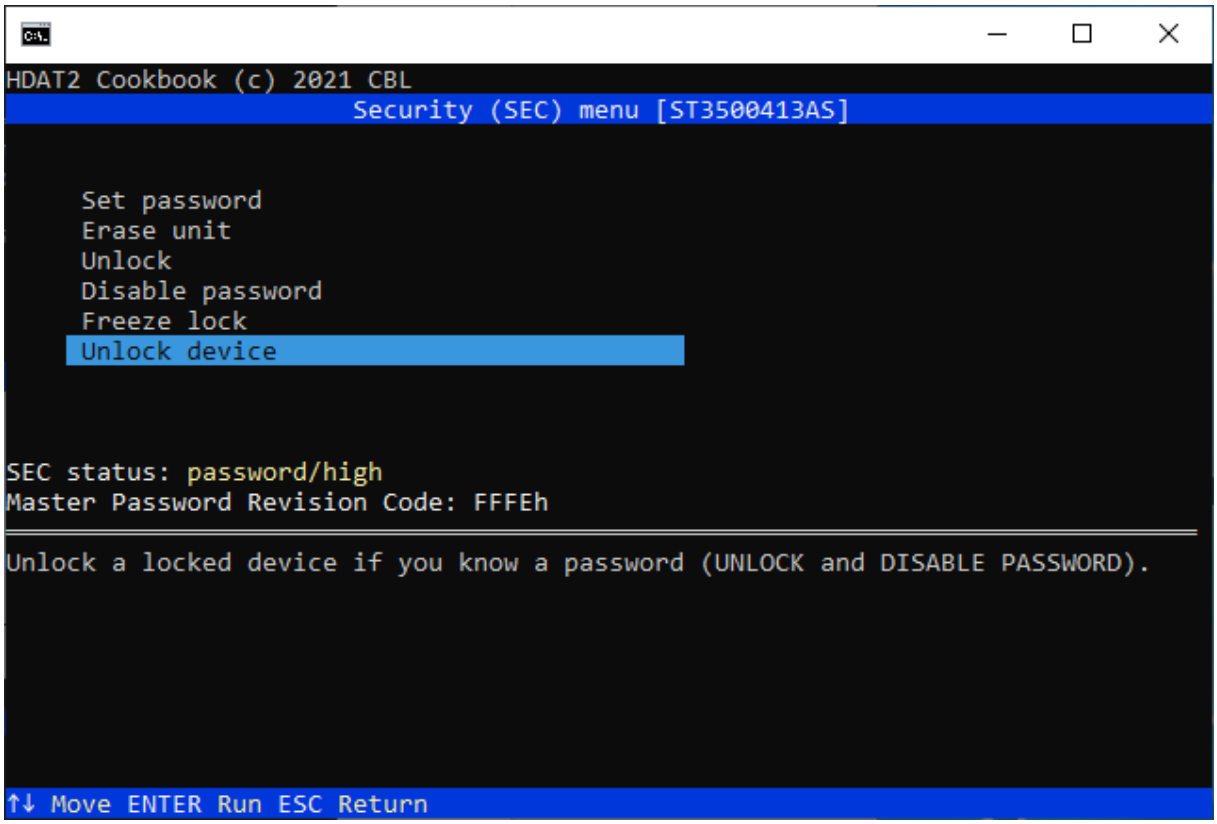

HDAT2 Cookbook (c) 2021 CBL
Disable password [ST3500413AS]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: password/high [UNLOCKED mode]
Master Password Revision Code: FFFEh
Identifier: User
Password : '1234'
Fill password : none
HEX: 31 32 33 34
Are you sure to run 'Disable password' <Y/N> ?

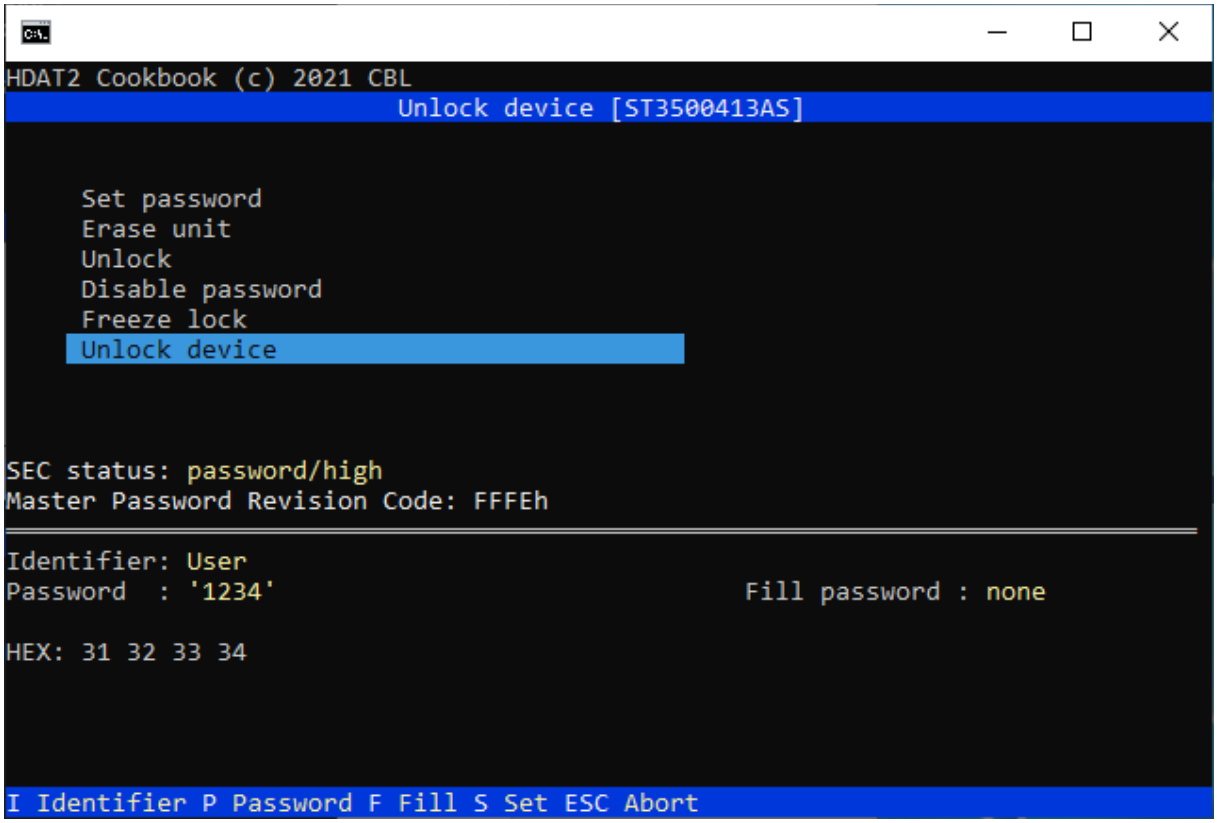

HDAT2 Cookbook (c) 2021 CBL
Disable password [ST3500413AS]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: password/high [UNLOCKED mode]
Master Password Revision Code: FFFEh
Identifier: User
Password : '1234'
Fill password : none
HEX: 31 32 33 34
Command completed successfully. Press any key...

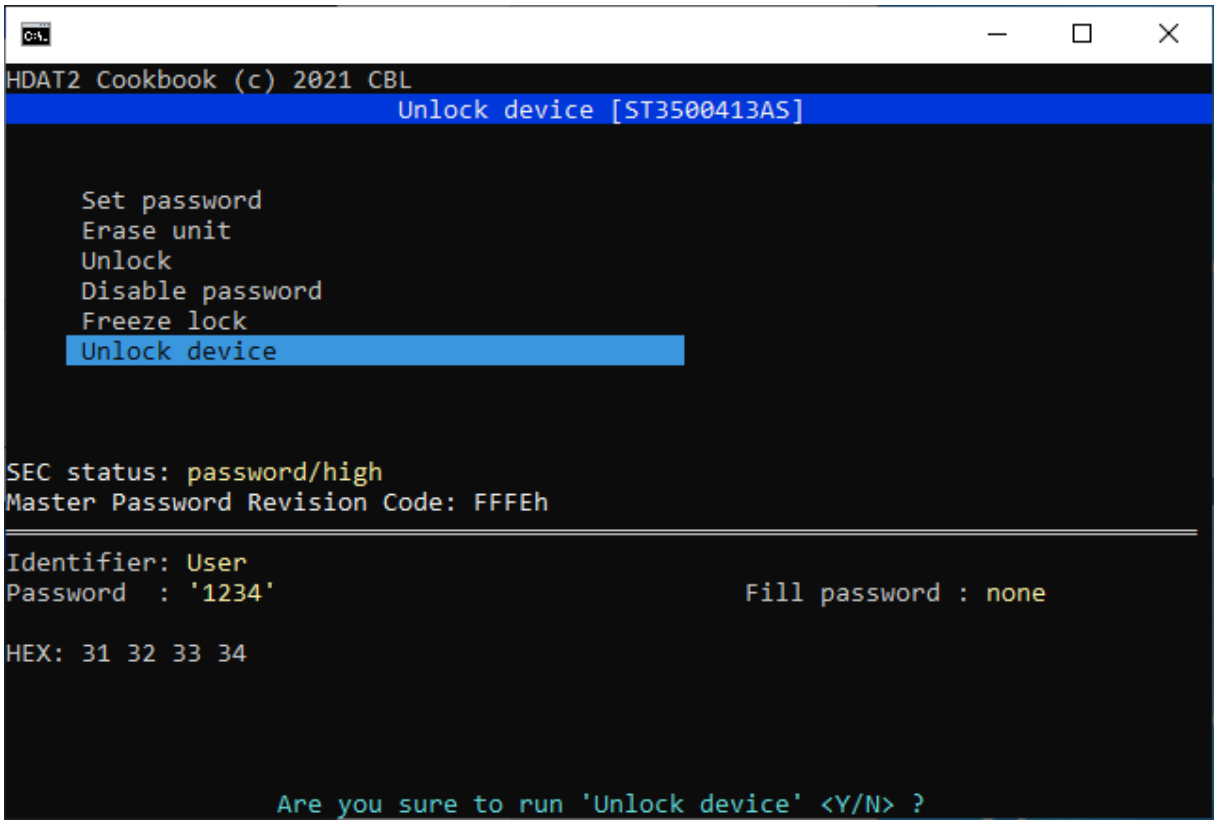


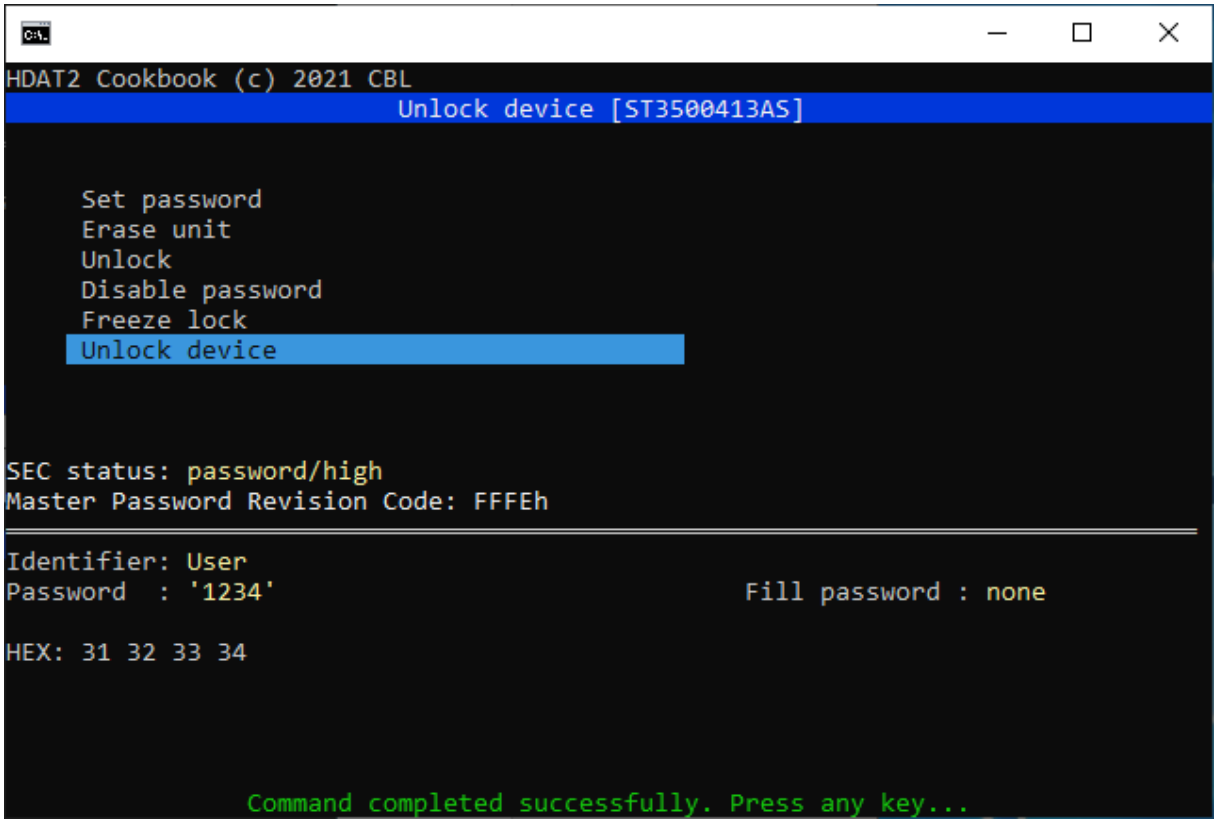
Unlock device

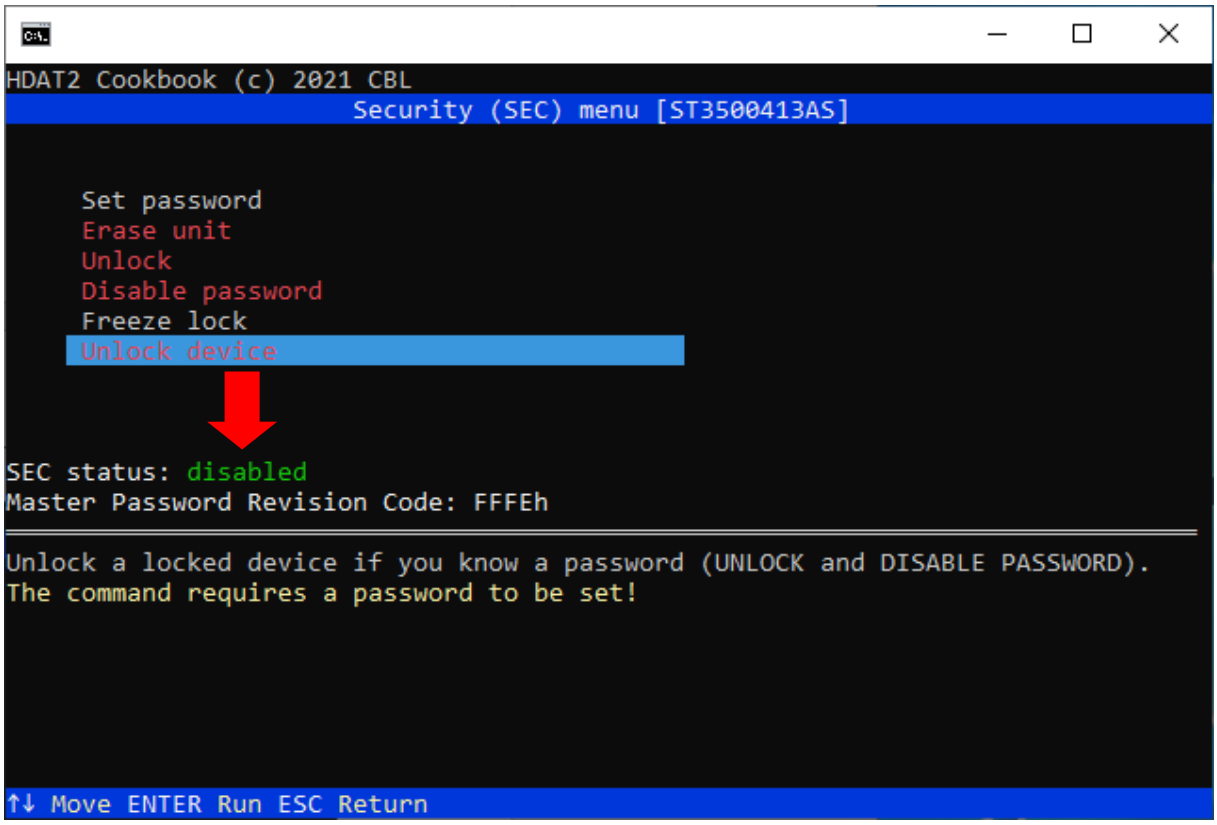
You can also use a special function **Unlock device** to unlock and then disable password.




HDAT2 Cookbook (c) 2021 CBL
Unlock device [ST3500413AS]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: password/high
Master Password Revision Code: FFFEh
Identifier: User
Password : '1234'
Fill password : none
HEX: 31 32 33 34
I Identifier P Password F Fill S Set ESC Abort


HDAT2 Cookbook (c) 2021 CBL
Unlock device [ST3500413AS]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: password/high
Master Password Revision Code: FFFEh
Identifier: User
Password : '1234'
Fill password : none
HEX: 31 32 33 34
Are you sure to run 'Unlock device' <Y/N> ?


HDAT2 Cookbook (c) 2021 CBL
Unlock device [ST3500413AS]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: password/high
Master Password Revision Code: FFFEh
Identifier: User
Password : '1234'
Fill password : none
HEX: 31 32 33 34
Command completed successfully. Press any key...


HDAT2 Cookbook (c) 2021 CBL
Security (SEC) menu [ST3500413AS]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: disabled
Master Password Revision Code: FFFEh
Unlock a locked device if you know a password (UNLOCK and DISABLE PASSWORD).
The command requires a password to be set!
↑↓ Move ENTER Run ESC Return

Erase the device

Erase unit (wipe) does not mean delete or format. Data erasure is a method of software based overwriting. It uses an application to write patterns of data (like 00h or FFh) onto each of a hard drive's sectors on all areas of a hard drive.

To erase device you can use SECURITY ERASE UNIT command in Security Menu or, when supported, SCT Write Same command in SMART Menu.

Disk overwriting programs that cannot access the entire hard drive, including hidden areas like the Host Protected Area (HPA), Device Configuration Overlay (DCO), and remapped sectors, perform **an incomplete erasure**, leaving some of the data intact.

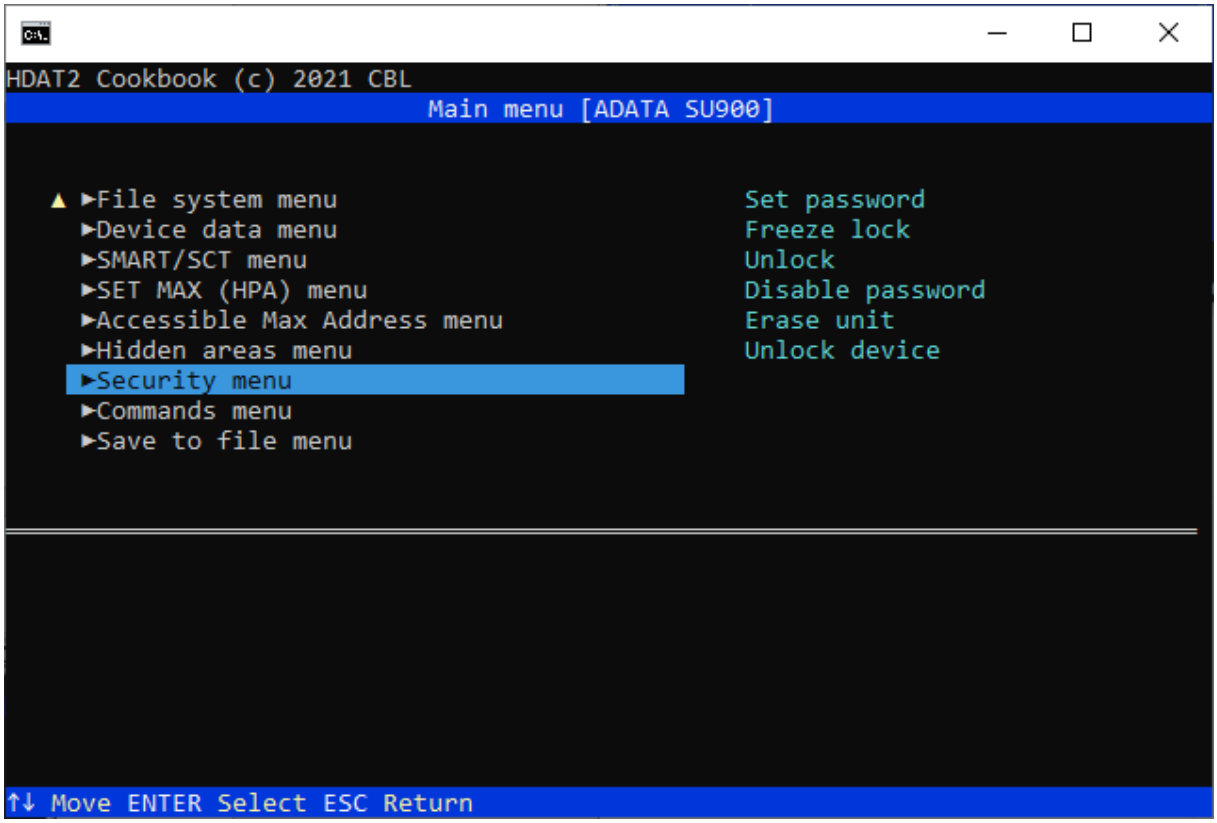
To use security erase command you should first set any password – we use password "1234".

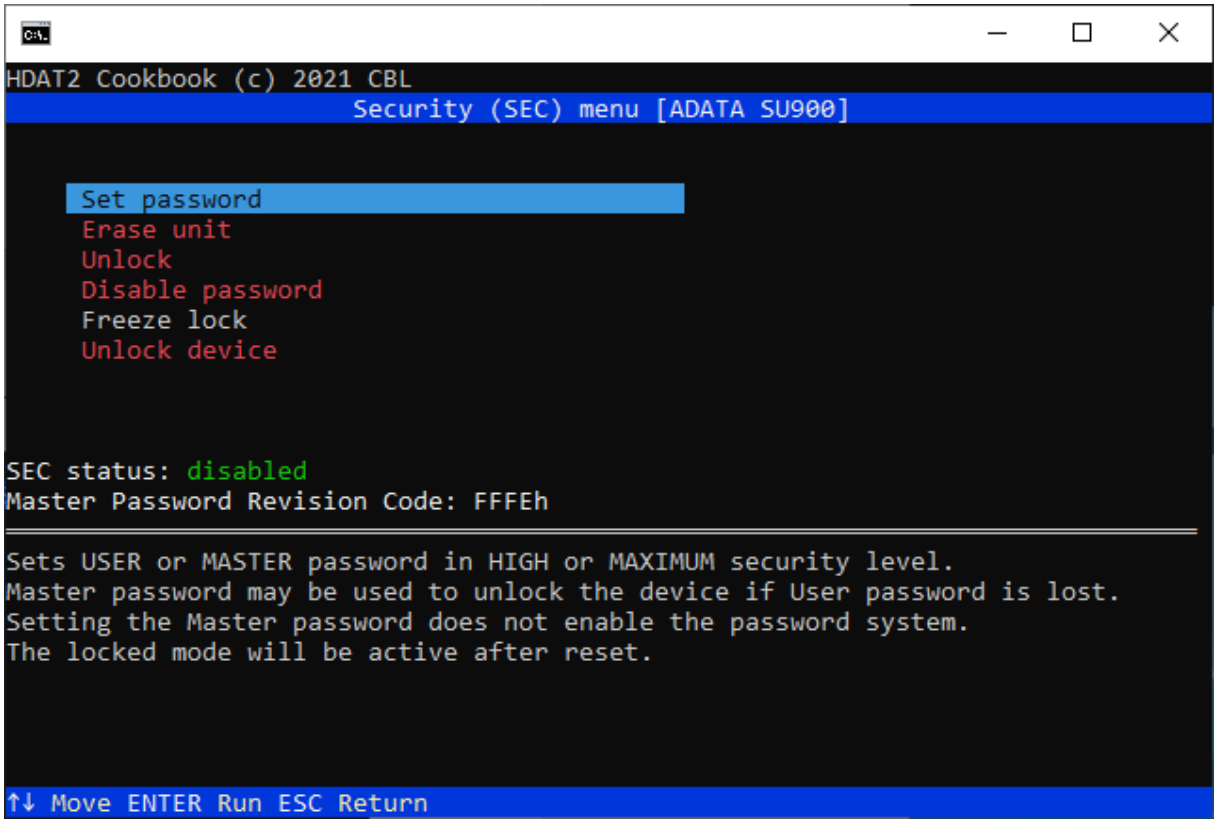
Security erase the device

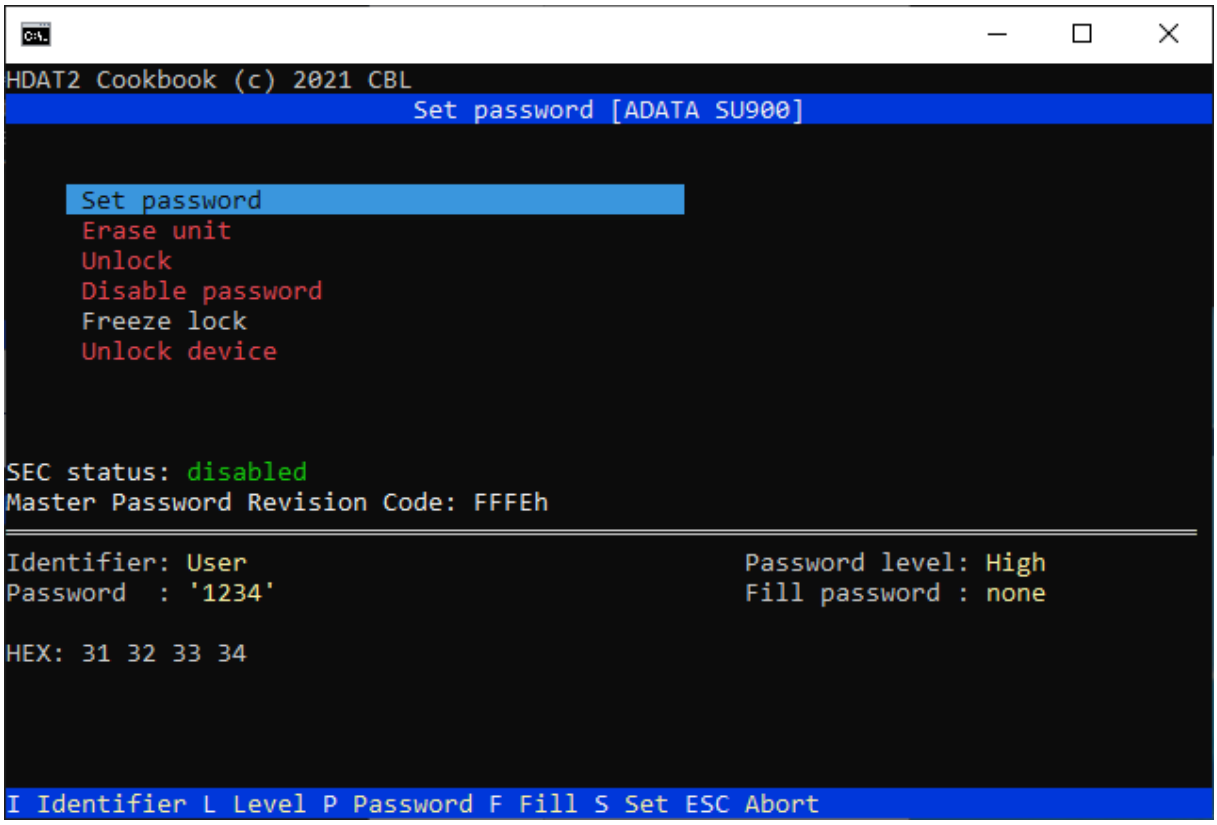
In Enhanced Erase mode, all previously written user data shall be overwritten, including sectors that are no longer in use due to reallocation.

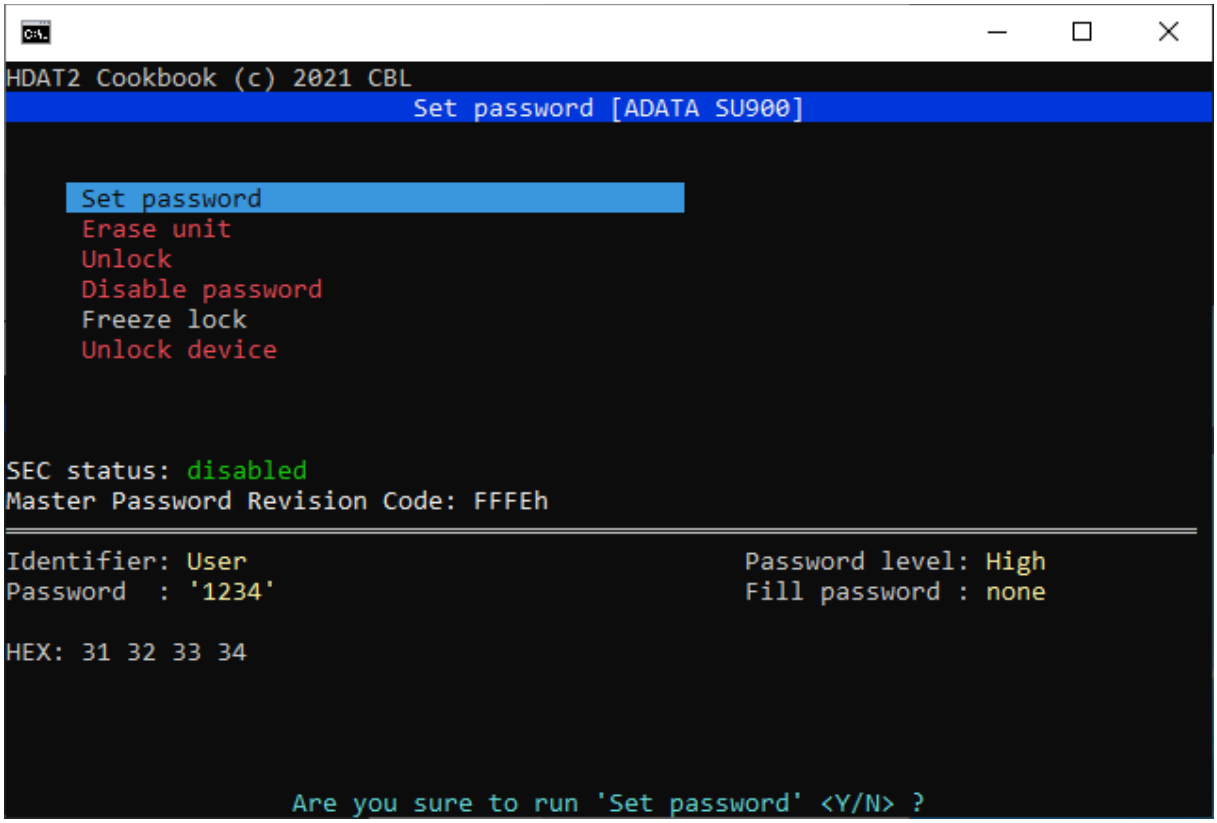
SECURITY ERASE UNIT allow erase HPA (Host Protected Area) or DCO (Device Configuration Overlay) areas, if any, as well. But don't remove these areas.

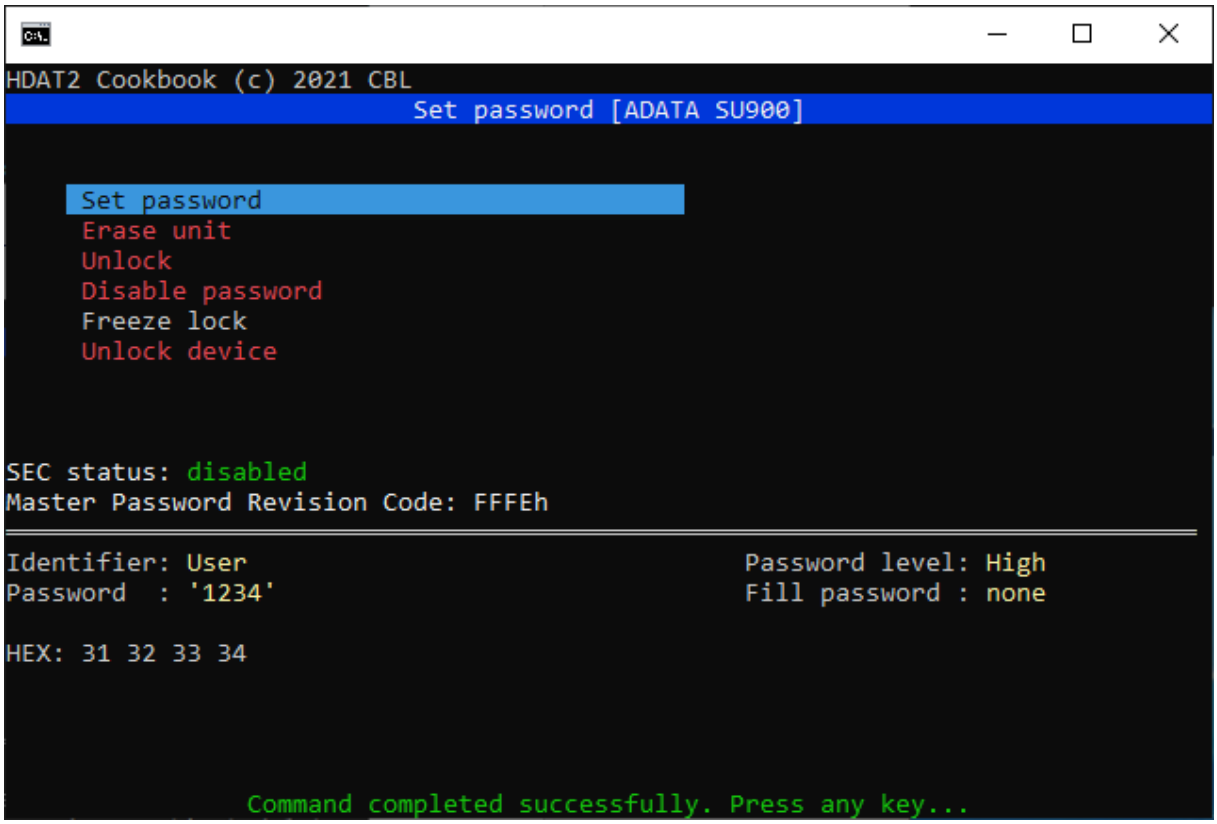
Also in High security mode the SECURITY ERASE UNIT command can be used with either the User or Master password.

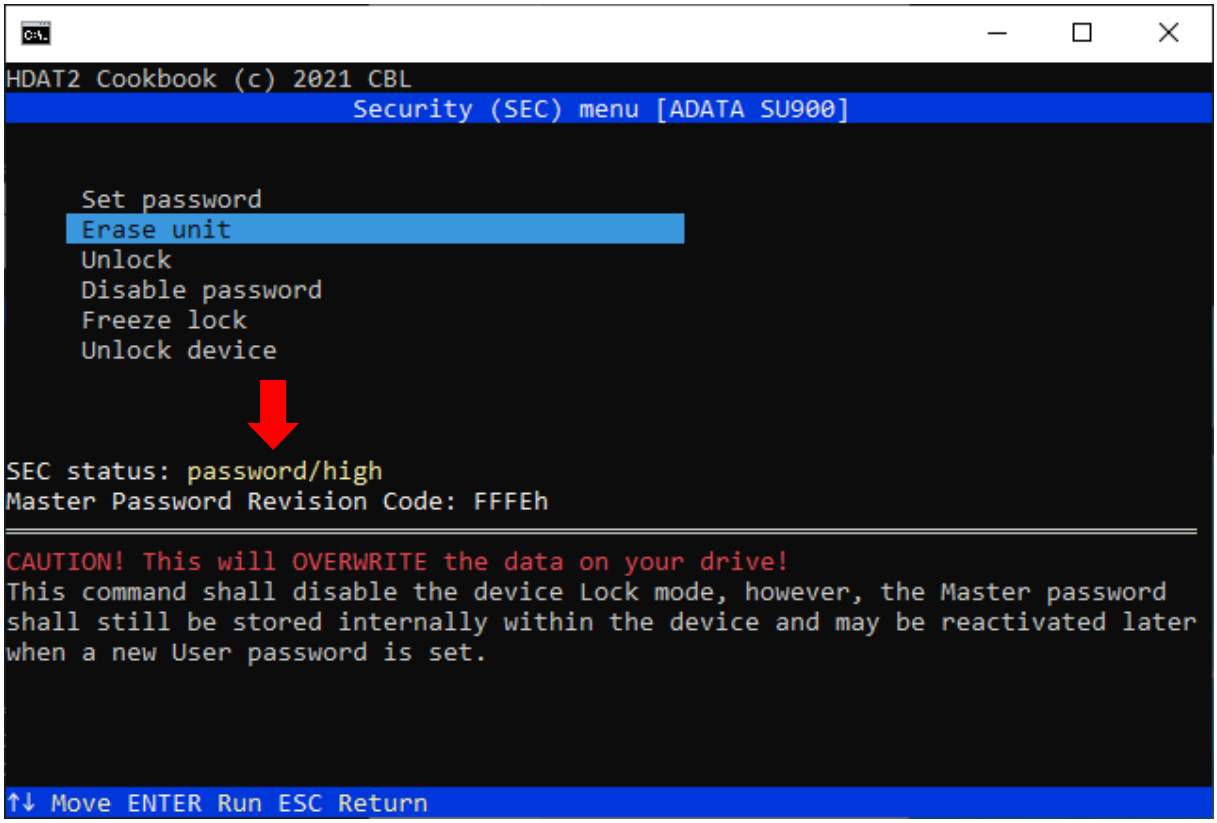


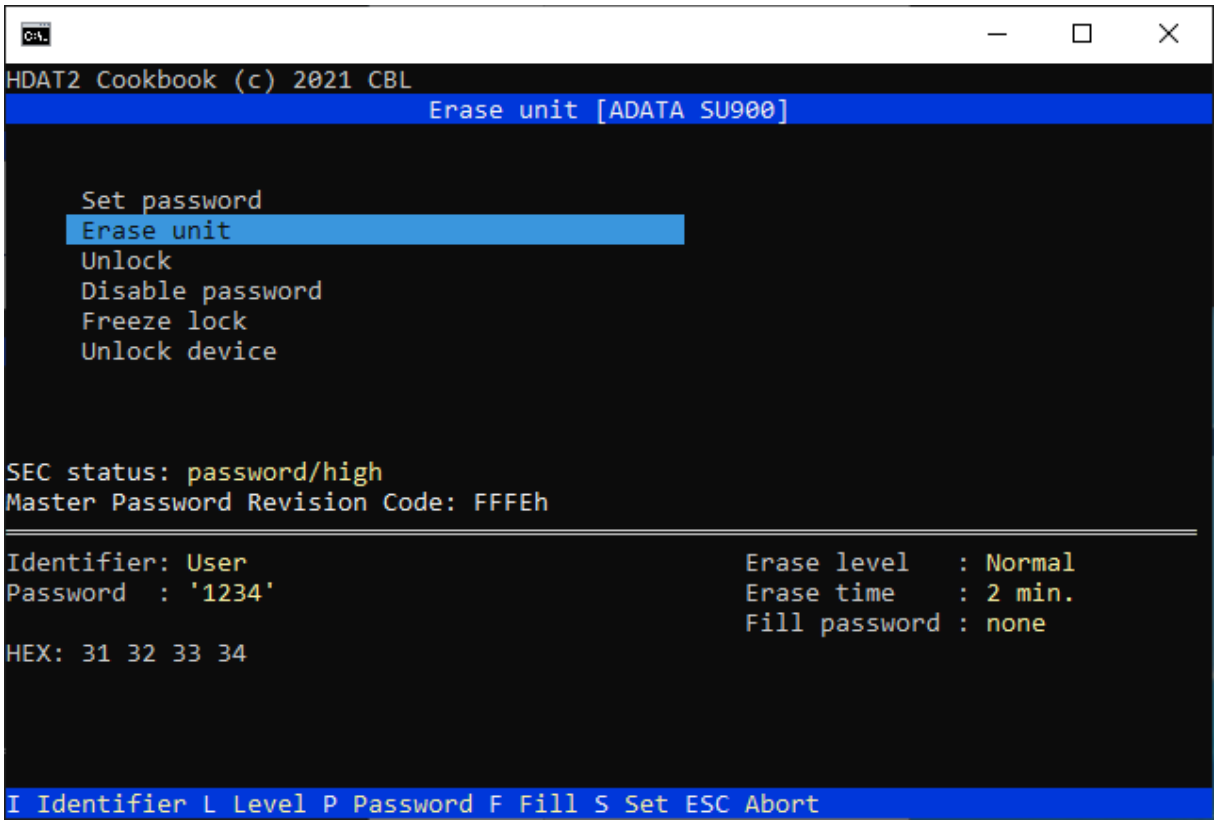

HDAT2 Cookbook (c) 2021 CBL
Security (SEC) menu [ADATA SU900]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: disabled
Master Password Revision Code: FFFEh
Sets USER or MASTER password in HIGH or MAXIMUM security level.
Master password may be used to unlock the device if User password is lost.
Setting the Master password does not enable the password system.
The locked mode will be active after reset.
↑↓ Move ENTER Run ESC Return

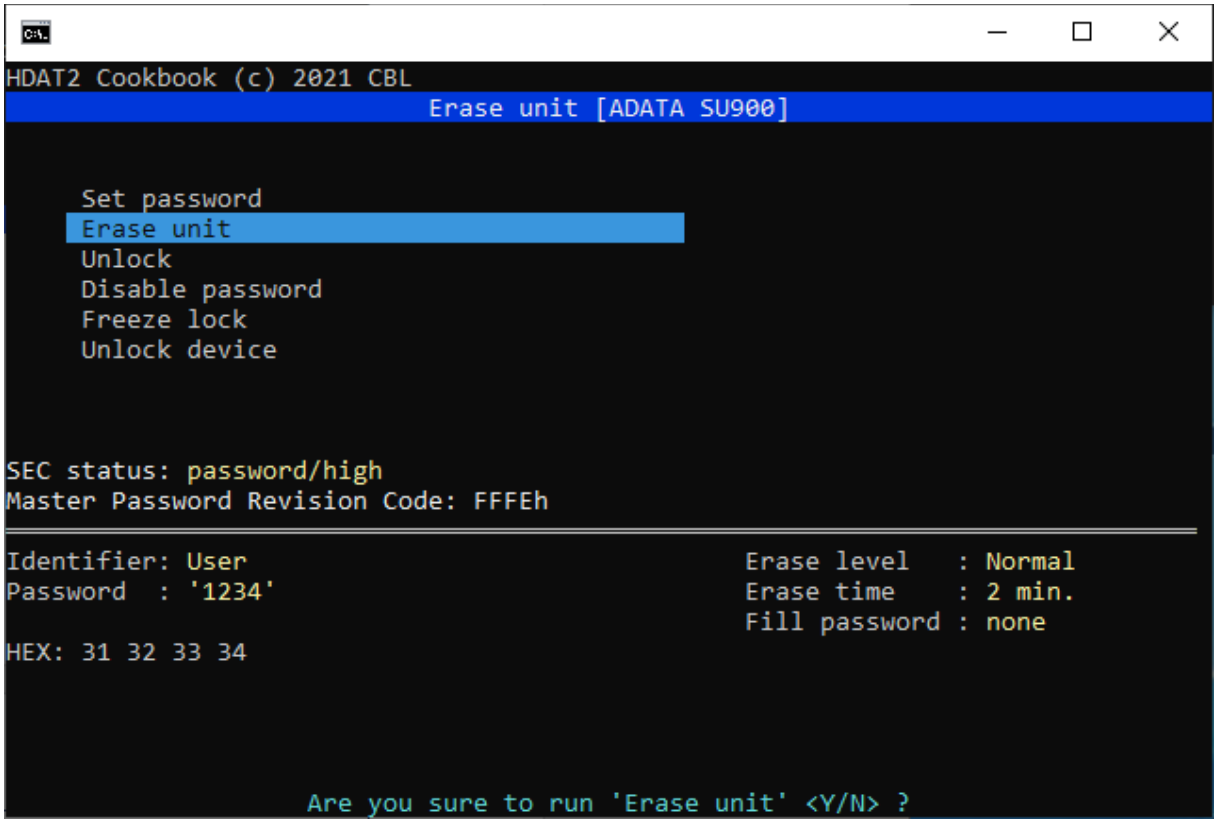

HDAT2 Cookbook (c) 2021 CBL
Set password [ADATA SU900]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: disabled
Master Password Revision Code: FFFEh
Identifier: User
Password : '1234'
Password level: High
Fill password : none
HEX: 31 32 33 34
I Identifier L Level P Password F Fill S Set ESC Abort

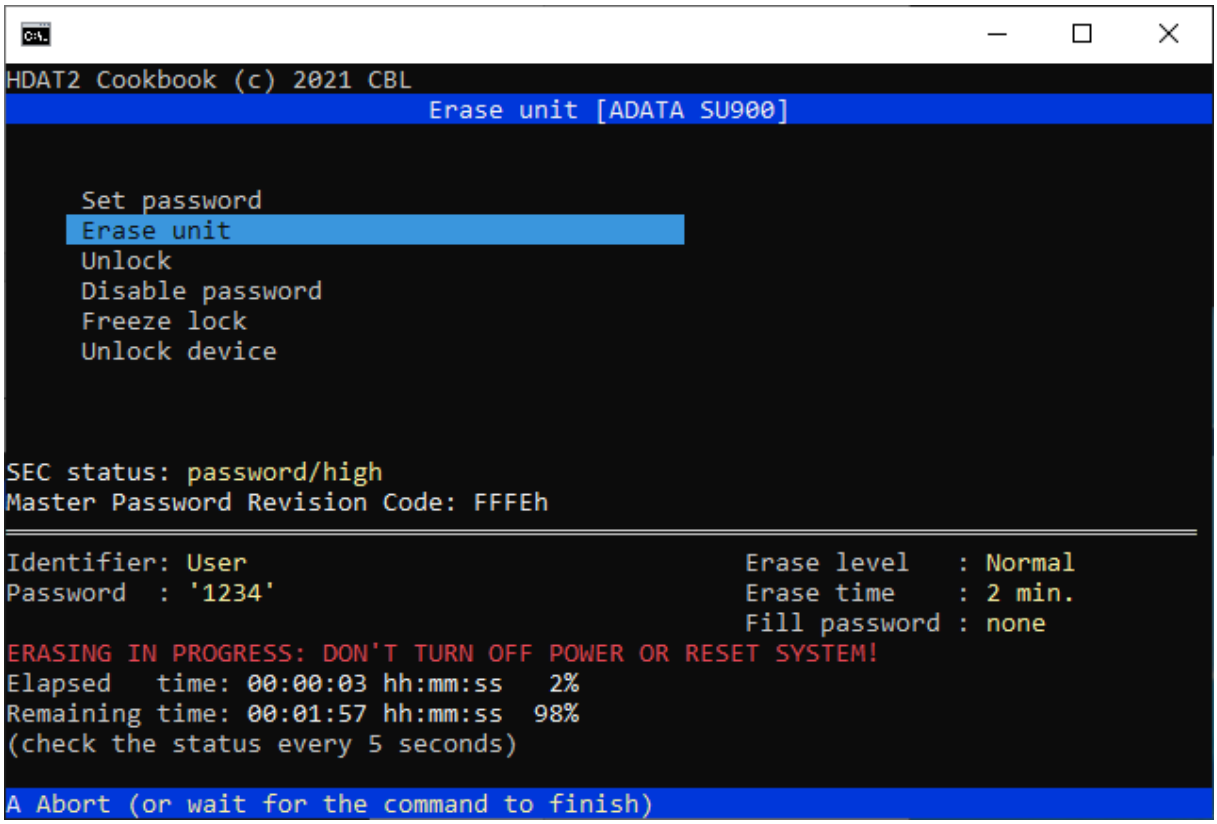

HDAT2 Cookbook (c) 2021 CBL
Set password [ADATA SU900]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: disabled
Master Password Revision Code: FFFEh
Identifier: User
Password : '1234'
Password level: High
Fill password : none
HEX: 31 32 33 34
Are you sure to run 'Set password' <Y/N> ?

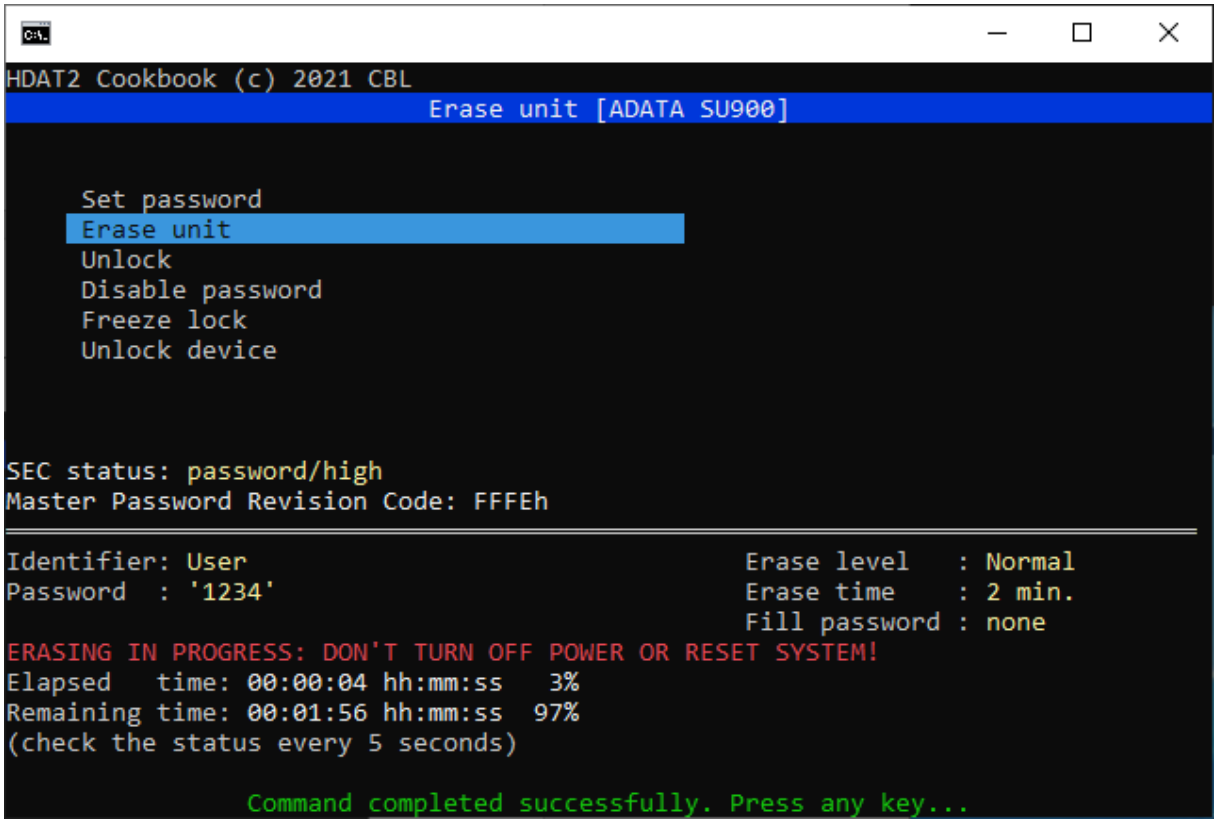

HDAT2 Cookbook (c) 2021 CBL
Set password [ADATA SU900]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: disabled
Master Password Revision Code: FFFEh
Identifier: User
Password : '1234'
Password level: High
Fill password : none
HEX: 31 32 33 34
Command completed successfully. Press any key...

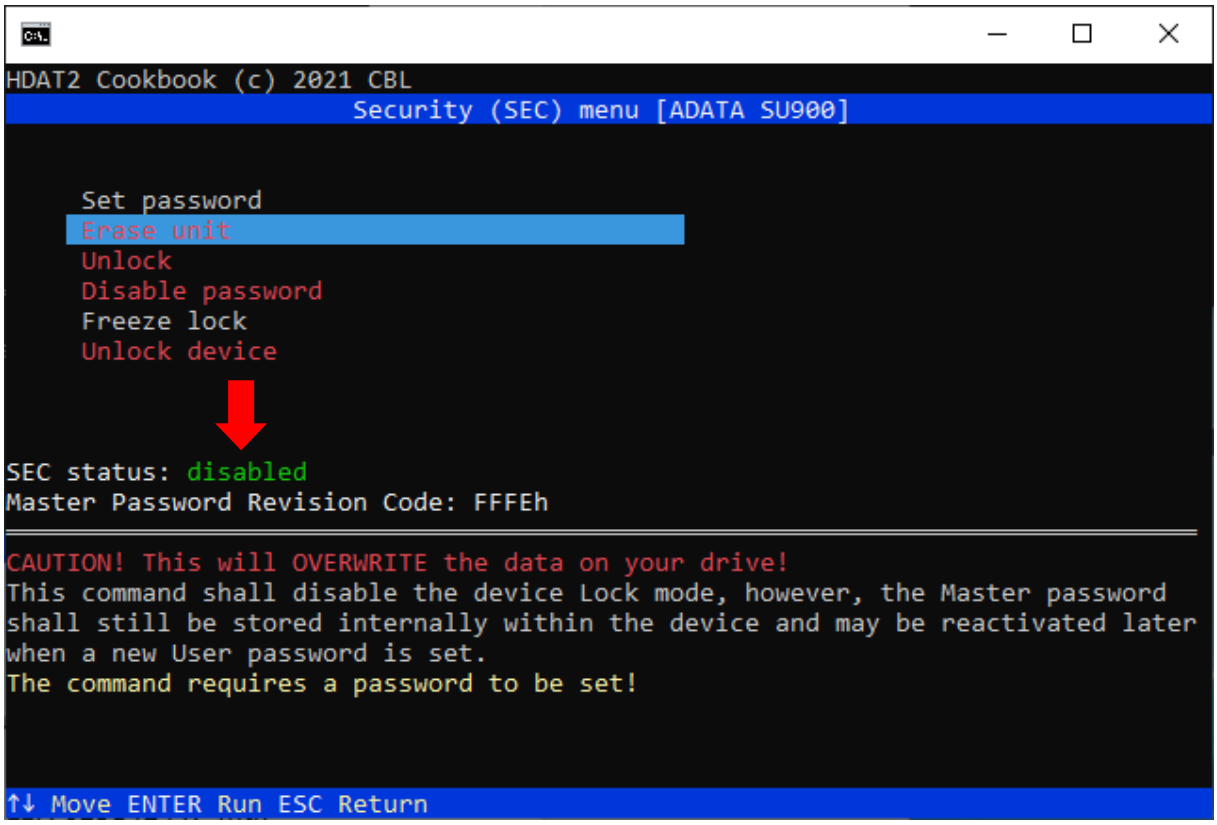

HDAT2 Cookbook (c) 2021 CBL
Security (SEC) menu [ADATA SU900]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: password/high
Master Password Revision Code: FFFEh
CAUTION! This will OVERWRITE the data on your drive!
This command shall disable the device Lock mode, however, the Master password shall still be stored internally within the device and may be reactivated later when a new User password is set.
↑↓ Move ENTER Run ESC Return


HDAT2 Cookbook (c) 2021 CBL
Erase unit [ADATA SU900]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: password/high
Master Password Revision Code: FFFEh
Identifier: User
Password : '1234'
HEX: 31 32 33 34
Erase level : Normal
Erase time : 2 min.
Fill password : none
I Identifier L Level P Password F Fill S Set ESC Abort


HDAT2 Cookbook (c) 2021 CBL
Erase unit [ADATA SU900]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: password/high
Master Password Revision Code: FFFEh
Identifier: User
Password : '1234'
HEX: 31 32 33 34
Erase level : Normal
Erase time : 2 min.
Fill password : none
Are you sure to run 'Erase unit' <Y/N> ?


HDAT2 Cookbook (c) 2021 CBL
Erase unit [ADATA SU900]
Set password
Erase unit
Unlock
Disable password
Freeze lock
Unlock device
SEC status: password/high
Master Password Revision Code: FFFEh
Identifier: User
Password : '1234'
Erase level : Normal
Erase time : 2 min.
Fill password : none
ERASING IN PROGRESS: DON'T TURN OFF POWER OR RESET SYSTEM!
Elapsed time: 00:00:03 hh:mm:ss 2%
Remaining time: 00:01:57 hh:mm:ss 98%
(check the status every 5 seconds)
A Abort (or wait for the command to finish)

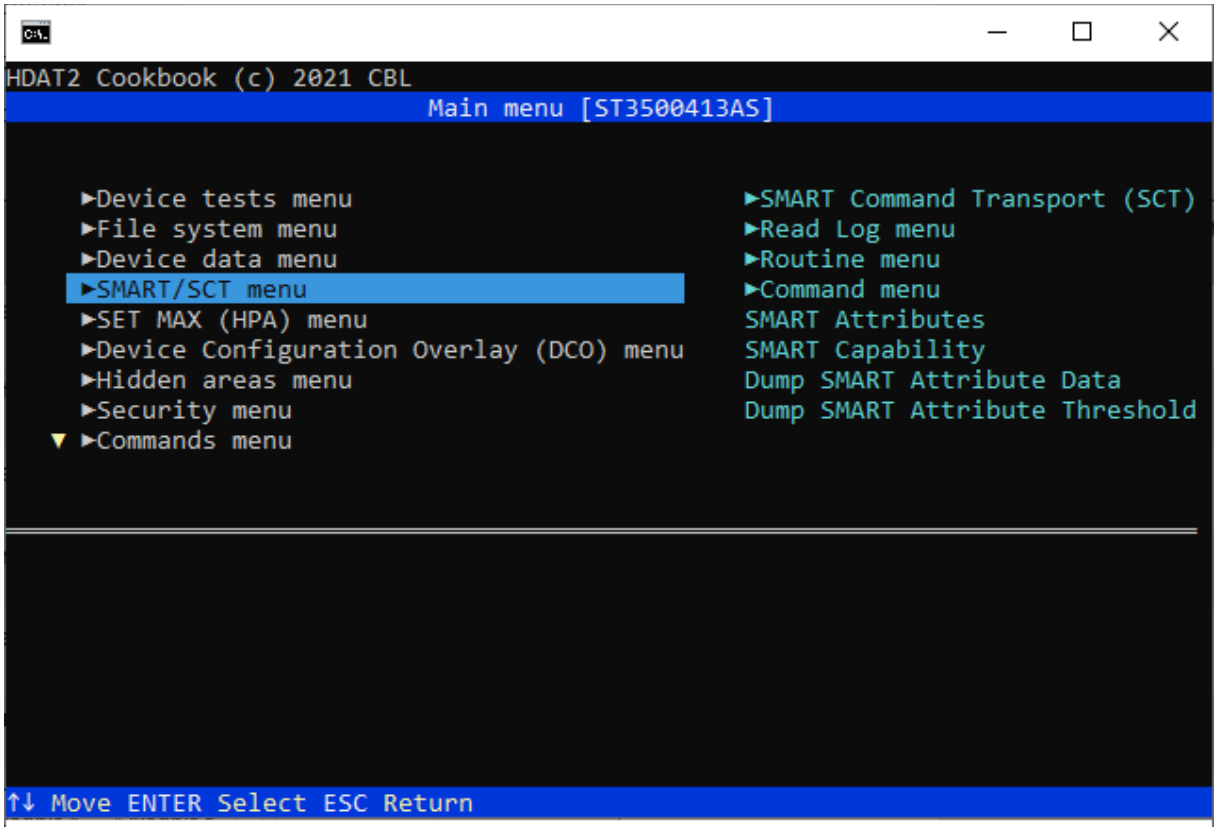


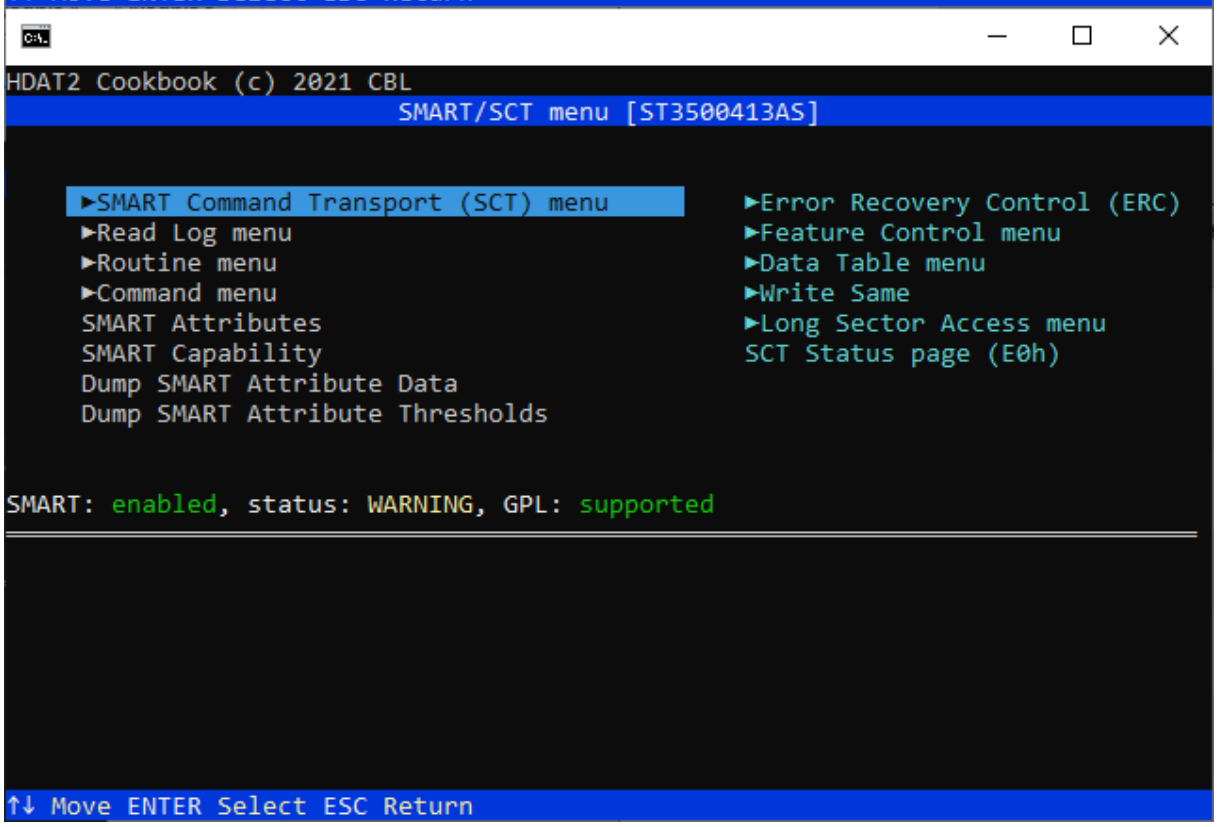


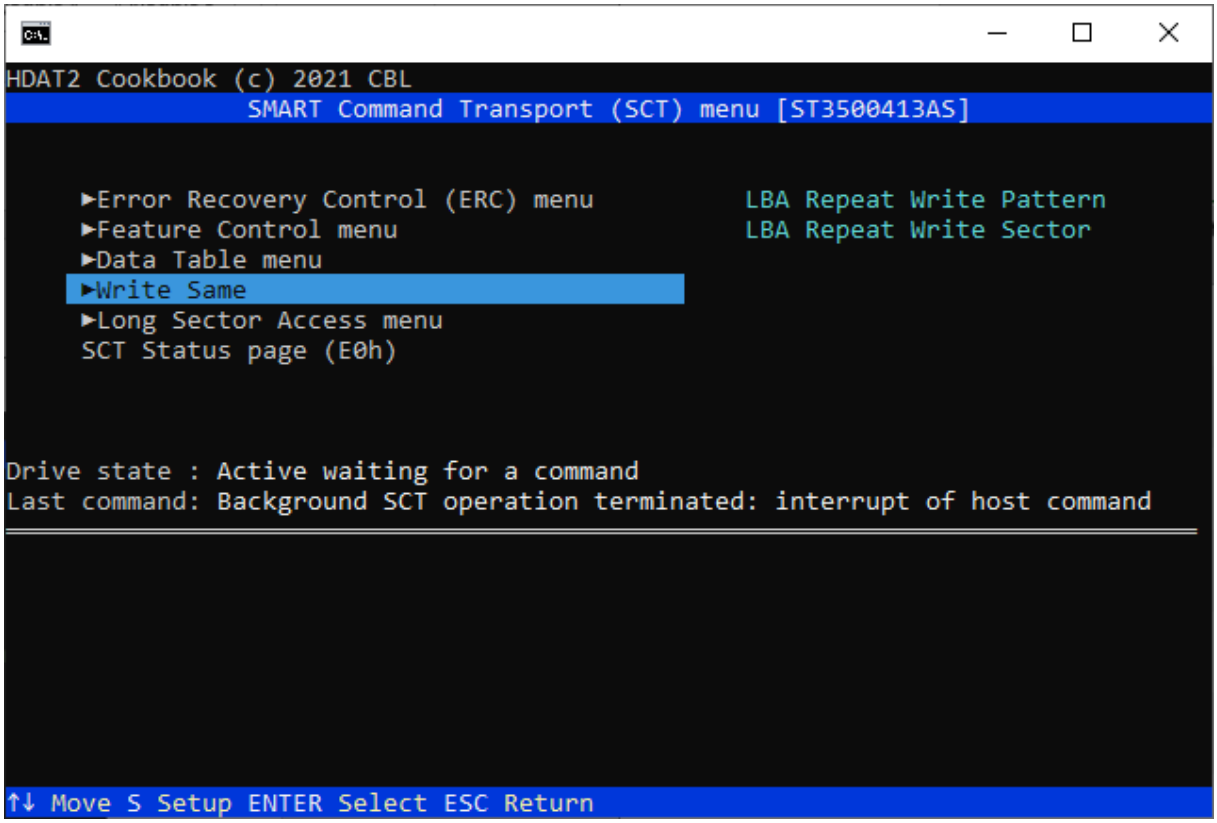
SCT Write Same

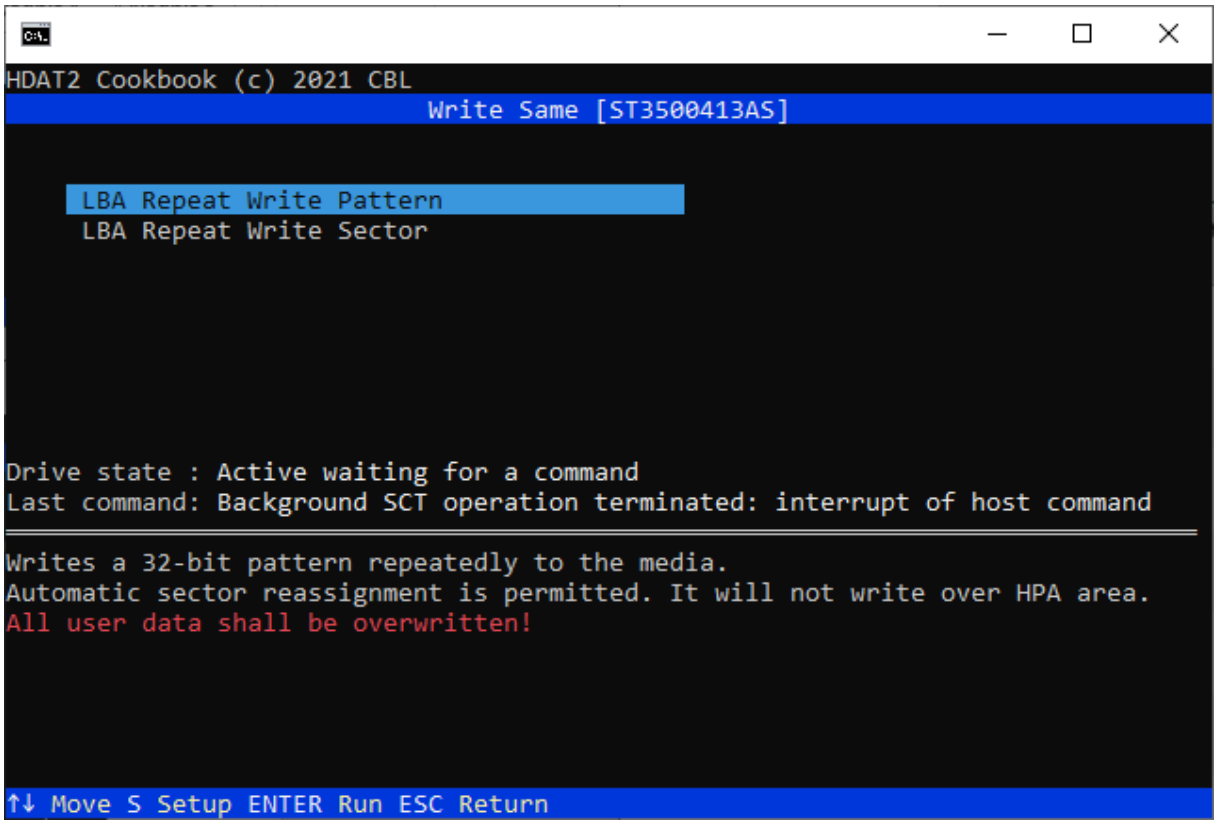
When device supports SMART Command Transport (SCT) you can use the SCT function Write Same – LBA Repeat Write Pattern or LBA Repeat Write Sector.

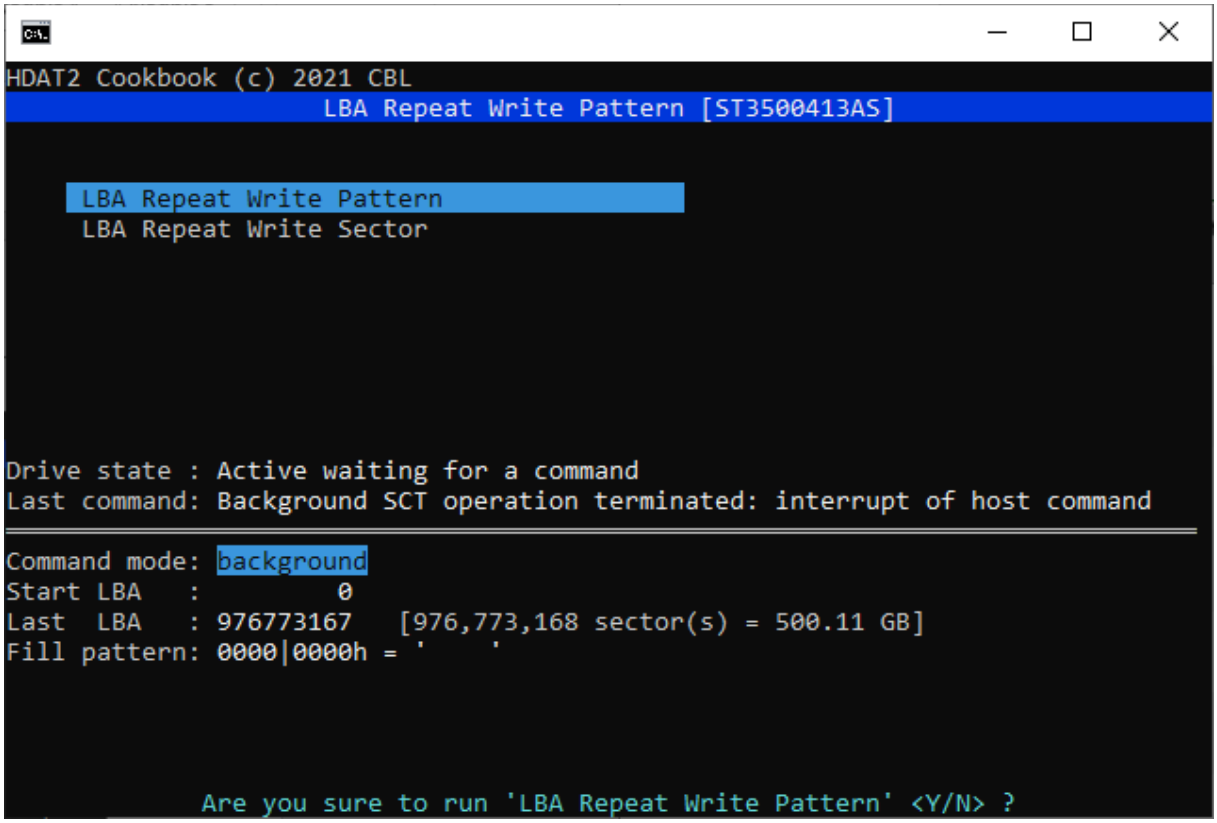
Example: We will overwrite sectors from LBA 0 with hexadecimal pattern "0000|0000h".

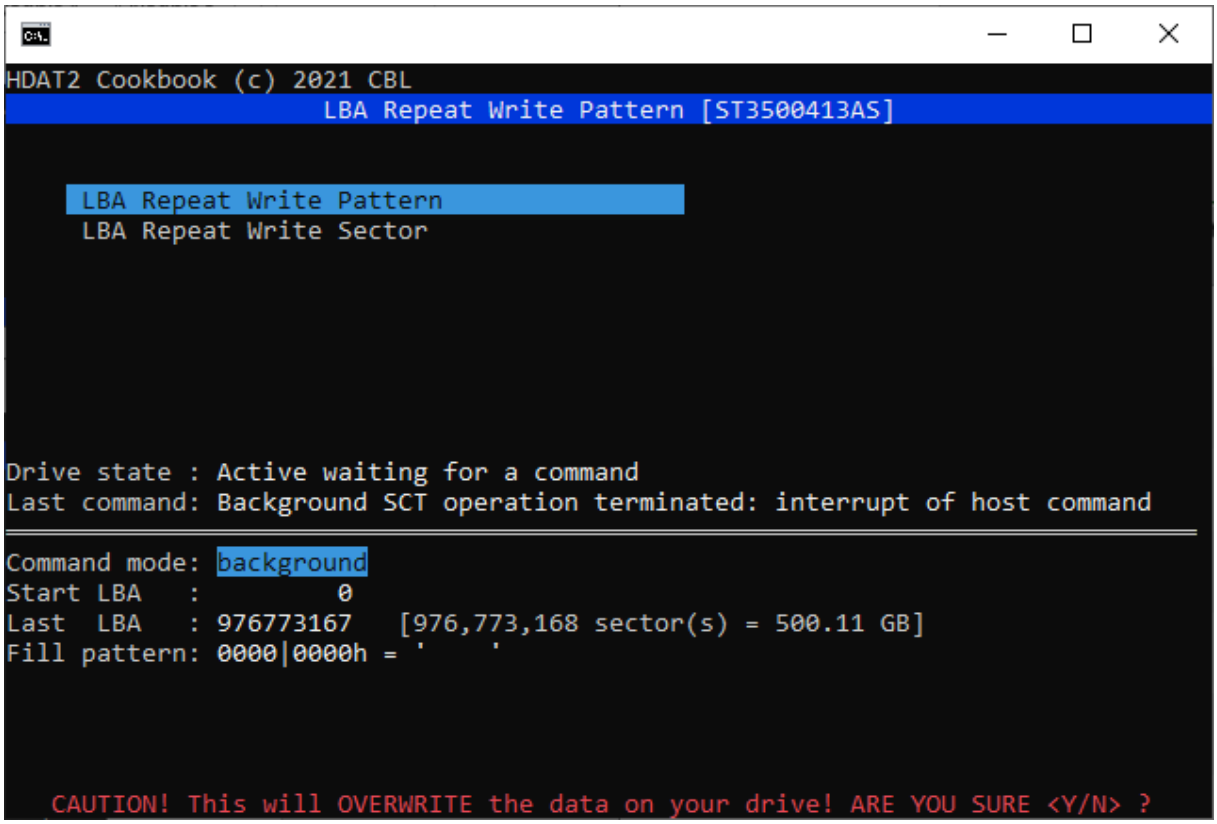

HDAT2 Cookbook (c) 2021 CBL
Main menu [ST3500413AS]
►Device tests menu
►File system menu
►Device data menu
►SMART/SCT menu
►SET MAX (HPA) menu
►Device Configuration Overlay (DCO) menu
►Hidden areas menu
►Security menu
►Commands menu
►SMART Command Transport (SCT)
►Read Log menu
►Routine menu
►Command menu
SMART Attributes
SMART Capability
Dump SMART Attribute Data
Dump SMART Attribute Threshold
↑↓ Move ENTER Select ESC Return

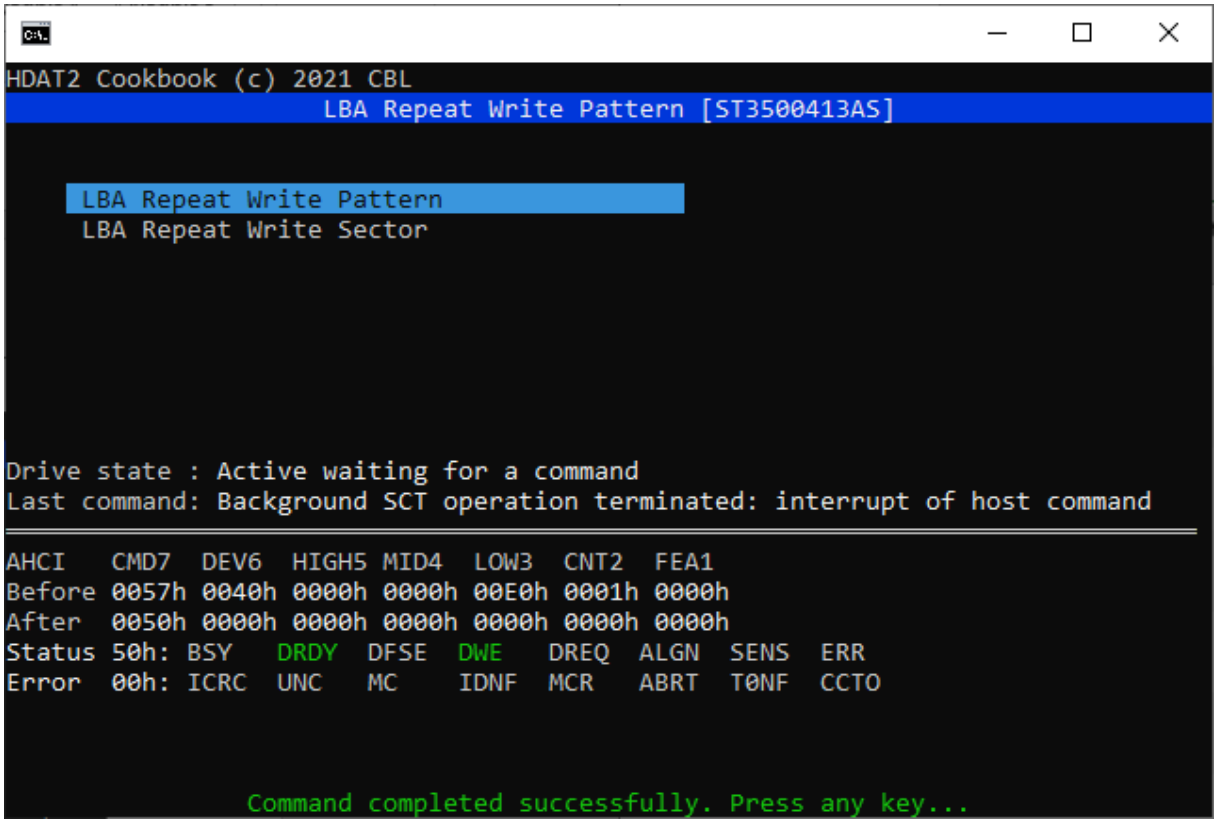

HDAT2 Cookbook (c) 2021 CBL
SMART/SCT menu [ST3500413AS]
►SMART Command Transport (SCT) menu
►Read Log menu
►Routine menu
►Command menu
SMART Attributes
SMART Capability
Dump SMART Attribute Data
Dump SMART Attribute Thresholds
►Error Recovery Control (ERC)
►Feature Control menu
►Data Table menu
►Write Same
►Long Sector Access menu
SCT Status page (E0h)
SMART: enabled, status: WARNING, GPL: supported
↑↓ Move ENTER Select ESC Return

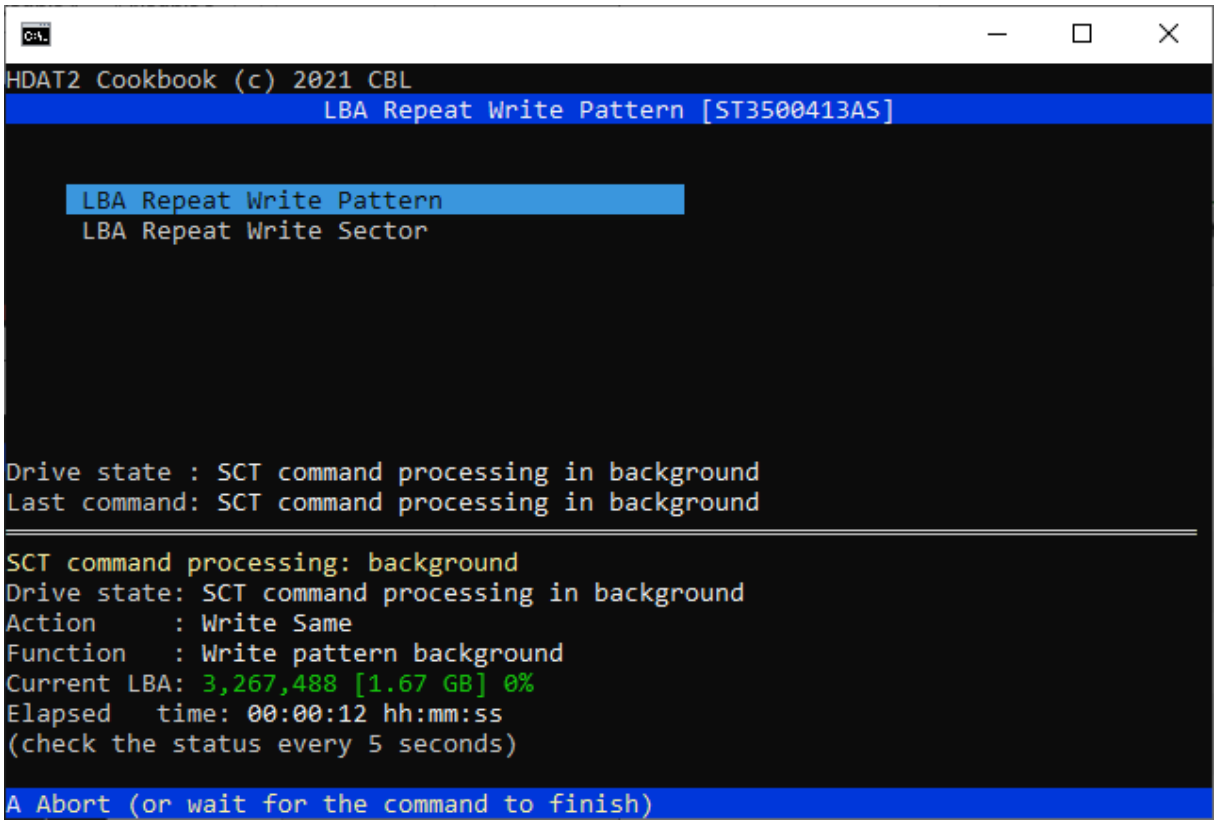

HDAT2 Cookbook (c) 2021 CBL
SMART Command Transport (SCT) menu [ST3500413AS]
►Error Recovery Control (ERC) menu
►Feature Control menu
►Data Table menu
►Write Same
►Long Sector Access menu
SCT Status page (E0h)
LBA Repeat Write Pattern
LBA Repeat Write Sector
Drive state : Active waiting for a command
Last command: Background SCT operation terminated: interrupt of host command
↑↓ Move S Setup ENTER Select ESC Return


HDAT2 Cookbook (c) 2021 CBL
Write Same [ST3500413AS]
LBA Repeat Write Pattern
LBA Repeat Write Sector
Drive state : Active waiting for a command
Last command: Background SCT operation terminated: interrupt of host command
Writes a 32-bit pattern repeatedly to the media.
Automatic sector reassignment is permitted. It will not write over HPA area.
All user data shall be overwritten!
↑↓ Move S Setup ENTER Run ESC Return

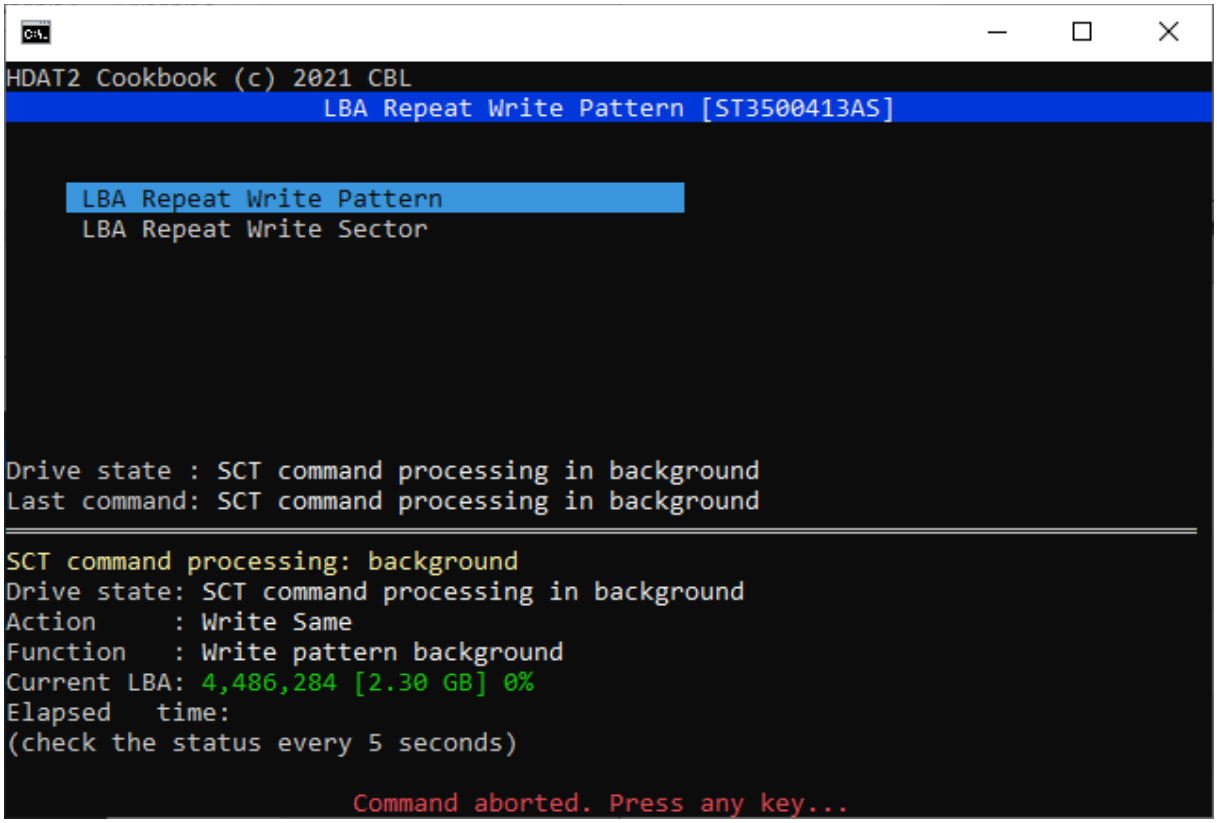

HDAT2 Cookbook (c) 2021 CBL
LBA Repeat Write Pattern [ST3500413AS]
LBA Repeat Write Pattern
LBA Repeat Write Sector
Drive state : Active waiting for a command
Last command: Background SCT operation terminated: interrupt of host command
Command mode: background
Start LBA : 0
Last LBA : 976773167 [976,773,168 sector(s) = 500.11 GB]
Fill pattern: 0000|0000h = ' '
Are you sure to run 'LBA Repeat Write Pattern' <Y/N> ?

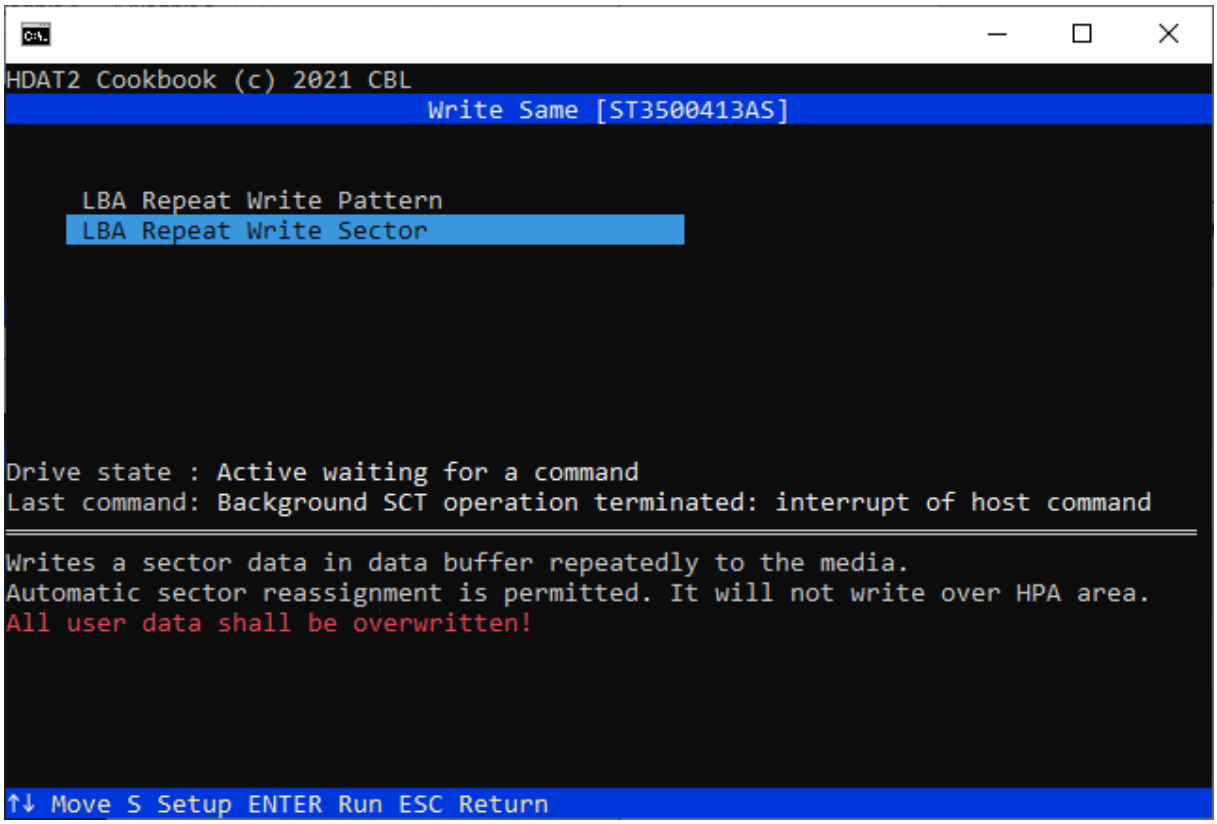

HDAT2 Cookbook (c) 2021 CBL
LBA Repeat Write Pattern [ST3500413AS]
LBA Repeat Write Pattern
LBA Repeat Write Sector
Drive state : Active waiting for a command
Last command: Background SCT operation terminated: interrupt of host command
Command mode: background
Start LBA : 0
Last LBA : 976773167 [976,773,168 sector(s) = 500.11 GB]
Fill pattern: 0000|0000h = ' '
CAUTION! This will OVERWRITE the data on your drive! ARE YOU SURE <Y/N> ?

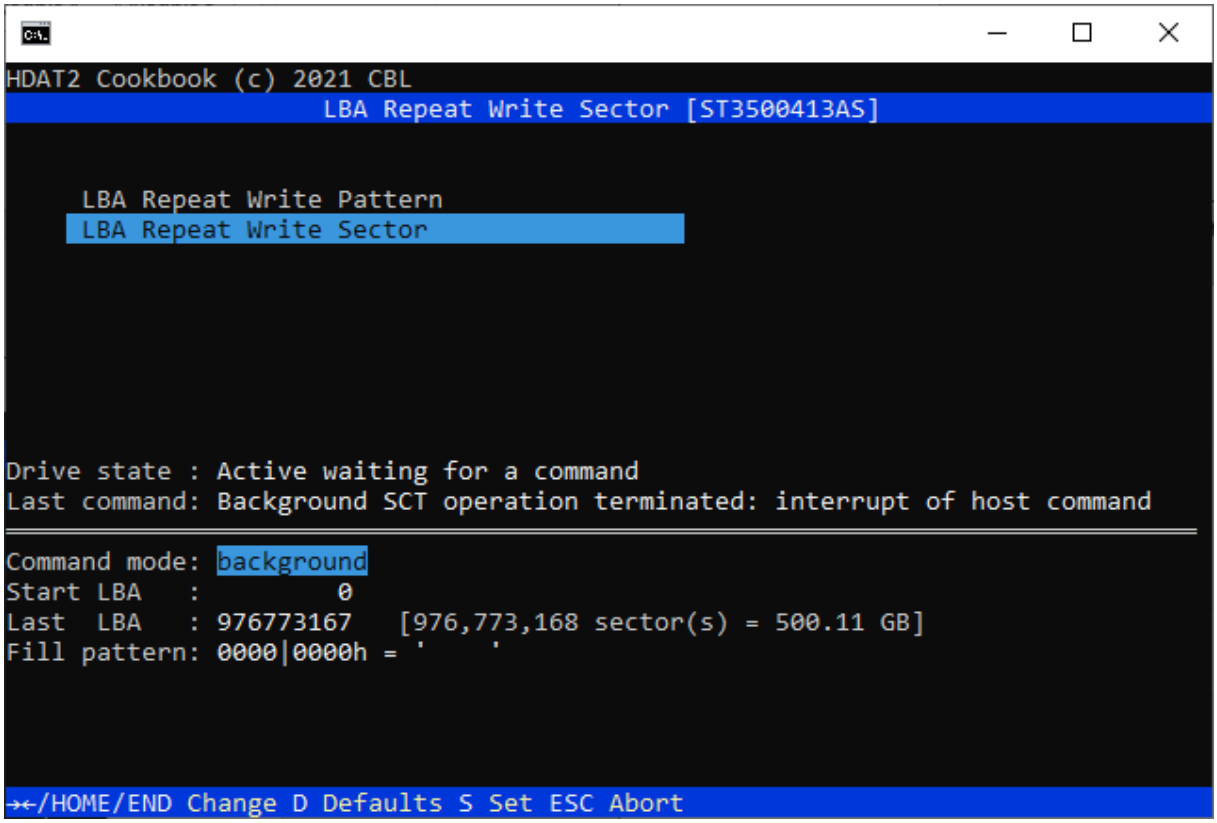


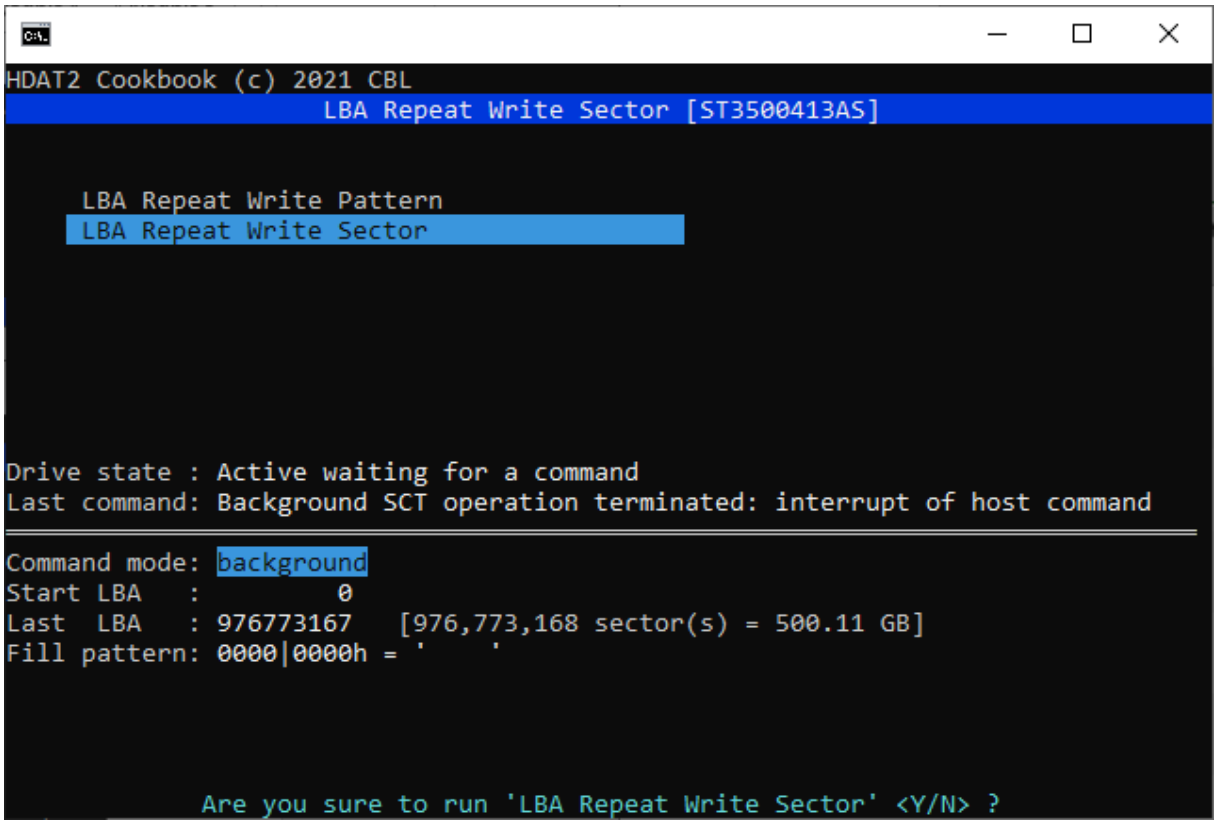


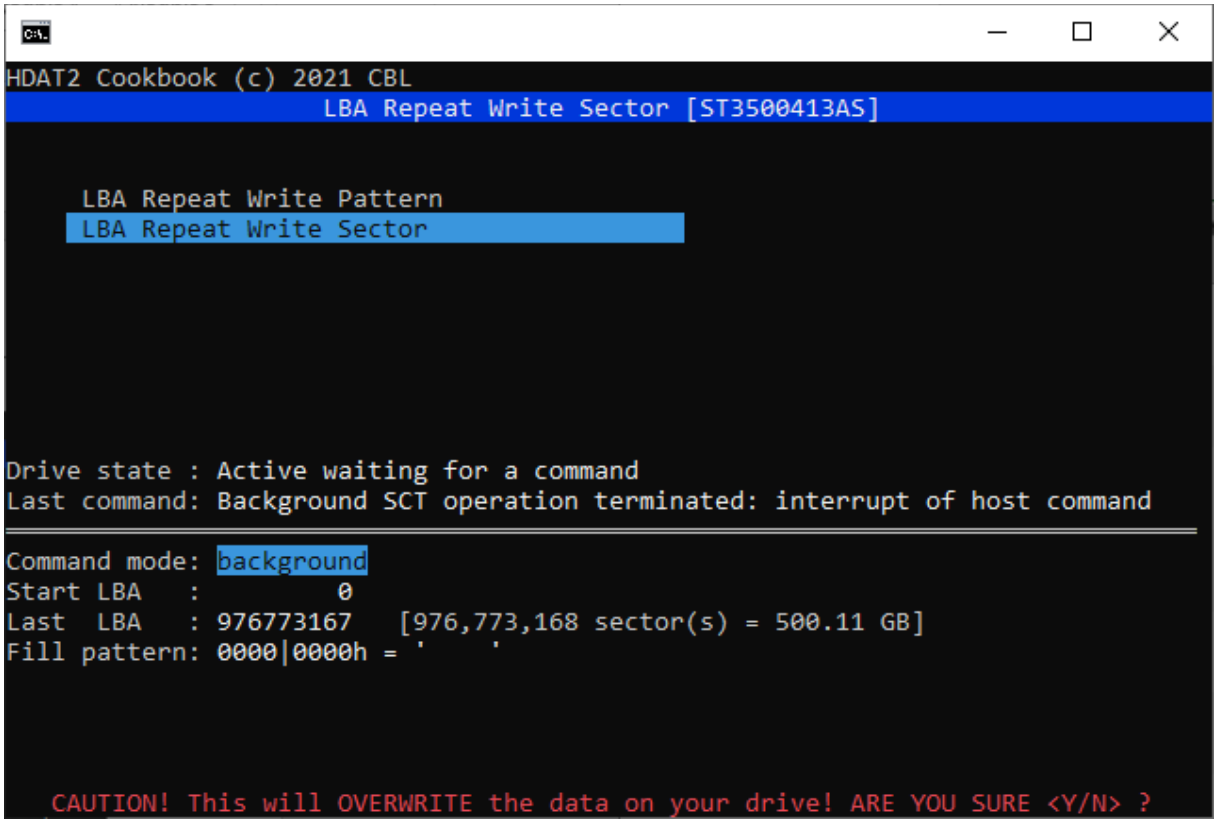
I interrupted the command with the 'A' key.

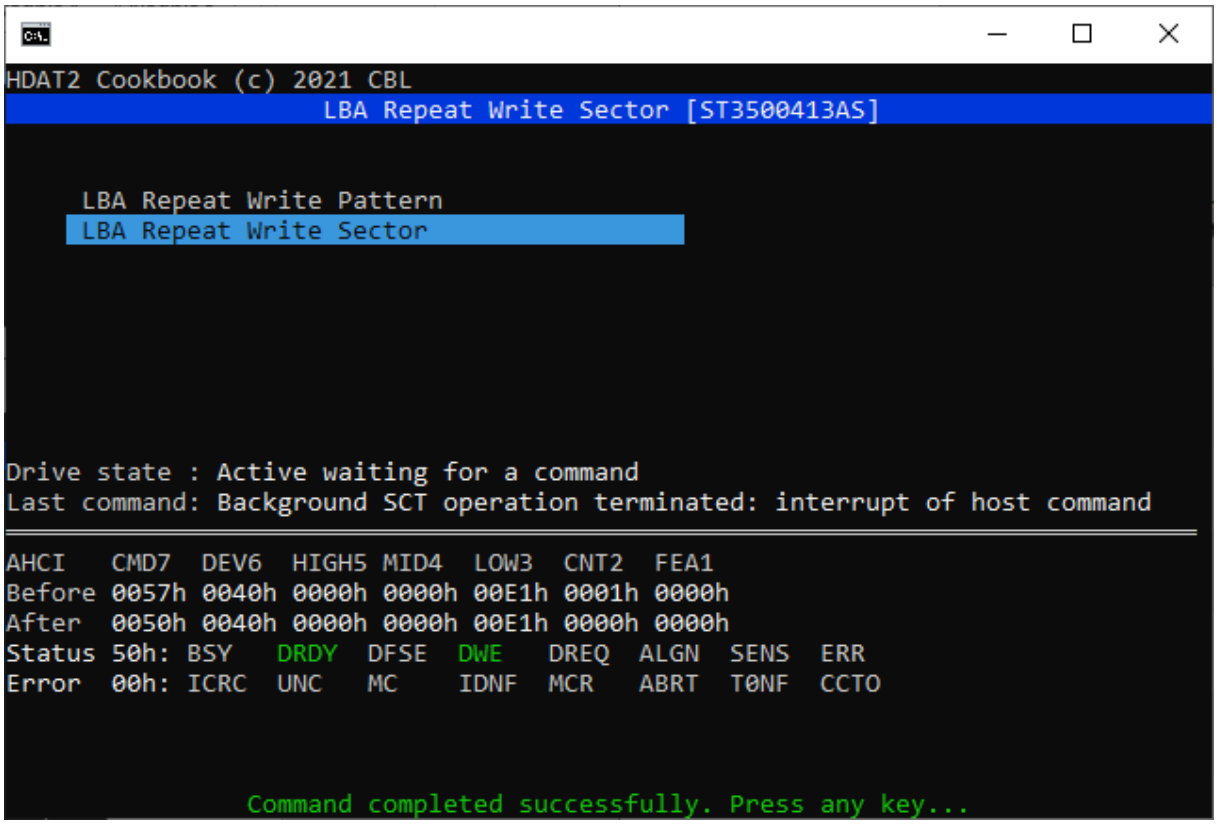

HDAT2 Cookbook (c) 2021 CBL
LBA Repeat Write Pattern [ST3500413AS]
LBA Repeat Write Pattern
LBA Repeat Write Sector
Drive state : SCT command processing in background
Last command: SCT command processing in background
SCT command processing: background
Drive state: SCT command processing in background
Action : Write Same
Function : Write pattern background
Current LBA: 4,486,284 [2.30 GB] 0%
Elapsed time:
(check the status every 5 seconds)
Command aborted. Press any key...

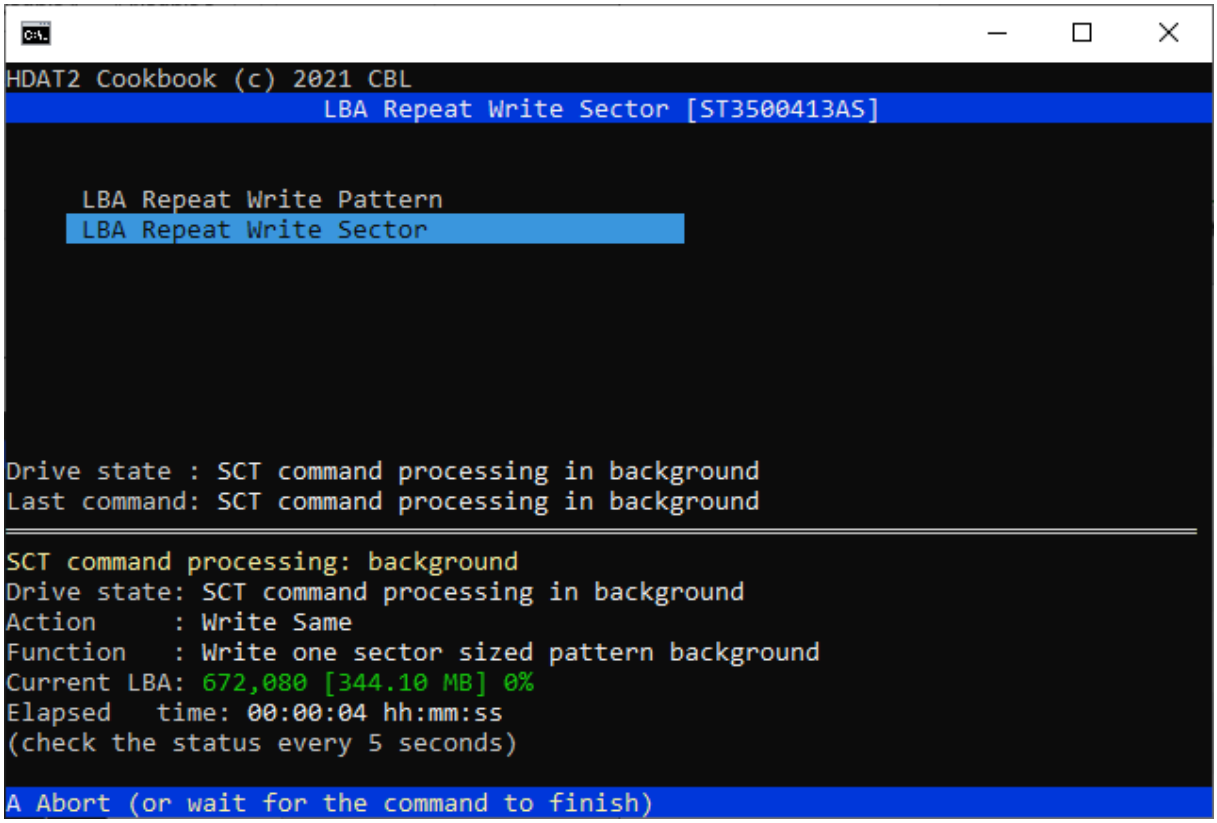

HDAT2 Cookbook (c) 2021 CBL
Write Same [ST3500413AS]
LBA Repeat Write Pattern
LBA Repeat Write Sector
Drive state : Active waiting for a command
Last command: Background SCT operation terminated: interrupt of host command
Writes a sector data in data buffer repeatedly to the media.
Automatic sector reassignment is permitted. It will not write over HPA area.
All user data shall be overwritten!
↑↓ Move S Setup ENTER Run ESC Return

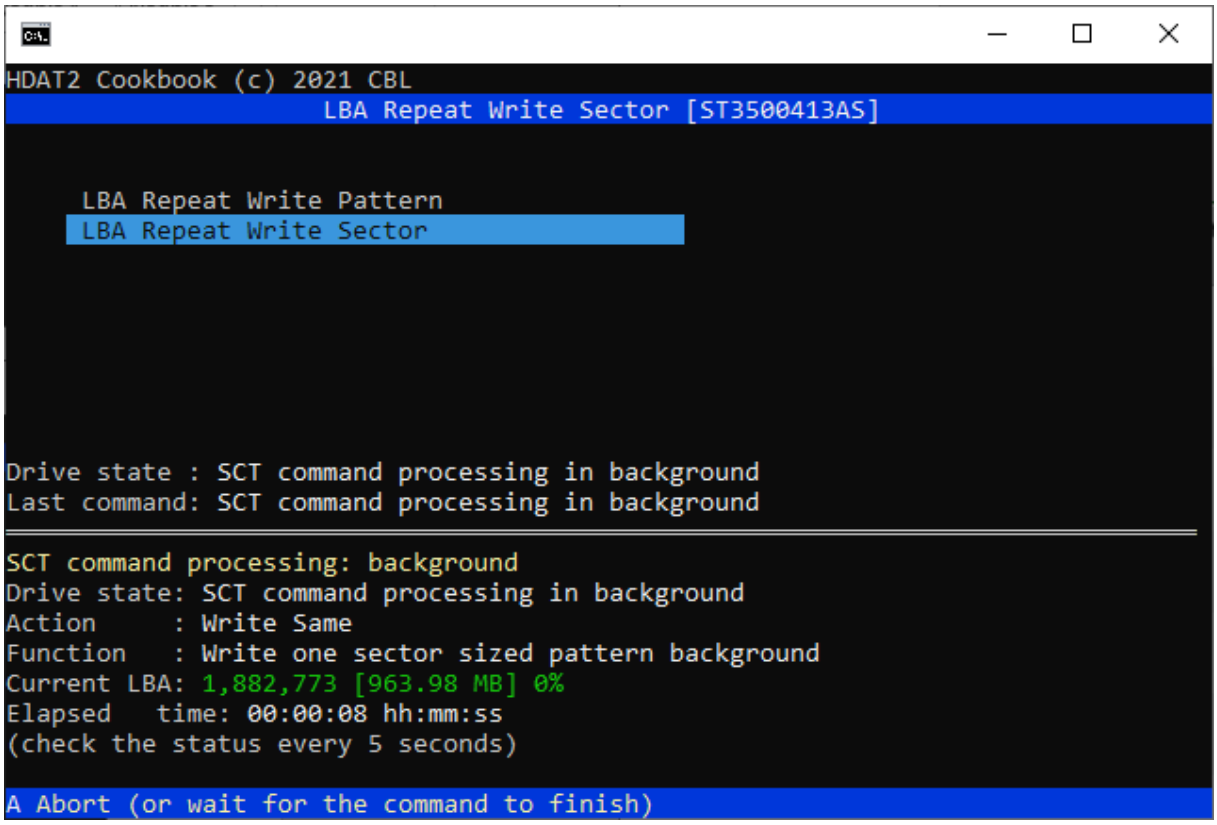

HDAT2 Cookbook (c) 2021 CBL
LBA Repeat Write Sector [ST3500413AS]
LBA Repeat Write Pattern
LBA Repeat Write Sector
Drive state : Active waiting for a command
Last command: Background SCT operation terminated: interrupt of host command
Command mode: background
Start LBA : 0
Last LBA : 976773167 [976,773,168 sector(s) = 500.11 GB]
Fill pattern: 0000|0000h = ' '
→←/HOME/END Change D Defaults S Set ESC Abort


HDAT2 Cookbook (c) 2021 CBL
LBA Repeat Write Sector [ST3500413AS]
LBA Repeat Write Pattern
LBA Repeat Write Sector
Drive state : Active waiting for a command
Last command: Background SCT operation terminated: interrupt of host command
Command mode: background
Start LBA : 0
Last LBA : 976773167 [976,773,168 sector(s) = 500.11 GB]
Fill pattern: 0000|0000h = ' '
Are you sure to run 'LBA Repeat Write Sector' <Y/N> ?

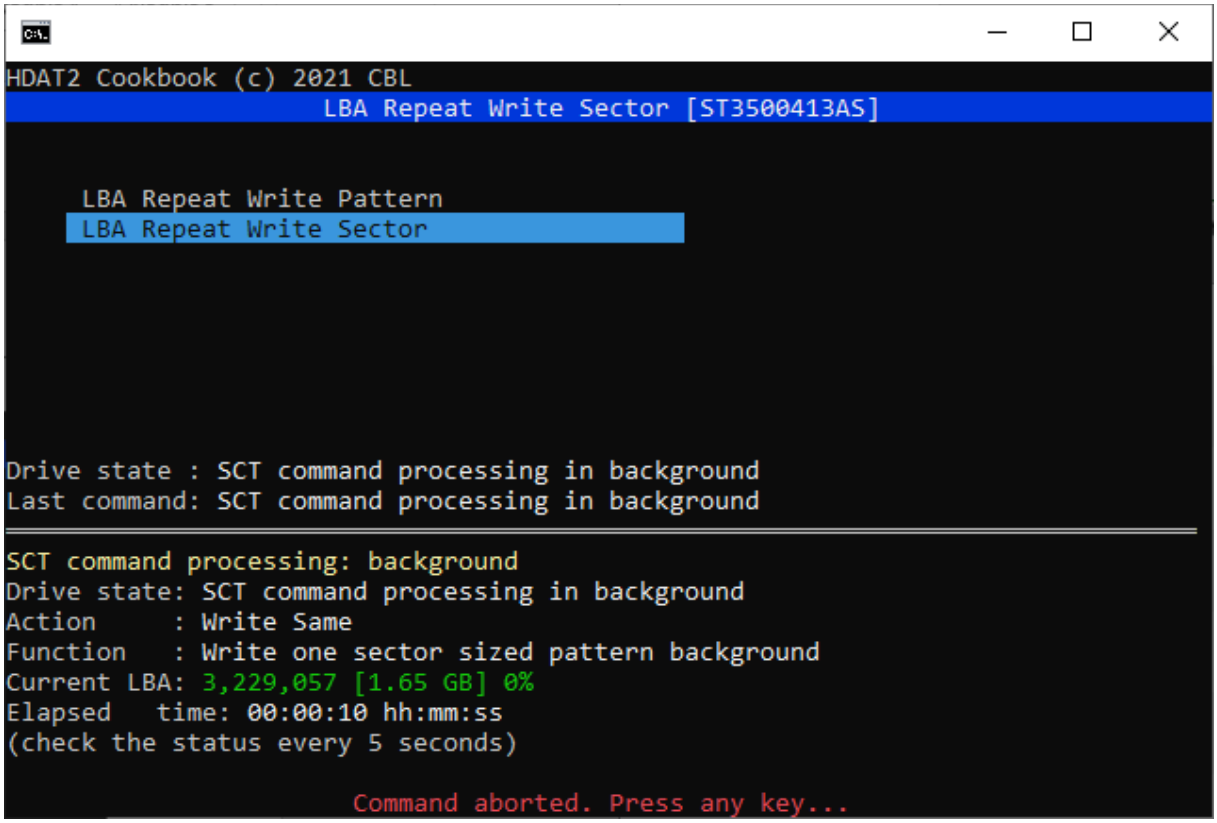

HDAT2 Cookbook (c) 2021 CBL
LBA Repeat Write Sector [ST3500413AS]
LBA Repeat Write Pattern
LBA Repeat Write Sector
Drive state : Active waiting for a command
Last command: Background SCT operation terminated: interrupt of host command
Command mode: background
Start LBA : 0
Last LBA : 976773167 [976,773,168 sector(s) = 500.11 GB]
Fill pattern: 0000|0000h = ' '
CAUTION! This will OVERWRITE the data on your drive! ARE YOU SURE <Y/N> ?


HDAT2 Cookbook (c) 2021 CBL
LBA Repeat Write Sector [ST3500413AS]
LBA Repeat Write Pattern
LBA Repeat Write Sector
Drive state : Active waiting for a command
Last command: Background SCT operation terminated: interrupt of host command
AHCI CMD7 DEV6 HIGH5 MID4 LOW3 CNT2 FEA1
Before 0057h 0040h 0000h 0000h 00E1h 0001h 0000h
After 0050h 0040h 0000h 0000h 00E1h 0000h 0000h
Status 50h: BSY DRDY DFSE DWE DREQ ALGN SENS ERR
Error 00h: ICRC UNC MC IDNF MCR ABRT T0NF CCTO
Command completed successfully. Press any key...





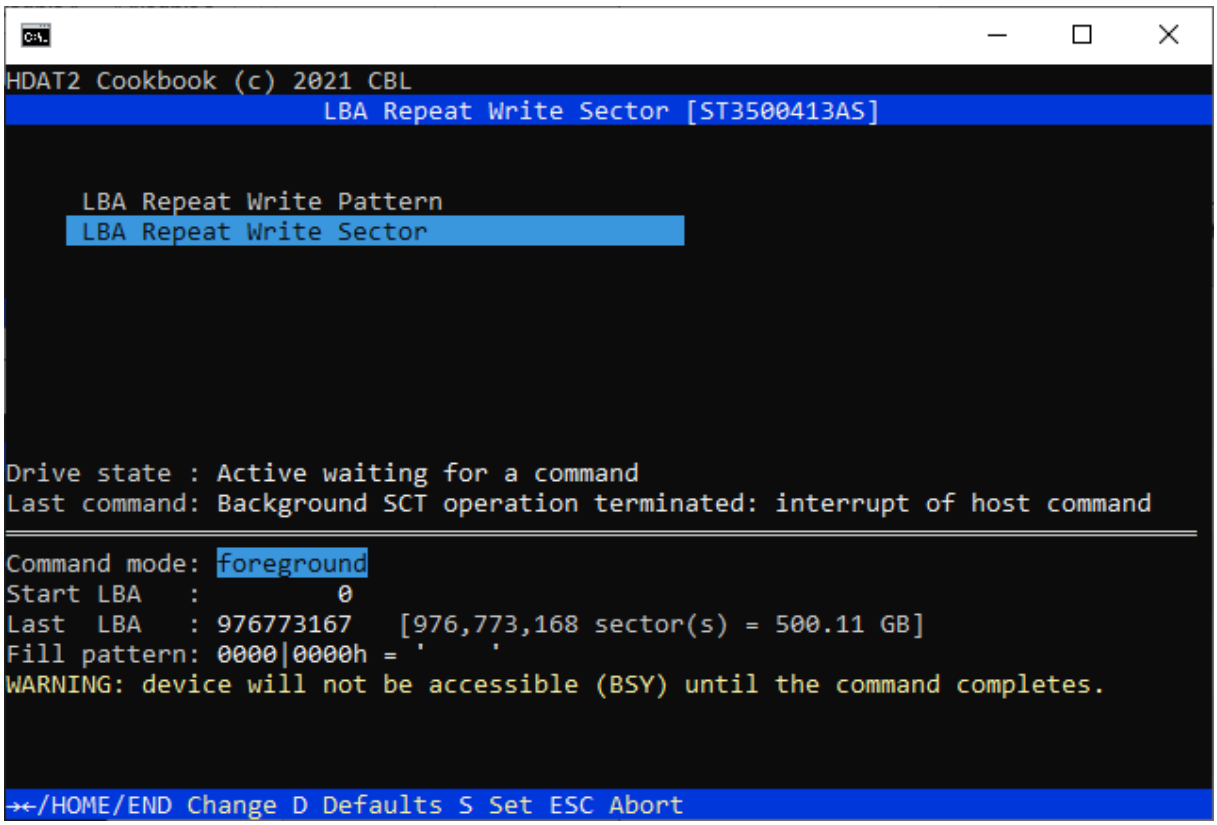
I interrupted the command with the 'A' key.

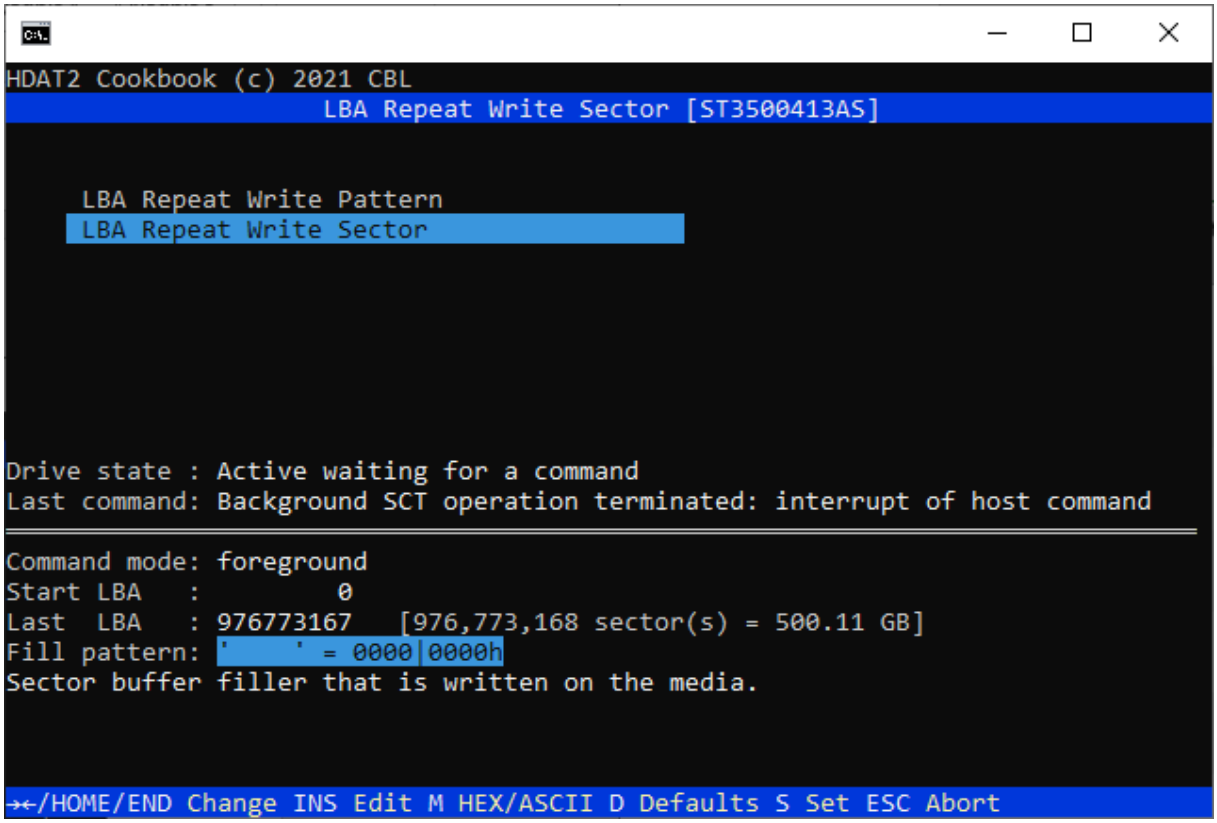


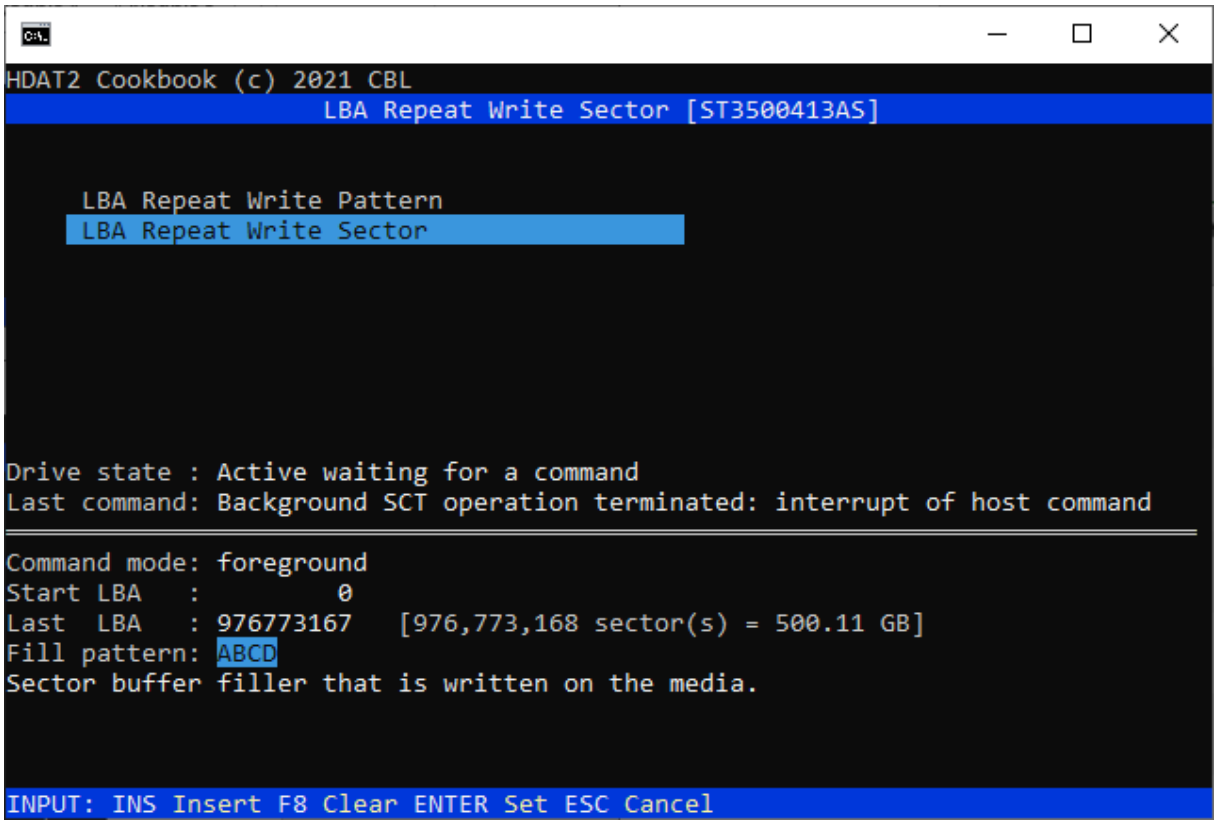
Now we change the write pattern 0000|0000h to ABCDh.

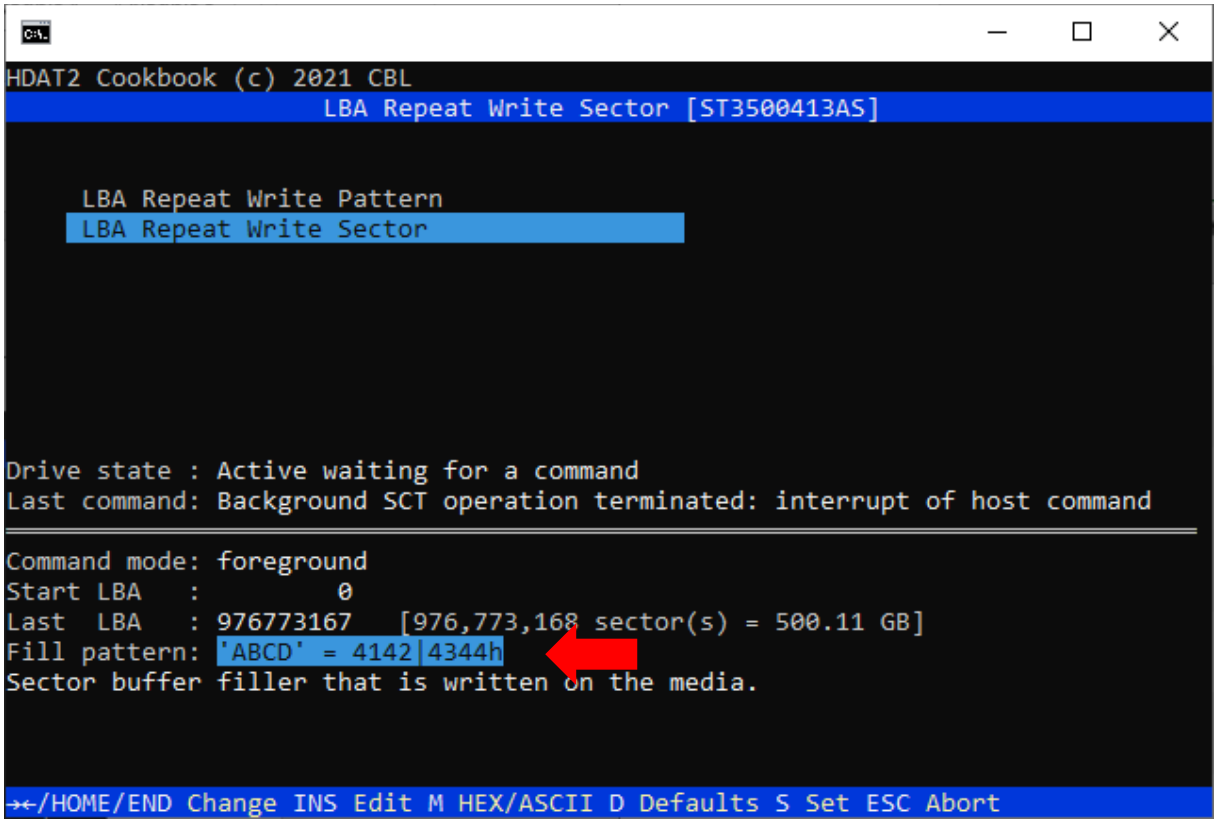
How to change '**Fill pattern**':

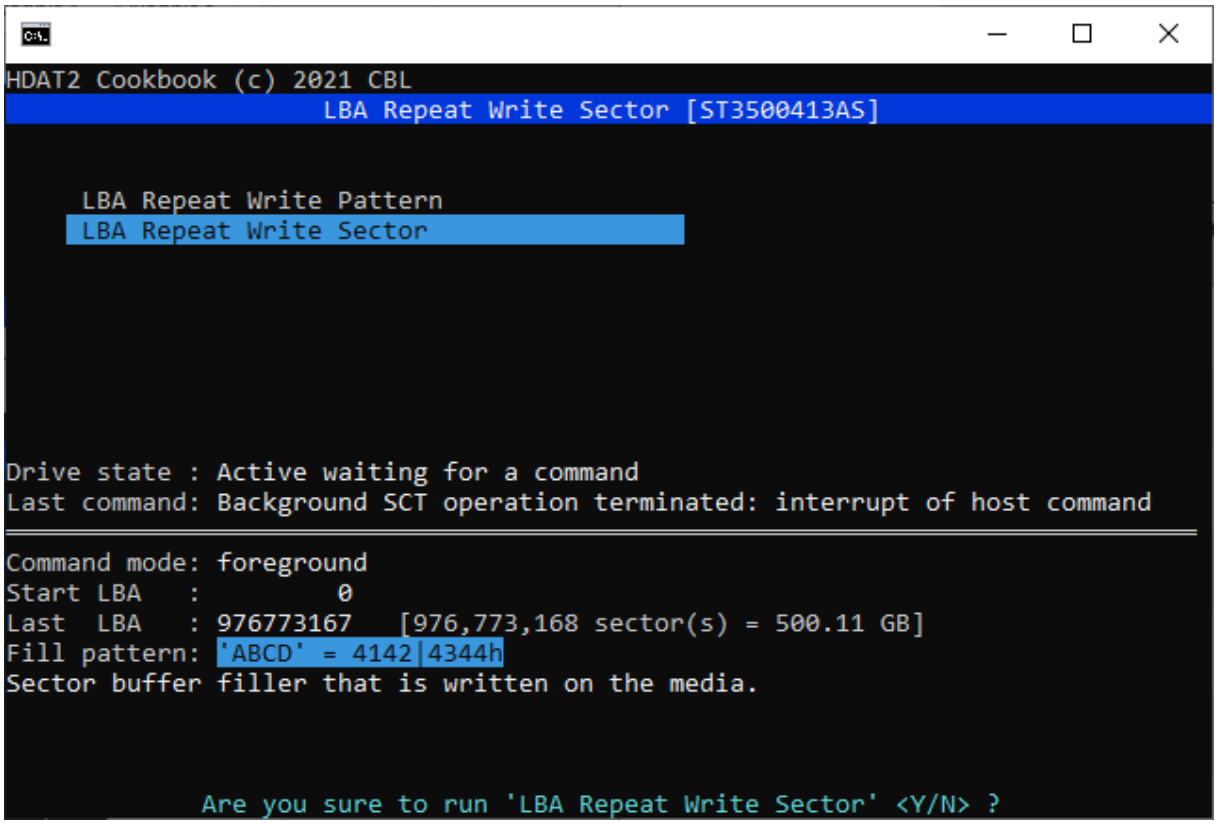
Use the '**M**' key to select the type of input ASCII or HEX and use the '**INS**' key to enter the desired pattern.

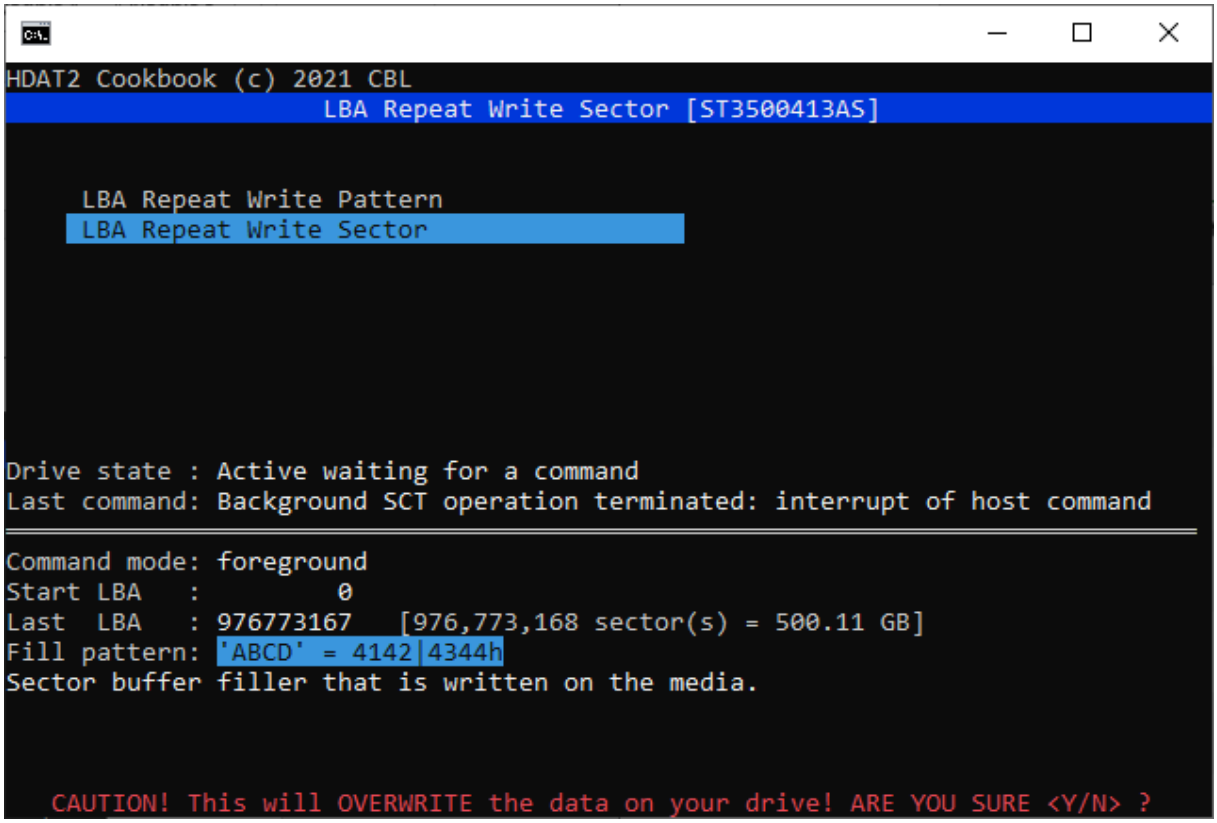


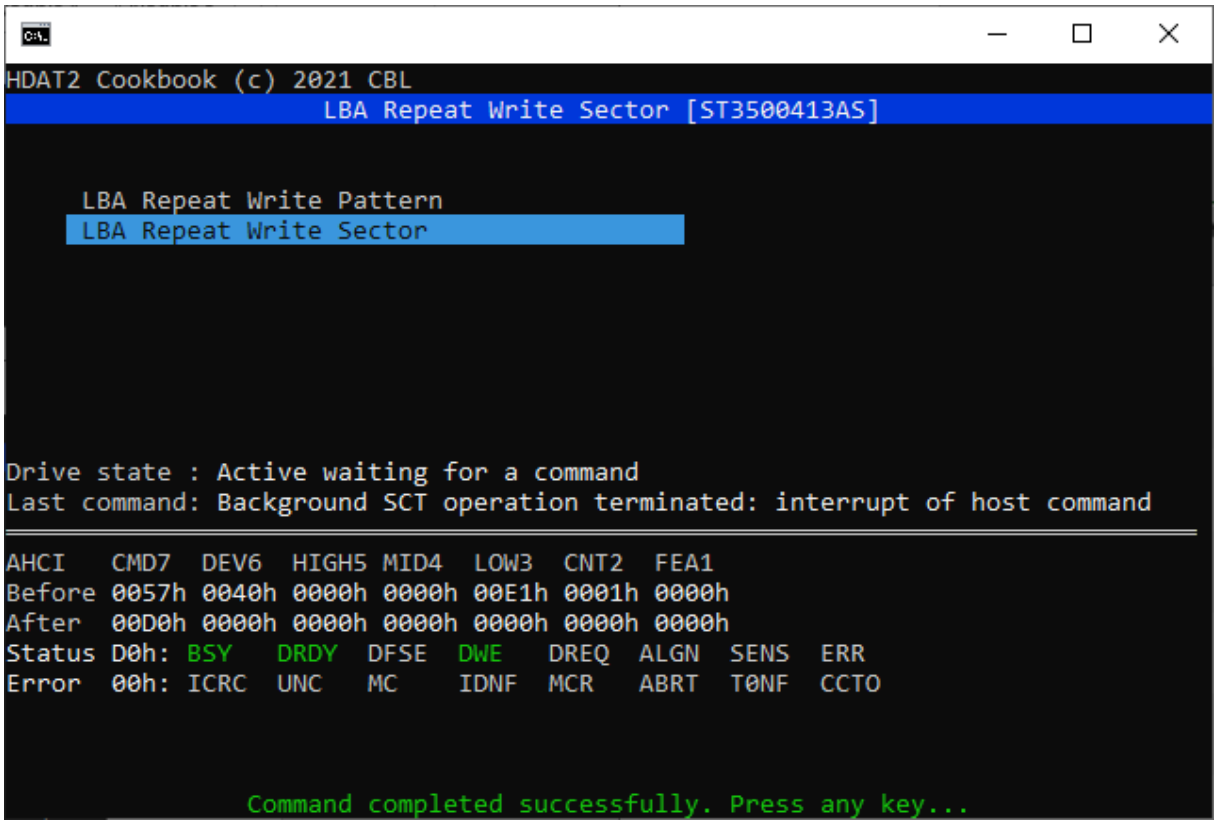

HDAT2 Cookbook (c) 2021 CBL
LBA Repeat Write Sector [ST3500413AS]
LBA Repeat Write Pattern
LBA Repeat Write Sector
Drive state : Active waiting for a command
Last command: Background SCT operation terminated: interrupt of host command
Command mode: foreground
Start LBA : 0
Last LBA : 976773167 [976,773,168 sector(s) = 500.11 GB]
Fill pattern: ' ' = 0000|0000h
Sector buffer filler that is written on the media.
→←/HOME/END Change INS Edit M HEX/ASCII D Defaults S Set ESC Abort


HDAT2 Cookbook (c) 2021 CBL
LBA Repeat Write Sector [ST3500413AS]
LBA Repeat Write Pattern
LBA Repeat Write Sector
Drive state : Active waiting for a command
Last command: Background SCT operation terminated: interrupt of host command
Command mode: foreground
Start LBA : 0
Last LBA : 976773167 [976,773,168 sector(s) = 500.11 GB]
Fill pattern: ABCD
Sector buffer filler that is written on the media.
INPUT: INS Insert F8 Clear ENTER Set ESC Cancel

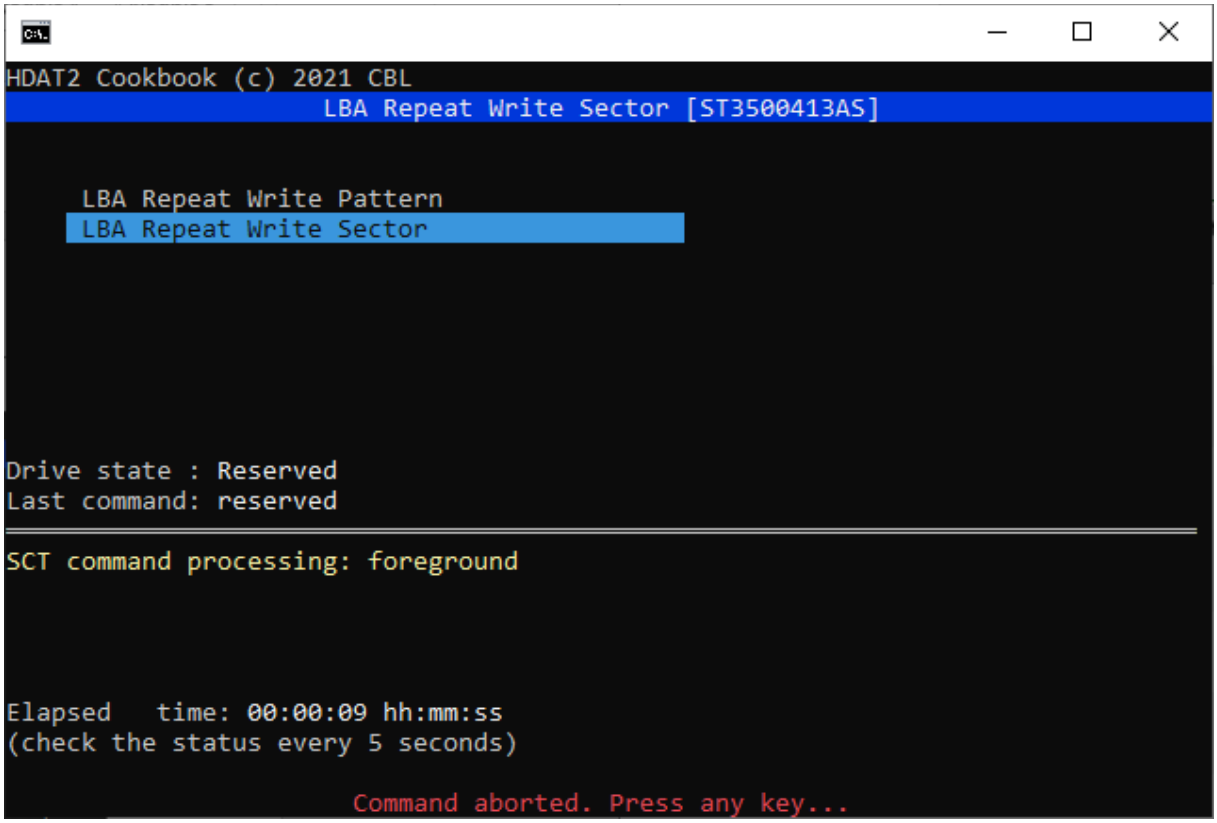

HDAT2 Cookbook (c) 2021 CBL
LBA Repeat Write Sector [ST3500413AS]
LBA Repeat Write Pattern
LBA Repeat Write Sector
Drive state : Active waiting for a command
Last command: Background SCT operation terminated: interrupt of host command
Command mode: foreground
Start LBA : 0
Last LBA : 976773167 [976,773,168 sector(s) = 500.11 GB]
Fill pattern: 'ABCD' = 4142|4344h
Sector buffer filler that is written on the media.
→←/HOME/END Change INS Edit M HEX/ASCII D Defaults S Set ESC Abort


HDAT2 Cookbook (c) 2021 CBL
LBA Repeat Write Sector [ST3500413AS]
LBA Repeat Write Pattern
LBA Repeat Write Sector
Drive state : Active waiting for a command
Last command: Background SCT operation terminated: interrupt of host command
Command mode: foreground
Start LBA : 0
Last LBA : 976773167 [976,773,168 sector(s) = 500.11 GB]
Fill pattern: 'ABCD' = 4142|4344h
Sector buffer filler that is written on the media.
Are you sure to run 'LBA Repeat Write Sector' <Y/N> ?

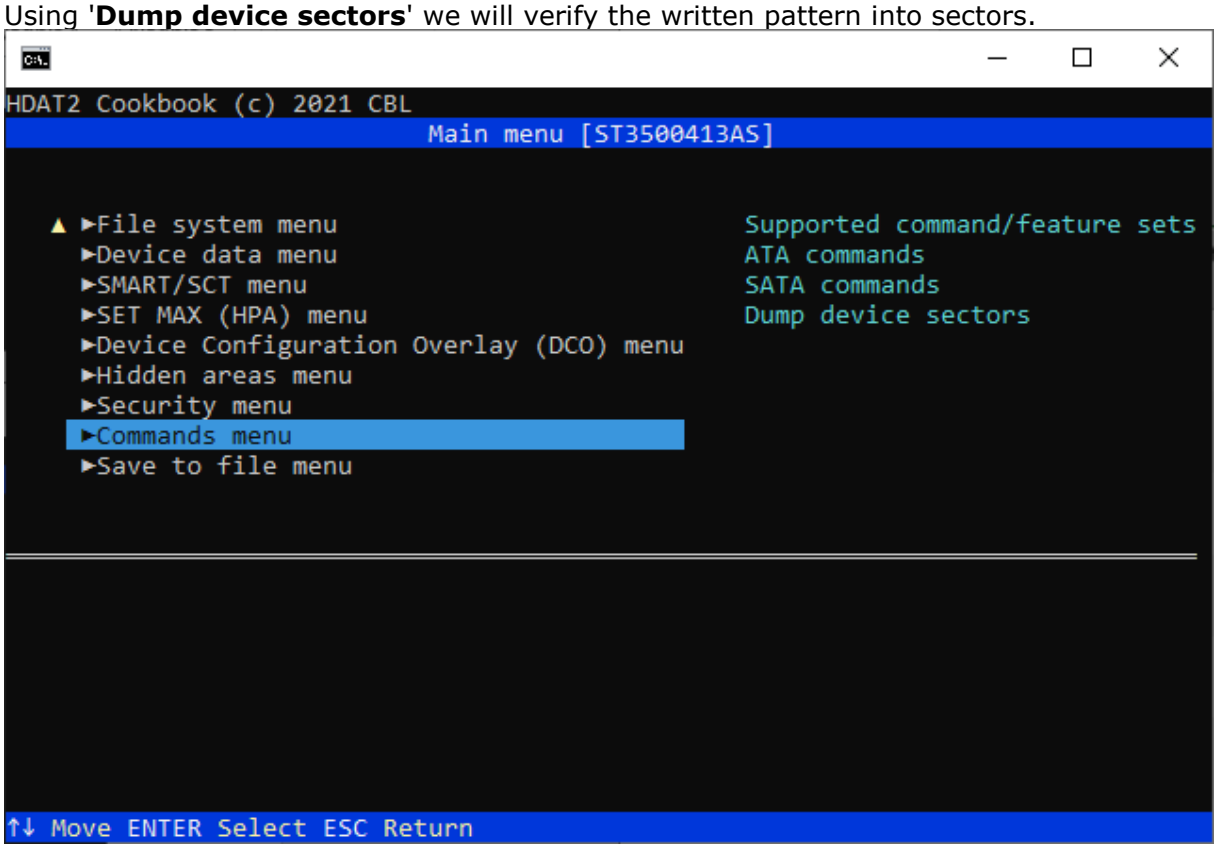


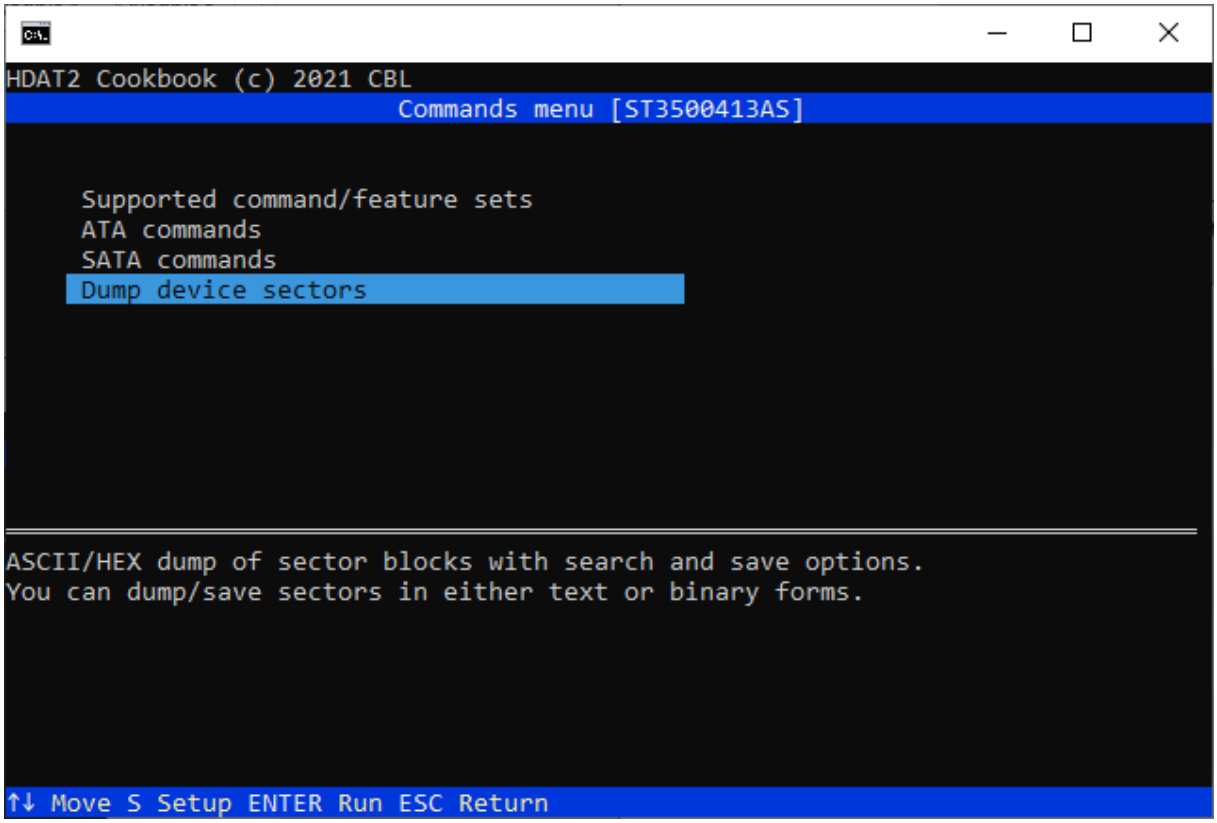


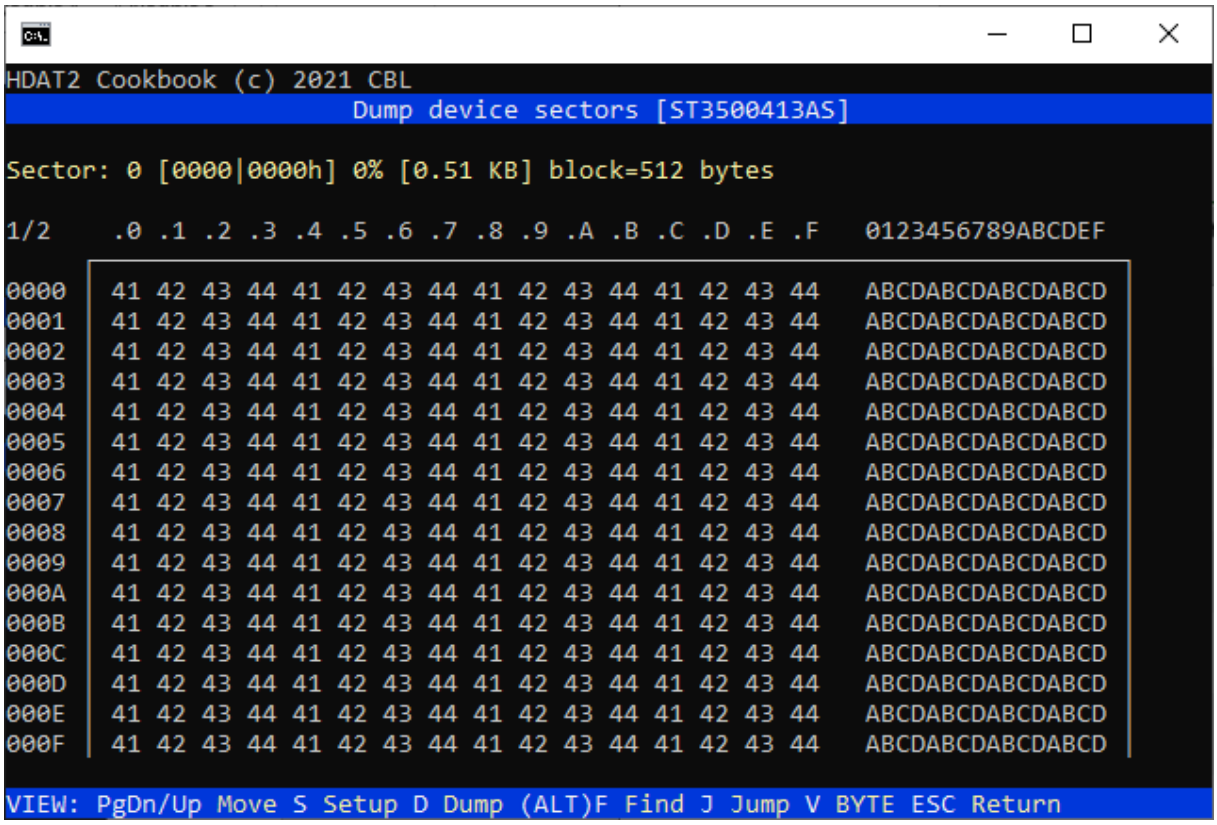
I interrupted the command with the 'A' key.



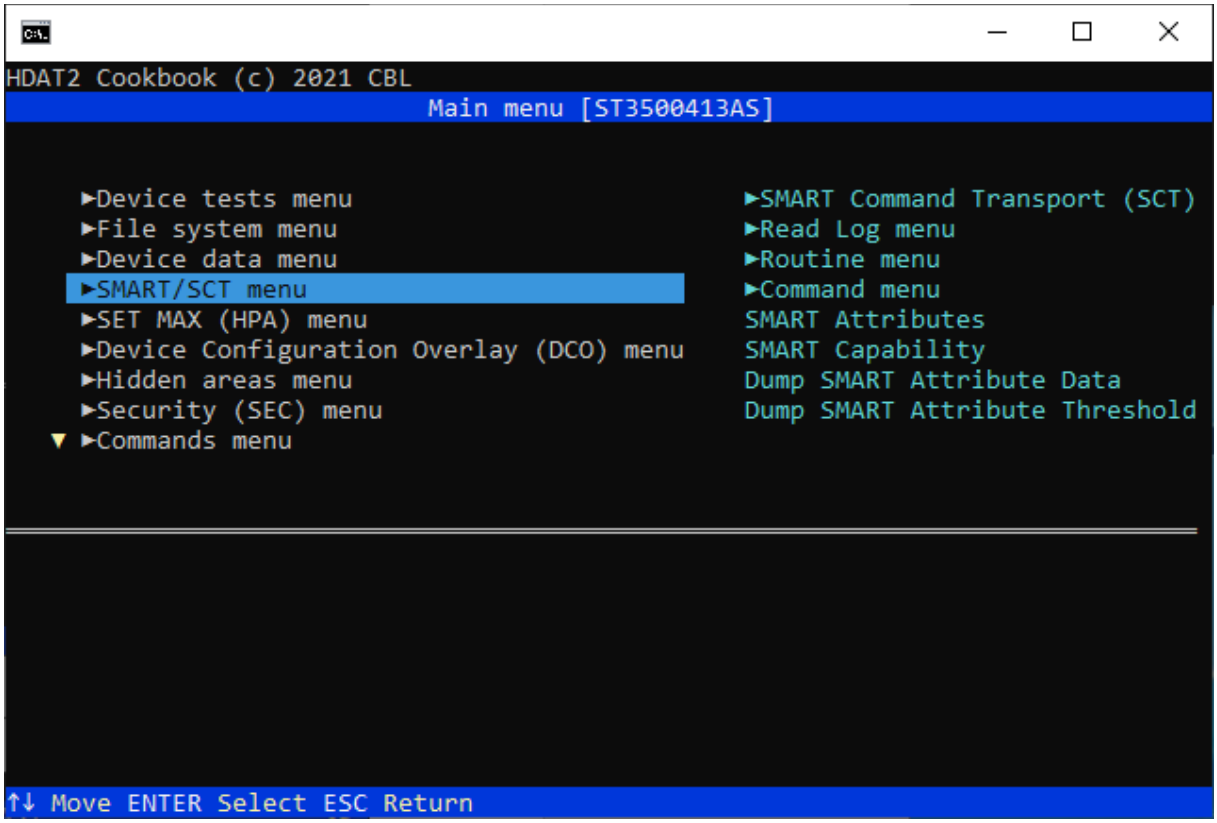
Using '**Dump device sectors**' we will verify the written pattern into sectors.

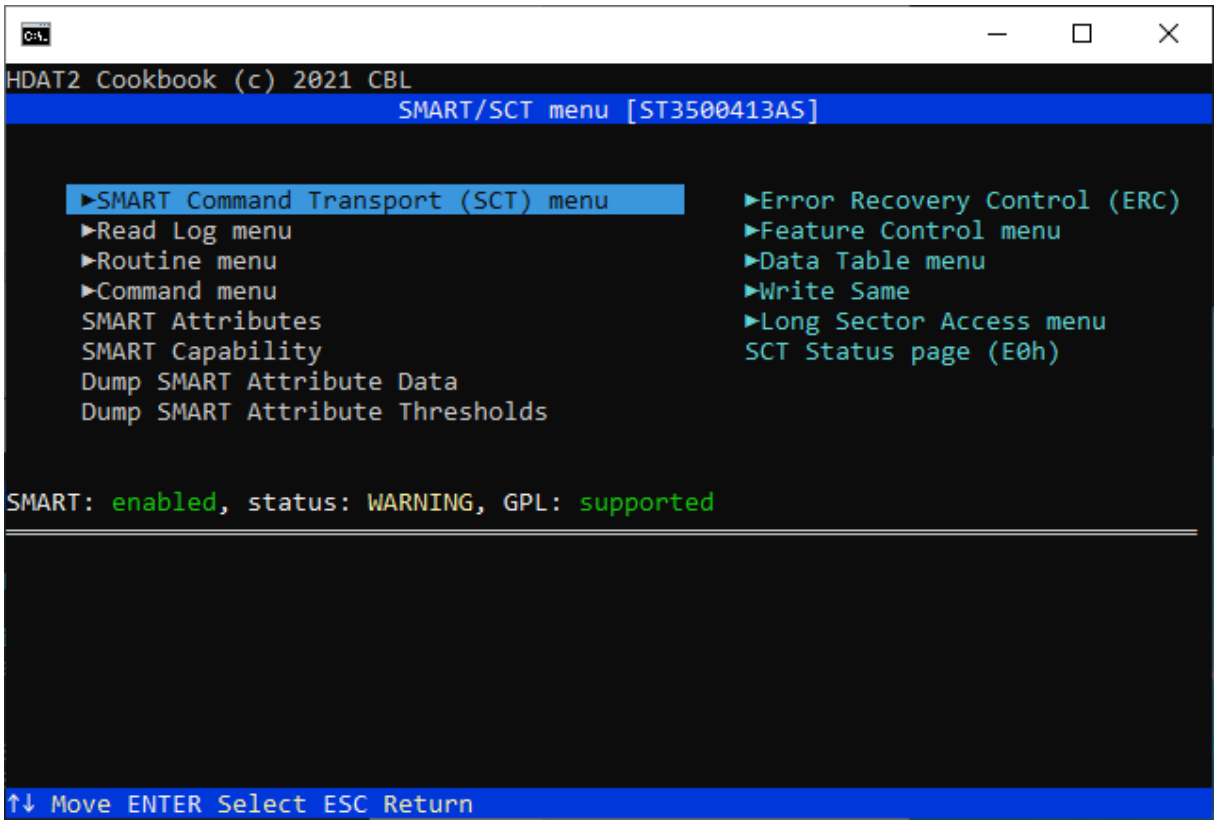


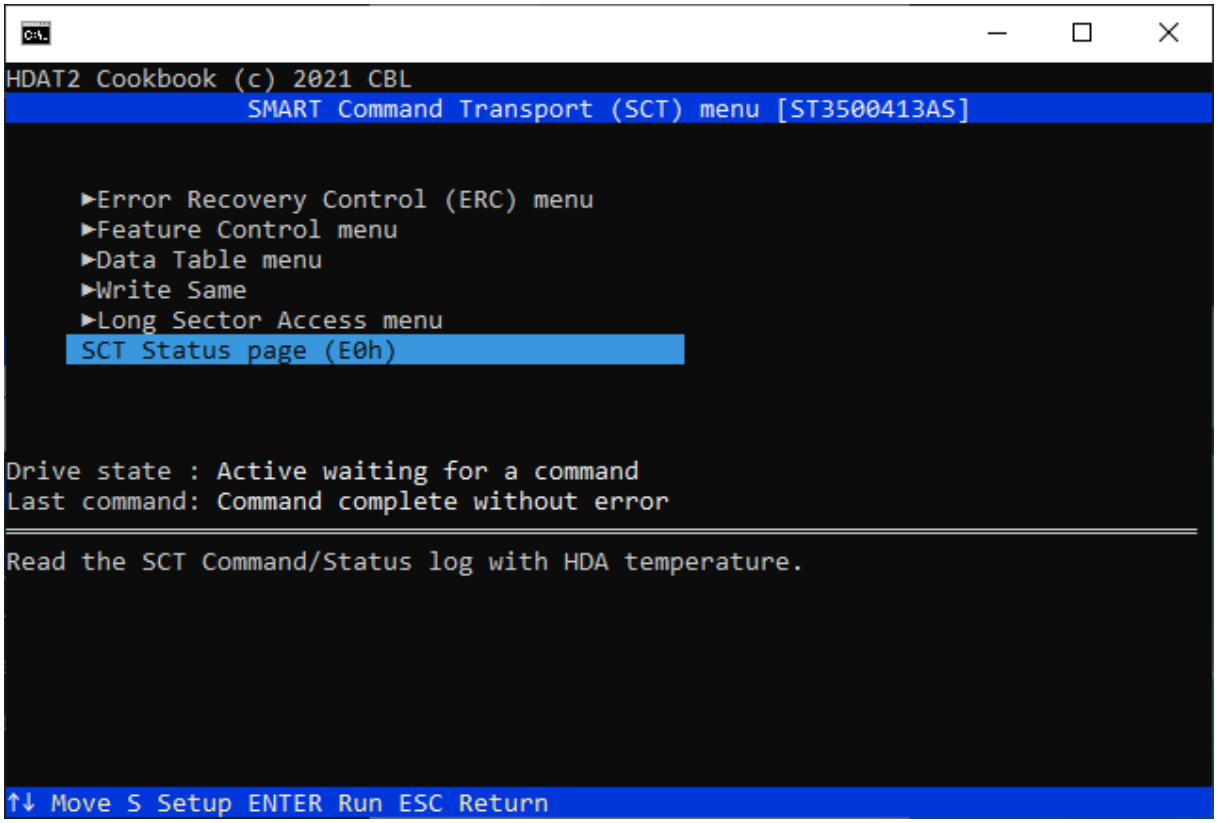


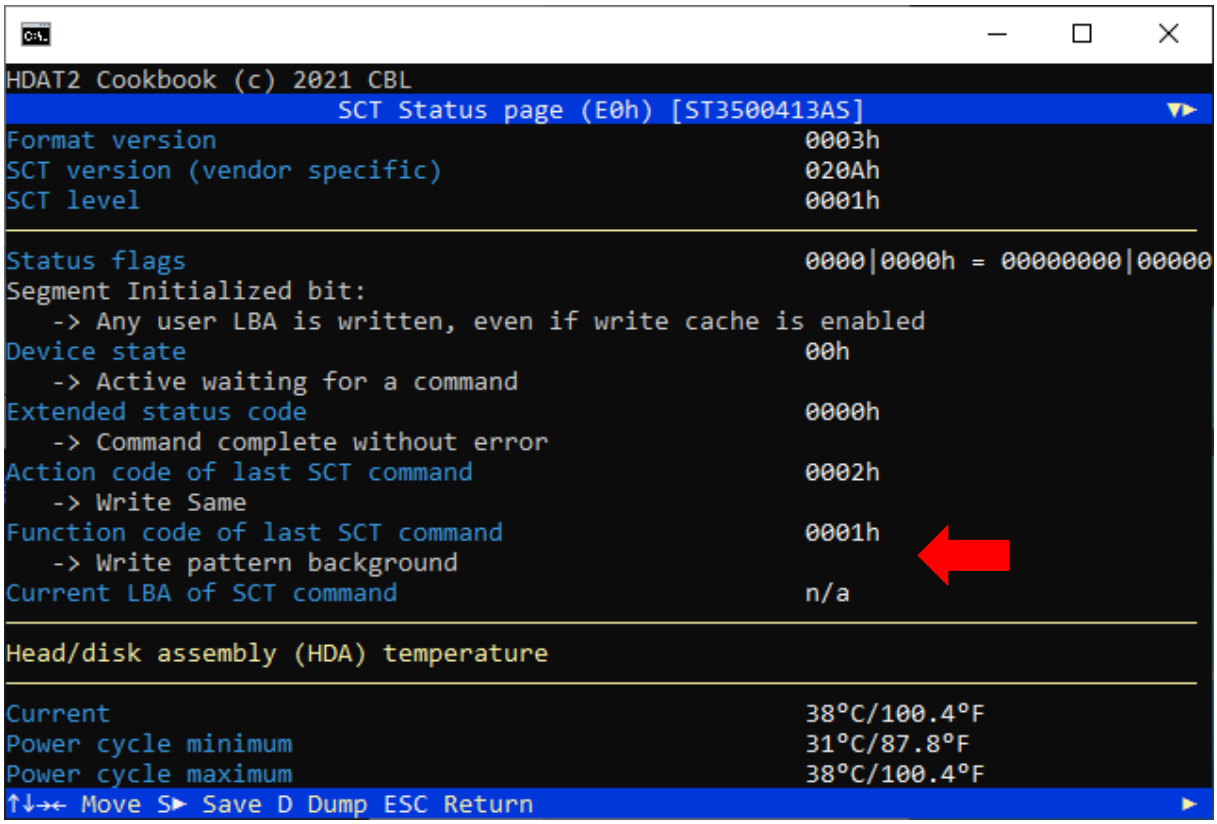


You can also check command status in SCT status page.


HDAT2 Cookbook (c) 2021 CBL
Main menu [ST3500413AS]
►Device tests menu
►File system menu
►Device data menu
►SMART/SCT menu
►SET MAX (HPA) menu
►Device Configuration Overlay (DCO) menu
►Hidden areas menu
►Security (SEC) menu
▼ ►Commands menu
►SMART Command Transport (SCT)
►Read Log menu
►Routine menu
►Command menu
SMART Attributes
SMART Capability
Dump SMART Attribute Data
Dump SMART Attribute Threshold
↑↓ Move ENTER Select ESC Return


HDAT2 Cookbook (c) 2021 CBL
SMART/SCT menu [ST3500413AS]
►SMART Command Transport (SCT) menu
►Read Log menu
►Routine menu
►Command menu
SMART Attributes
SMART Capability
Dump SMART Attribute Data
Dump SMART Attribute Thresholds
►Error Recovery Control (ERC)
►Feature Control menu
►Data Table menu
►Write Same
►Long Sector Access menu
SCT Status page (E0h)
SMART: enabled, status: WARNING, GPL: supported
↑↓ Move ENTER Select ESC Return


HDAT2 Cookbook (c) 2021 CBL
SMART Command Transport (SCT) menu [ST3500413AS]
►Error Recovery Control (ERC) menu
►Feature Control menu
►Data Table menu
►Write Same
►Long Sector Access menu
SCT Status page (E0h)
Drive state : Active waiting for a command
Last command: Command complete without error
Read the SCT Command/Status log with HDA temperature.
↑↓ Move S Setup ENTER Run ESC Return


HDAT2 Cookbook (c) 2021 CBL
SCT Status page (E0h) [ST3500413AS]
Format version 0003h
SCT version (vendor specific) 020Ah
SCT level 0001h
Status flags 0000|0000h = 00000000|00000
Segment Initialized bit:
-> Any user LBA is written, even if write cache is enabled
Device state 00h
-> Active waiting for a command
Extended status code 0000h
-> Command complete without error
Action code of last SCT command 0002h
-> Write Same
Function code of last SCT command 0001h
-> Write pattern background
Current LBA of SCT command n/a
Head/disk assembly (HDA) temperature
Current 38°C/100.4°F
Power cycle minimum 31°C/87.8°F
Power cycle maximum 38°C/100.4°F
↑↓→← Move S► Save D Dump ESC Return

Search the device

Types of searched objects: string, empty sector, non-empty sector or time stamp.

In setup menu (with a key 'S') you can select type of search object: string, empty sector, non-empty sector or time stamp.

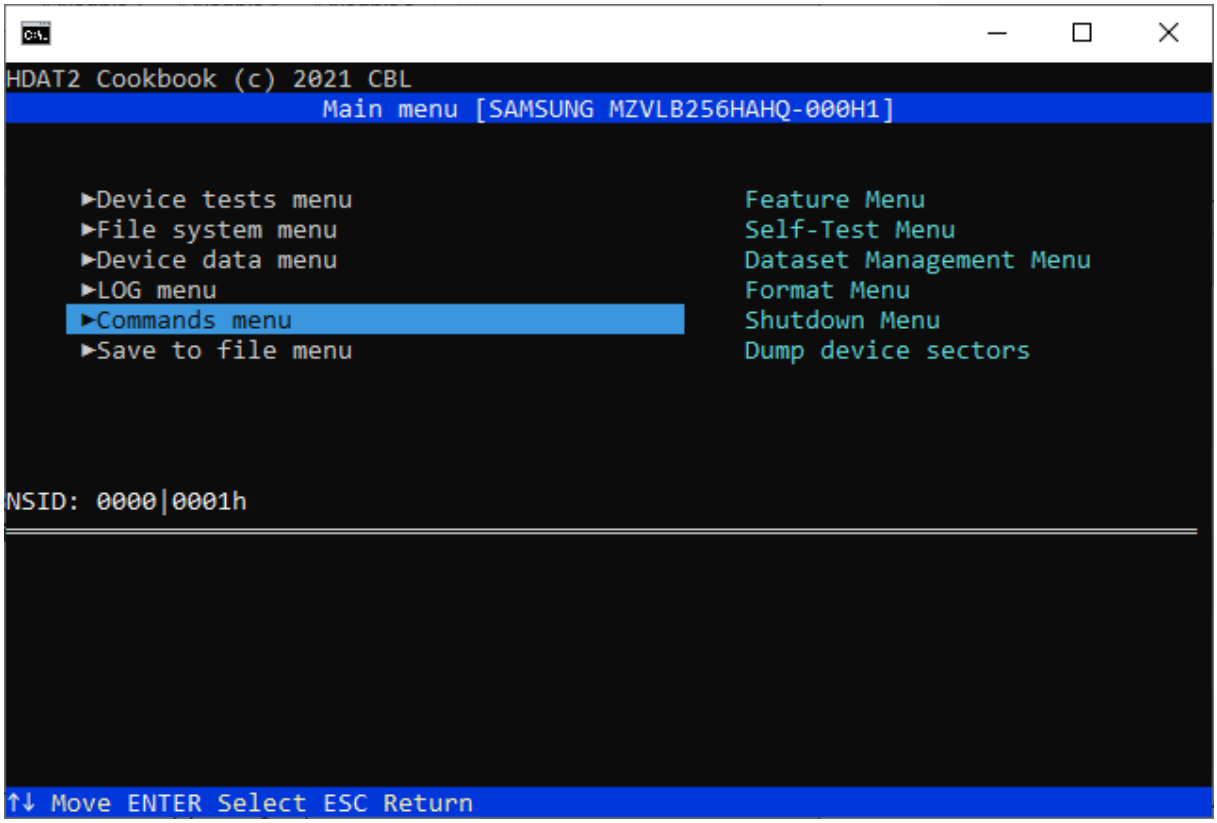
When overwriting a bad sector, a **time stamp** is stored in the sector at a fixed location.

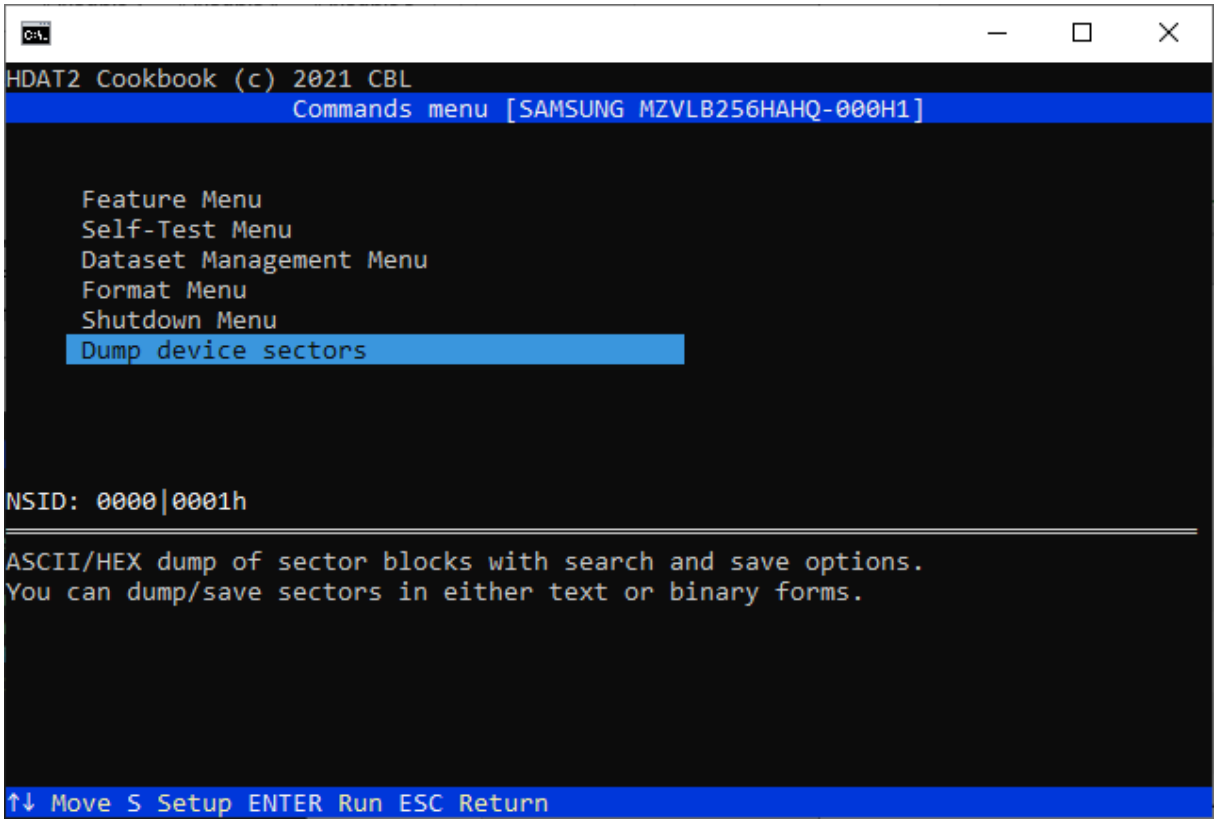
Search for string

You can search a string with these parameters:

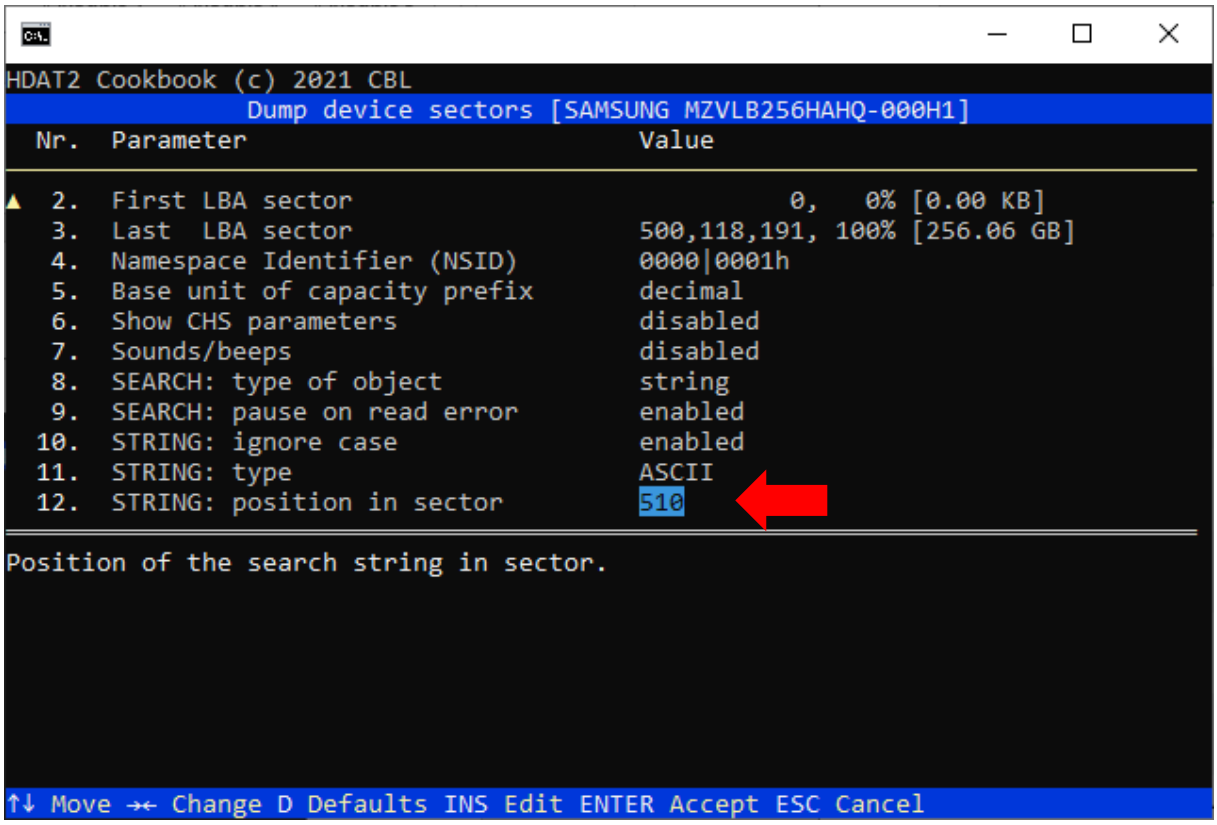
- case or non-case sensitive
- string type (ASCII or UNICODE)
- position in sector

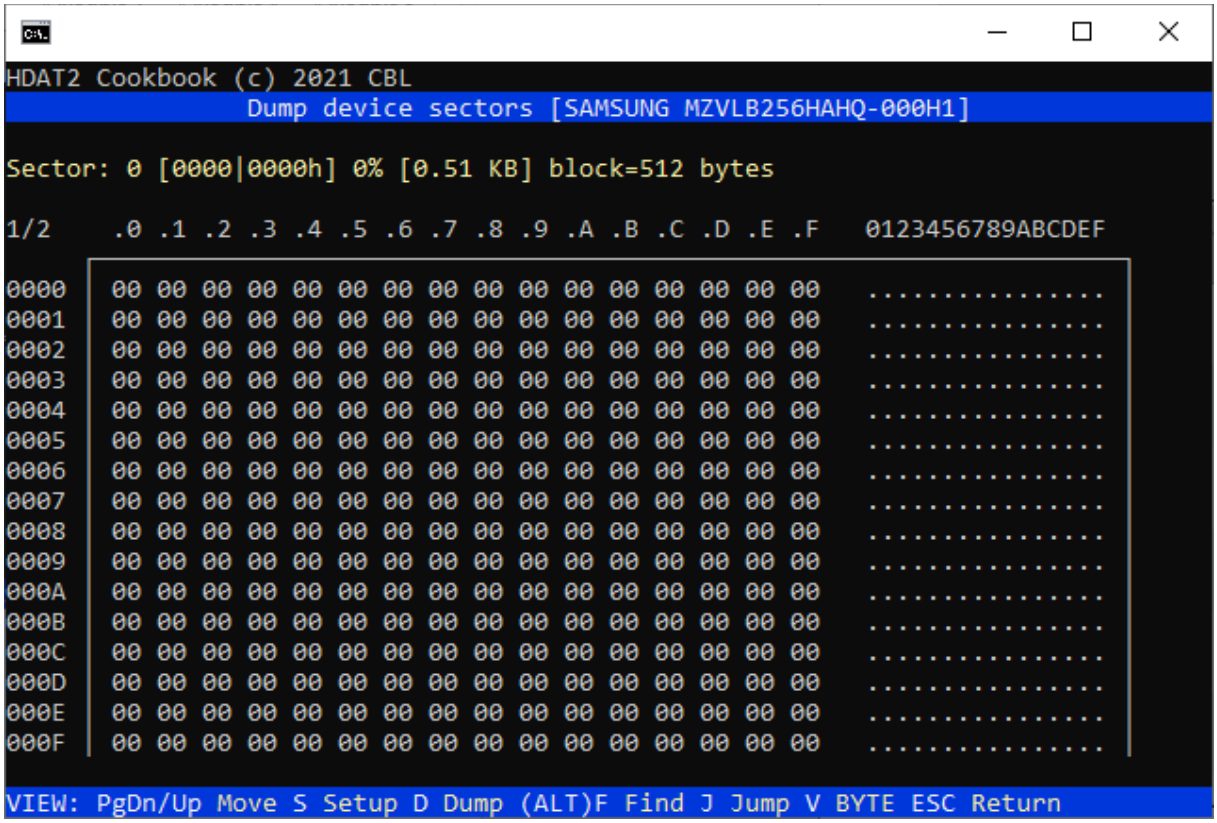
Example 1: On NVMe device Samsung I want to search for a string 'U¬' (hexadecimal 55h and AAh), in non-case sensitive mode and only when this string is on fixed position 510 in sector. This could be e.g. master boot record (MBR) or boot sector.



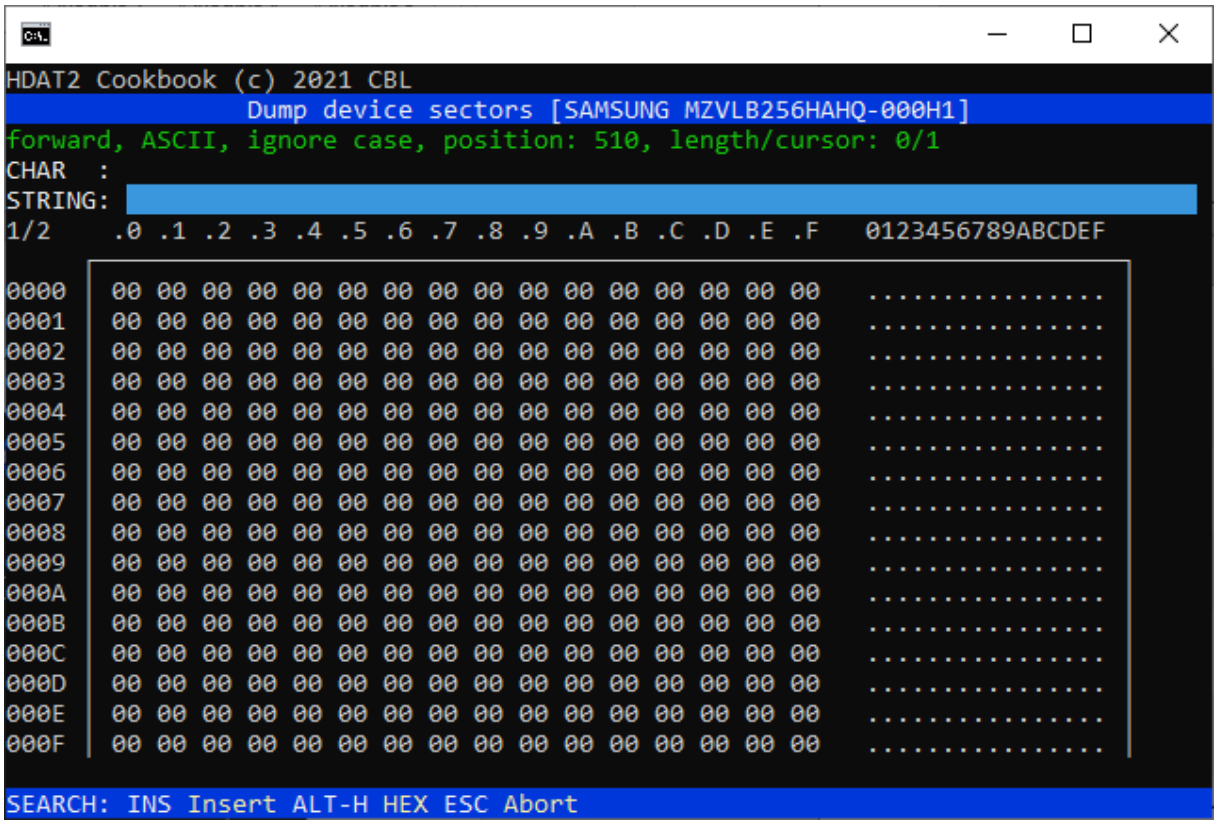


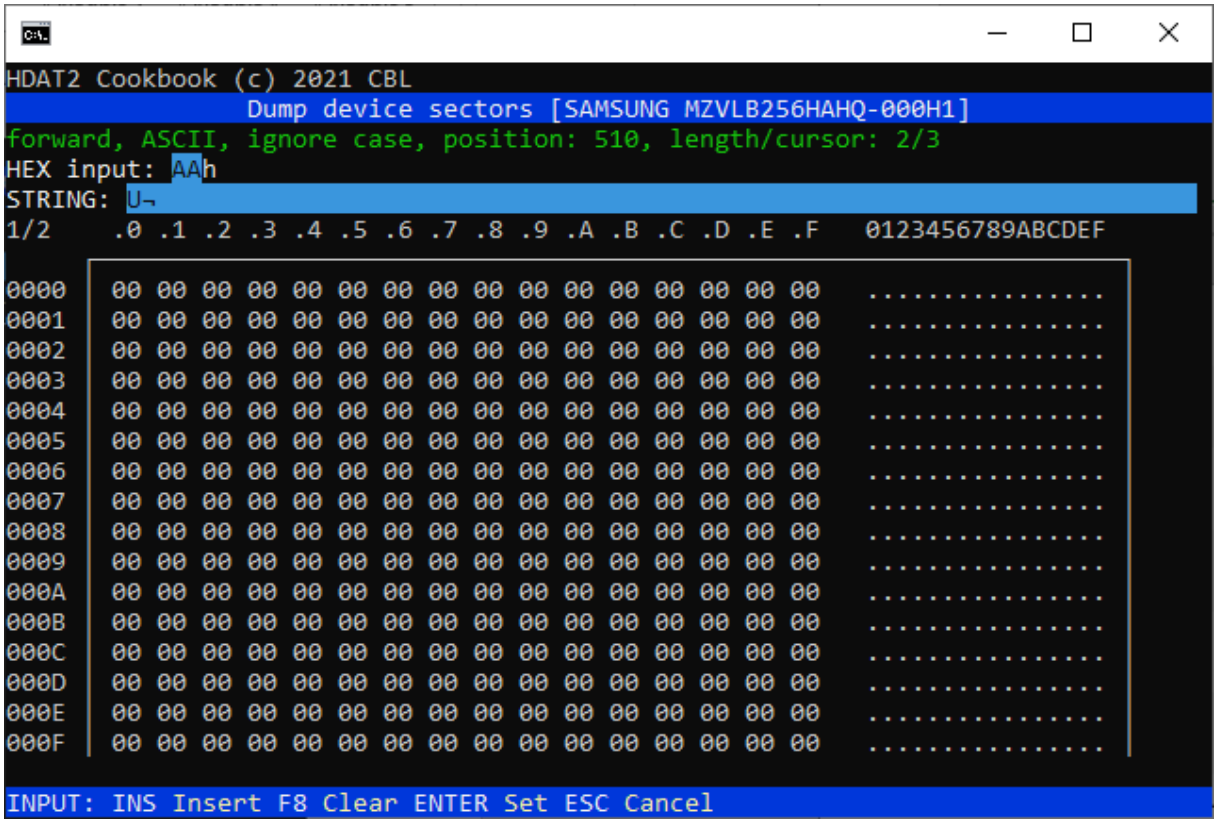
Press a key 'S' for setup, set the parameter 'STRING: position in sector' to 510 and press 'ENTER' to accept.

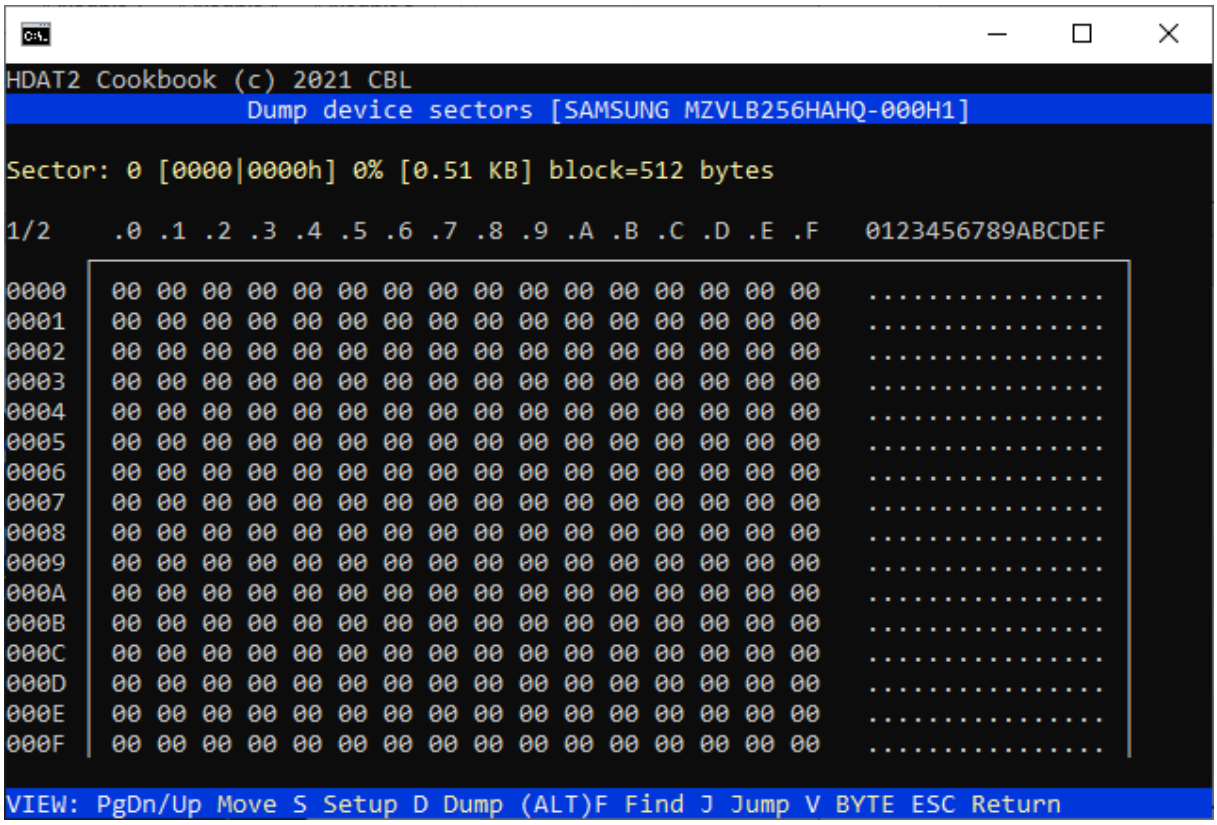


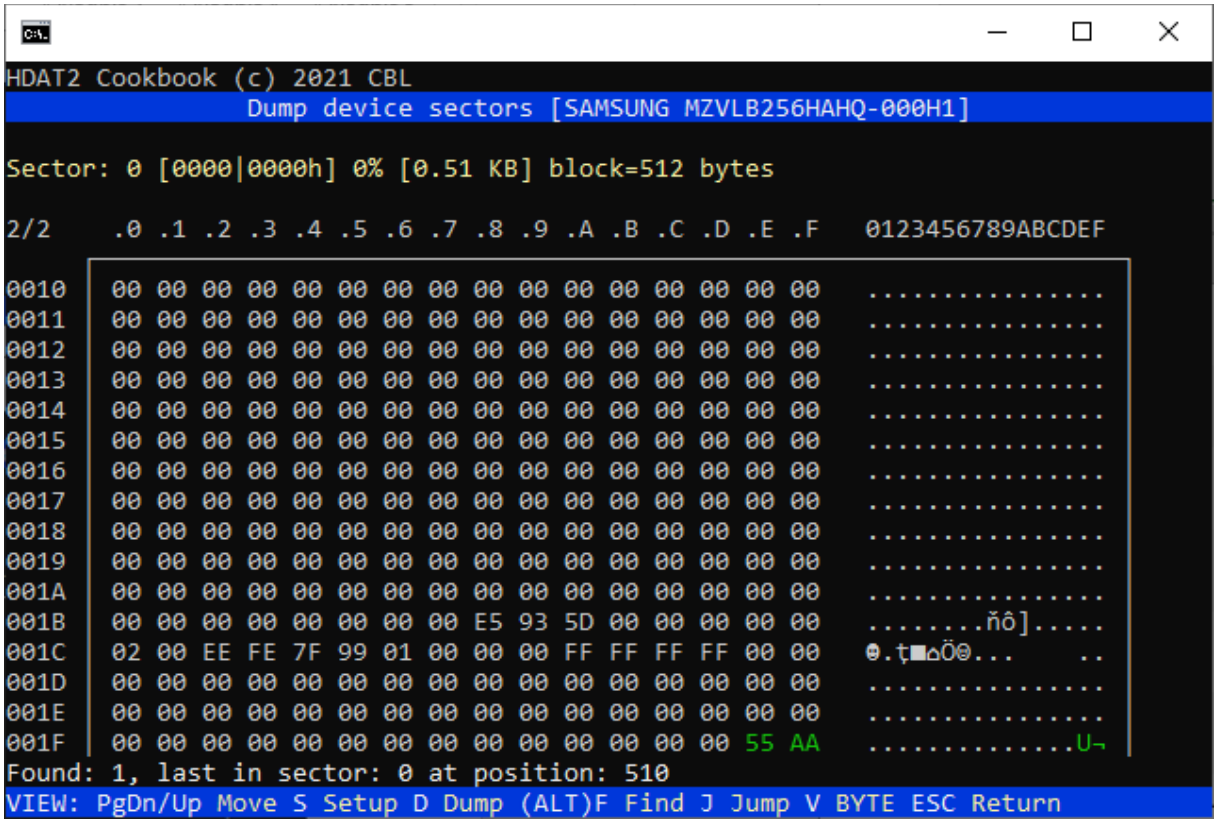


By pressing '**ALT-F**' and then '**ALT-H**' you can insert any hexadecimal value.

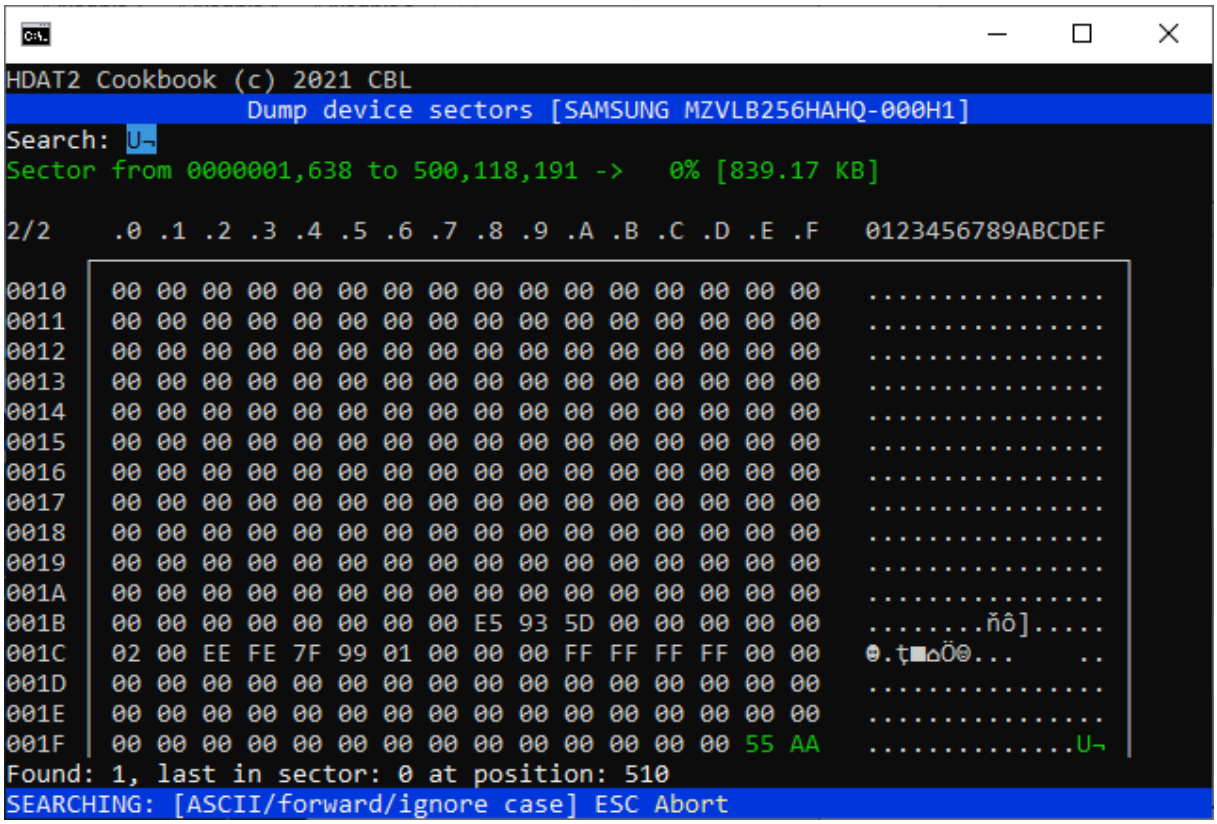


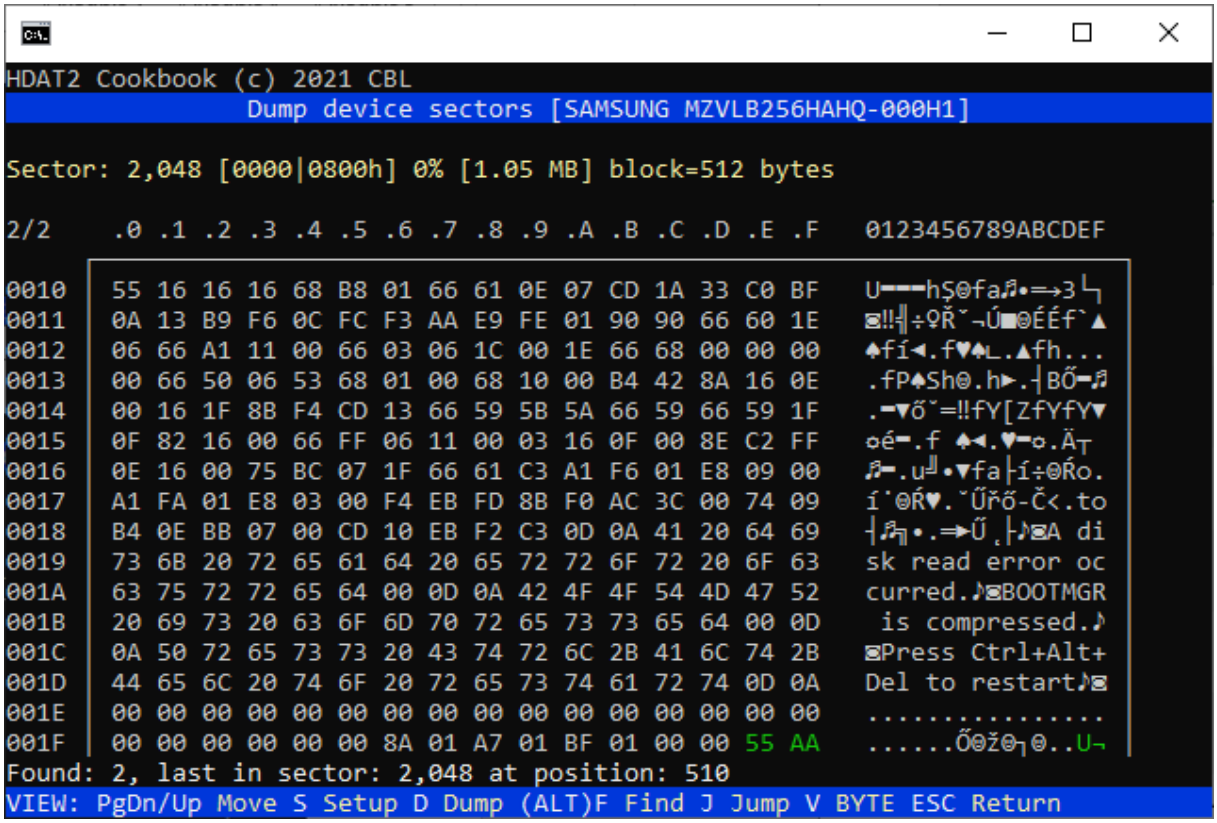

HDAT2 Cookbook (c) 2021 CBL
Dump device sectors [SAMSUNG MZVLB256HAHQ-000H1]
forward, ASCII, ignore case, position: 510, length/cursor: 2/3
HEX input: AAh
STRING: U¬
1/2 .0 .1 .2 .3 .4 .5 .6 .7 .8 .9 .A .B .C .D .E .F 0123456789ABCDEF
0000 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0001 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0002 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0003 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0004 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0005 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0006 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0007 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0008 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0009 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
000A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
000B 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
000C 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
000D 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
000E 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
000F 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
INPUT: INS Insert F8 Clear ENTER Set ESC Cancel


HDAT2 Cookbook (c) 2021 CBL
Dump device sectors [SAMSUNG MZVLB256HAHQ-000H1]
Sector: 0 [0000|0000h] 0% [0.51 KB] block=512 bytes
1/2 .0 .1 .2 .3 .4 .5 .6 .7 .8 .9 .A .B .C .D .E .F 0123456789ABCDEF
0000 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0001 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0002 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0003 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0004 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0005 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0006 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0007 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0008 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0009 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
000A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
000B 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
000C 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
000D 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
000E 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
000F 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
VIEW: PgDn/Up Move S Setup D Dump (ALT)F Find J Jump V BYTE ESC Return



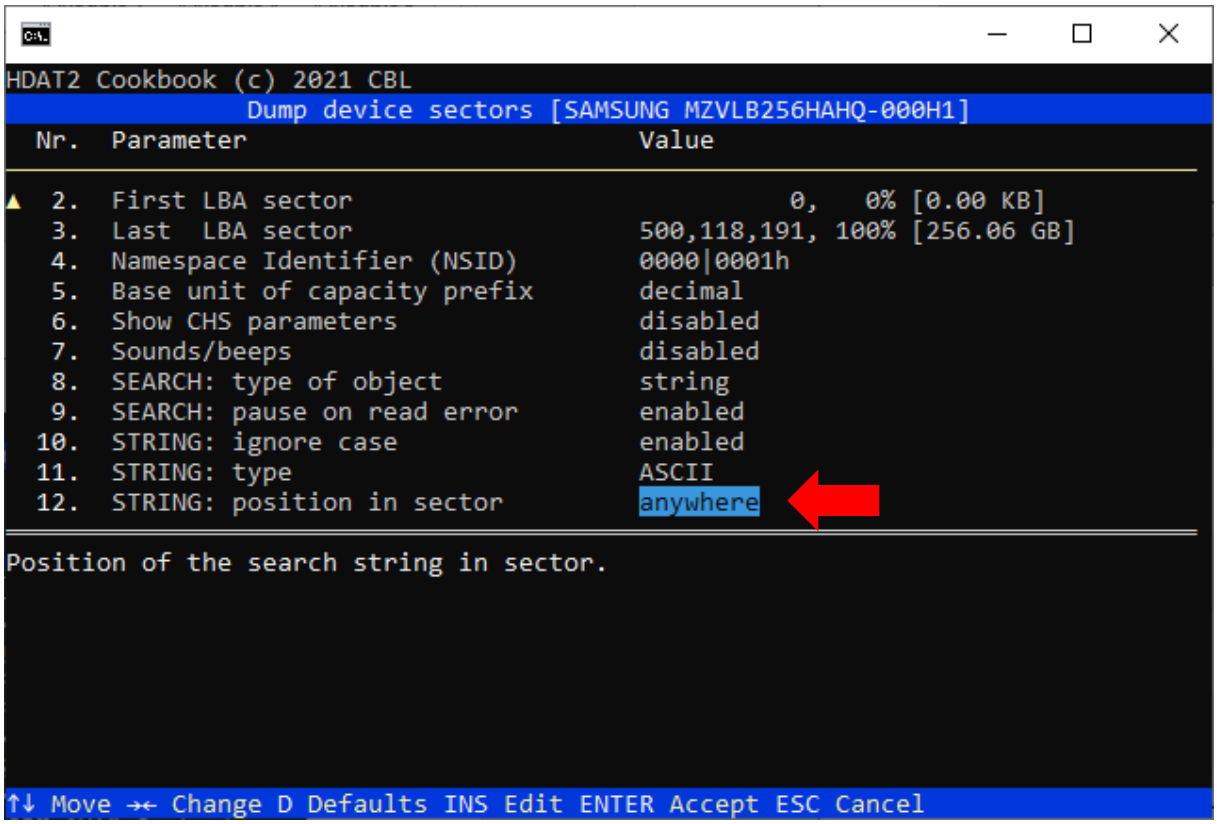
Press a key 'F' to search for the next occurrence.

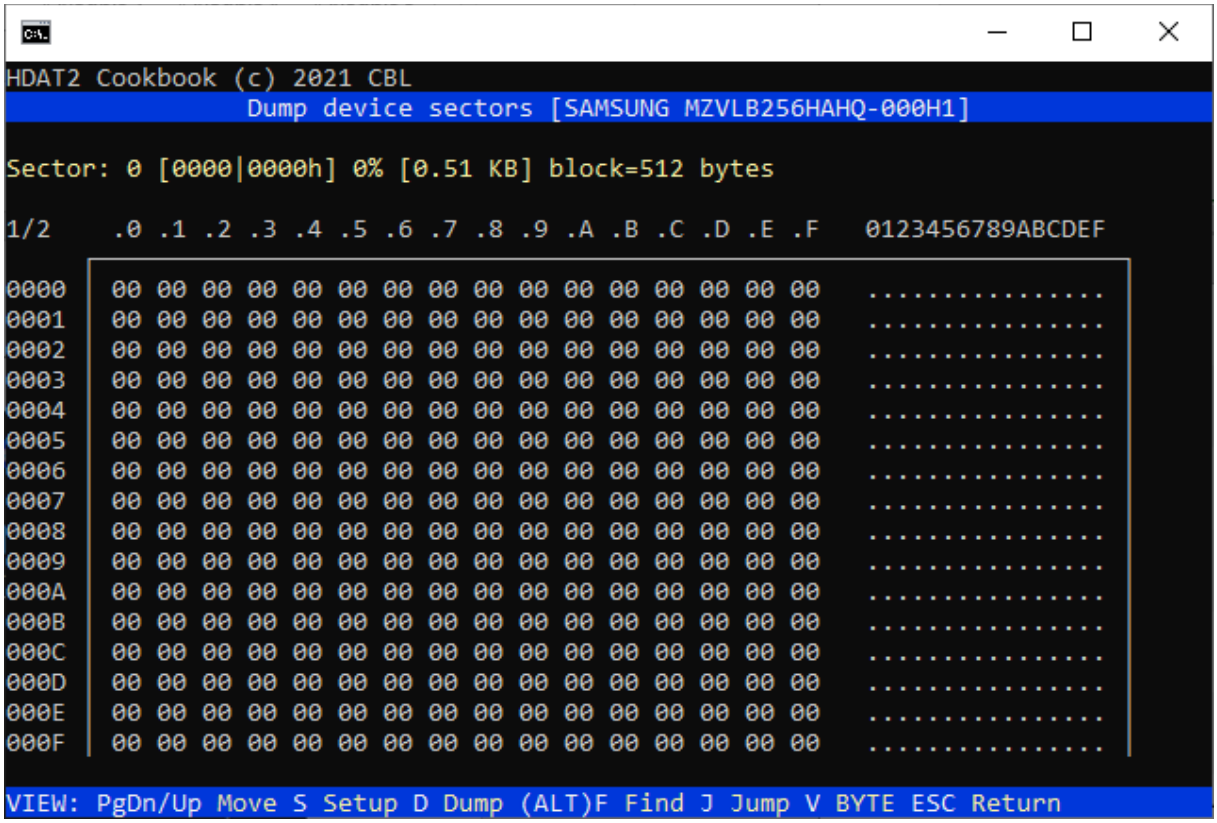




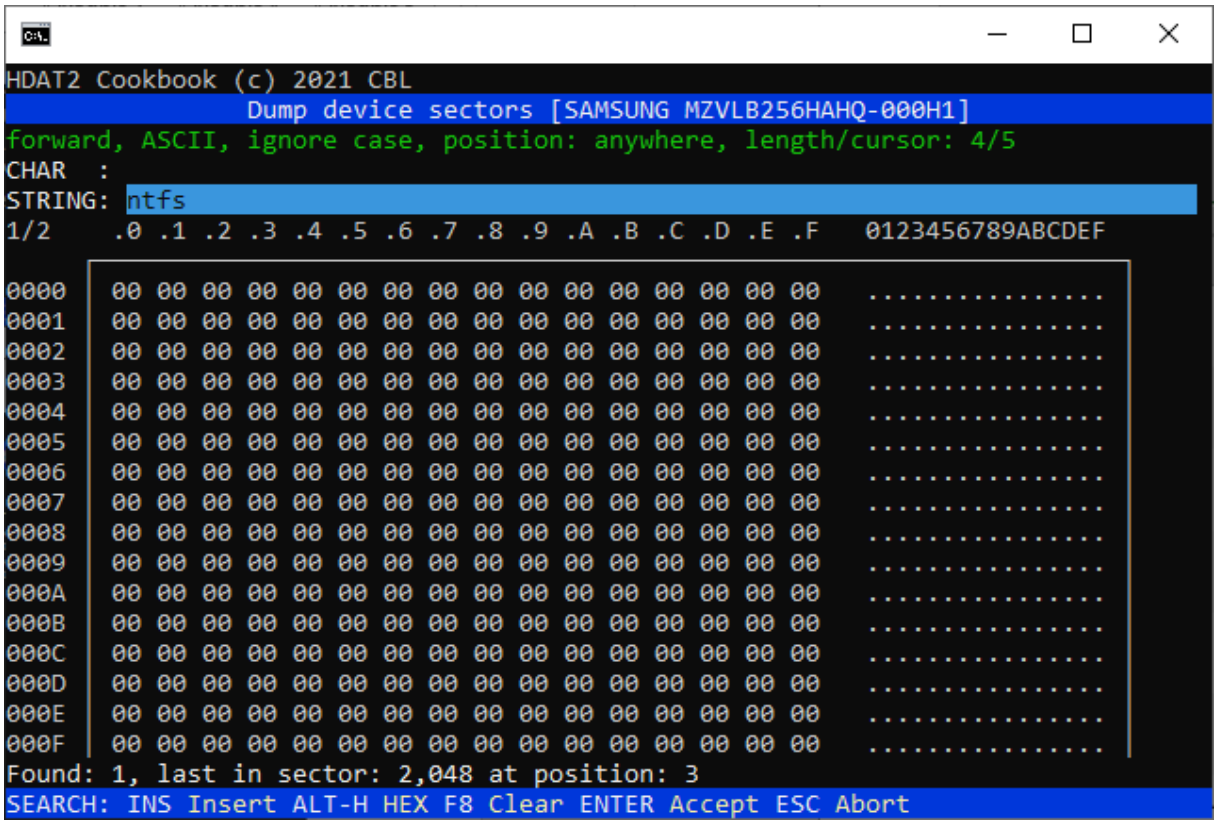
Example 2: On NVMe device Samsung I want to search for a string 'NTFS', in non-case sensitive mode and regardless of position in the sector.

Press a key 'S' for setup, set the parameter 'STRING: position in sector' to 'anywhere' and press 'ENTER' to accept.

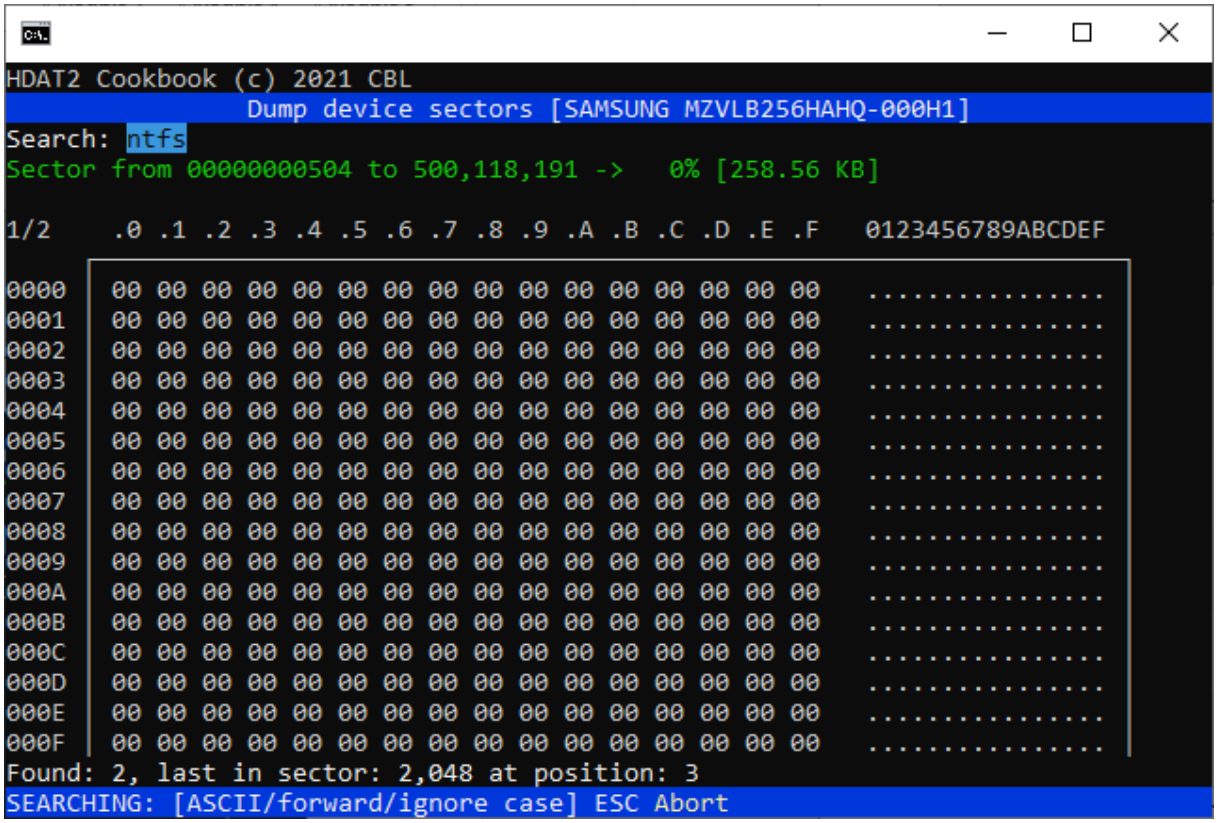


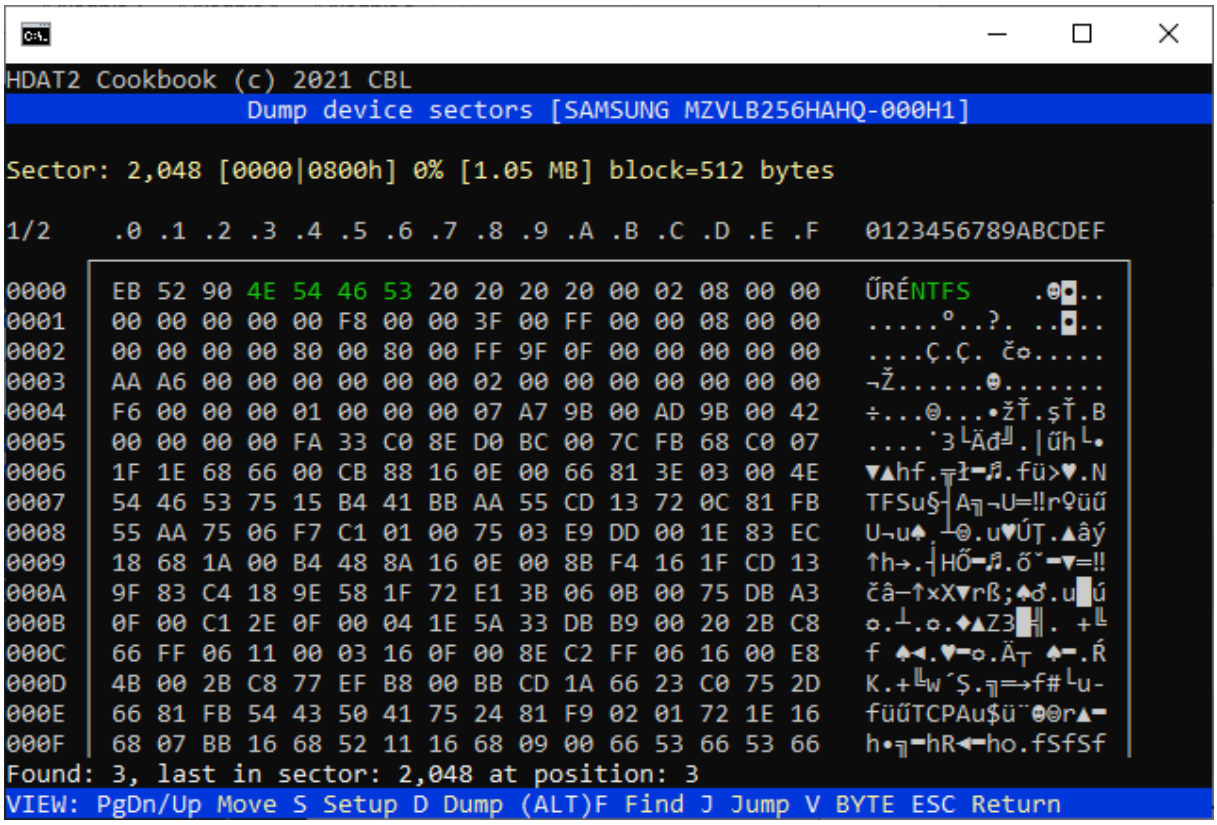


Press a key 'ALT+F', write 'ntfs' in the STRING field and press 'ENTER' to accept.



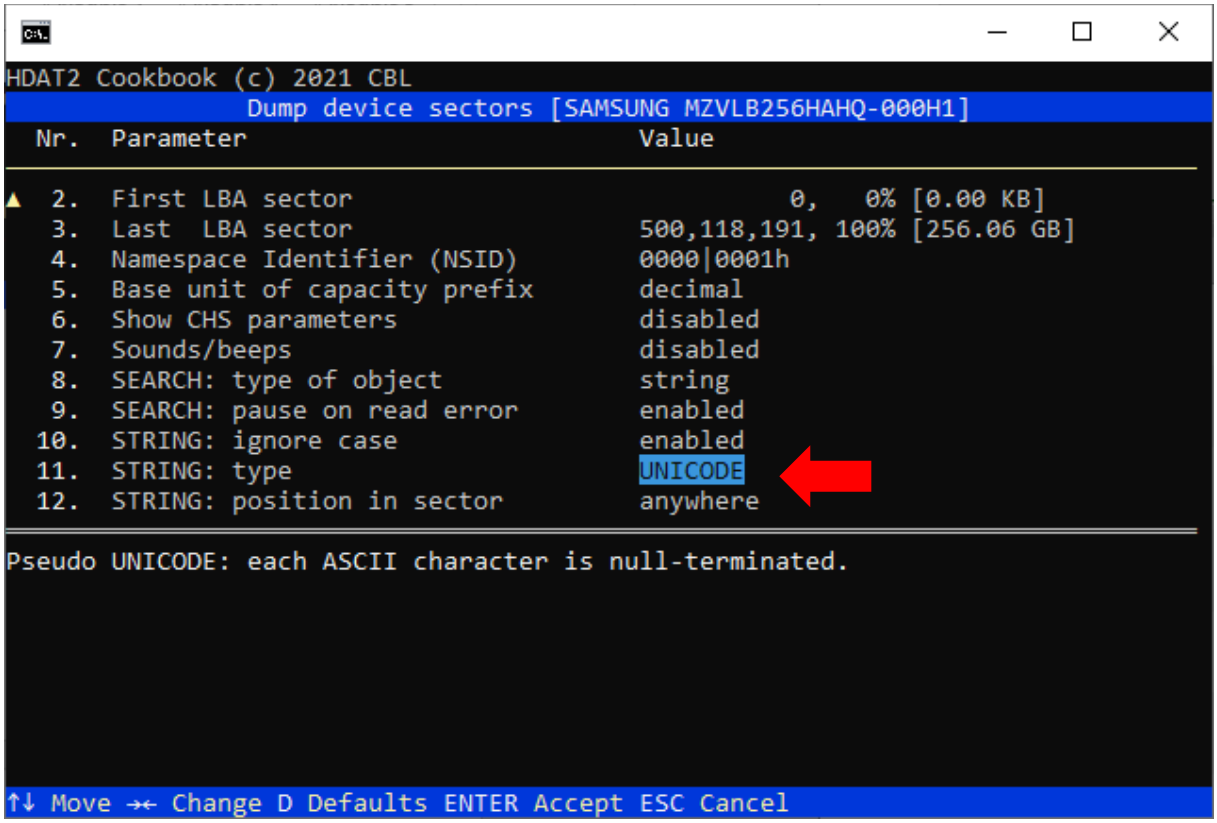
Press a key 'F' to search.



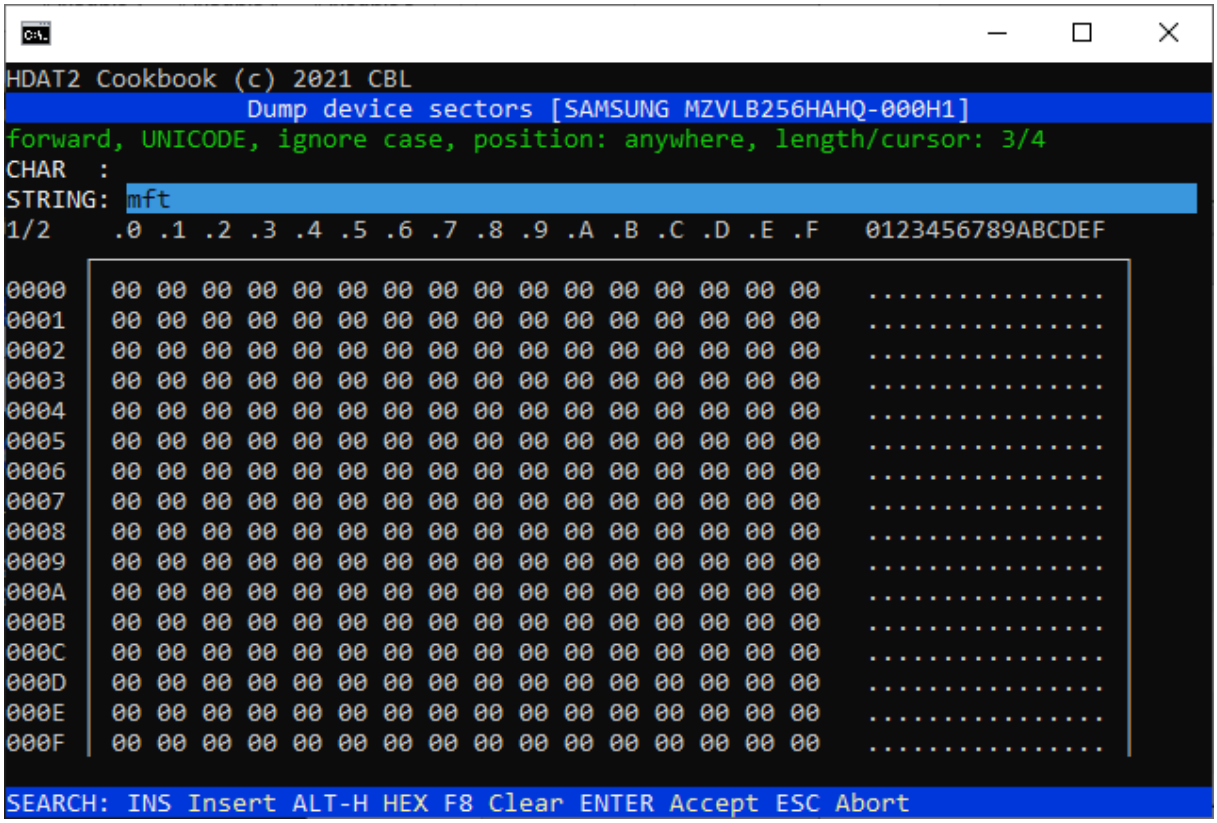


Example 3: On NVMe device Samsung I want to search for a string 'MFT', in non-case sensitive mode and regardless of position in the sector. Text 'MFT' (NTFS Master File Table) is stored as Unicode string.

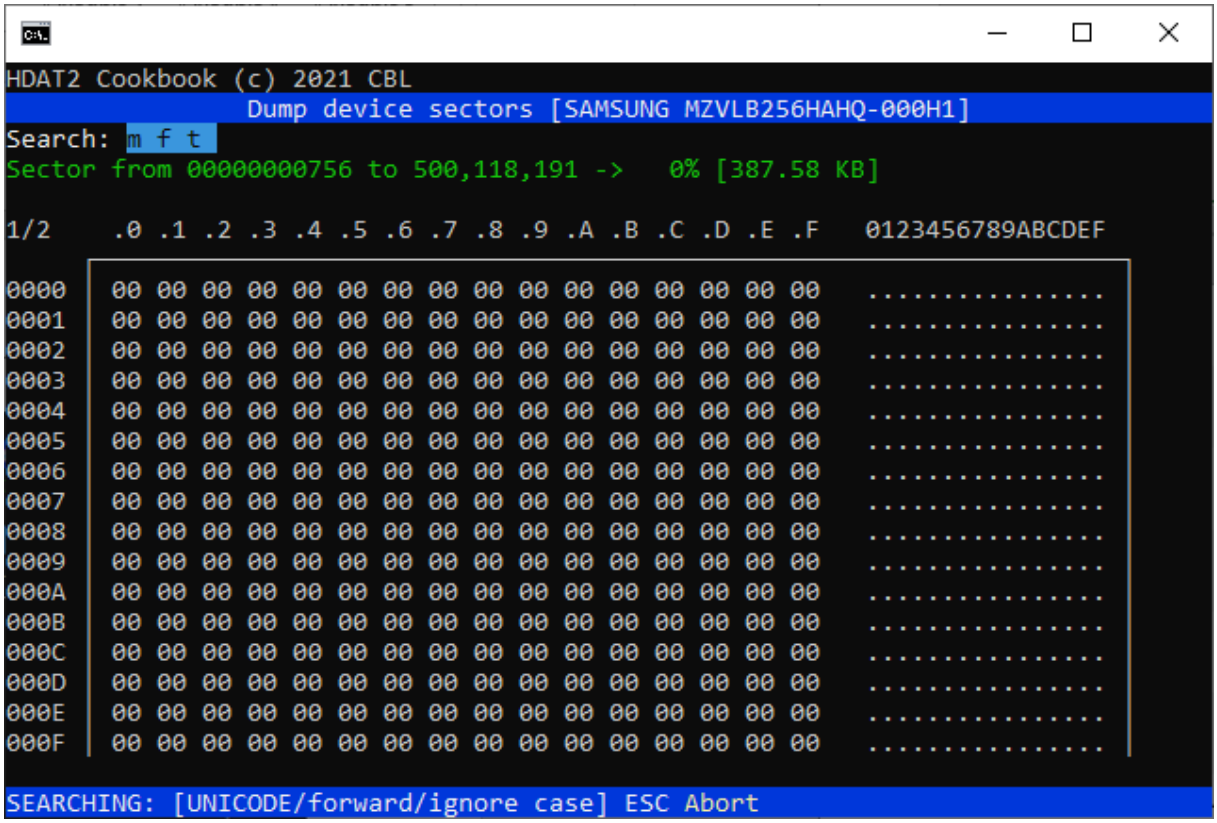
Press a key 'S' for setup, set the parameter 'STRING: position in sector' to 'UNICODE' and 'ENTER' to accept.

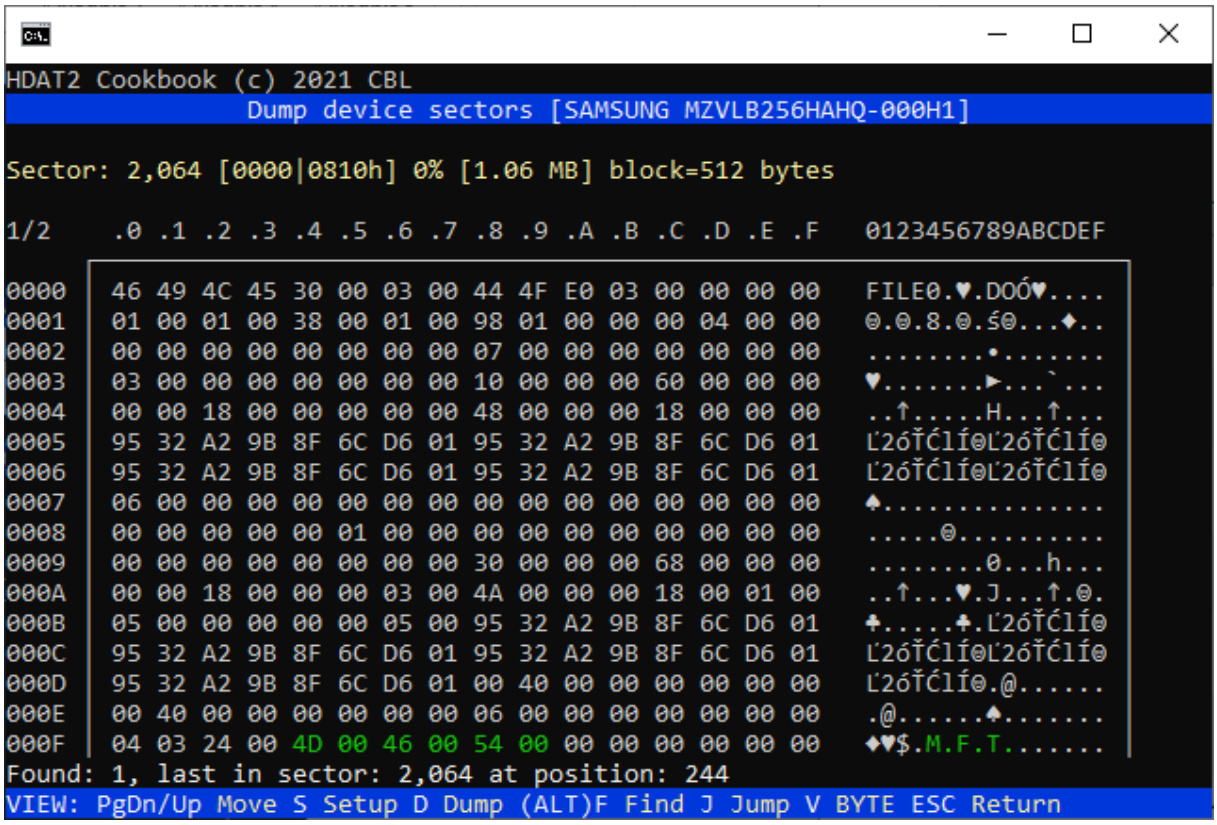


Press a key 'ALT+F', write 'mft' in the STRING field and press 'ENTER' to accept.



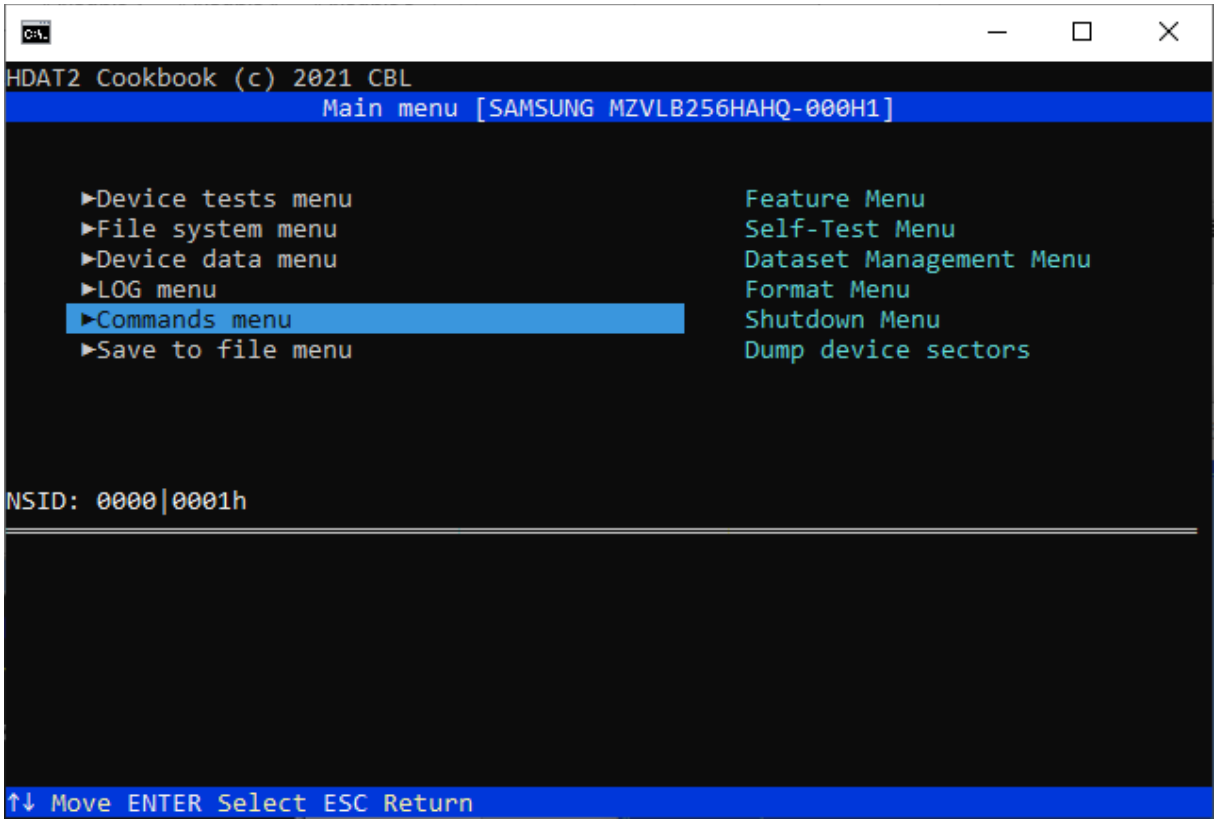
Press a key 'F' to search.

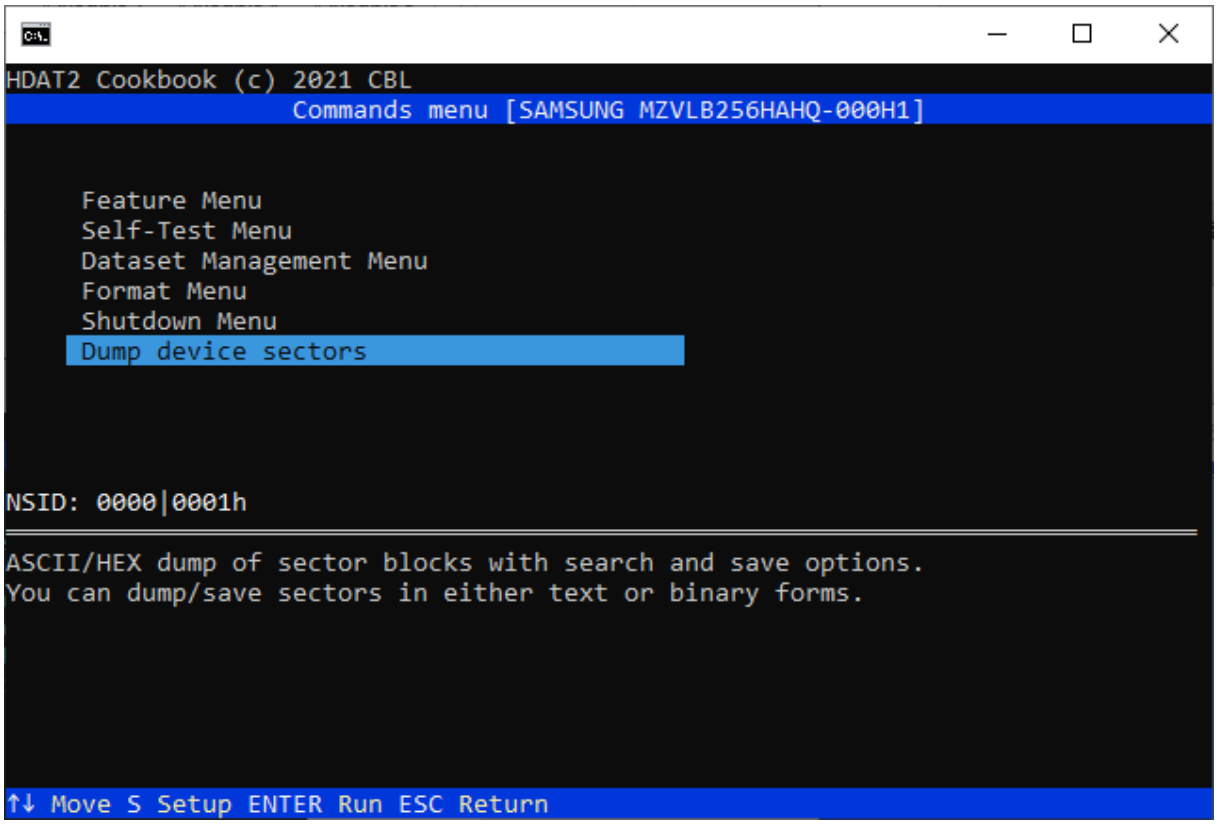


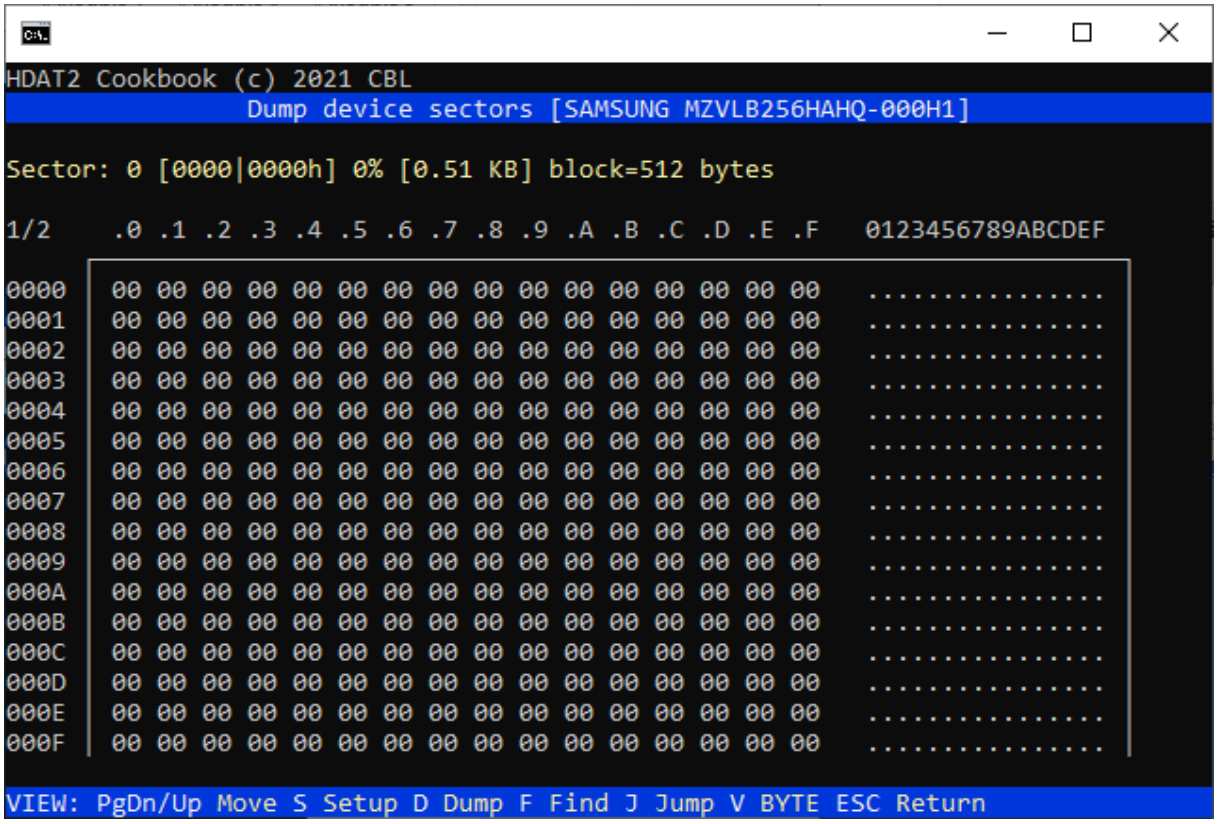


Search for empty sector

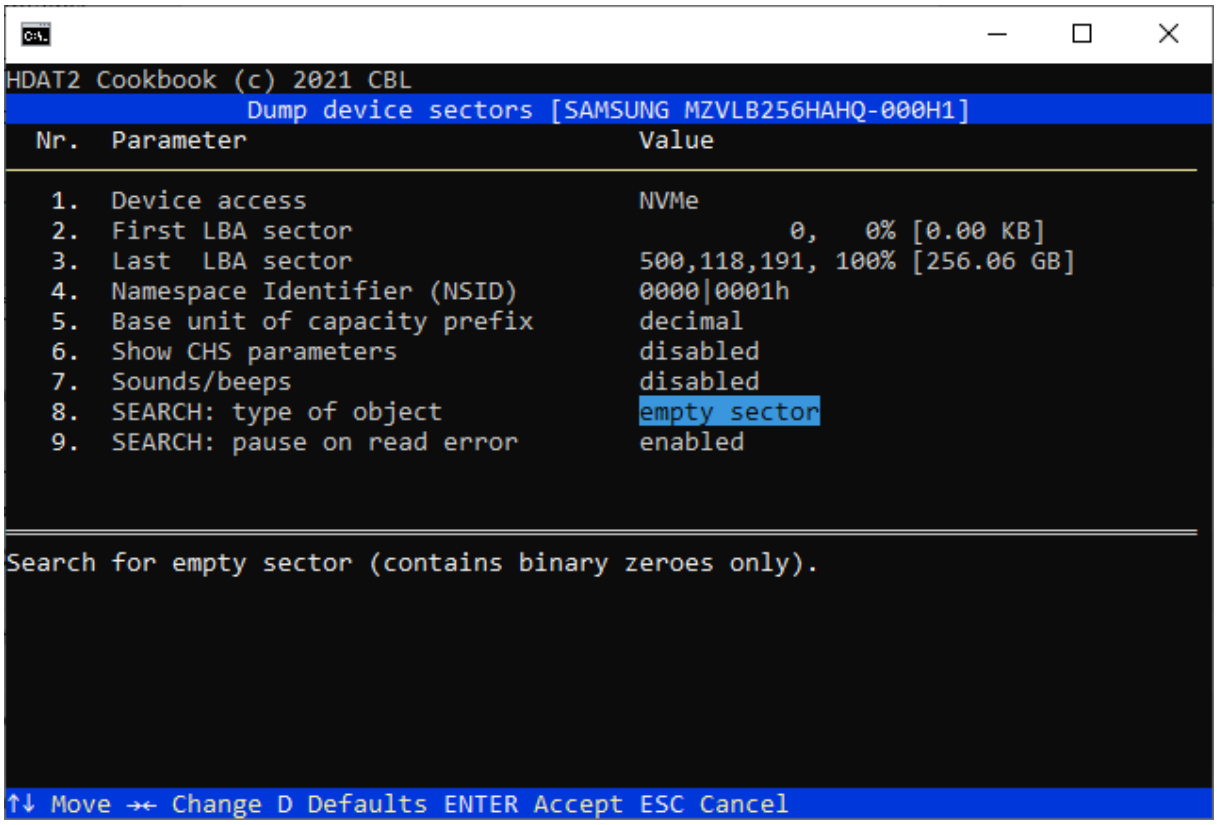
This is usable if you are looking for empty sector (with binary 00h) on device.


HDAT2 Cookbook (c) 2021 CBL
Main menu [SAMSUNG MZVLB256HAHQ-000H1]
►Device tests menu
►File system menu
►Device data menu
►LOG menu
►Commands menu
►Save to file menu
Feature Menu
Self-Test Menu
Dataset Management Menu
Format Menu
Shutdown Menu
Dump device sectors
NSID: 0000|0001h
↑↓ Move ENTER Select ESC Return

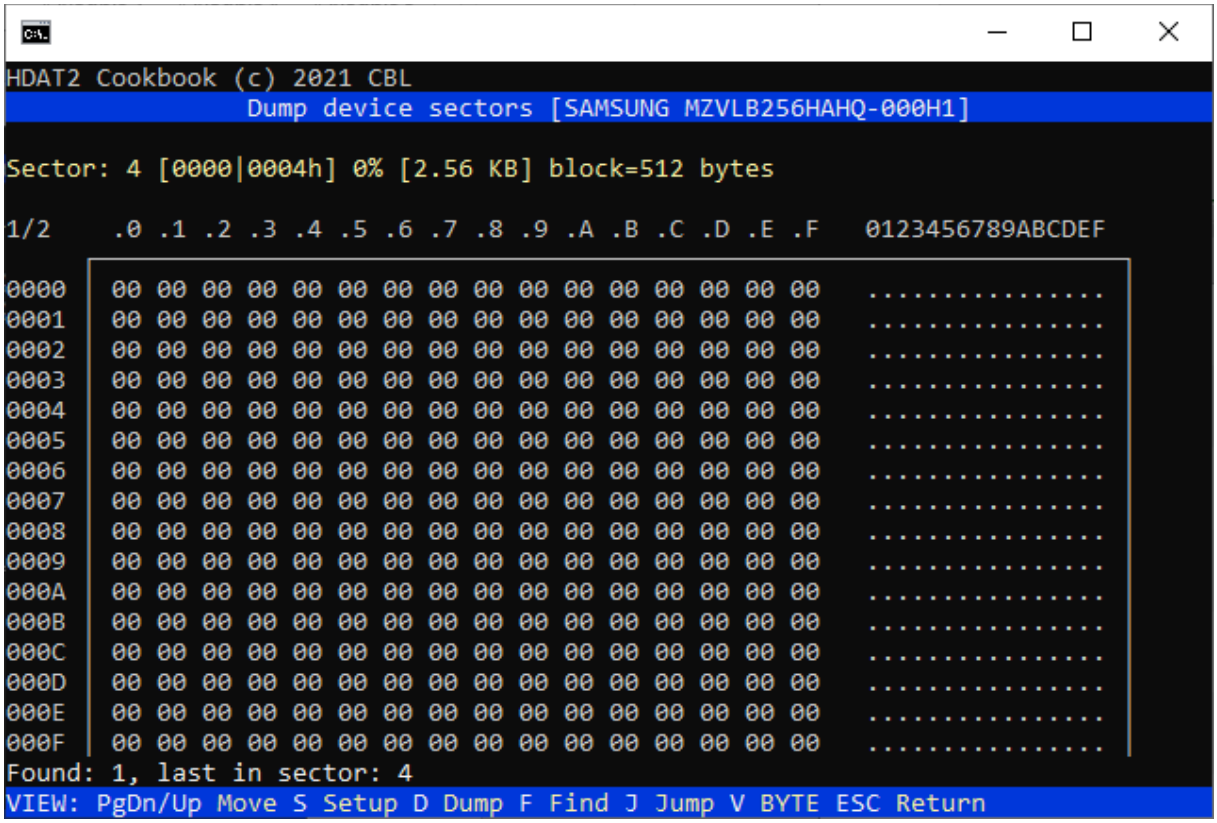

HDAT2 Cookbook (c) 2021 CBL
Commands menu [SAMSUNG MZVLB256HAHQ-000H1]
Feature Menu
Self-Test Menu
Dataset Management Menu
Format Menu
Shutdown Menu
Dump device sectors
NSID: 0000|0001h
ASCII/HEX dump of sector blocks with search and save options.
You can dump/save sectors in either text or binary forms.
↑↓ Move S Setup ENTER Run ESC Return



Press a key 'S' for setup, set the parameter 'STRING: type of object' to 'empty sector' and 'ENTER' to accept.



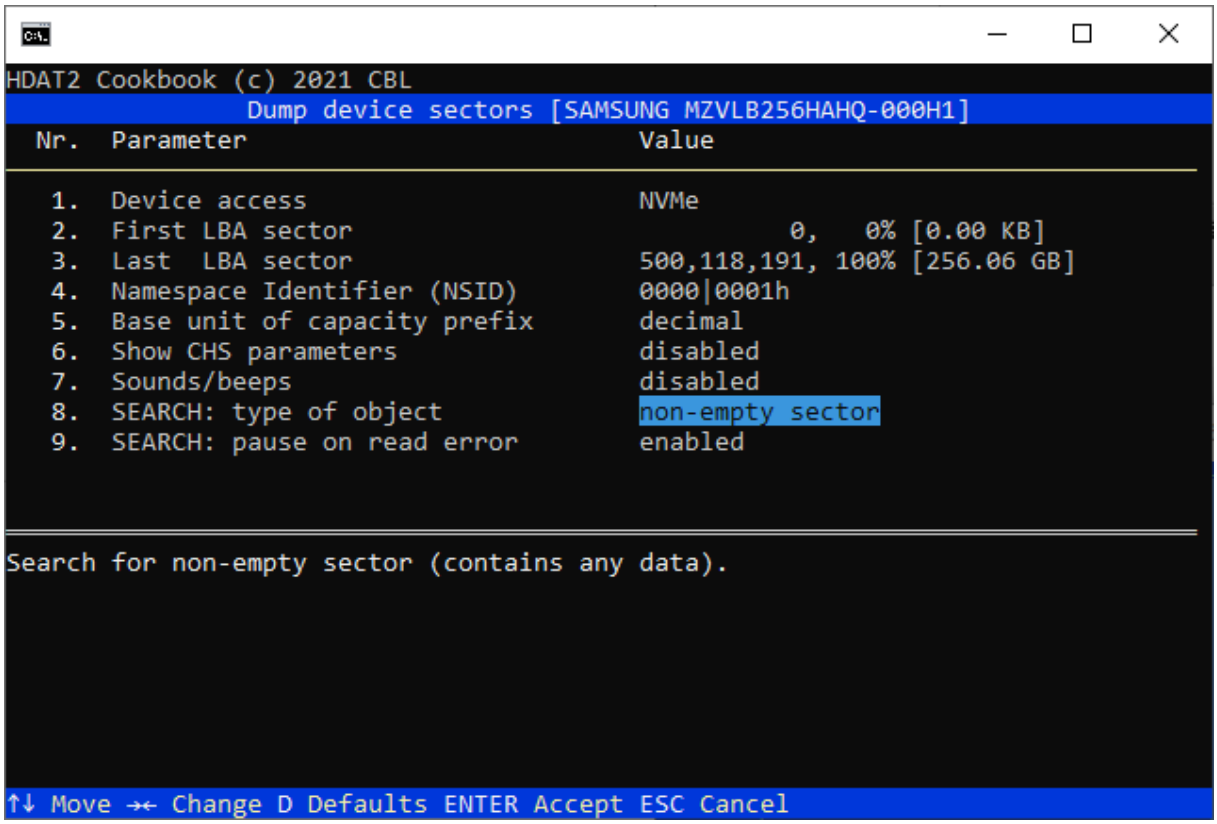
Press a key 'F' to search.


HDAT2 Cookbook (c) 2021 CBL
Dump device sectors [SAMSUNG MZVLB256HAHQ-000H1]
Sector: 4 [0000|0004h] 0% [2.56 KB] block=512 bytes
1/2 .0 .1 .2 .3 .4 .5 .6 .7 .8 .9 .A .B .C .D .E .F 0123456789ABCDEF
0000 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0001 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0002 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0003 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0004 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0005 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0006 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0007 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0008 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0009 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
000A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
000B 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
000C 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
000D 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
000E 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
000F 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
Found: 1, last in sector: 4
VIEW: PgDn/Up Move S Setup D Dump F Find J Jump V BYTE ESC Return

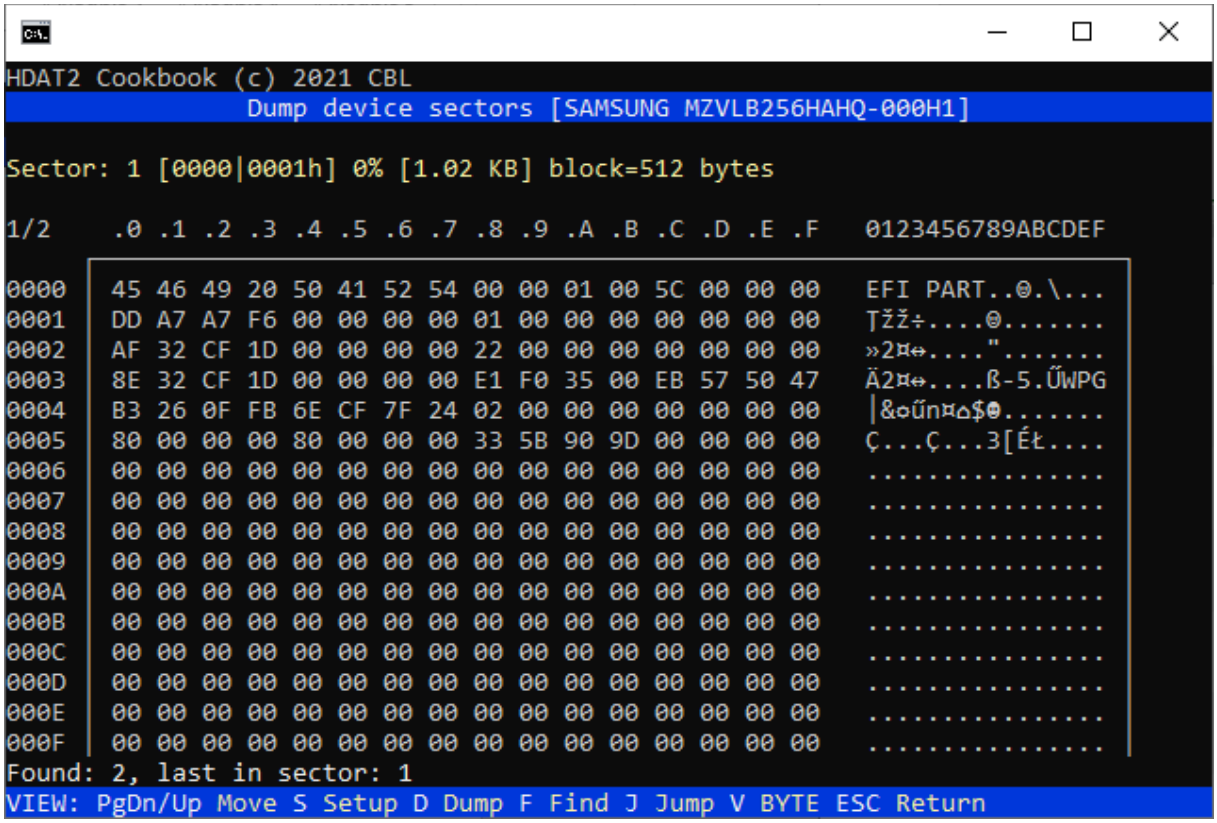
Search for non-empty sector

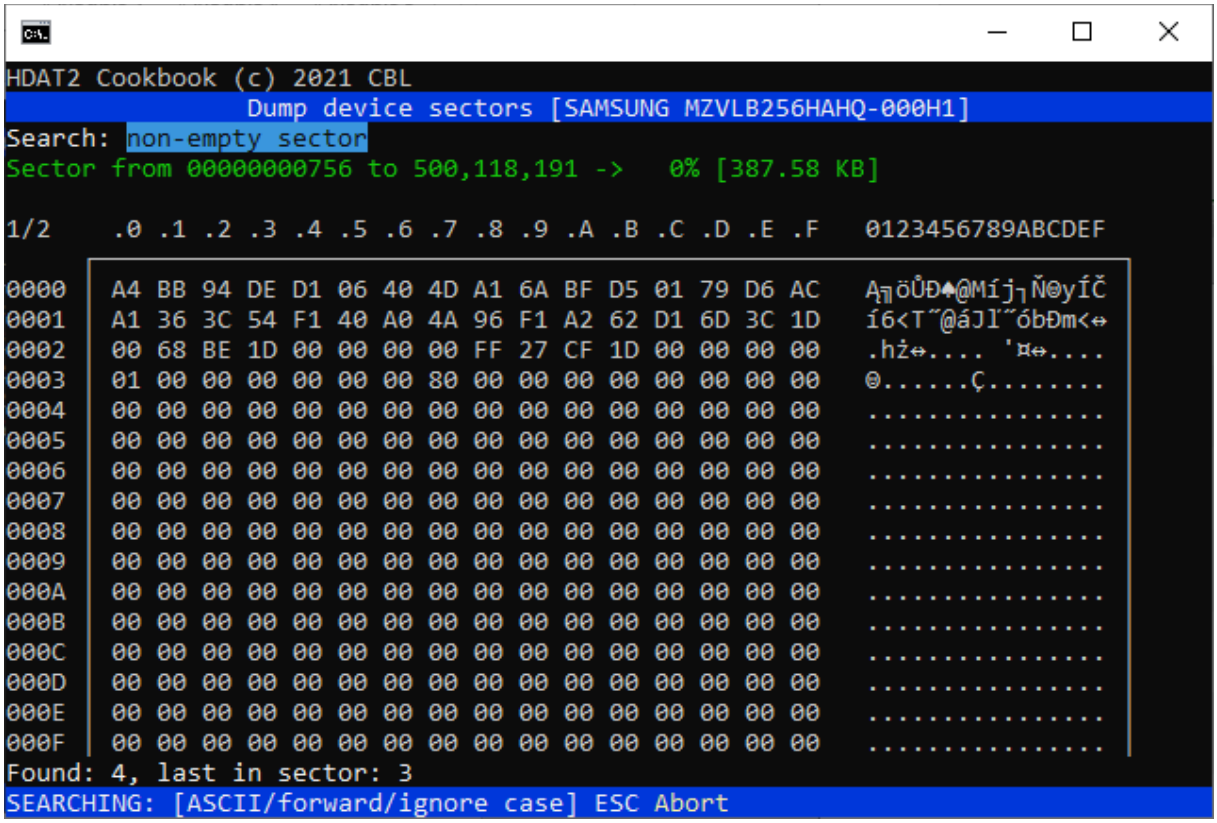
This is usable if you are looking for any data on device.

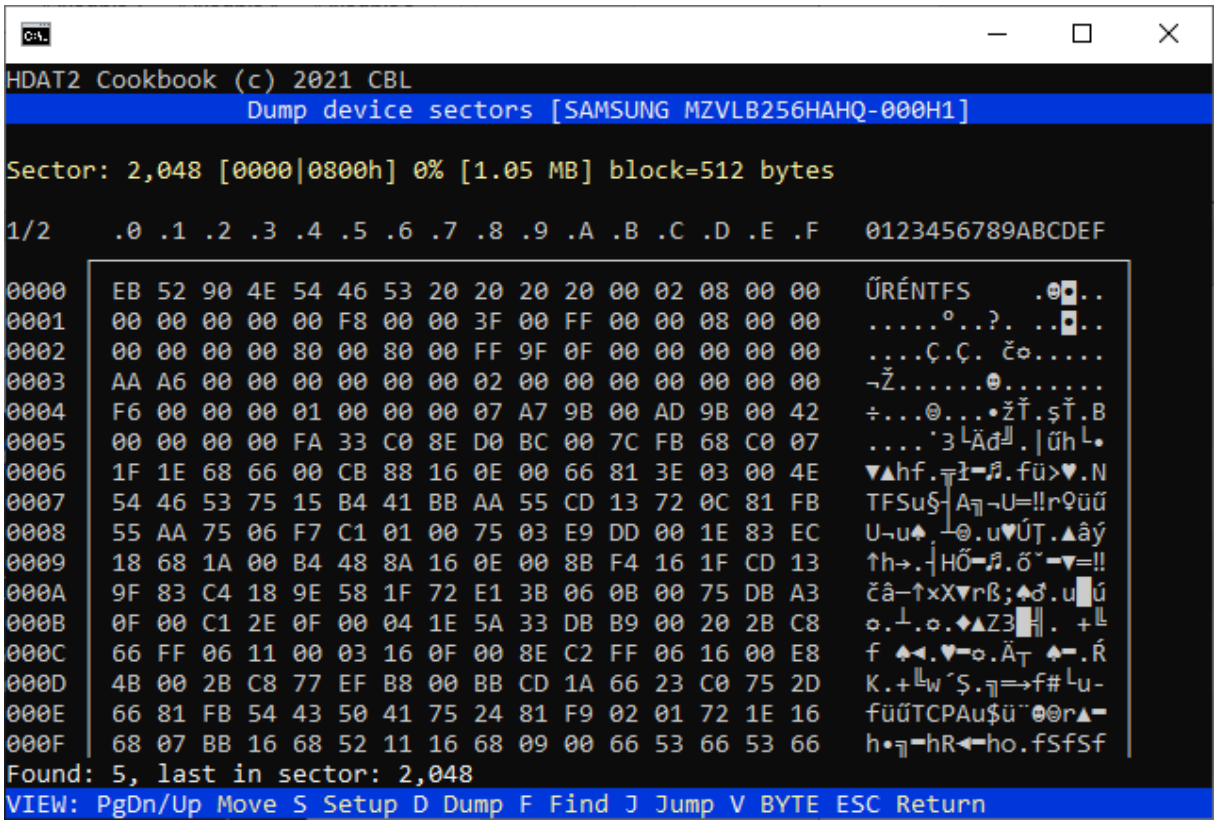
Press a key 'S' for setup, set the parameter 'STRING: type of object' to 'non-empty sector' and 'ENTER' to accept.



Press a key 'F' to search.




HDAT2 Cookbook (c) 2021 CBL
Dump device sectors [SAMSUNG MZVLB256HAHQ-000H1]
Search: non-empty sector
Sector from 00000000756 to 500,118,191 -> 0% [387.58 KB]
1/2 .0 .1 .2 .3 .4 .5 .6 .7 .8 .9 .A .B .C .D .E .F 0123456789ABCDEF
0000 A4 BB 94 DE D1 06 40 4D A1 6A BF D5 01 79 D6 AC
0001 A1 36 3C 54 F1 40 A0 4A 96 F1 A2 62 D1 6D 3C 1D
0002 00 68 BE 1D 00 00 00 00 FF 27 CF 1D 00 00 00 00
0003 01 00 00 00 00 00 00 80 00 00 00 00 00 00 00 00
0004 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0005 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0006 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0007 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0008 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0009 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
000A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
000B 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
000C 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
000D 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
000E 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
000F 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Found: 4, last in sector: 3
SEARCHING: [ASCII/forward/ignore case] ESC Abort


HDAT2 Cookbook (c) 2021 CBL
Dump device sectors [SAMSUNG MZVLB256HAHQ-000H1]
Sector: 2,048 [0000|0800h] 0% [1.05 MB] block=512 bytes
1/2 .0 .1 .2 .3 .4 .5 .6 .7 .8 .9 .A .B .C .D .E .F 0123456789ABCDEF
0000 EB 52 90 4E 54 46 53 20 20 20 20 00 02 08 00 00
0001 00 00 00 00 00 F8 00 00 3F 00 FF 00 00 08 00 00
0002 00 00 00 00 80 00 80 00 FF 9F 0F 00 00 00 00 00
0003 AA A6 00 00 00 00 00 00 02 00 00 00 00 00 00 00
0004 F6 00 00 00 01 00 00 00 07 A7 9B 00 AD 9B 00 42
0005 00 00 00 00 FA 33 C0 8E D0 BC 00 7C FB 68 C0 07
0006 1F 1E 68 66 00 CB 88 16 0E 00 66 81 3E 03 00 4E
0007 54 46 53 75 15 B4 41 BB AA 55 CD 13 72 0C 81 FB
0008 55 AA 75 06 F7 C1 01 00 75 03 E9 DD 00 1E 83 EC
0009 18 68 1A 00 B4 48 8A 16 0E 00 8B F4 16 1F CD 13
000A 9F 83 C4 18 9E 58 1F 72 E1 3B 06 0B 00 75 DB A3
000B 0F 00 C1 2E 0F 00 04 1E 5A 33 DB B9 00 20 2B C8
000C 66 FF 06 11 00 03 16 0F 00 8E C2 FF 06 16 00 E8
000D 4B 00 2B C8 77 EF B8 00 BB CD 1A 66 23 C0 75 2D
000E 66 81 FB 54 43 50 41 75 24 81 F9 02 01 72 1E 16
000F 68 07 BB 16 68 52 11 16 68 09 00 66 53 66 53 66
Found: 5, last in sector: 2,048
VIEW: PgDn/Up Move S Setup D Dump F Find J Jump V BYTE ESC Return

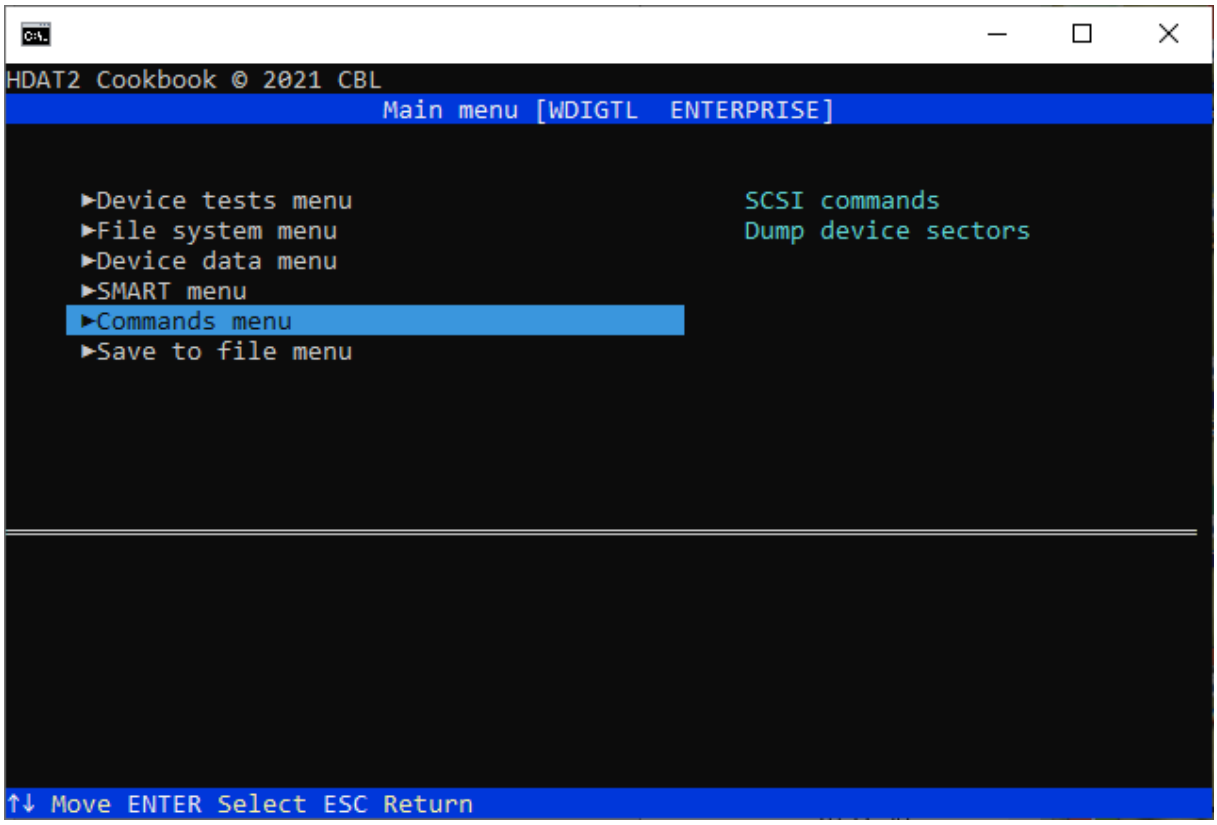
Change the logical sector size

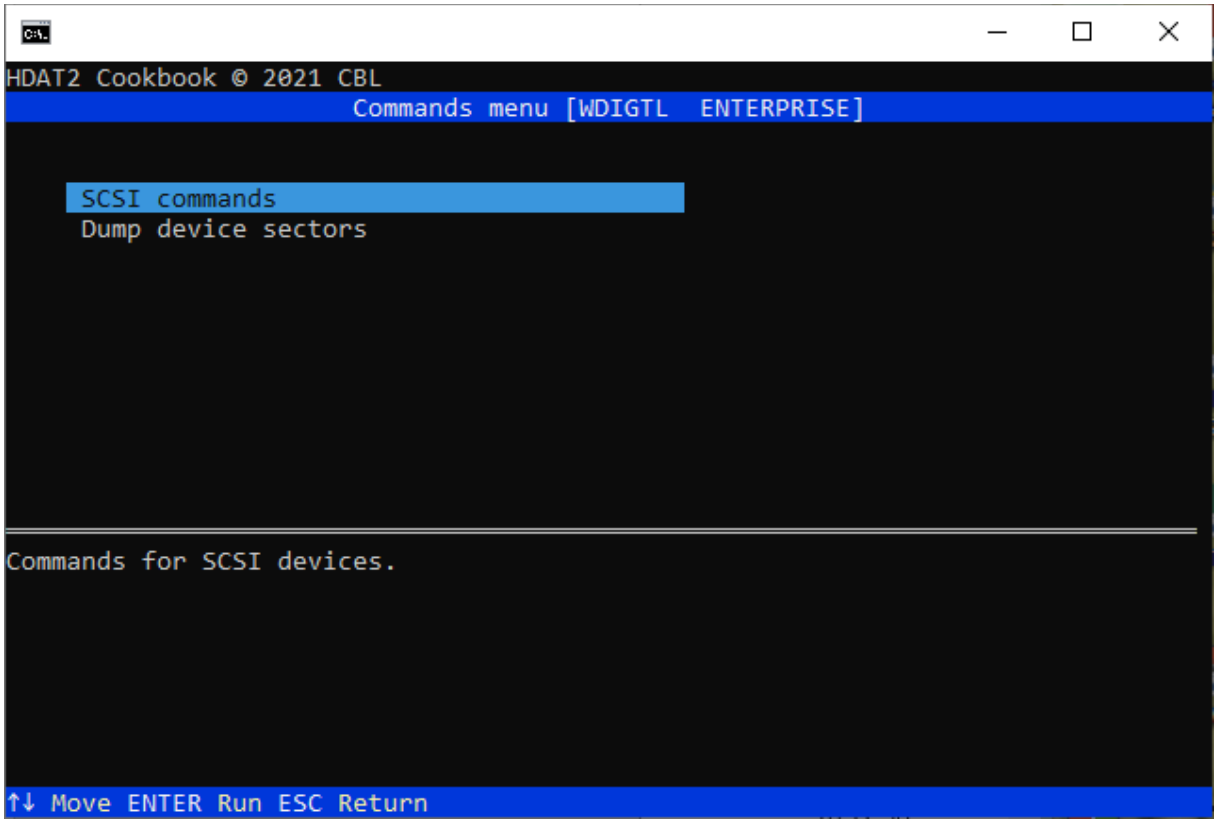
On some hard drives you can change the size of the logical sector.

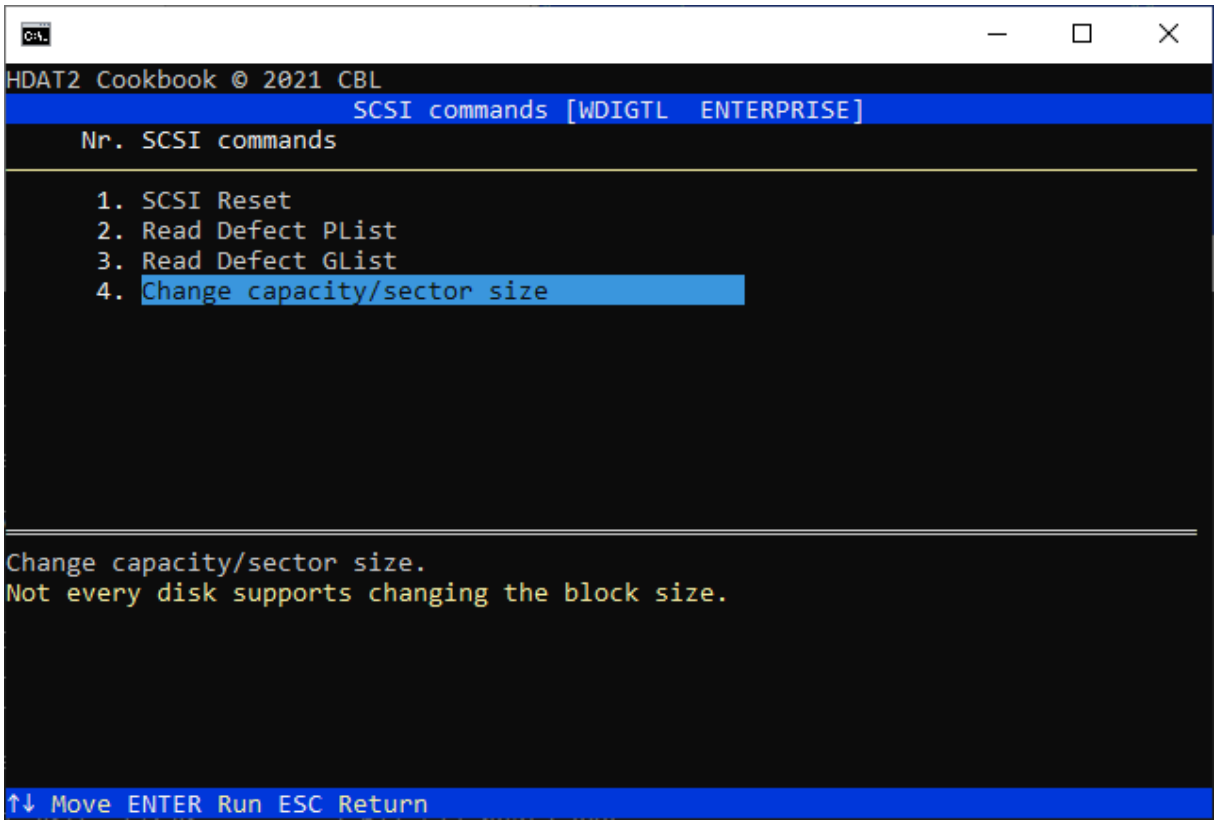
For SATA and NVMe drives the values for logical sector size can be set to 512 or 4096, if the disks support those values. The default value is platform dependent.

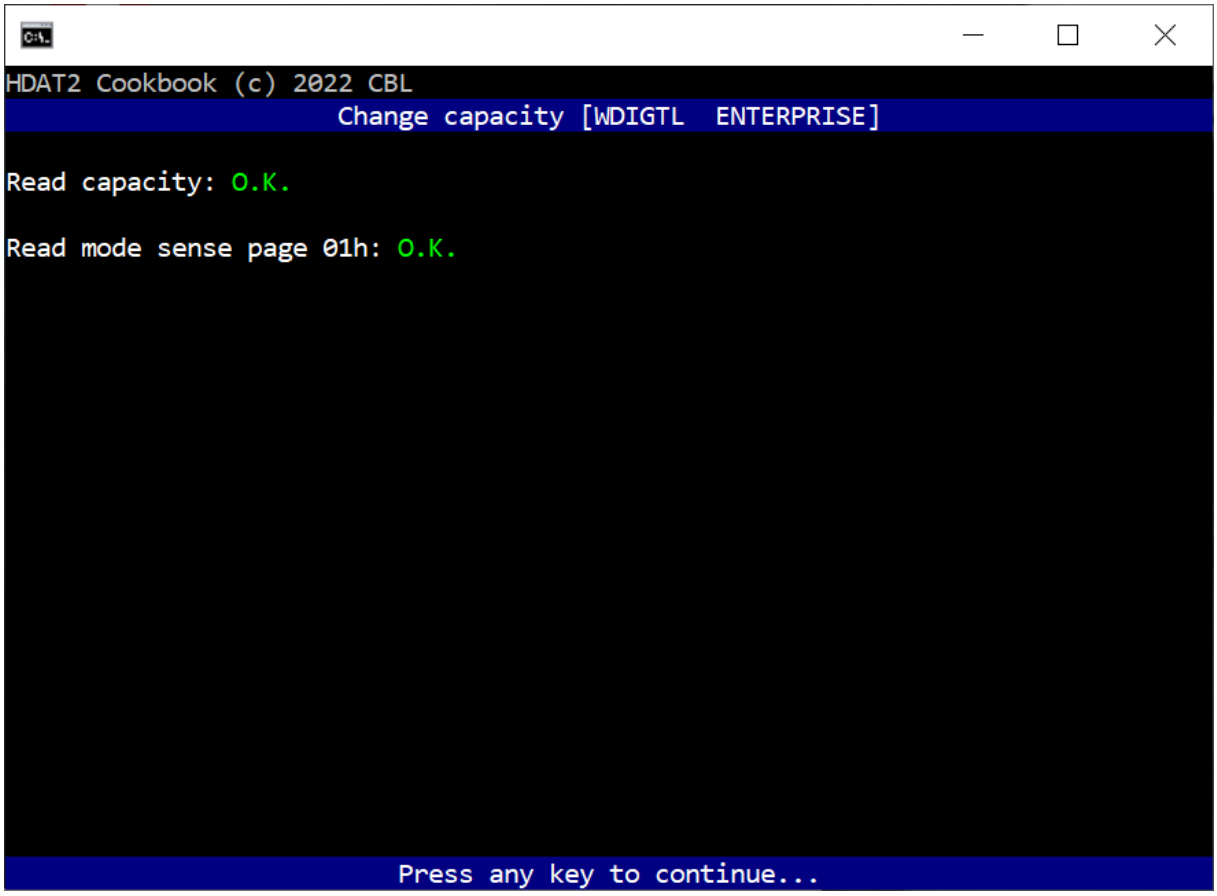
The current sector size settings can be checked in the device data menu.

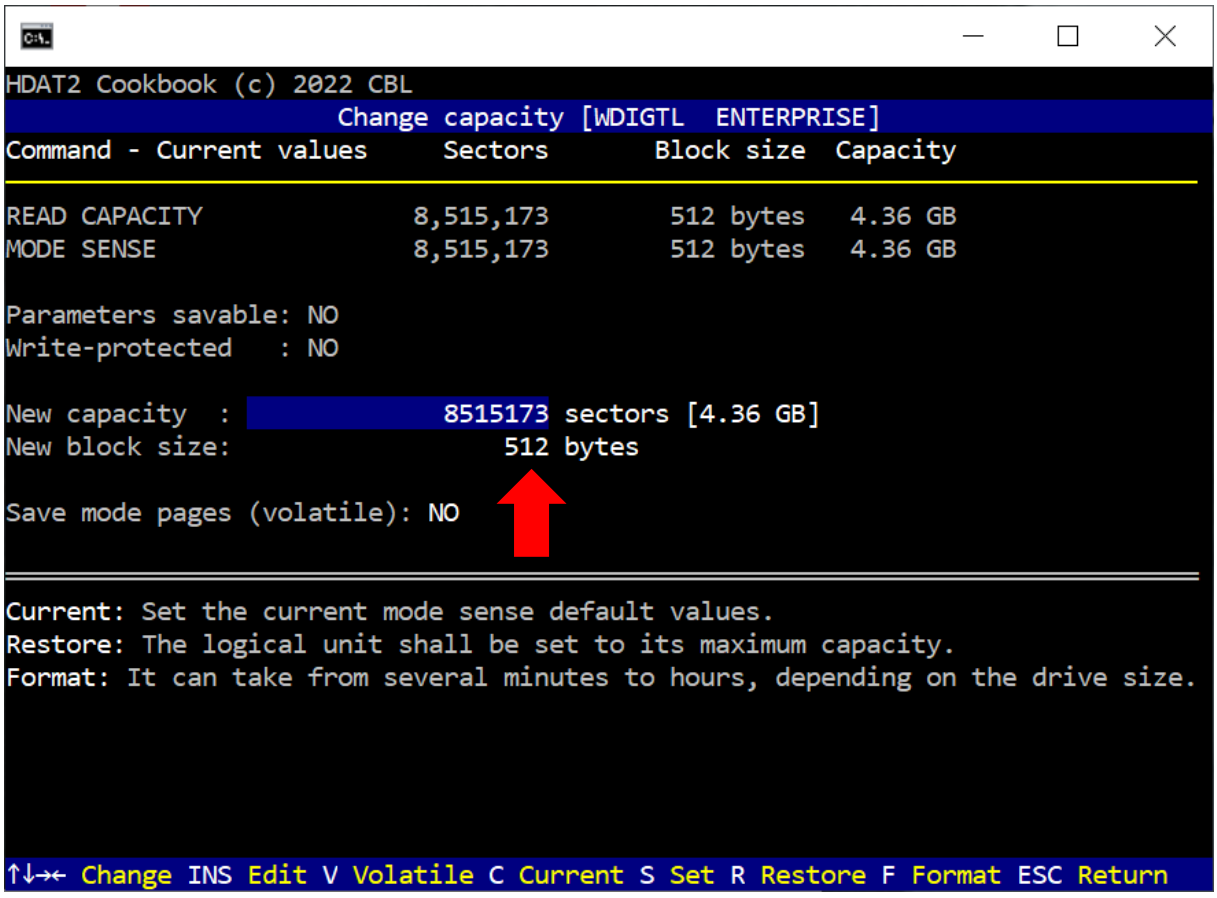
SCSI drives



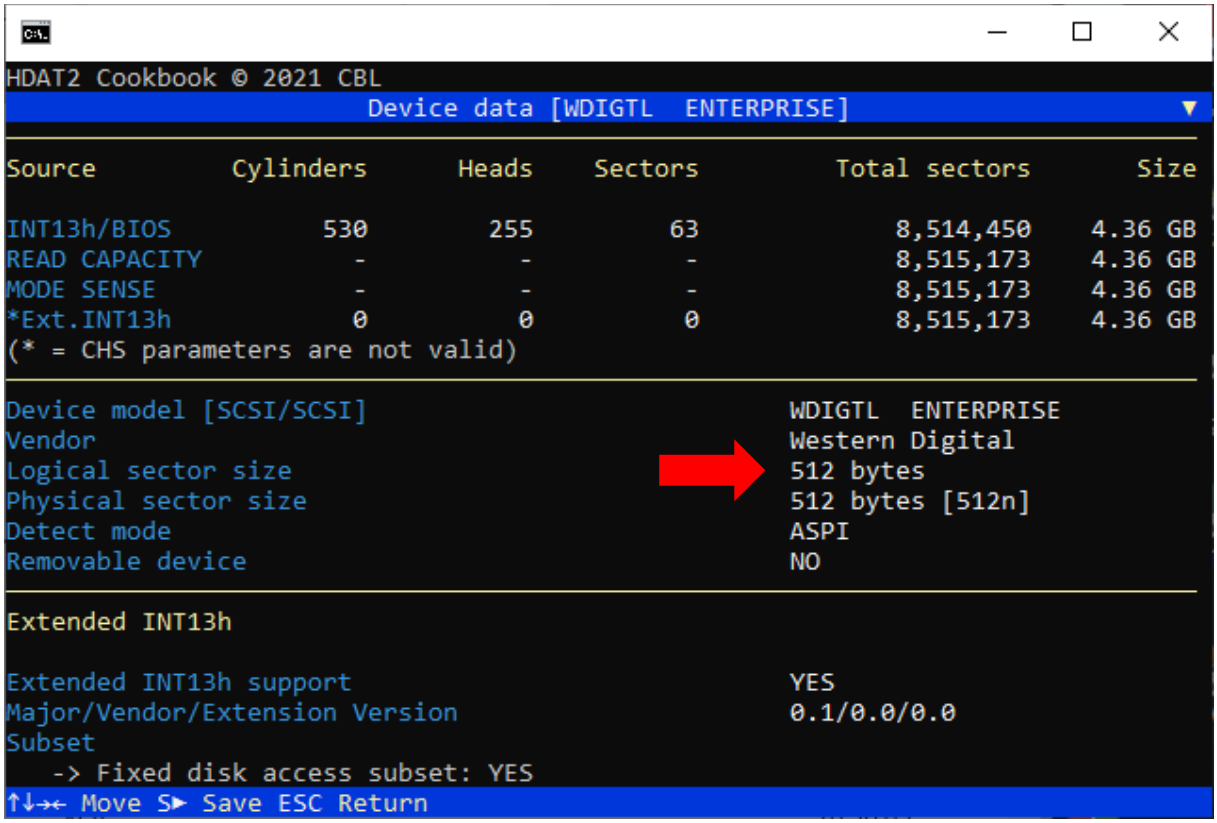

HDAT2 Cookbook © 2021 CBL
Commands menu [WDIGTL ENTERPRISE]
SCSI commands
Dump device sectors
Commands for SCSI devices.
↑↓ Move ENTER Run ESC Return


HDAT2 Cookbook © 2021 CBL
SCSI commands [WDIGTL ENTERPRISE]
Nr. SCSI commands
1. SCSI Reset
2. Read Defect PList
3. Read Defect GList
4. Change capacity/sector size
Change capacity/sector size.
Not every disk supports changing the block size.
↑↓ Move ENTER Run ESC Return

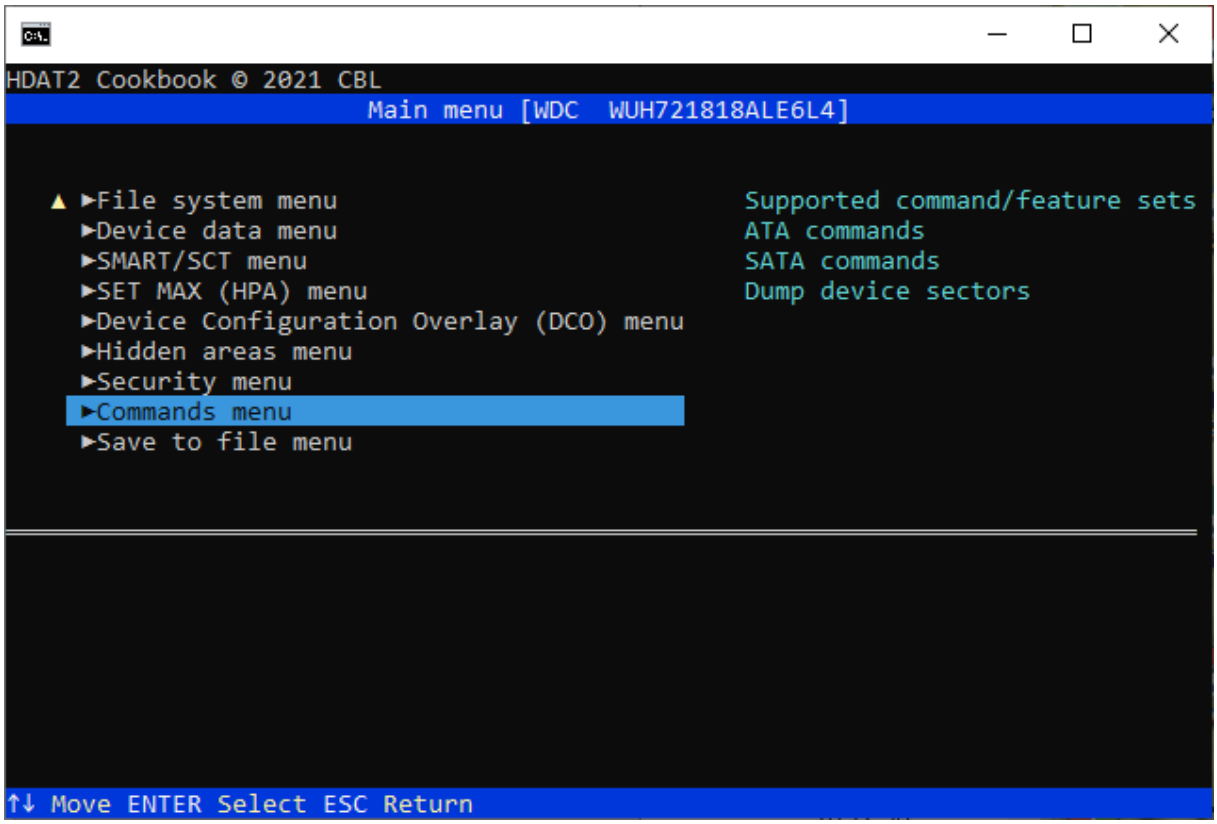


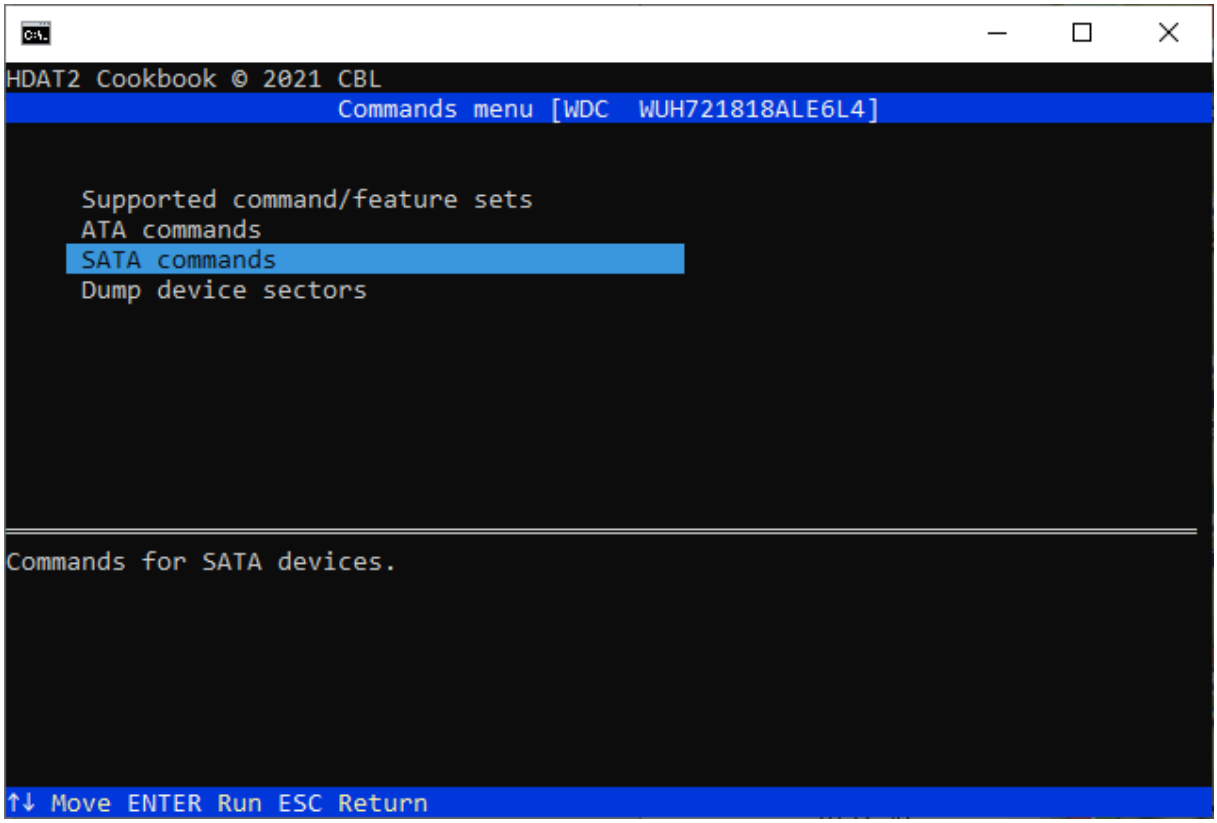


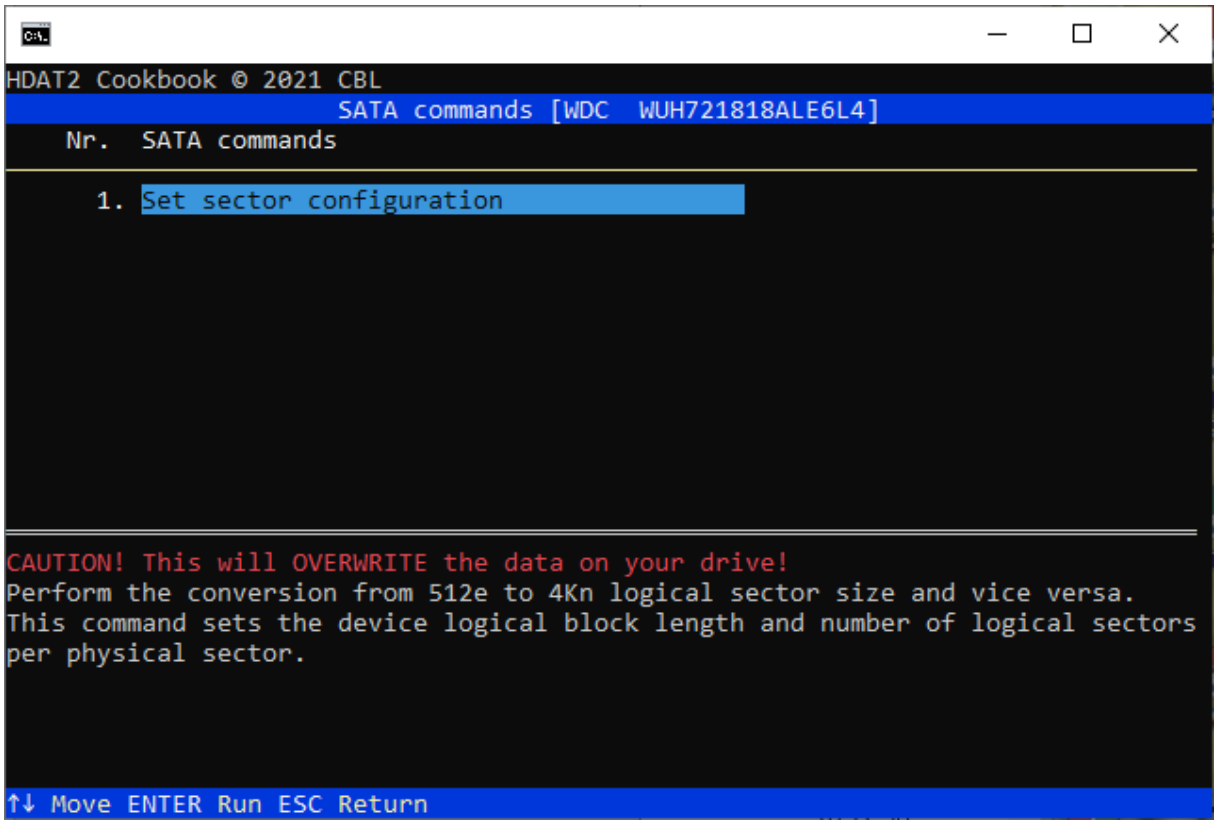
Check the current sector size setting:

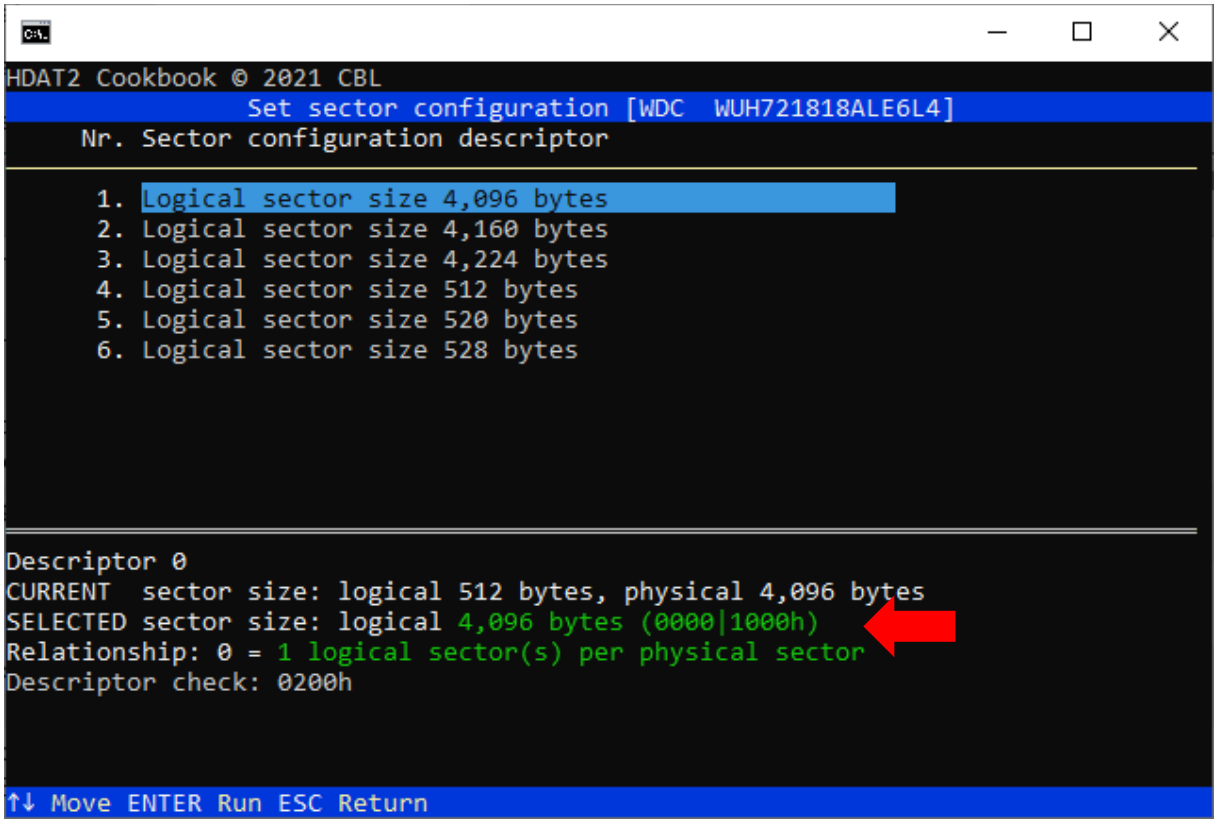

HDAT2 Cookbook © 2021 CBL
Device data [WDIGTL ENTERPRISE]
Source Cylinders Heads Sectors Total sectors Size
INT13h/BIOS 530 255 63 8,514,450 4.36 GB
READ CAPACITY - - - 8,515,173 4.36 GB
MODE SENSE - - - 8,515,173 4.36 GB
*Ext.INT13h 0 0 0 8,515,173 4.36 GB
(* = CHS parameters are not valid)
Device model [SCSI/SCSI] WDIGTL ENTERPRISE
Vendor Western Digital
Logical sector size 512 bytes
Physical sector size 512 bytes [512n]
Detect mode ASPI
Removable device NO
Extended INT13h
Extended INT13h support YES
Major/Vendor/Extension Version 0.1/0.0/0.0
Subset
-> Fixed disk access subset: YES
↑↓→← Move S► Save ESC Return

SATA drives

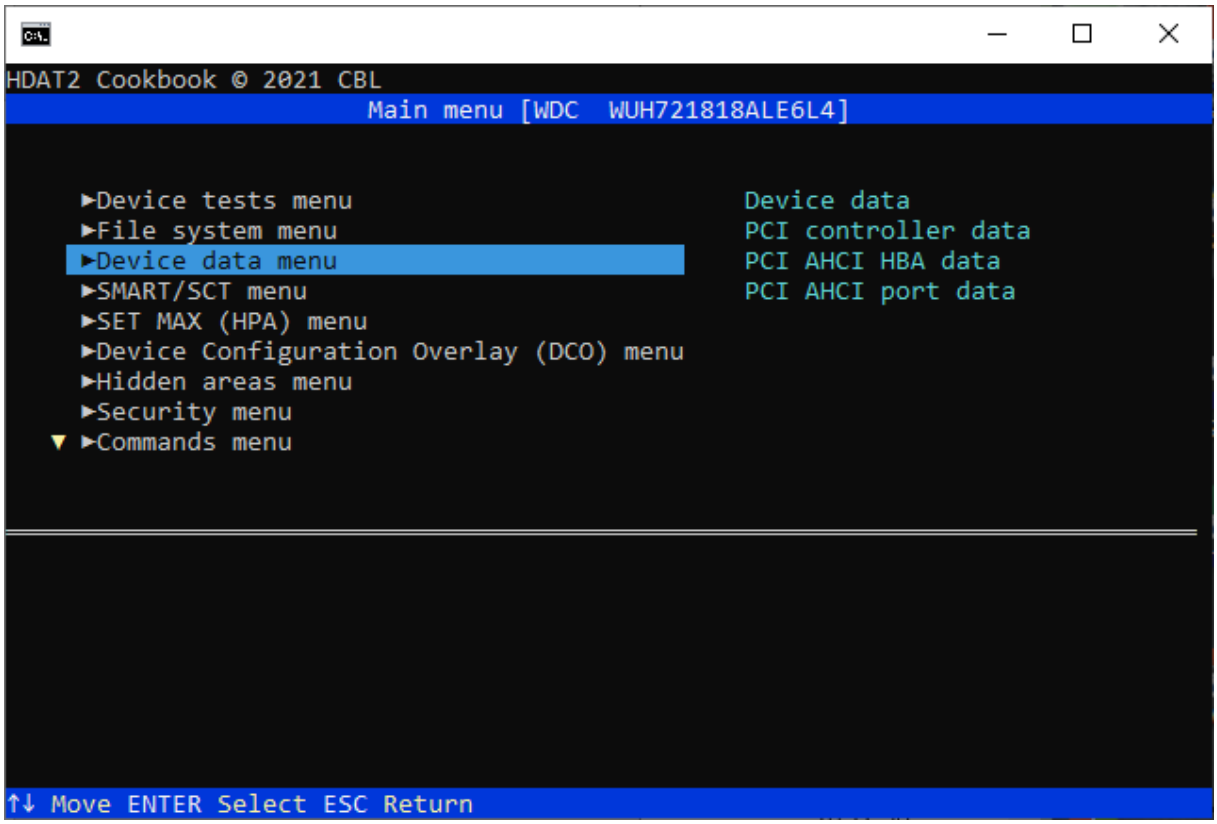

HDAT2 Cookbook © 2021 CBL
Main menu [WDC WUH721818ALE6L4]
►File system menu
►Device data menu
►SMART/SCT menu
►SET MAX (HPA) menu
►Device Configuration Overlay (DCO) menu
►Hidden areas menu
►Security menu
►Commands menu
►Save to file menu
Supported command/feature sets
ATA commands
SATA commands
Dump device sectors
↑↓ Move ENTER Select ESC Return

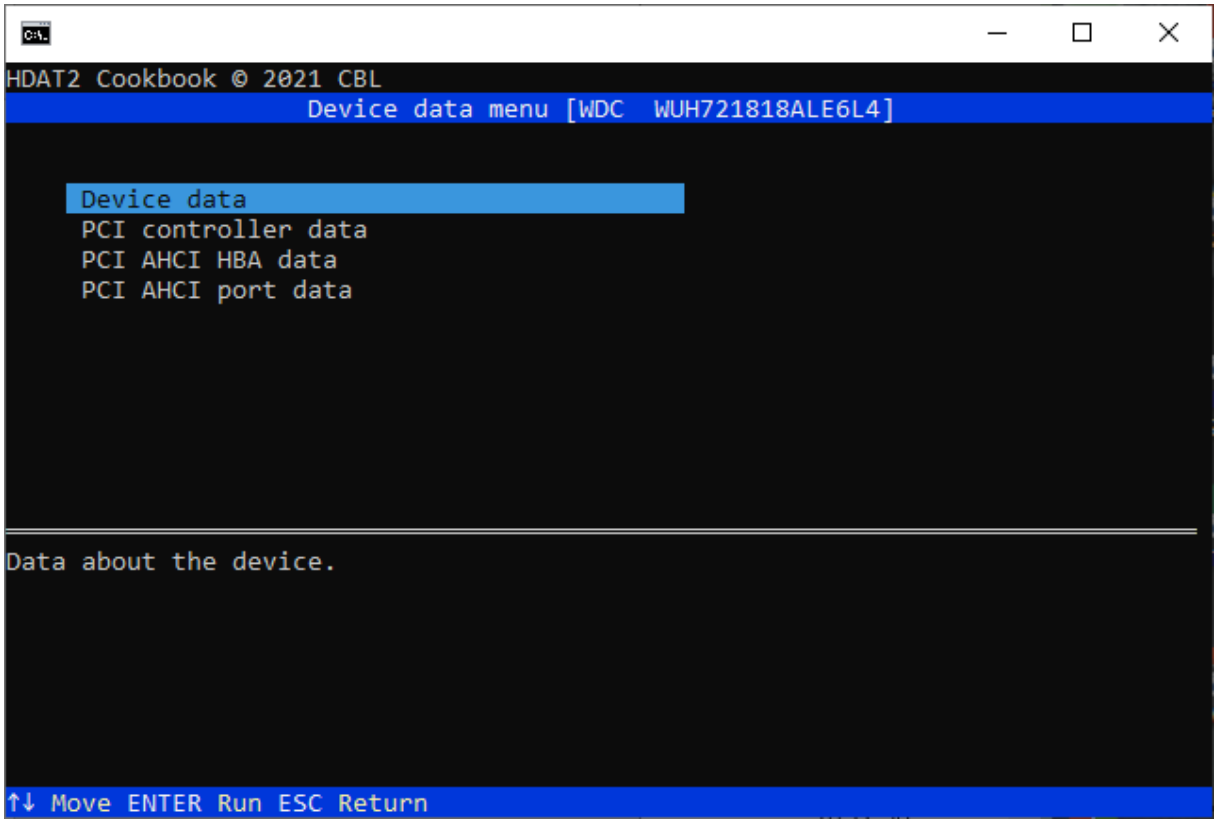

HDAT2 Cookbook © 2021 CBL
Commands menu [WDC WUH721818ALE6L4]
Supported command/feature sets
ATA commands
SATA commands
Dump device sectors
Commands for SATA devices.
↑↓ Move ENTER Run ESC Return

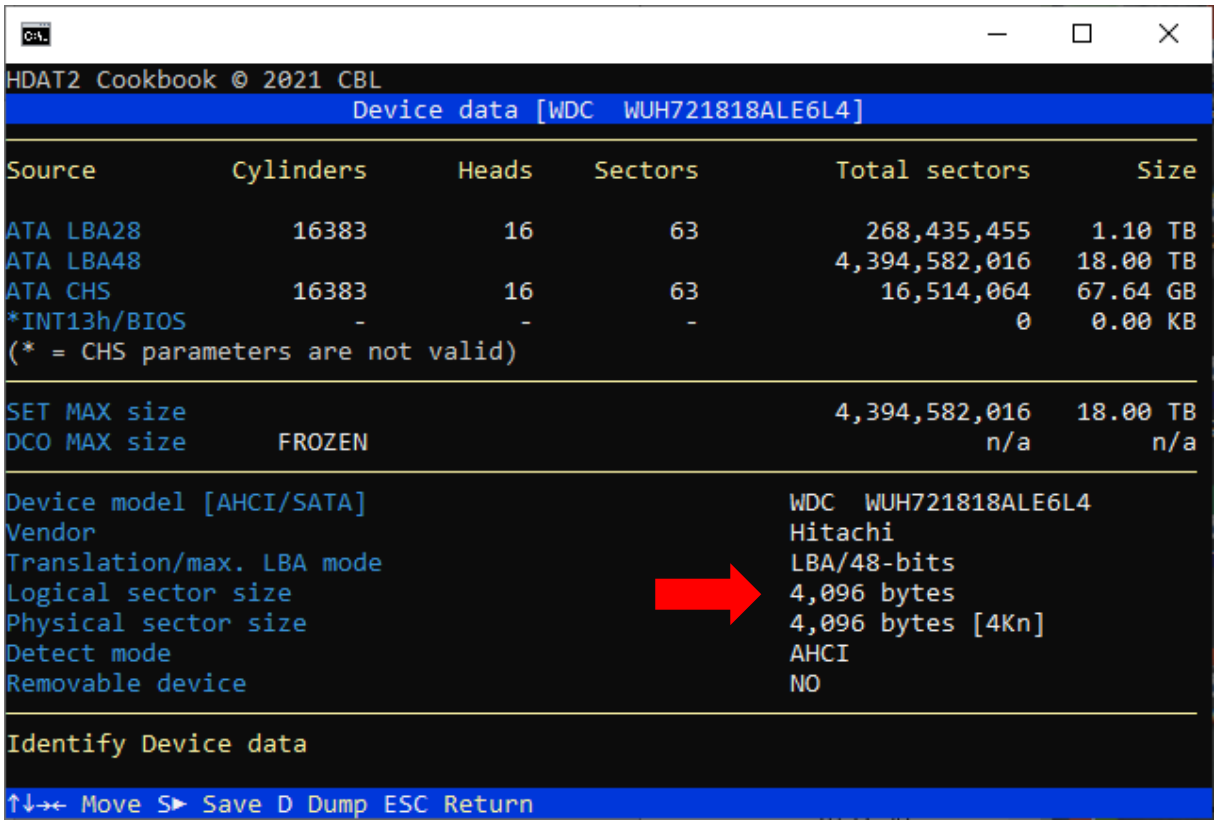

HDAT2 Cookbook © 2021 CBL
SATA commands [WDC WUH721818ALE6L4]
Nr. SATA commands
1. Set sector configuration
CAUTION! This will OVERWRITE the data on your drive!
Perform the conversion from 512e to 4Kn logical sector size and vice versa.
This command sets the device logical block length and number of logical sectors per physical sector.
↑↓ Move ENTER Run ESC Return



Check the current sector size setting:

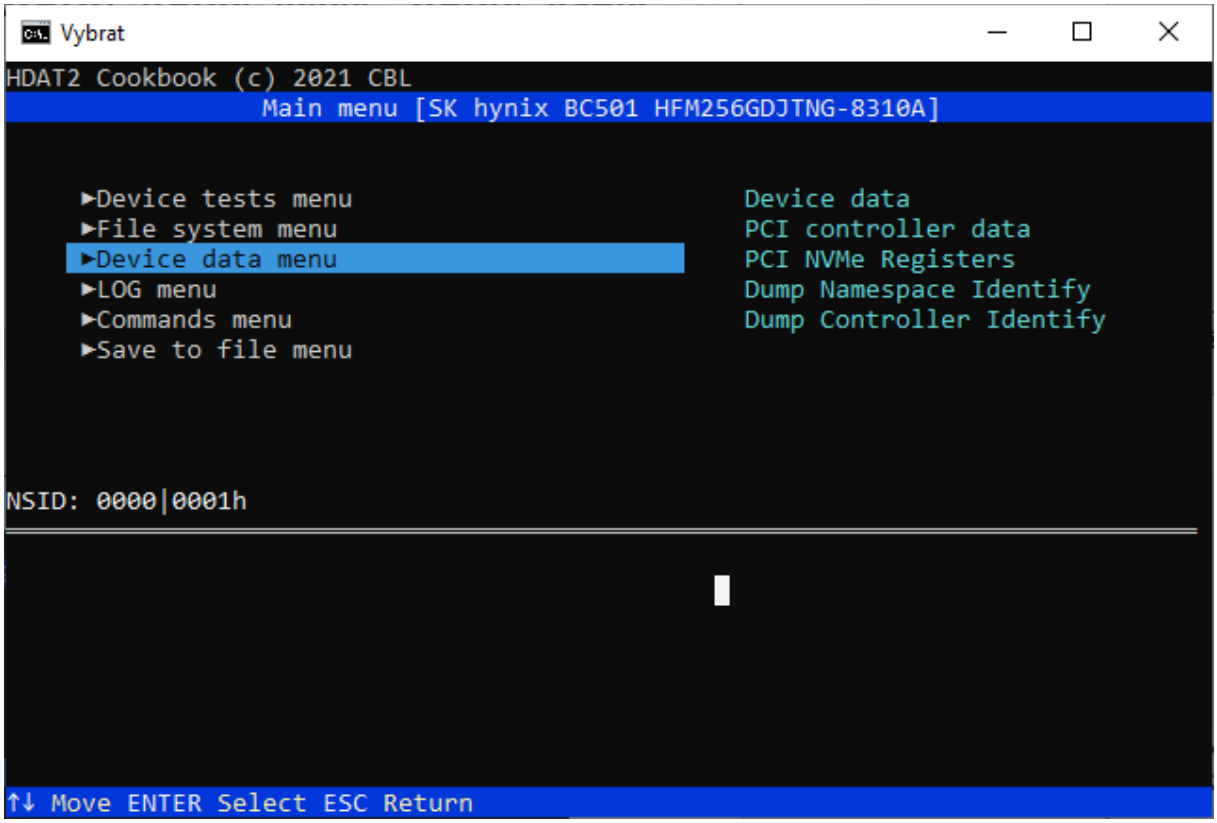


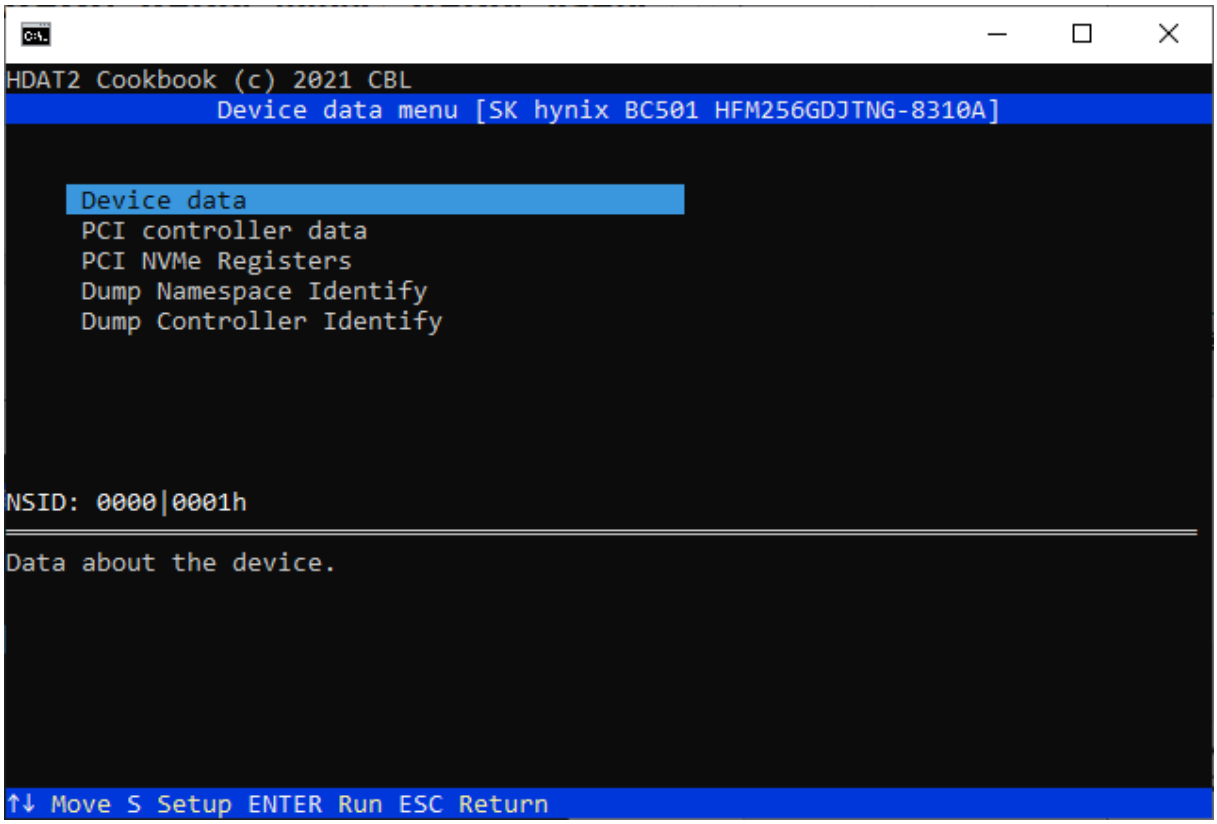


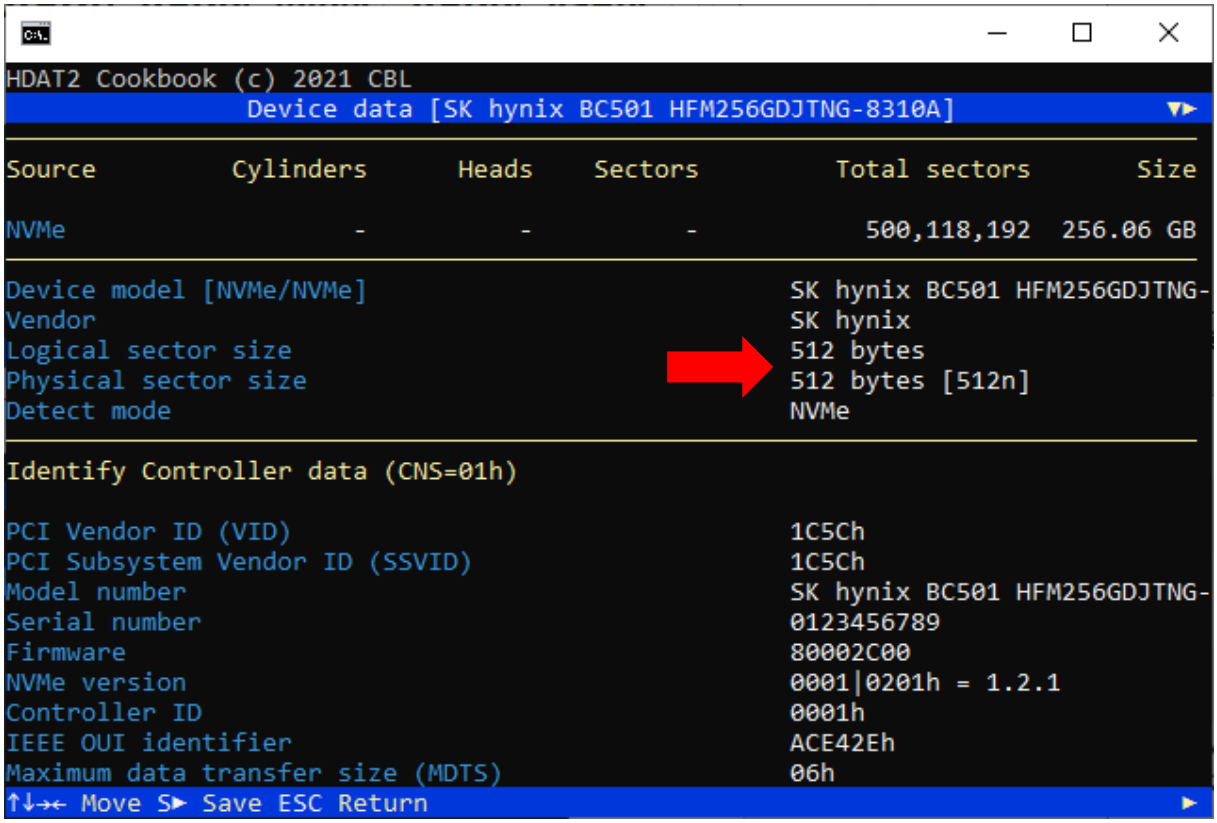


NVMe drives

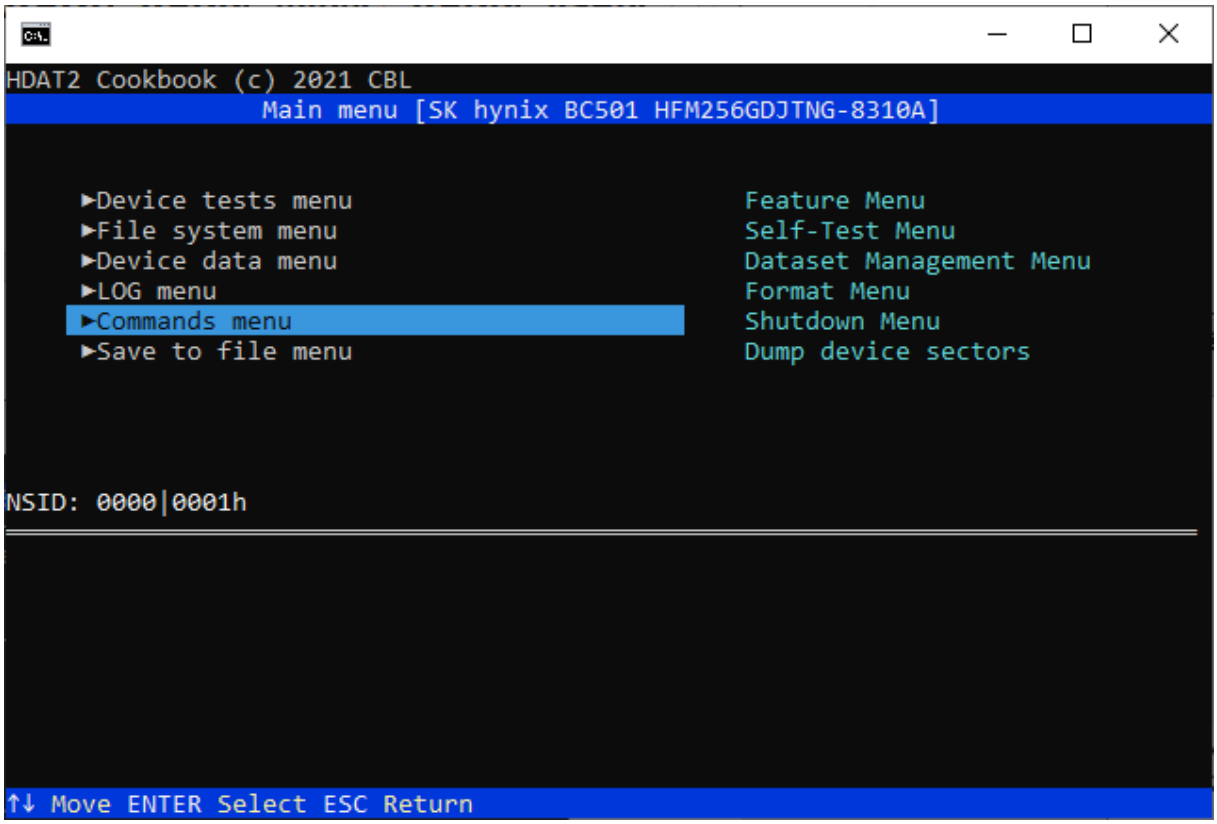
First we will display the current settings.

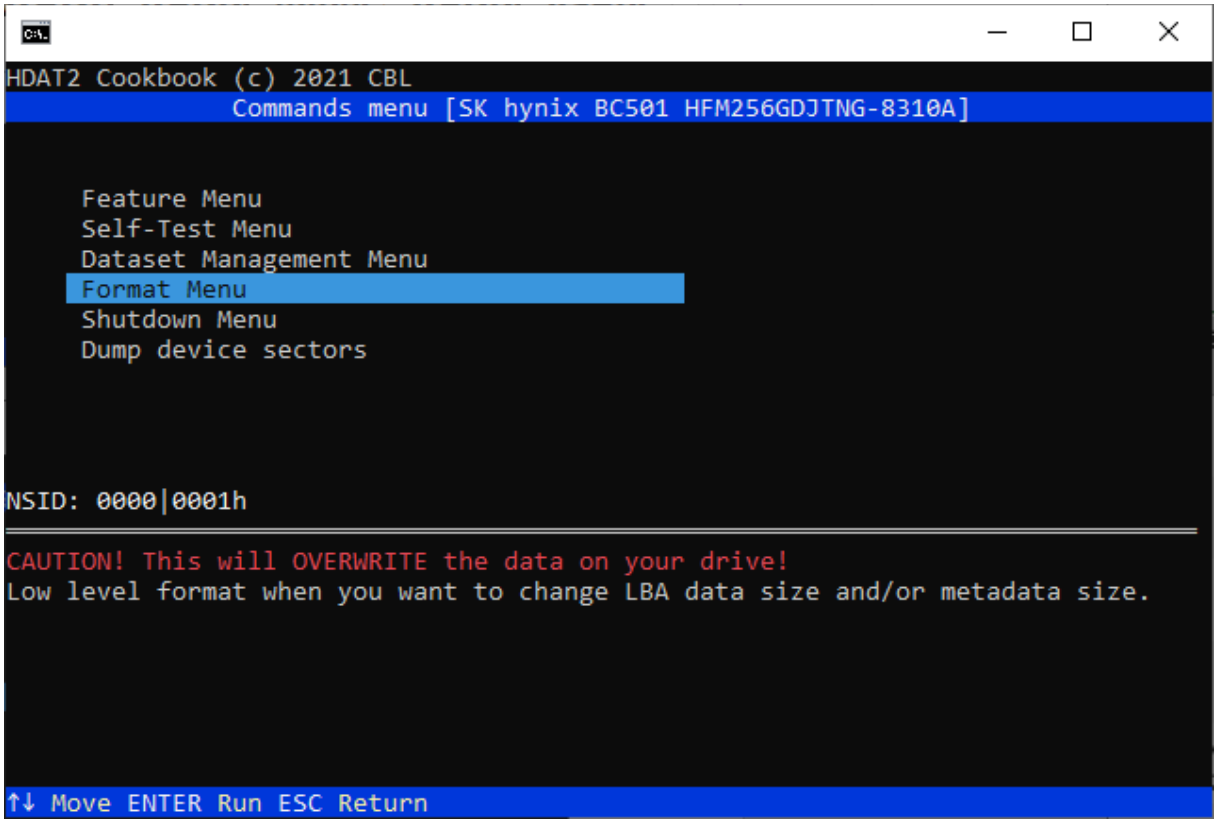

Vybrat
HDAT2 Cookbook (c) 2021 CBL
Main menu [SK hynix BC501 HFM256GDJTNG-8310A]
►Device tests menu
►File system menu
►Device data menu
►LOG menu
►Commands menu
►Save to file menu
Device data
PCI controller data
PCI NVMe Registers
Dump Namespace Identify
Dump Controller Identify
NSID: 0000|0001h
↑↓ Move ENTER Select ESC Return

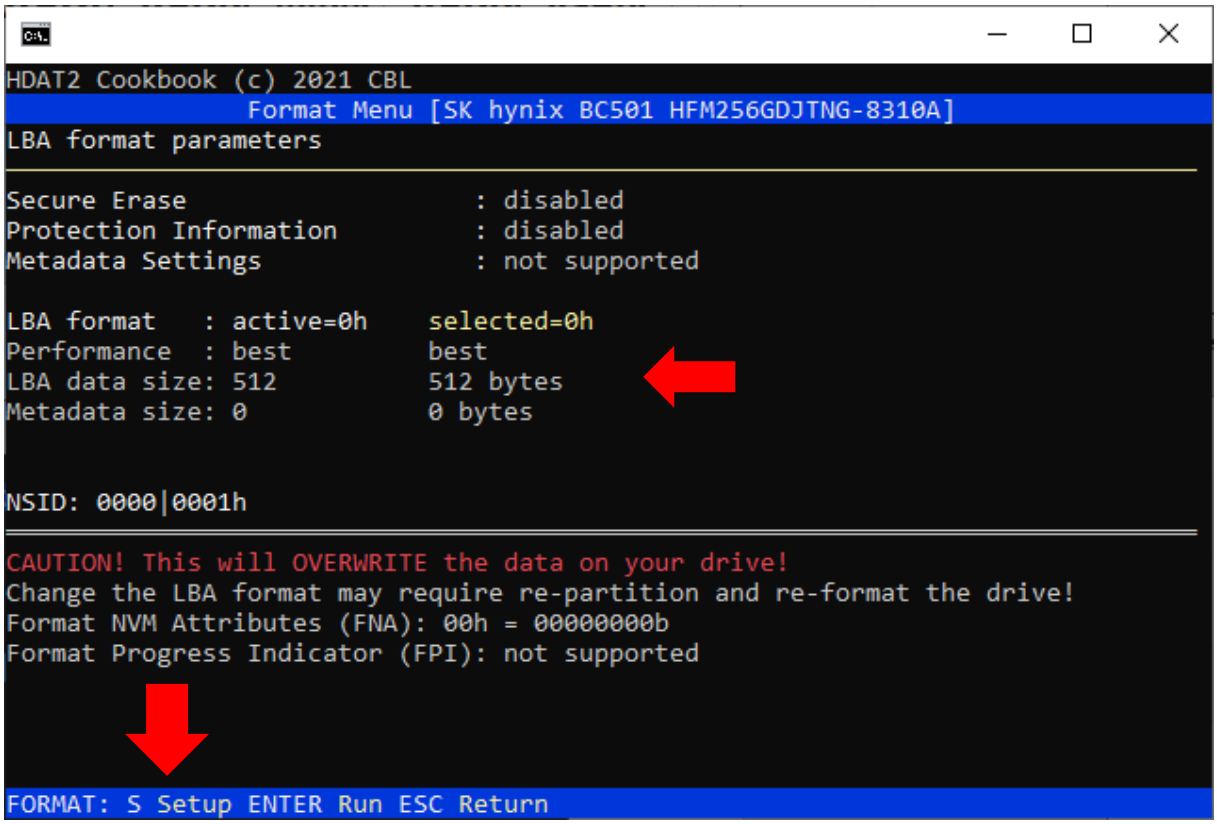

HDAT2 Cookbook (c) 2021 CBL
Device data menu [SK hynix BC501 HFM256GDJTNG-8310A]
Device data
PCI controller data
PCI NVMe Registers
Dump Namespace Identify
Dump Controller Identify
NSID: 0000|0001h
Data about the device.
↑↓ Move S Setup ENTER Run ESC Return



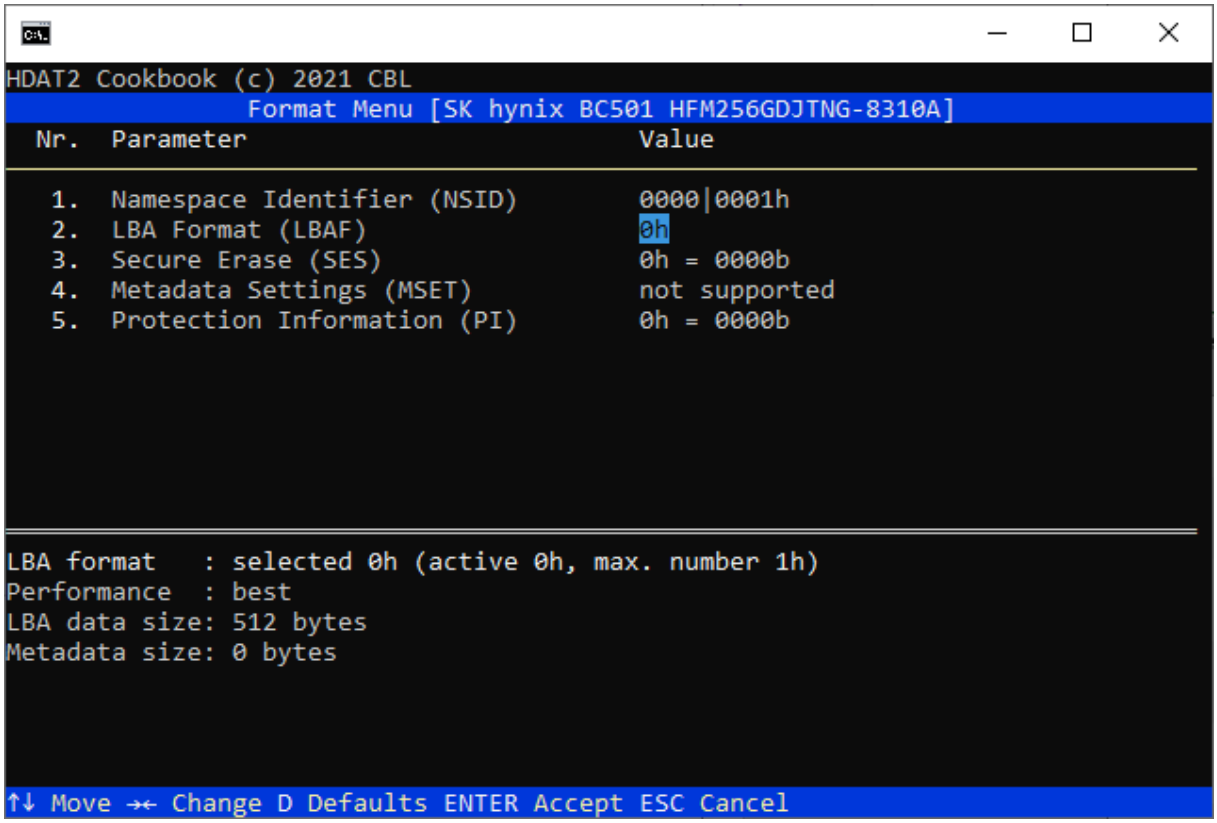
Now we change the sector size from 512 to 4096 bytes.

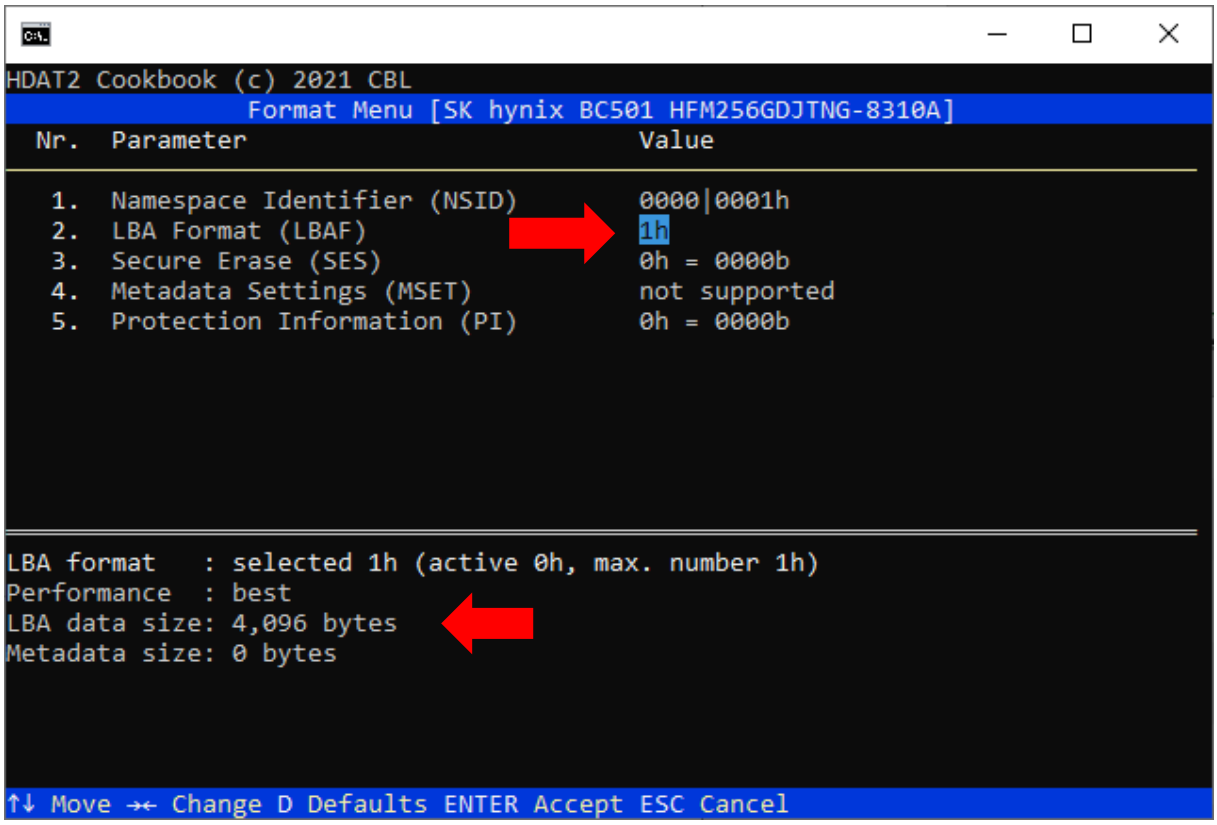


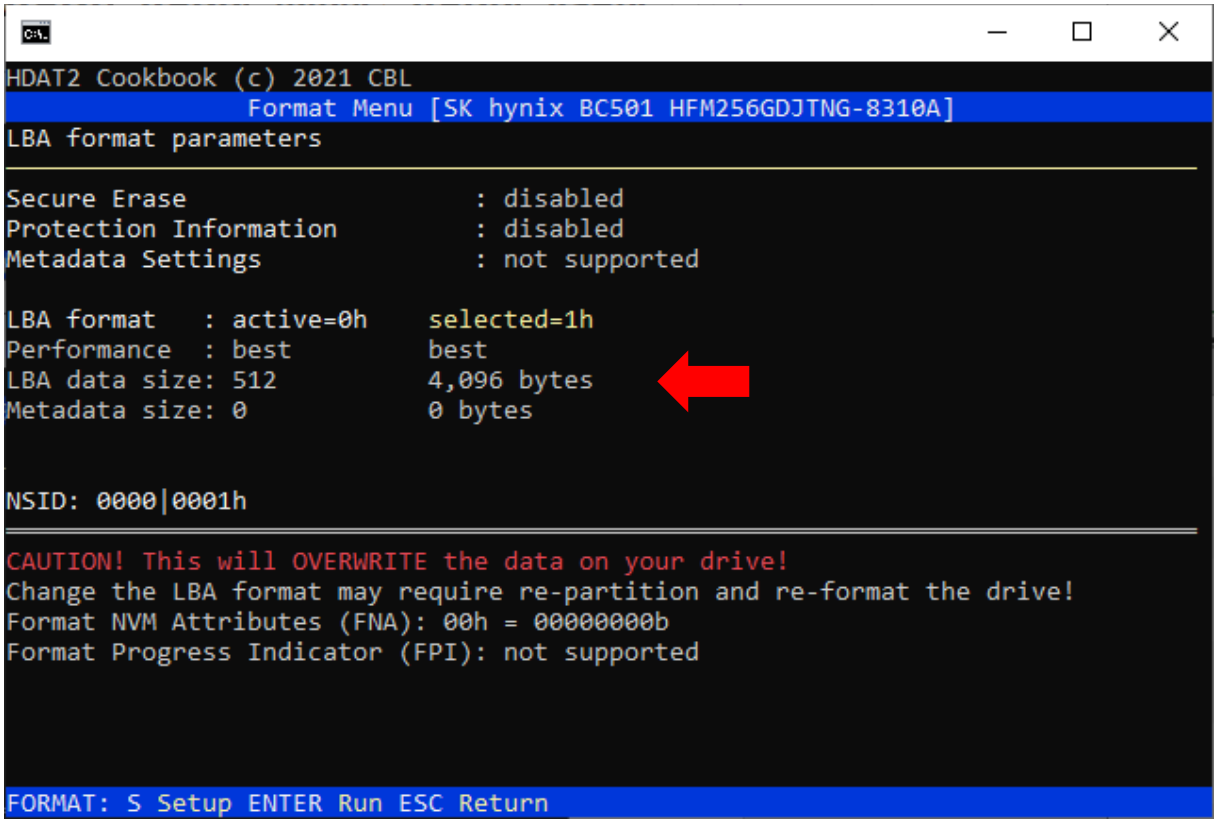


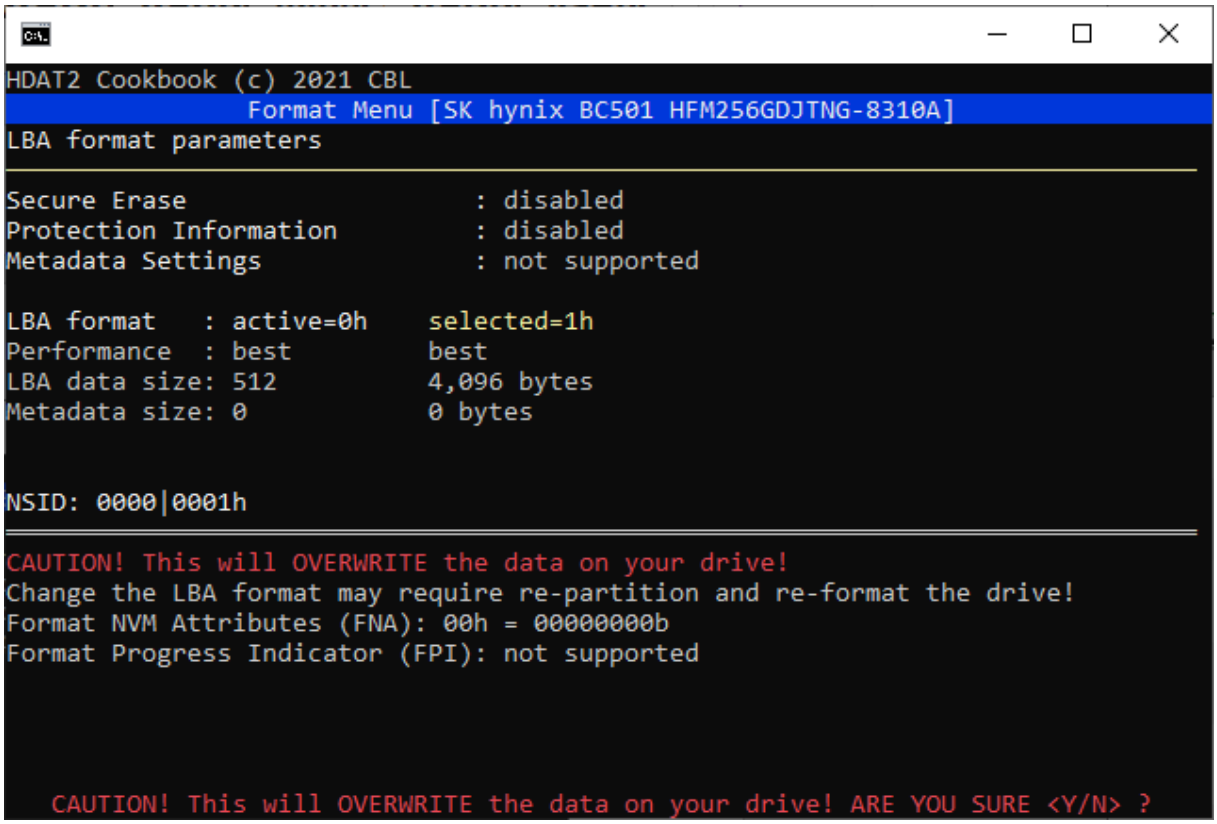


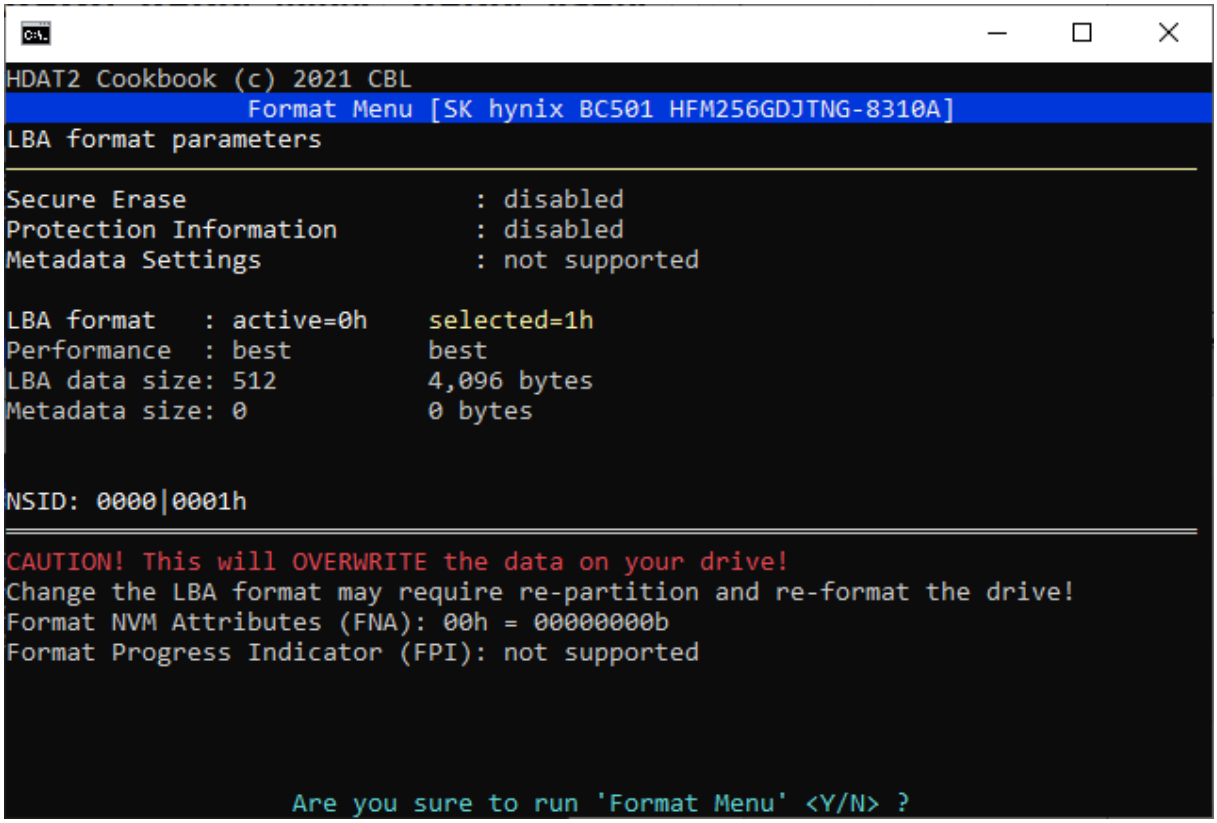
Press a key 'S' for setup and select the parameter 'LBA Format (LBAF)' to another LBA data size, if supported.

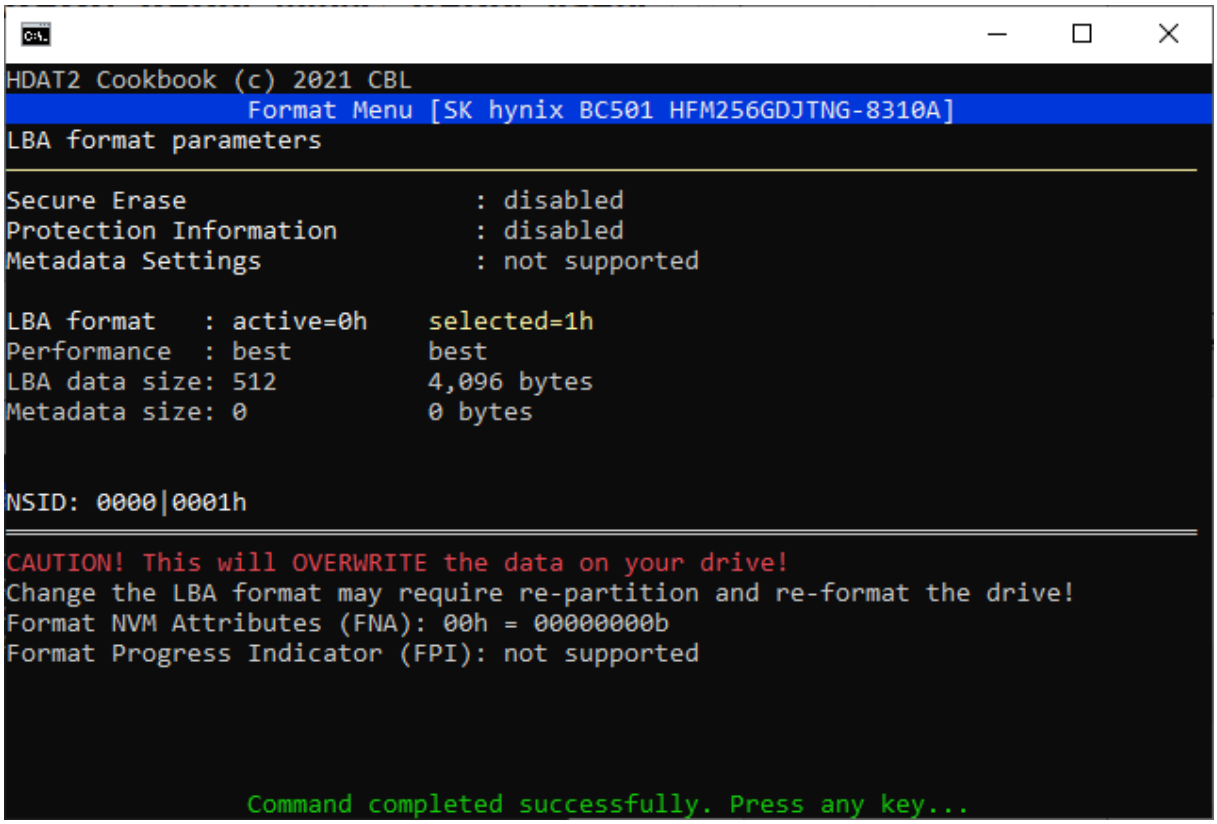

HDAT2 Cookbook (c) 2021 CBL
Format Menu [SK hynix BC501 HFM256GDJTNG-8310A]
Nr. Parameter Value
1. Namespace Identifier (NSID) 0000|0001h
2. LBA Format (LBAF) 0h
3. Secure Erase (SES) 0h = 0000b
4. Metadata Settings (MSET) not supported
5. Protection Information (PI) 0h = 0000b
LBA format : selected 0h (active 0h, max. number 1h)
Performance : best
LBA data size: 512 bytes
Metadata size: 0 bytes
↑↓ Move ↠ Change D Defaults ENTER Accept ESC Cancel

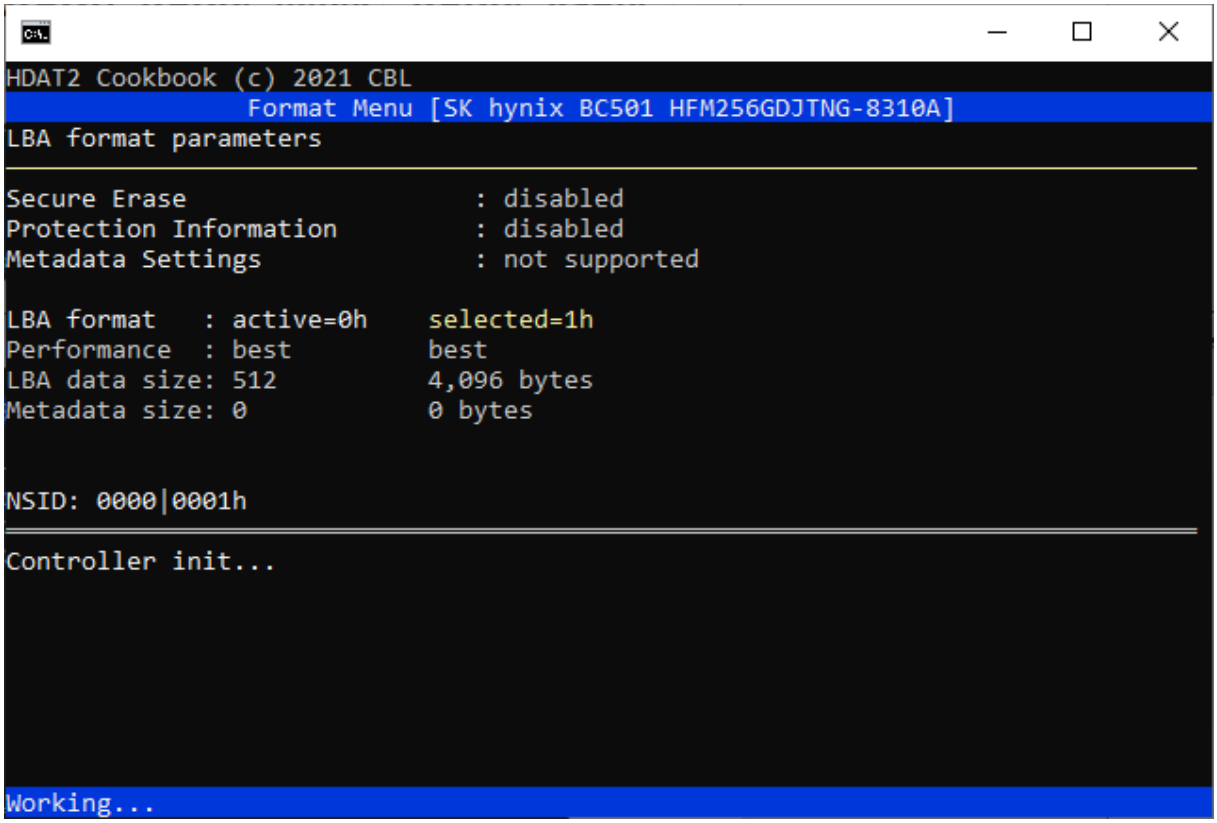

HDAT2 Cookbook (c) 2021 CBL
Format Menu [SK hynix BC501 HFM256GDJTNG-8310A]
Nr. Parameter Value
1. Namespace Identifier (NSID) 0000|0001h
2. LBA Format (LBAF) 1h
3. Secure Erase (SES) 0h = 0000b
4. Metadata Settings (MSET) not supported
5. Protection Information (PI) 0h = 0000b
LBA format : selected 1h (active 0h, max. number 1h)
Performance : best
LBA data size: 4,096 bytes
Metadata size: 0 bytes
↑↓ Move ↠ Change D Defaults ENTER Accept ESC Cancel

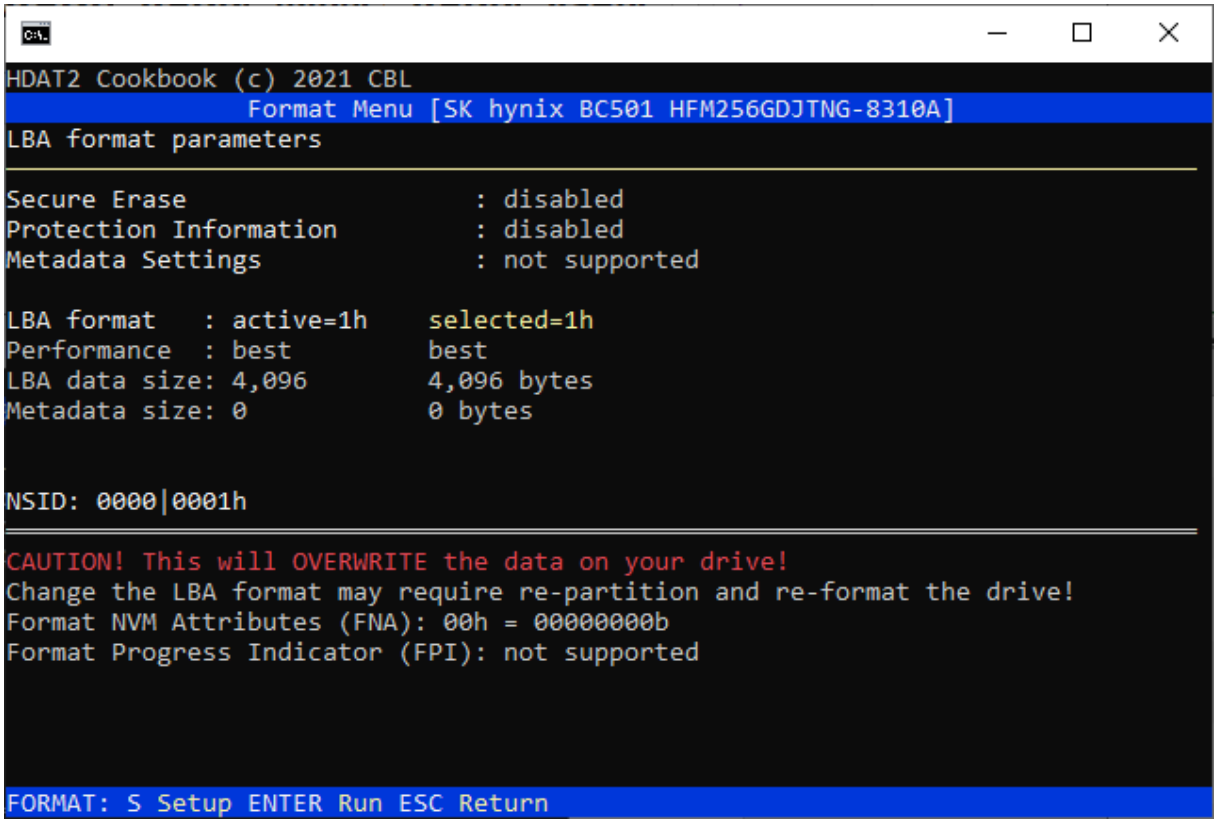

HDAT2 Cookbook (c) 2021 CBL
Format Menu [SK hynix BC501 HFM256GDJTNG-8310A]
LBA format parameters
Secure Erase : disabled
Protection Information : disabled
Metadata Settings : not supported
LBA format : active=0h selected=1h
Performance : best best
LBA data size: 512 4,096 bytes
Metadata size: 0 0 bytes
NSID: 0000|0001h
CAUTION! This will OVERWRITE the data on your drive!
Change the LBA format may require re-partition and re-format the drive!
Format NVM Attributes (FNA): 00h = 00000000b
Format Progress Indicator (FPI): not supported
FORMAT: S Setup ENTER Run ESC Return


HDAT2 Cookbook (c) 2021 CBL
Format Menu [SK hynix BC501 HFM256GDJTNG-8310A]
LBA format parameters
Secure Erase : disabled
Protection Information : disabled
Metadata Settings : not supported
LBA format : active=0h selected=1h
Performance : best best
LBA data size: 512 4,096 bytes
Metadata size: 0 0 bytes
NSID: 0000|0001h
CAUTION! This will OVERWRITE the data on your drive!
Change the LBA format may require re-partition and re-format the drive!
Format NVM Attributes (FNA): 00h = 00000000b
Format Progress Indicator (FPI): not supported
CAUTION! This will OVERWRITE the data on your drive! ARE YOU SURE <Y/N> ?

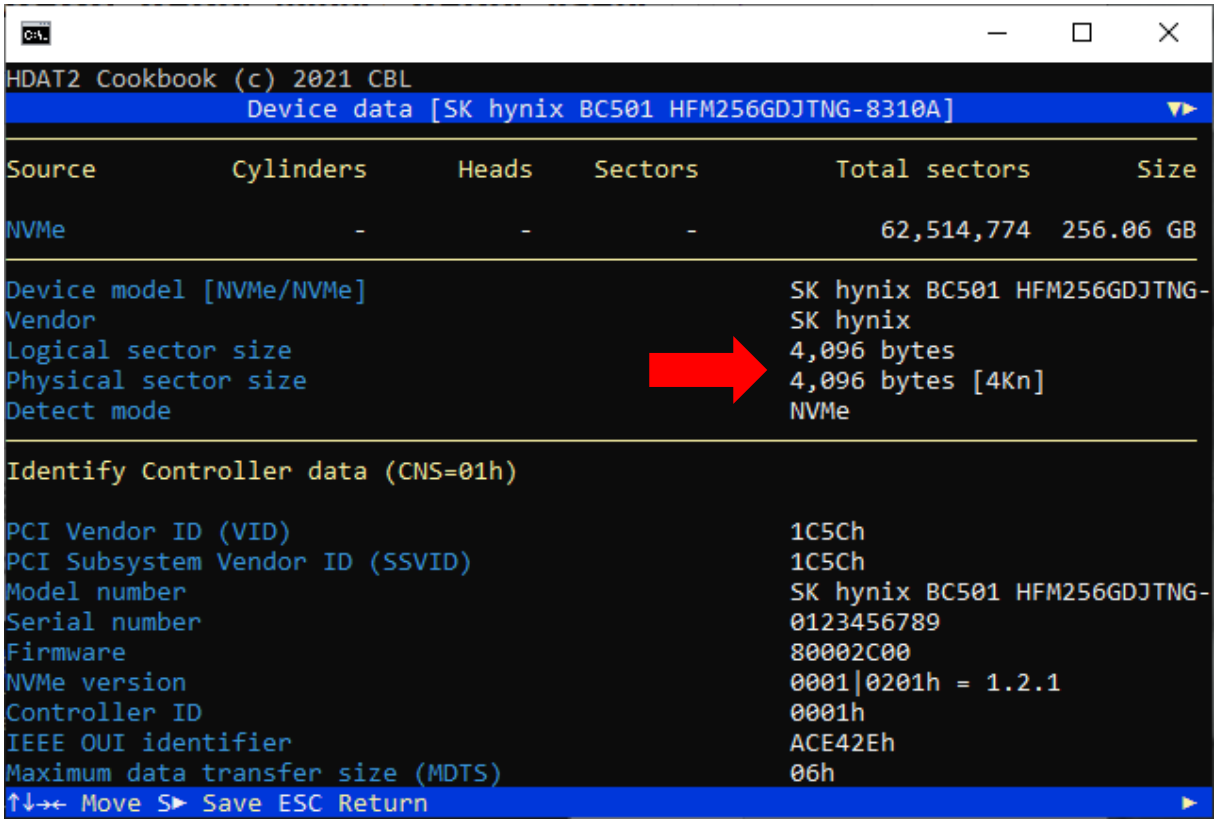

HDAT2 Cookbook (c) 2021 CBL
Format Menu [SK hynix BC501 HFM256GDJTNG-8310A]
LBA format parameters
Secure Erase : disabled
Protection Information : disabled
Metadata Settings : not supported
LBA format : active=0h selected=1h
Performance : best best
LBA data size: 512 4,096 bytes
Metadata size: 0 0 bytes
NSID: 0000|0001h
CAUTION! This will OVERWRITE the data on your drive!
Change the LBA format may require re-partition and re-format the drive!
Format NVM Attributes (FNA): 00h = 00000000b
Format Progress Indicator (FPI): not supported
Are you sure to run 'Format Menu' <Y/N> ?


HDAT2 Cookbook (c) 2021 CBL
Format Menu [SK hynix BC501 HFM256GDJTNG-8310A]
LBA format parameters
Secure Erase : disabled
Protection Information : disabled
Metadata Settings : not supported
LBA format : active=0h selected=1h
Performance : best best
LBA data size: 512 4,096 bytes
Metadata size: 0 0 bytes
NSID: 0000|0001h
CAUTION! This will OVERWRITE the data on your drive!
Change the LBA format may require re-partition and re-format the drive!
Format NVM Attributes (FNA): 00h = 00000000b
Format Progress Indicator (FPI): not supported
Command completed successfully. Press any key...





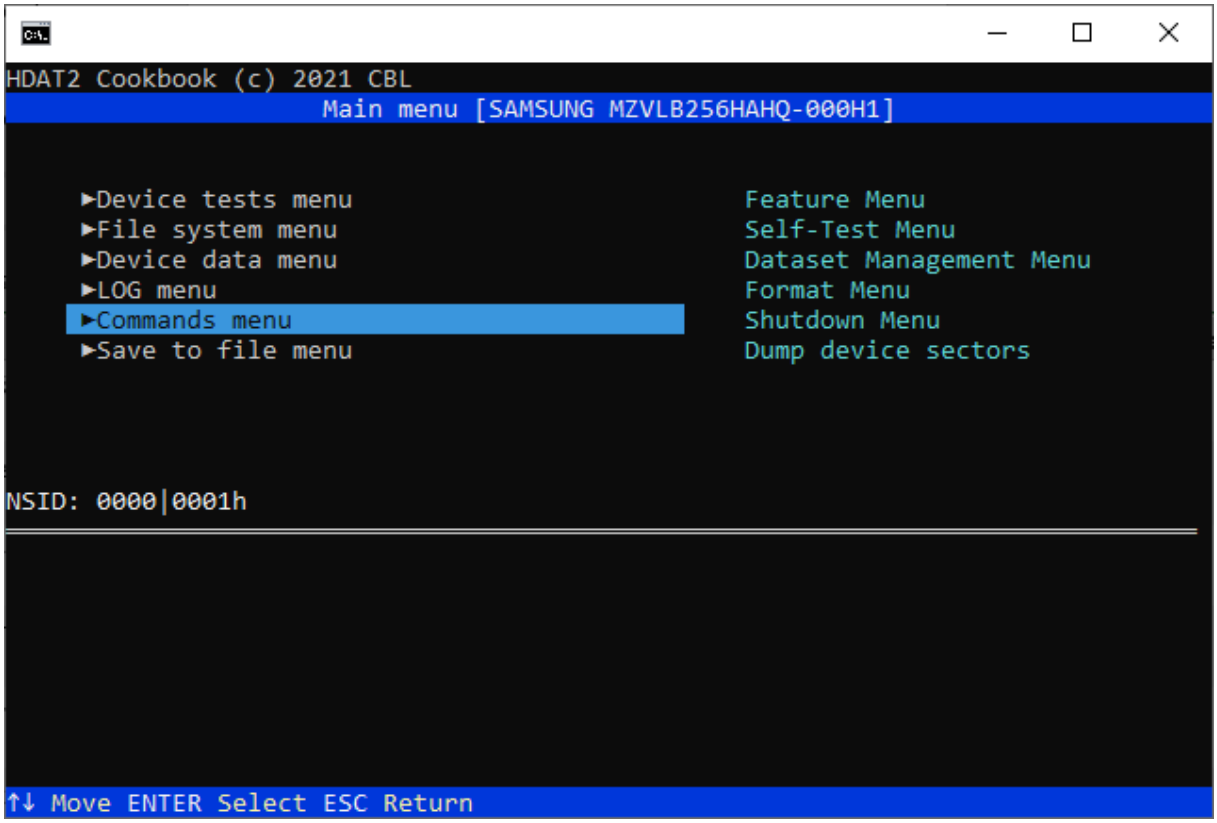
Now we list the new current settings.

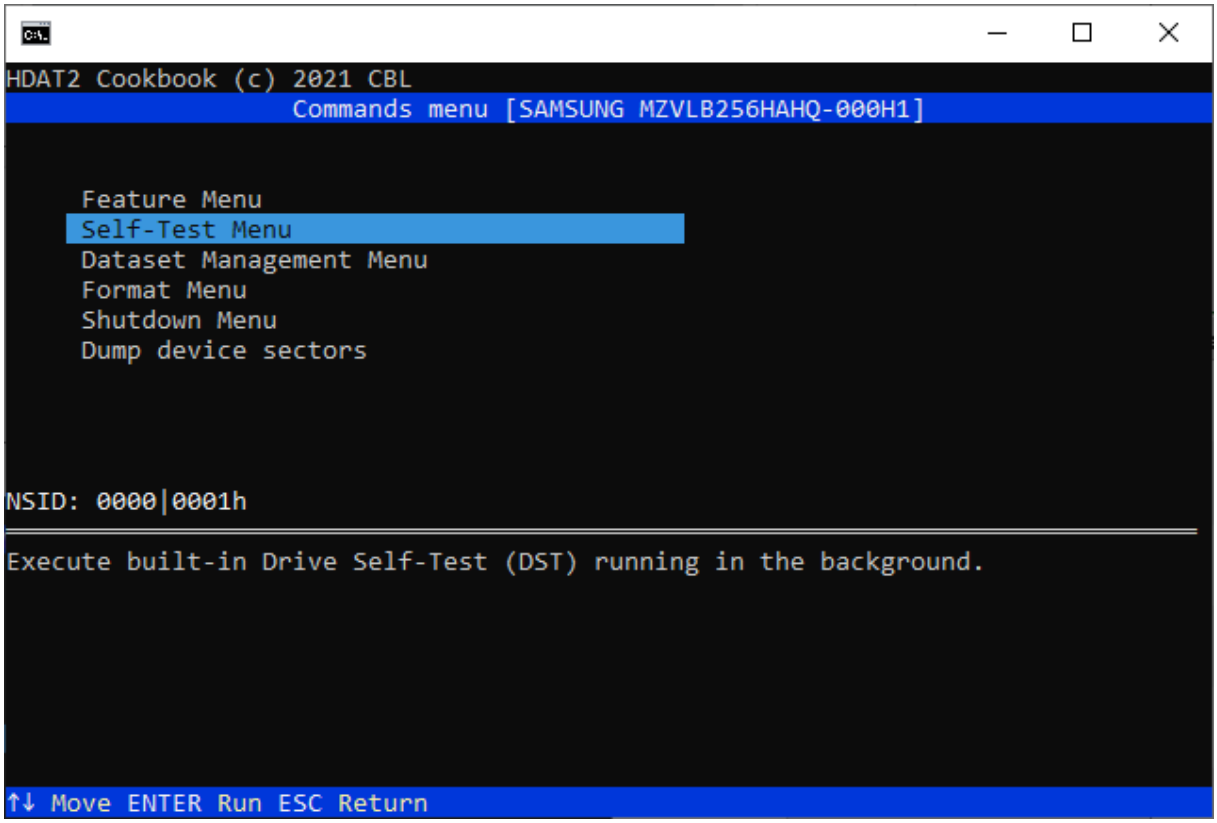

HDAT2 Cookbook (c) 2021 CBL
Device data [SK hynix BC501 HFM256GDJTNG-8310A]
Source Cylinders Heads Sectors Total sectors Size
NVMe - - - 62,514,774 256.06 GB
Device model [NVMe/NVMe] SK hynix BC501 HFM256GDJTNG-
Vendor SK hynix
Logical sector size 4,096 bytes
Physical sector size 4,096 bytes [4Kn]
Detect mode NVMe
Identify Controller data (CNS=01h)
PCI Vendor ID (VID) 1C5Ch
PCI Subsystem Vendor ID (SSVID) 1C5Ch
Model number SK hynix BC501 HFM256GDJTNG-
Serial number 0123456789
Firmware 80002C00
NVMe version 0001|0201h = 1.2.1
Controller ID 0001h
IEEE OUI identifier ACE42Eh
Maximum data transfer size (MDTS) 06h
↑↓→← Move S► Save ESC Return

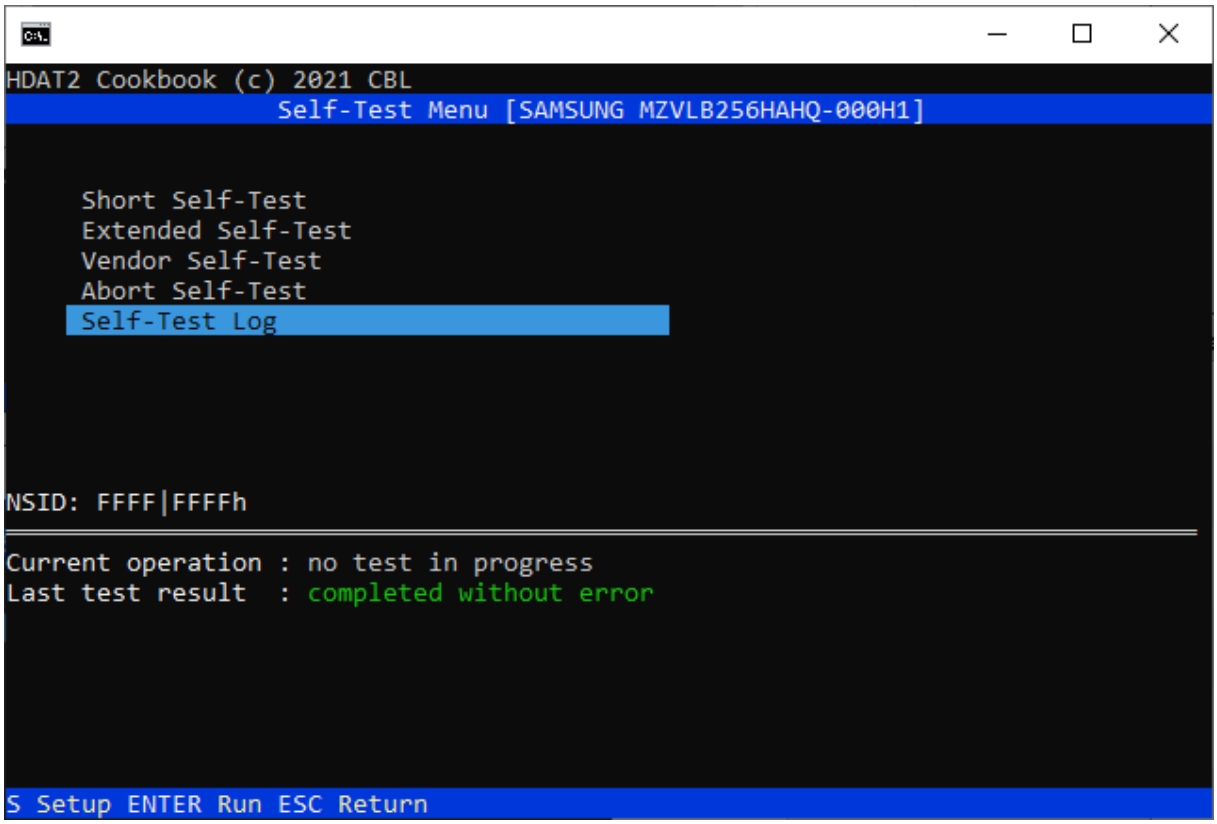
SMART

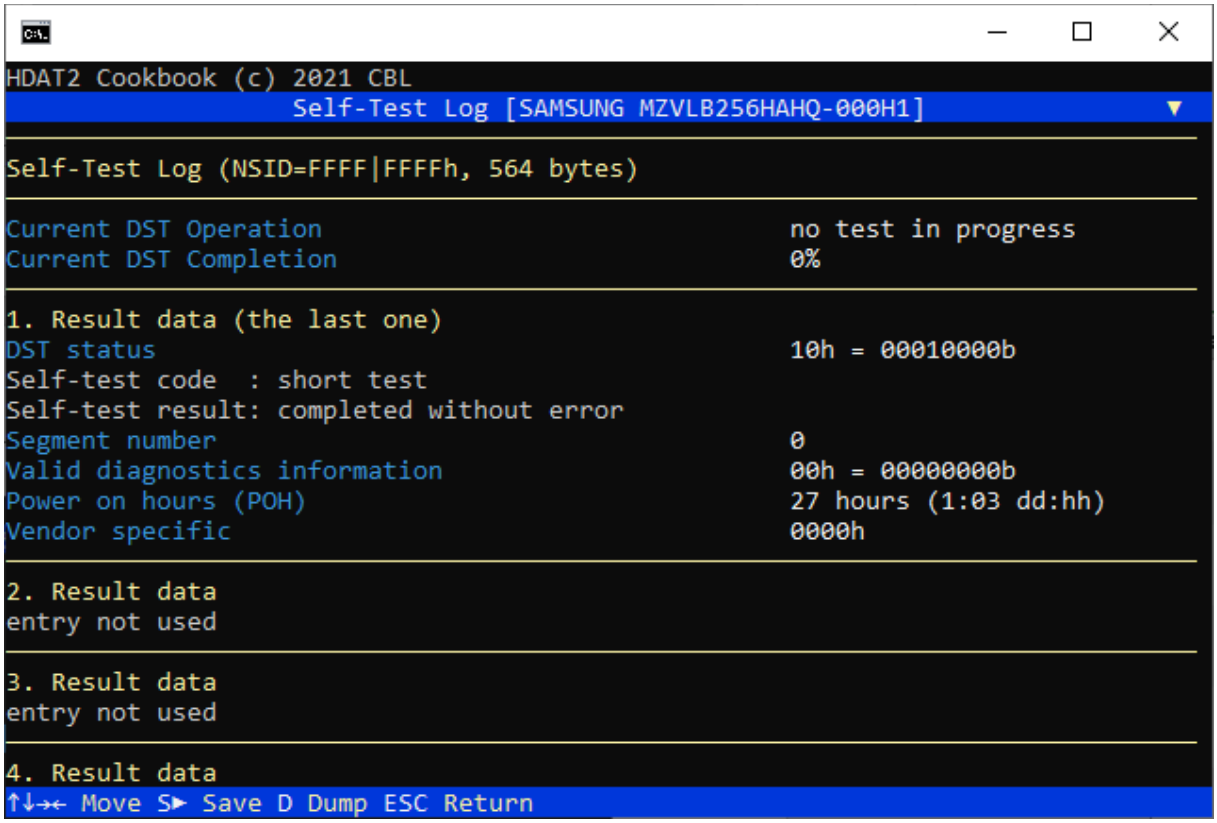
SMART self-tests

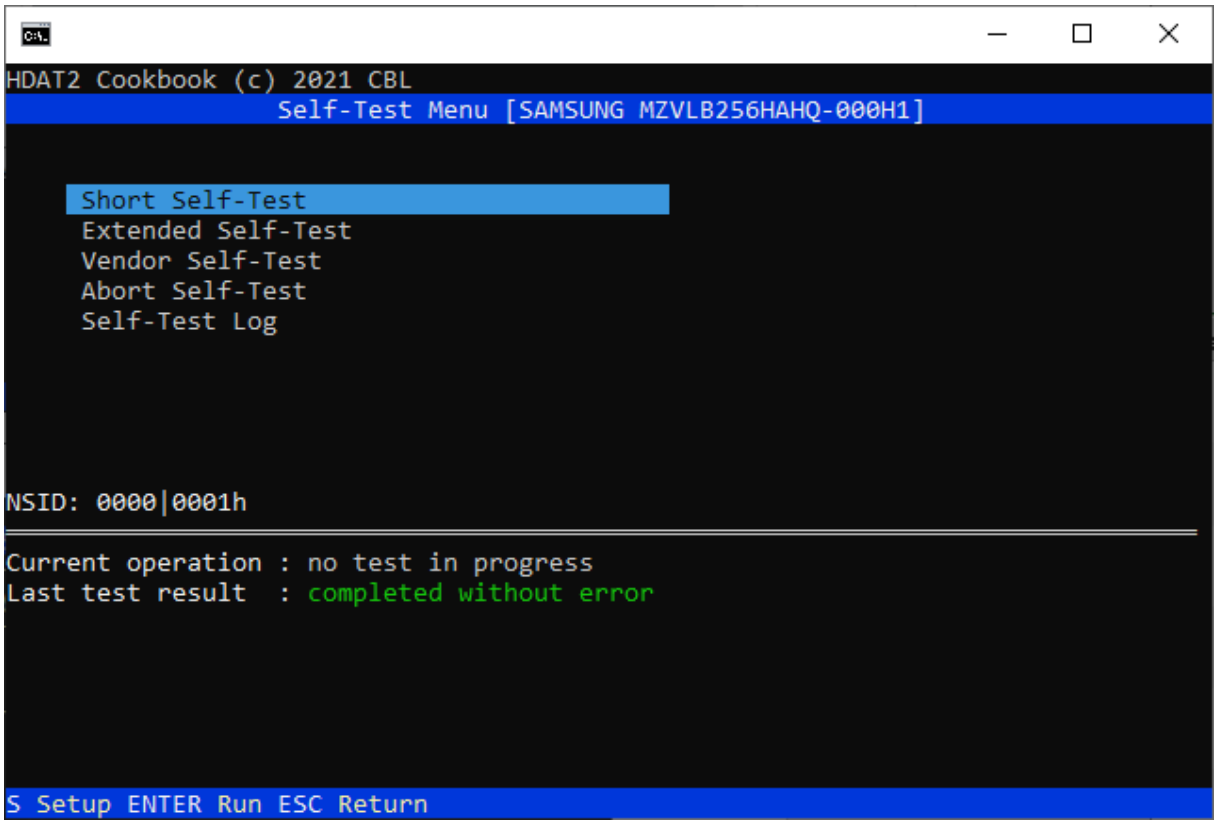
NVMe self-test

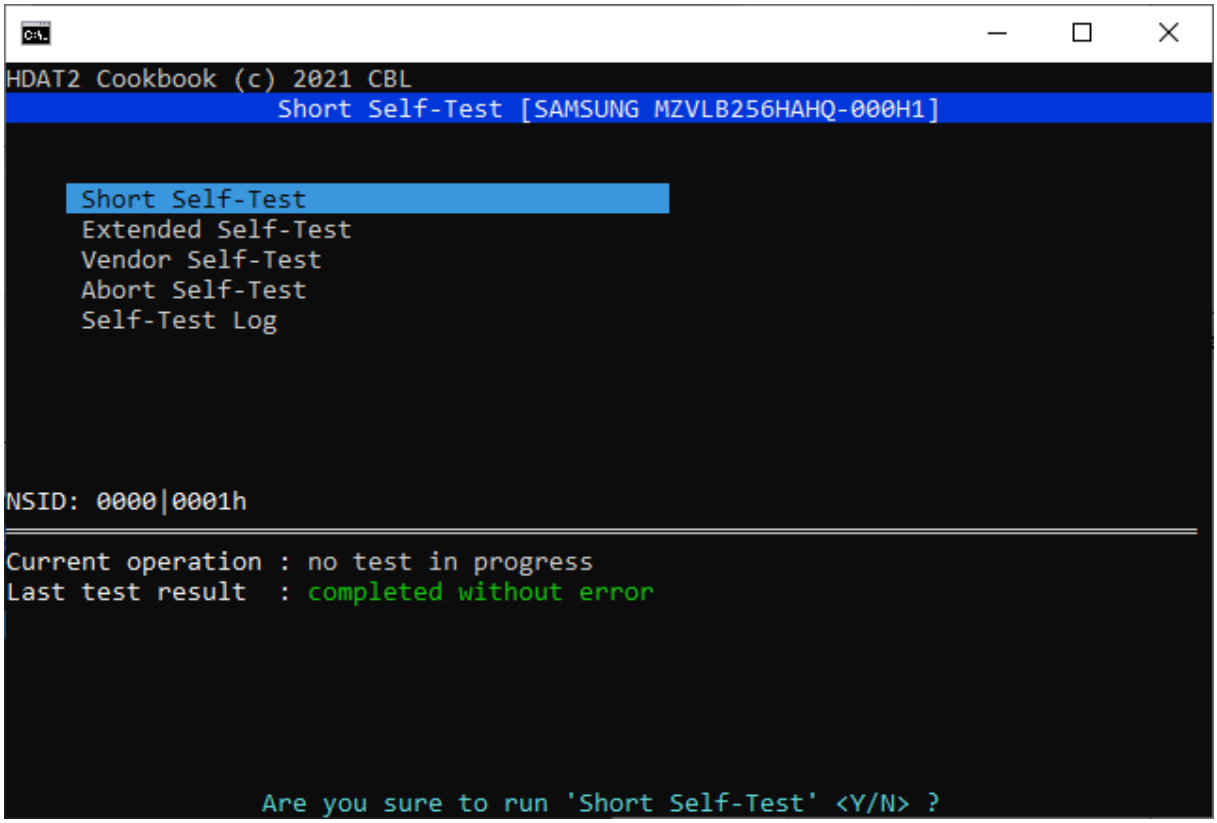


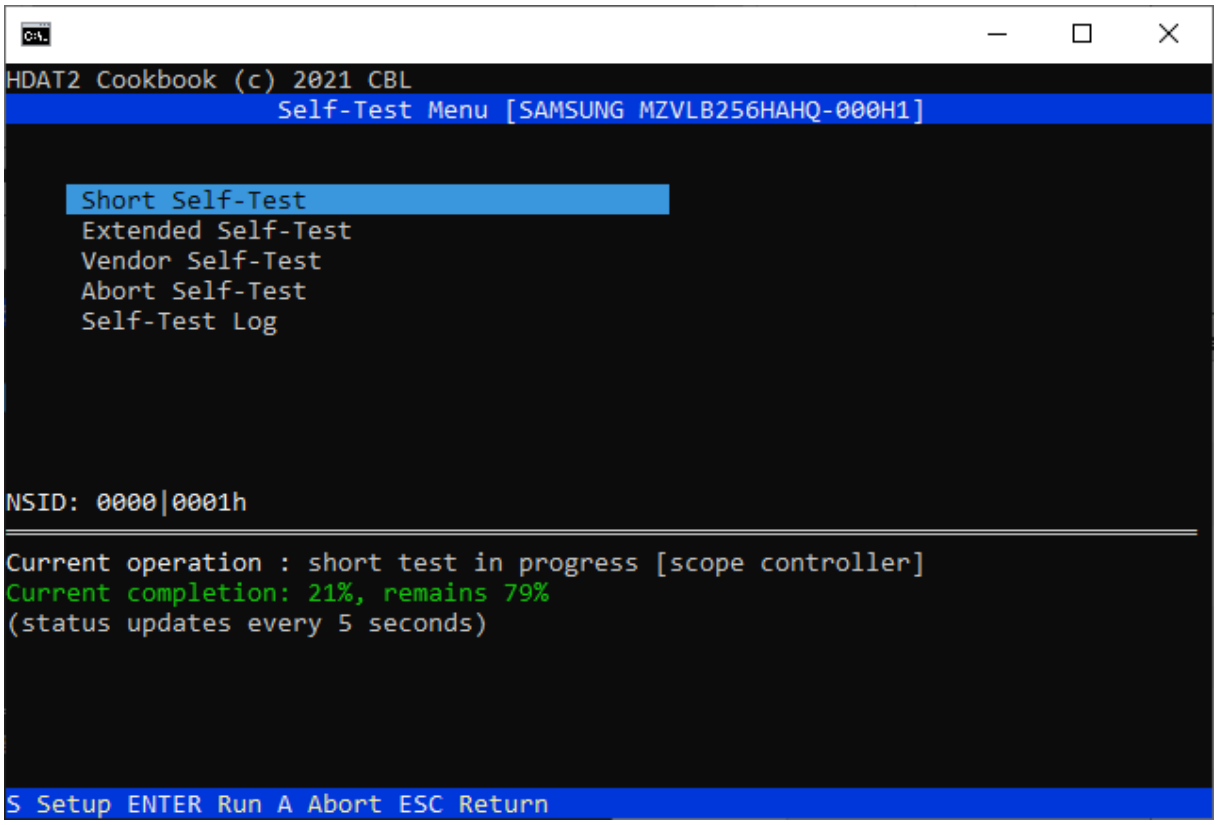

HDAT2 Cookbook (c) 2021 CBL
Commands menu [SAMSUNG MZVLB256HAHQ-000H1]
Feature Menu
Self-Test Menu
Dataset Management Menu
Format Menu
Shutdown Menu
Dump device sectors
NSID: 0000|0001h
Execute built-in Drive Self-Test (DST) running in the background.
↑↓ Move ENTER Run ESC Return

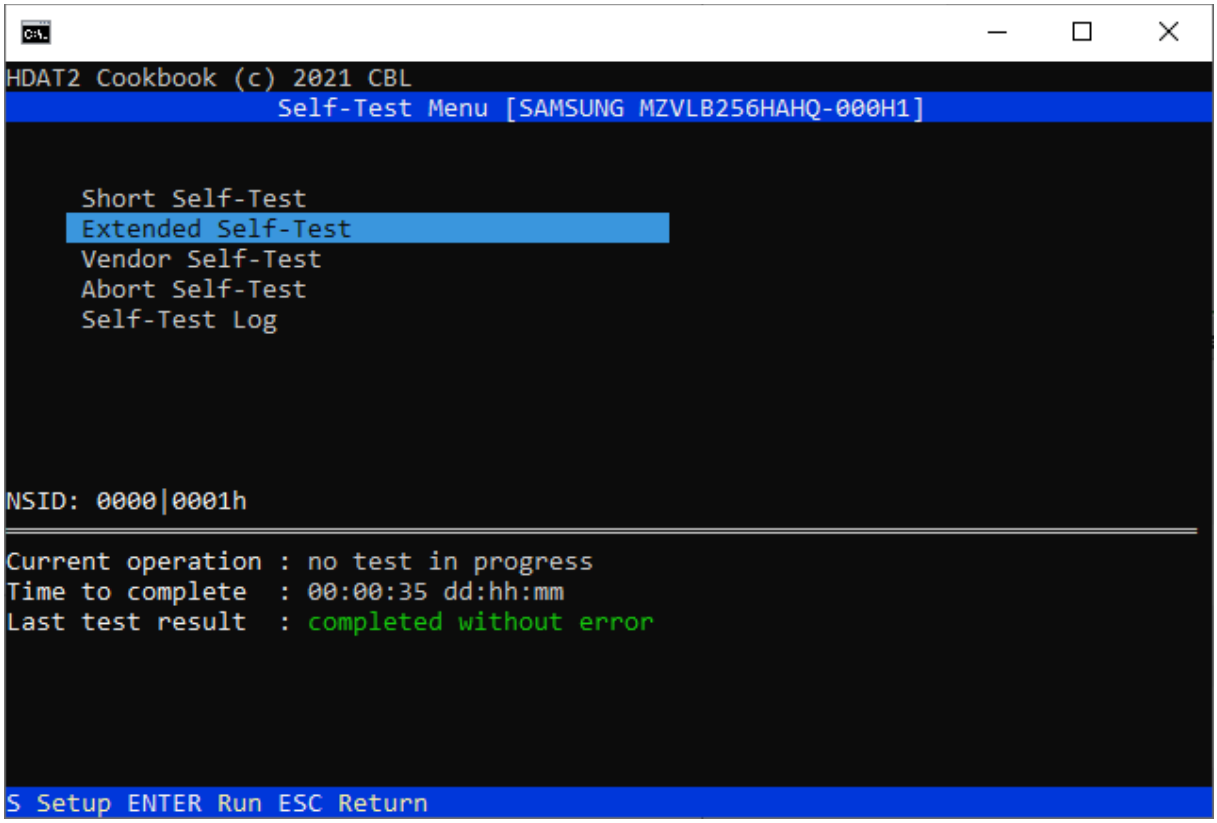

HDAT2 Cookbook (c) 2021 CBL
Self-Test Menu [SAMSUNG MZVLB256HAHQ-000H1]
Short Self-Test
Extended Self-Test
Vendor Self-Test
Abort Self-Test
Self-Test Log
NSID: FFFF|FFFFh
Current operation : no test in progress
Last test result : completed without error
S Setup ENTER Run ESC Return

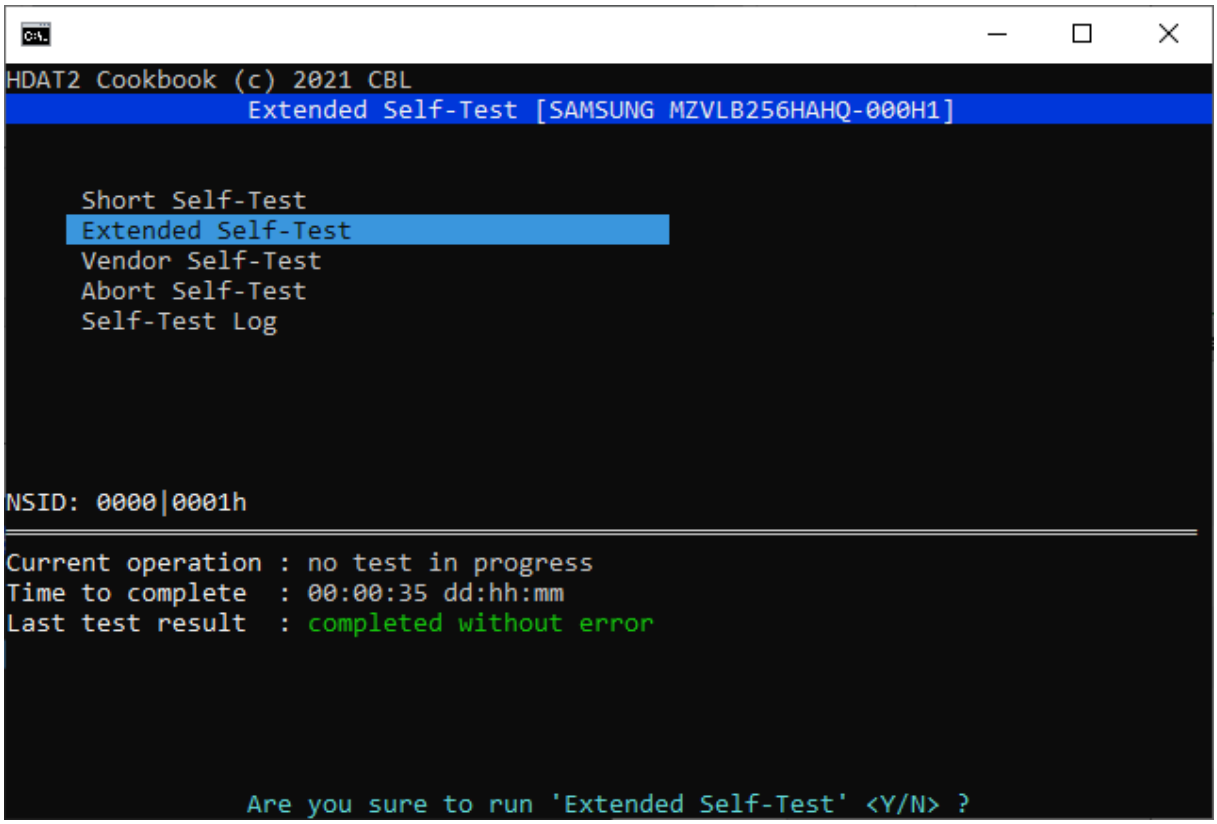

HDAT2 Cookbook (c) 2021 CBL
Self-Test Log [SAMSUNG MZVLB256HAHQ-000H1]
Self-Test Log (NSID=FFFF|FFFFh, 564 bytes)
Current DST Operation
no test in progress
Current DST Completion
0%
1. Result data (the last one)
DST status
10h = 00010000b
Self-test code : short test
Self-test result: completed without error
Segment number
0
Valid diagnostics information
00h = 00000000b
Power on hours (POH)
27 hours (1:03 dd:hh)
Vendor specific
0000h
2. Result data
entry not used
3. Result data
entry not used
4. Result data
↑↓→← Move S► Save D Dump ESC Return

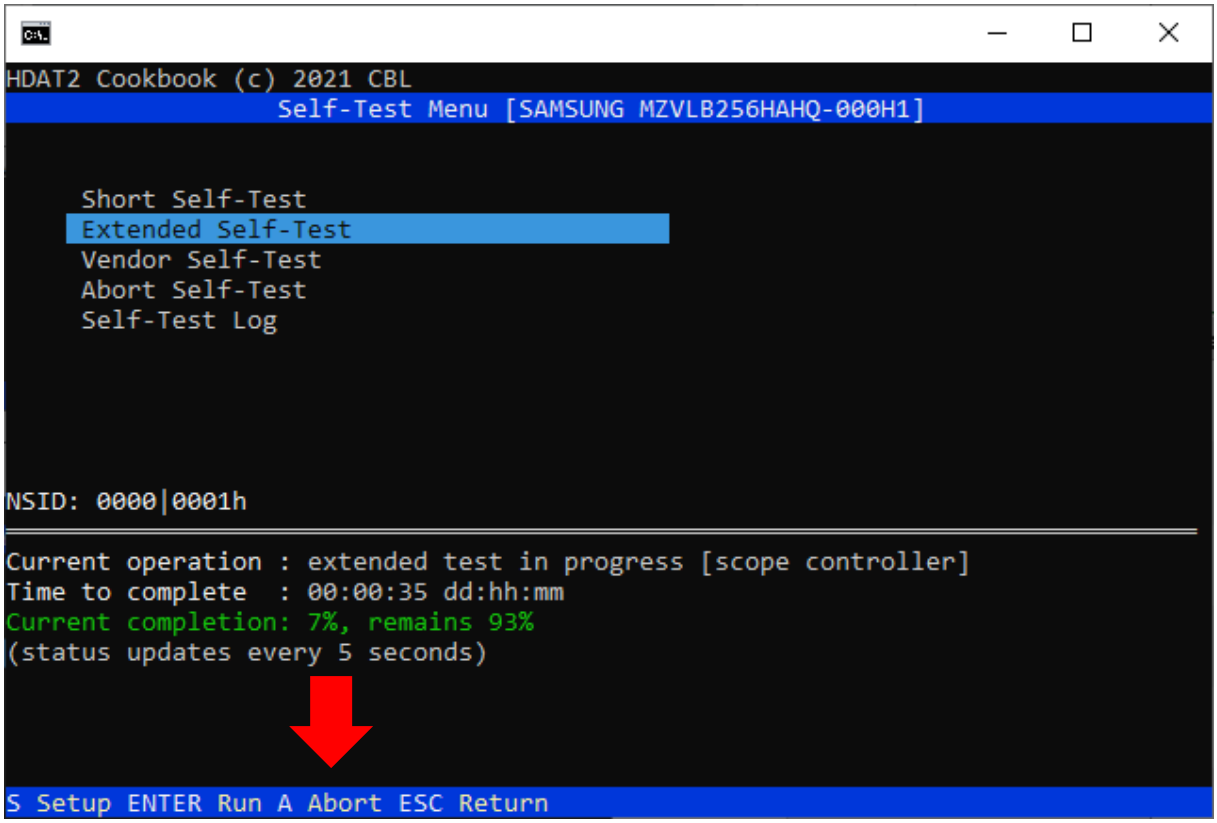

HDAT2 Cookbook (c) 2021 CBL
Self-Test Menu [SAMSUNG MZVLB256HAHQ-000H1]
Short Self-Test
Extended Self-Test
Vendor Self-Test
Abort Self-Test
Self-Test Log
NSID: 0000|0001h
Current operation : no test in progress
Last test result : completed without error
S Setup ENTER Run ESC Return


HDAT2 Cookbook (c) 2021 CBL
Short Self-Test [SAMSUNG MZVLB256HAHQ-000H1]
Short Self-Test
Extended Self-Test
Vendor Self-Test
Abort Self-Test
Self-Test Log
NSID: 0000|0001h
Current operation : no test in progress
Last test result : completed without error
Are you sure to run 'Short Self-Test' <Y/N> ?

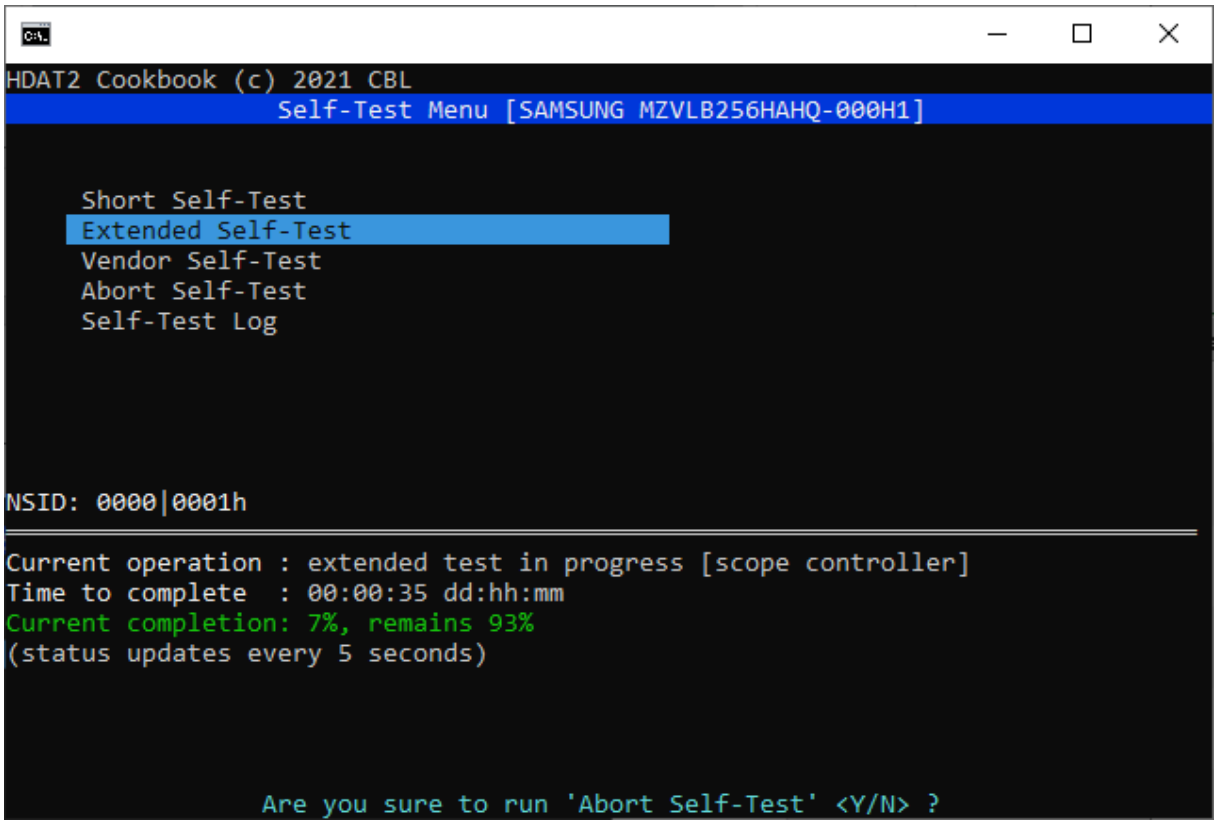

HDAT2 Cookbook (c) 2021 CBL
Self-Test Menu [SAMSUNG MZVLB256HAHQ-000H1]
Short Self-Test
Extended Self-Test
Vendor Self-Test
Abort Self-Test
Self-Test Log
NSID: 0000|0001h
Current operation : short test in progress [scope controller]
Current completion: 21%, remains 79%
(status updates every 5 seconds)
S Setup ENTER Run A Abort ESC Return

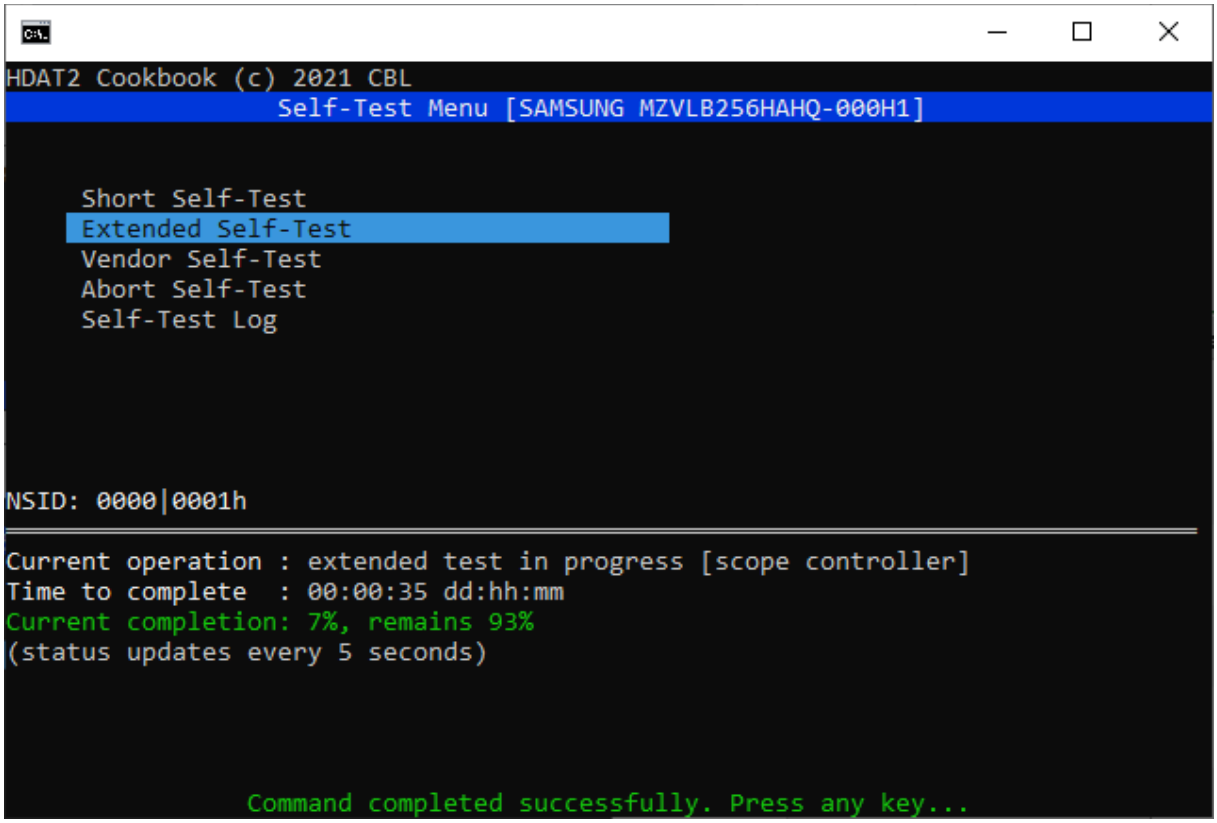

HDAT2 Cookbook (c) 2021 CBL
Self-Test Menu [SAMSUNG MZVLB256HAHQ-000H1]
Short Self-Test
Extended Self-Test
Vendor Self-Test
Abort Self-Test
Self-Test Log
NSID: 0000|0001h
Current operation : no test in progress
Time to complete : 00:00:35 dd:hh:mm
Last test result : completed without error
S Setup ENTER Run ESC Return

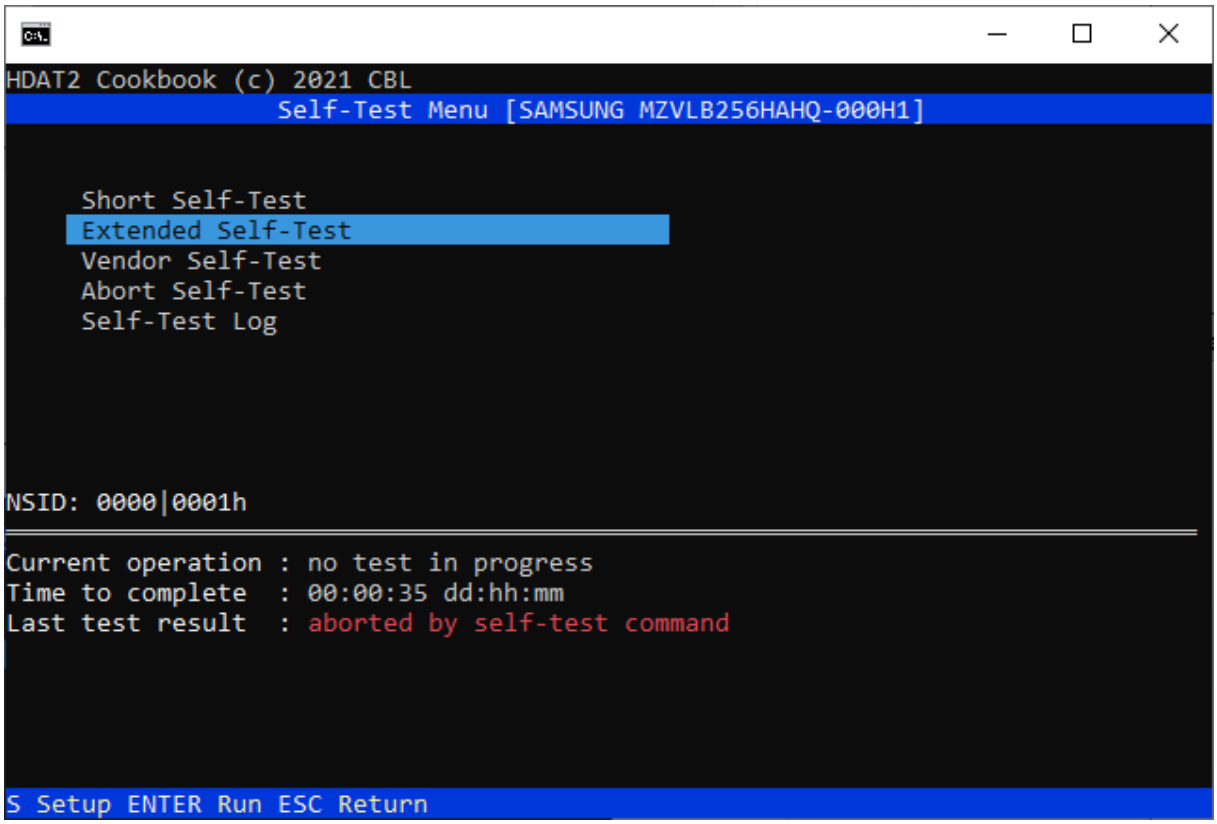

HDAT2 Cookbook (c) 2021 CBL
Extended Self-Test [SAMSUNG MZVLB256HAHQ-000H1]
Short Self-Test
Extended Self-Test
Vendor Self-Test
Abort Self-Test
Self-Test Log
NSID: 0000|0001h
Current operation : no test in progress
Time to complete : 00:00:35 dd:hh:mm
Last test result : completed without error
Are you sure to run 'Extended Self-Test' <Y/N> ?

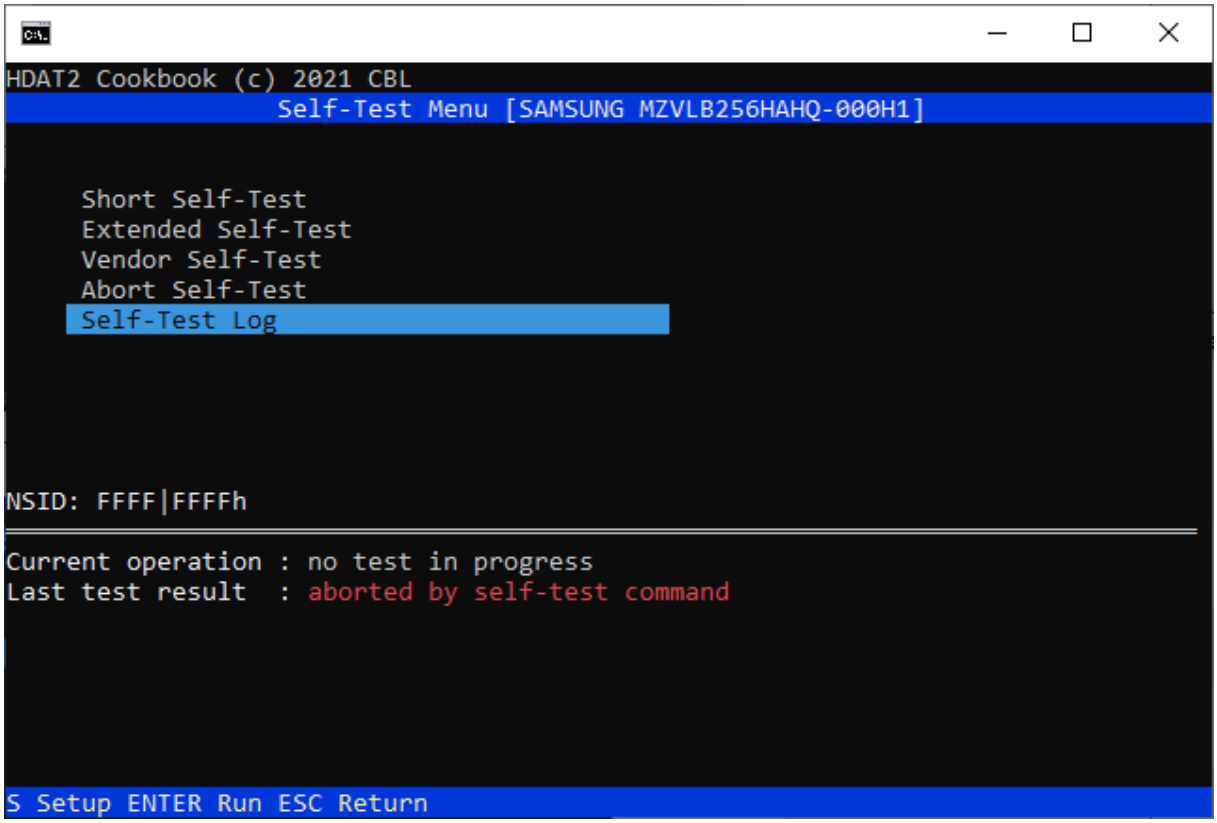


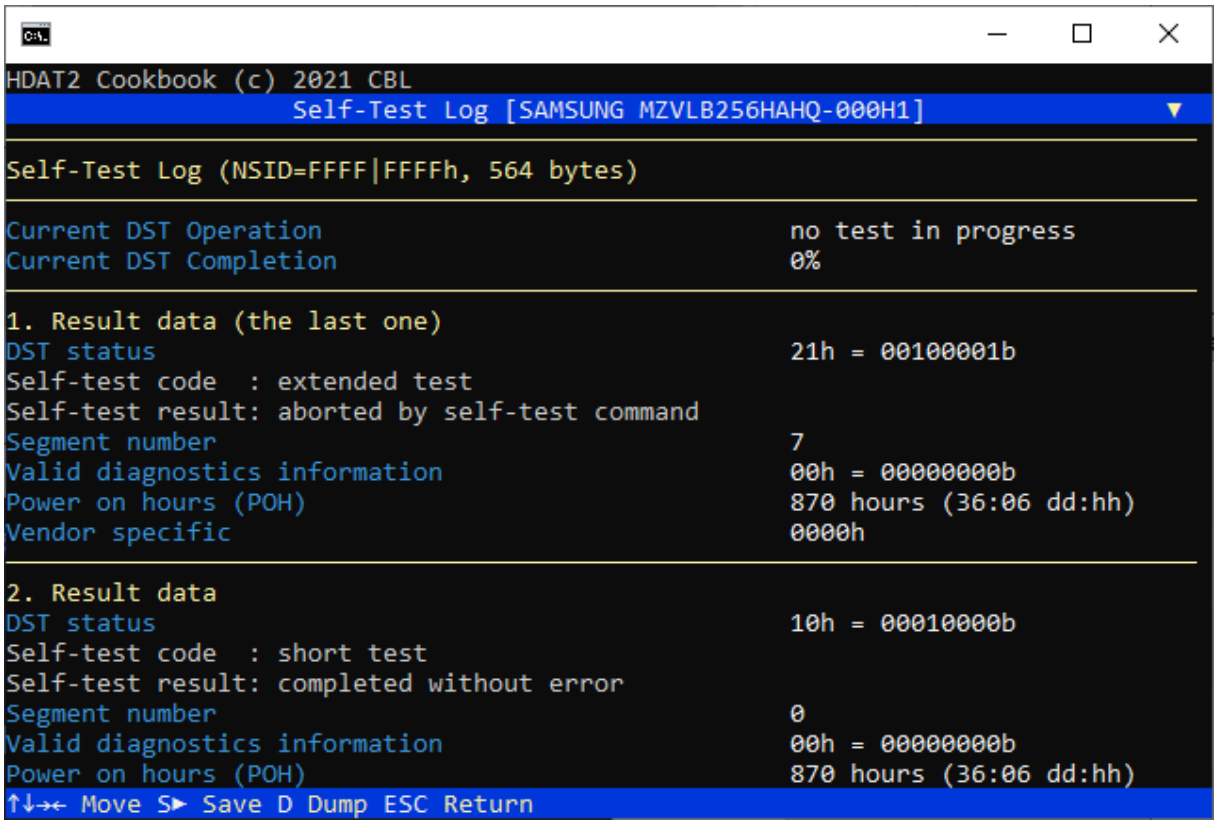
The running test can be interrupted by pressing the 'A' key.




HDAT2 Cookbook (c) 2021 CBL
Self-Test Menu [SAMSUNG MZVLB256HAHQ-000H1]
Short Self-Test
Extended Self-Test
Vendor Self-Test
Abort Self-Test
Self-Test Log
NSID: 0000|0001h
Current operation : extended test in progress [scope controller]
Time to complete : 00:00:35 dd:hh:mm
Current completion: 7%, remains 93%
(status updates every 5 seconds)
Command completed successfully. Press any key...

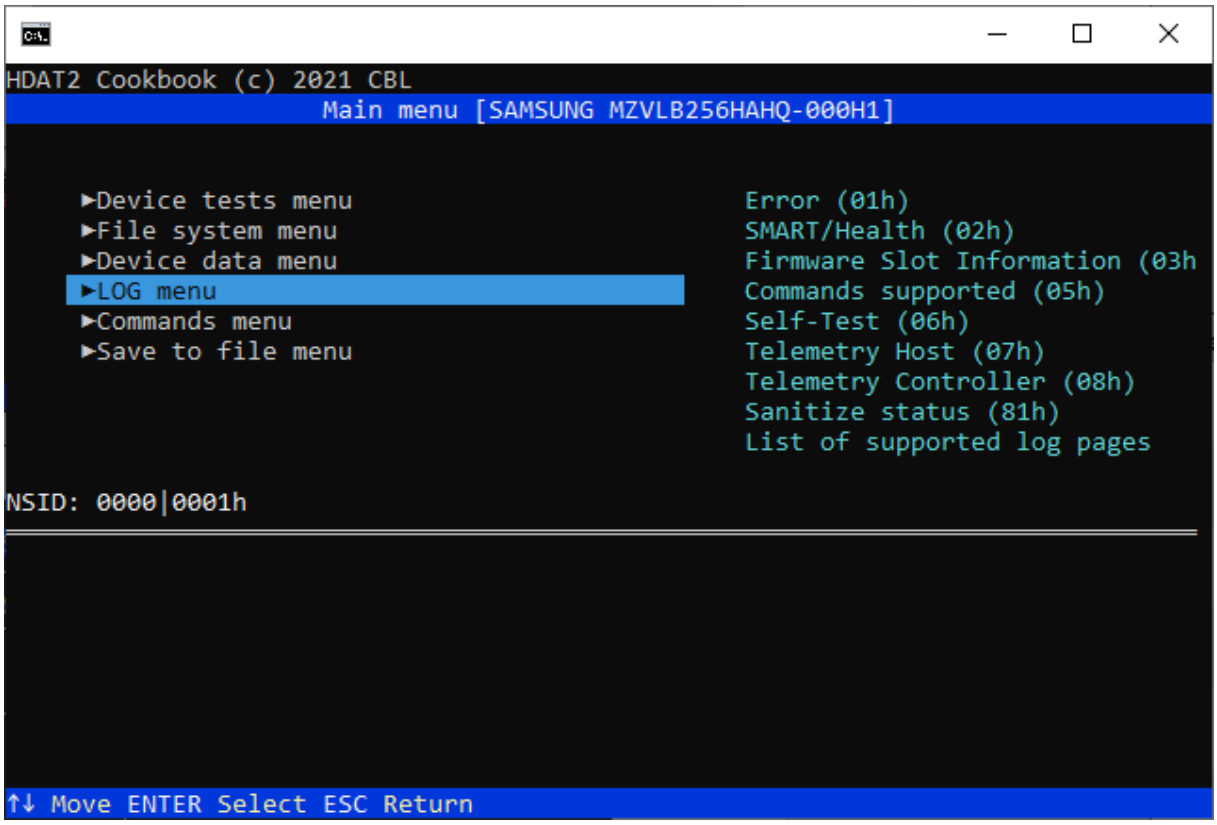

HDAT2 Cookbook (c) 2021 CBL
Self-Test Menu [SAMSUNG MZVLB256HAHQ-000H1]
Short Self-Test
Extended Self-Test
Vendor Self-Test
Abort Self-Test
Self-Test Log
NSID: 0000|0001h
Current operation : no test in progress
Time to complete : 00:00:35 dd:hh:mm
Last test result : aborted by self-test command
S Setup ENTER Run ESC Return

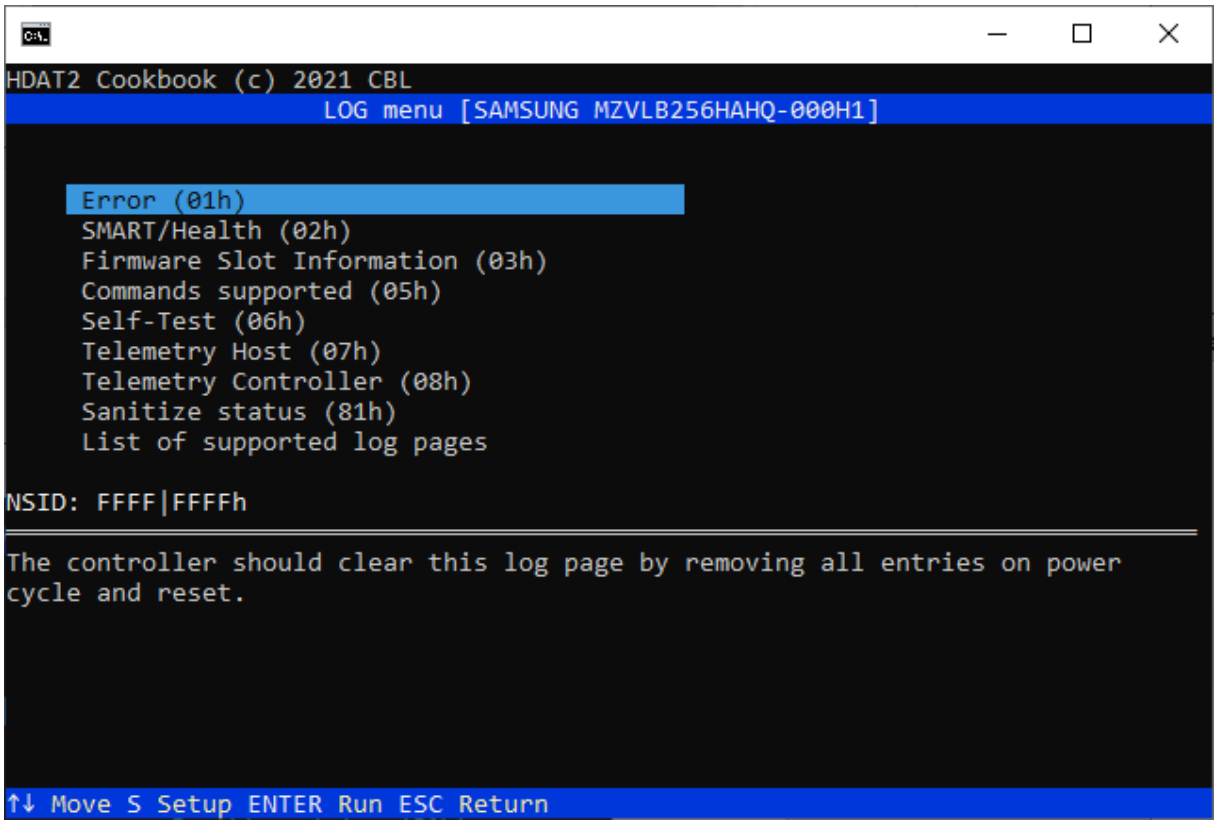

HDAT2 Cookbook (c) 2021 CBL
Self-Test Menu [SAMSUNG MZVLB256HAHQ-000H1]
Short Self-Test
Extended Self-Test
Vendor Self-Test
Abort Self-Test
Self-Test Log
NSID: FFFF|FFFFh
Current operation : no test in progress
Last test result : aborted by self-test command
S Setup ENTER Run ESC Return

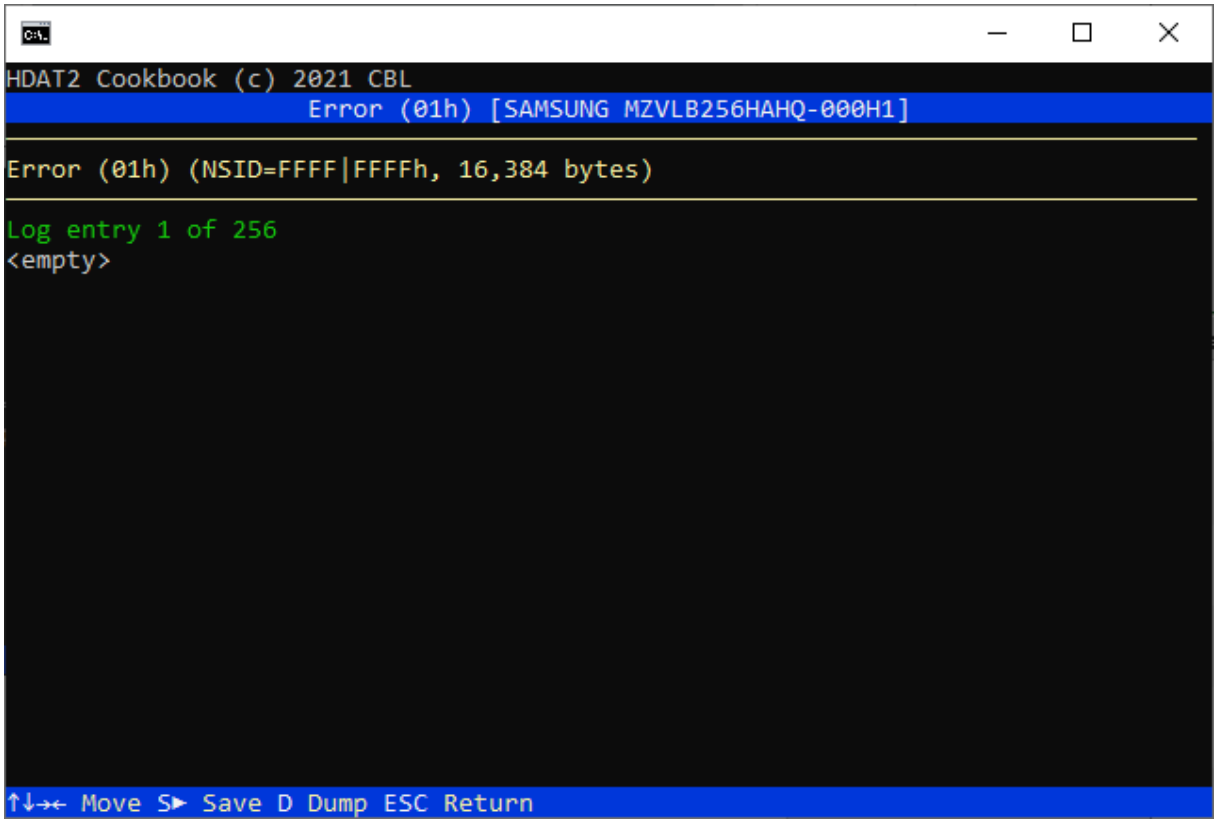

HDAT2 Cookbook (c) 2021 CBL
Self-Test Log [SAMSUNG MZVLB256HAHQ-000H1]
Self-Test Log (NSID=FFFF|FFFFh, 564 bytes)
Current DST Operation no test in progress
Current DST Completion 0%
1. Result data (the last one)
DST status 21h = 00100001b
Self-test code : extended test
Self-test result: aborted by self-test command
Segment number 7
Valid diagnostics information 00h = 00000000b
Power on hours (POH) 870 hours (36:06 dd:hh)
Vendor specific 0000h
2. Result data
DST status 10h = 00010000b
Self-test code : short test
Self-test result: completed without error
Segment number 0
Valid diagnostics information 00h = 00000000b
Power on hours (POH) 870 hours (36:06 dd:hh)
↑↓→← Move S► Save D Dump ESC Return

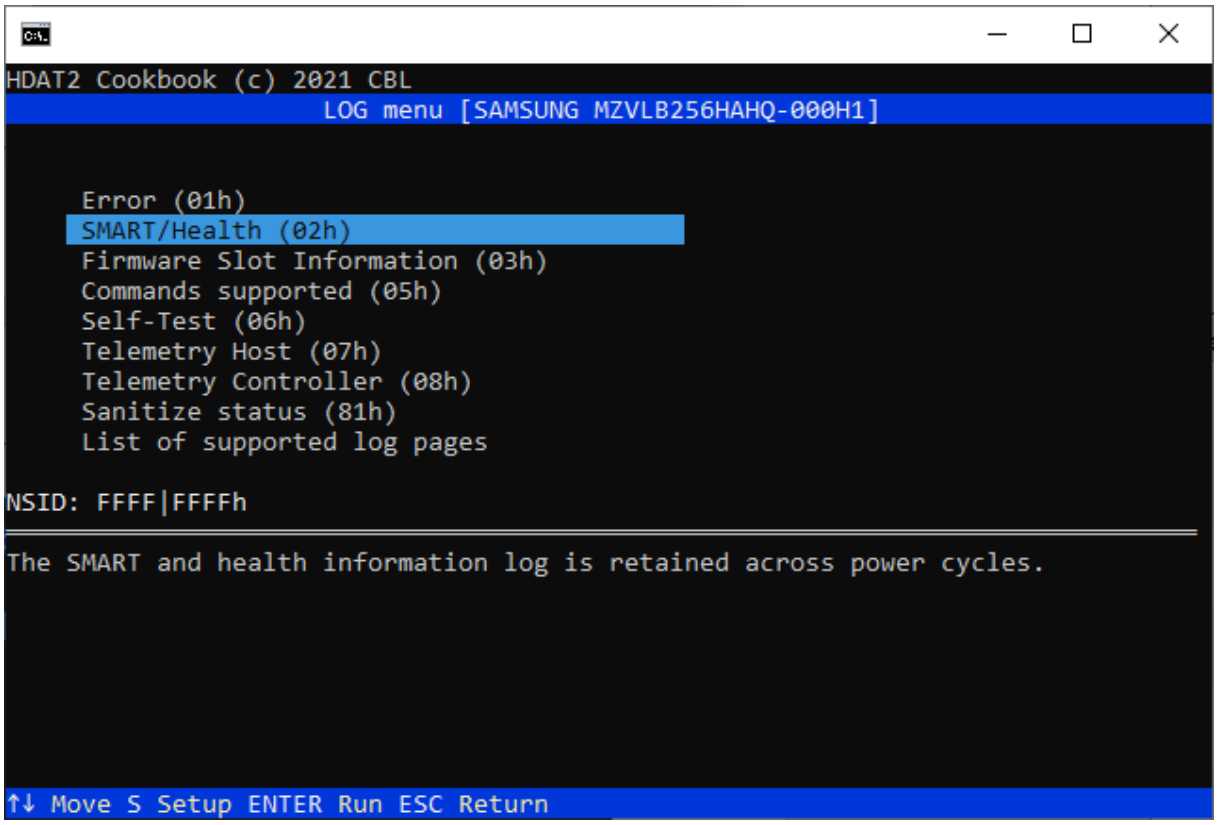
NVMe device

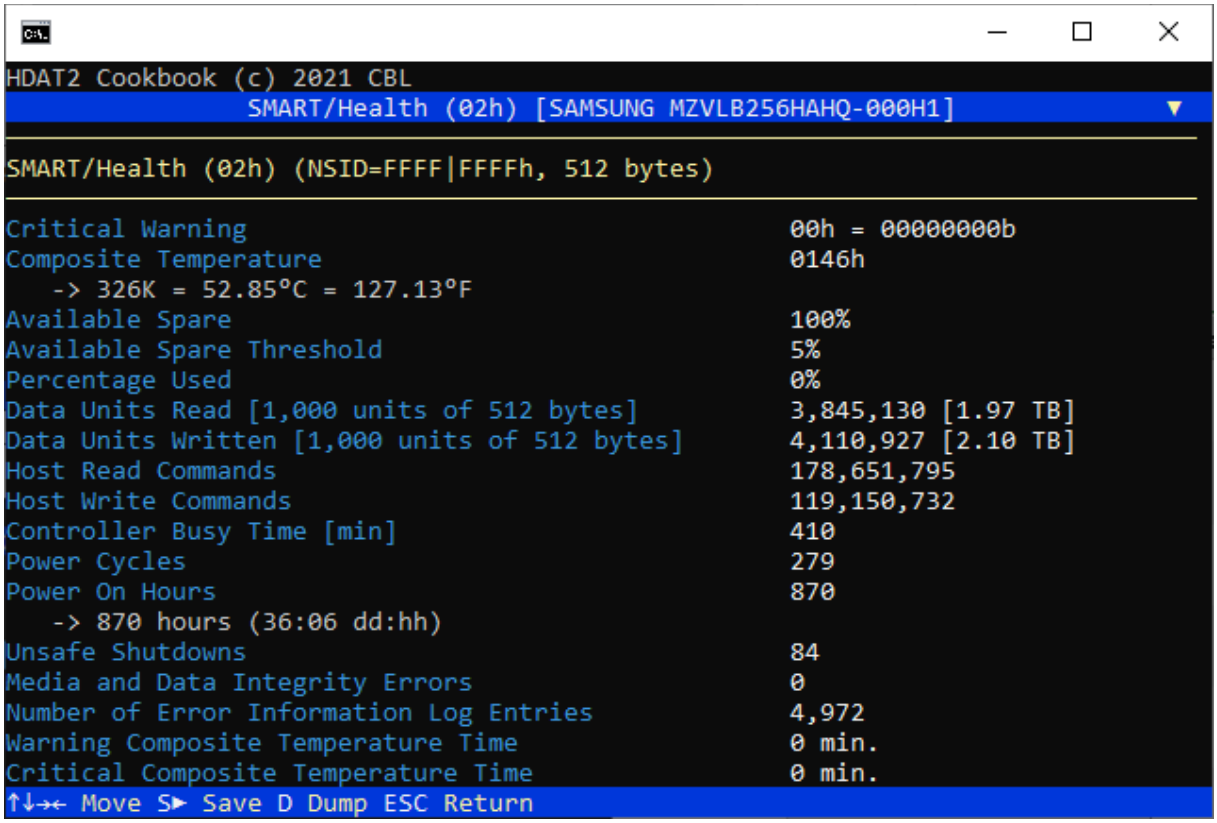
Examples of some logs for NVMe devices

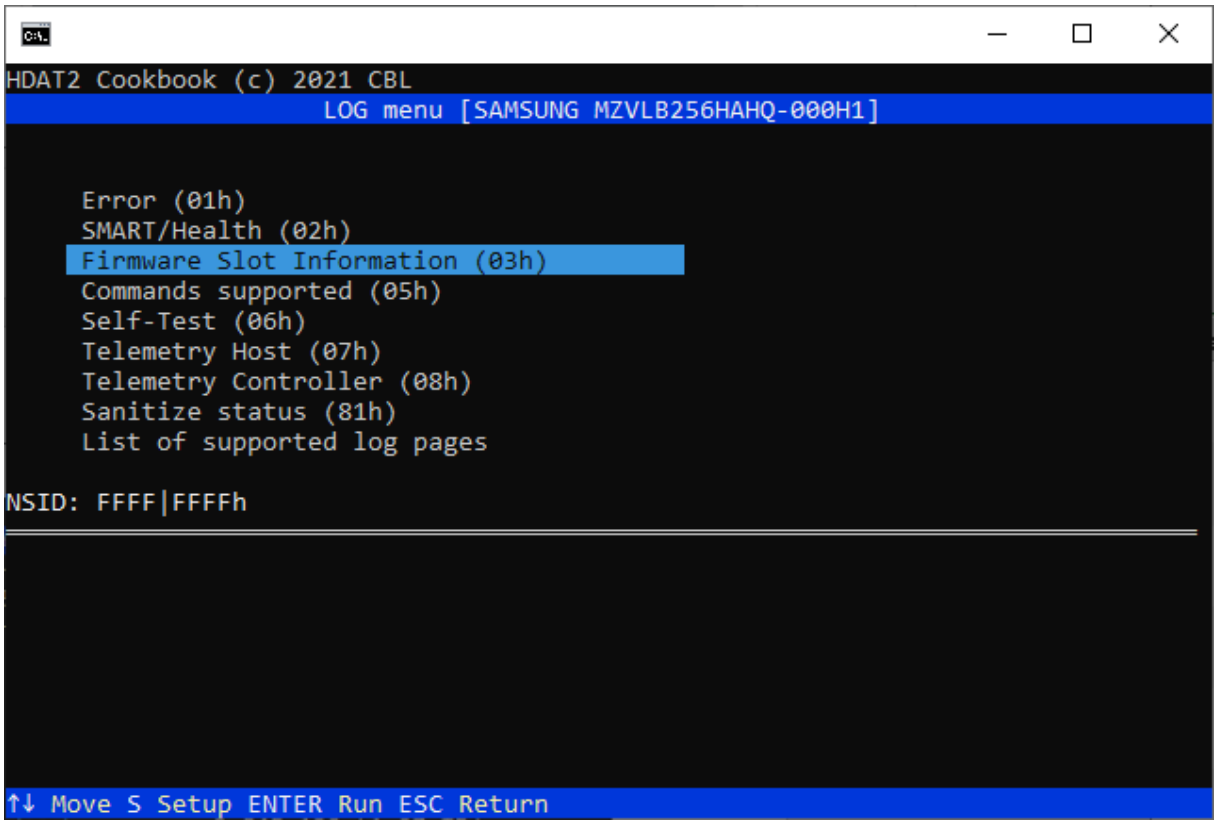


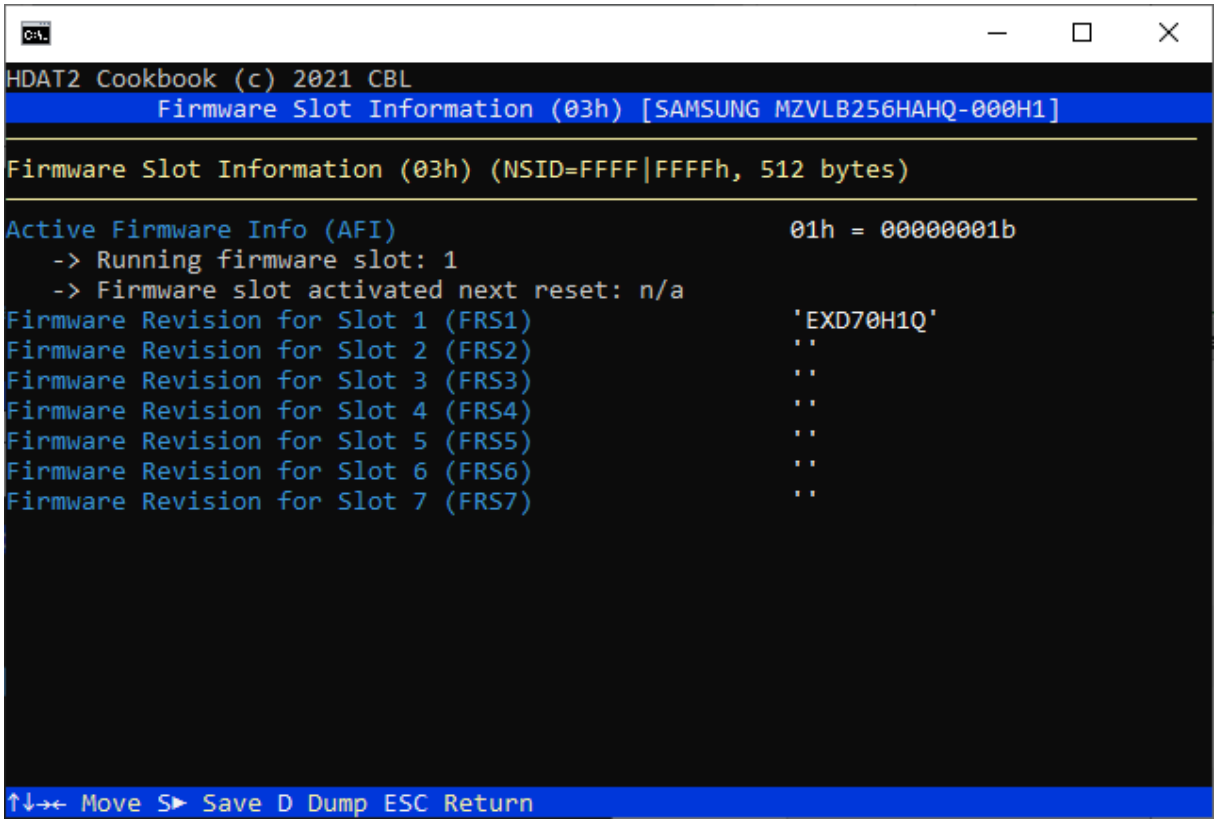


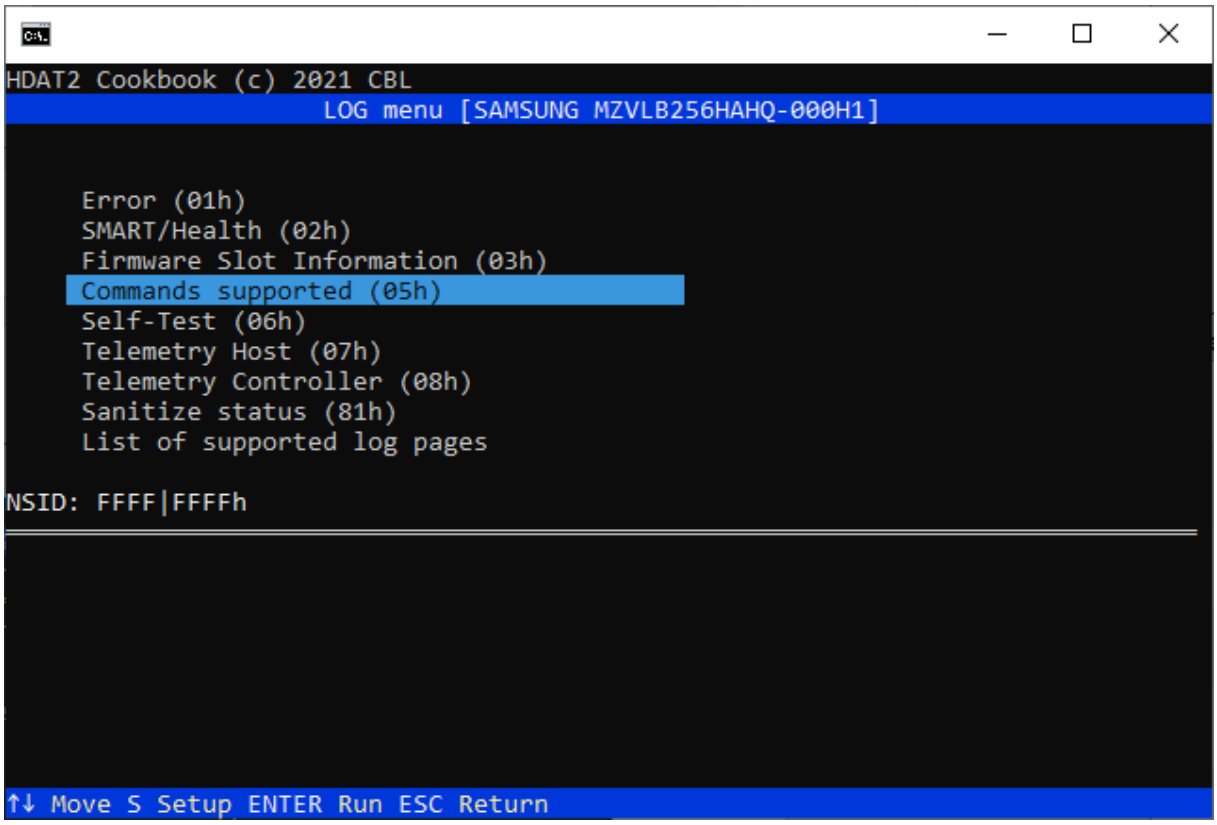

HDAT2 Cookbook (c) 2021 CBL
Error (01h) [SAMSUNG MZVLB256HAHQ-000H1]
Error (01h) (NSID=FFFF|FFFFh, 16,384 bytes)
Log entry 1 of 256
<empty>
↑↓→← Move S► Save D Dump ESC Return

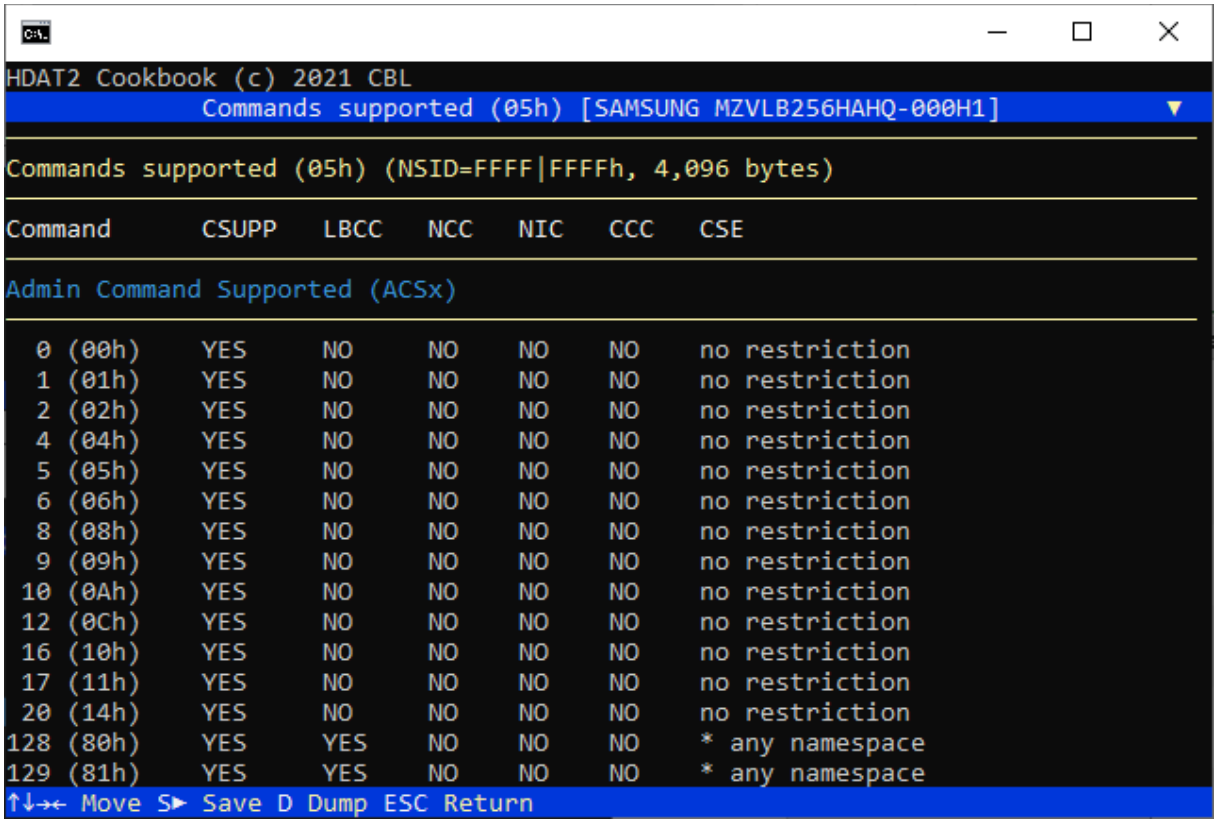

HDAT2 Cookbook (c) 2021 CBL
LOG menu [SAMSUNG MZVLB256HAHQ-000H1]
Error (01h)
SMART/Health (02h)
Firmware Slot Information (03h)
Commands supported (05h)
Self-Test (06h)
Telemetry Host (07h)
Telemetry Controller (08h)
Sanitize status (81h)
List of supported log pages
NSID: FFFF|FFFFh
The SMART and health information log is retained across power cycles.
↑↓ Move S Setup ENTER Run ESC Return

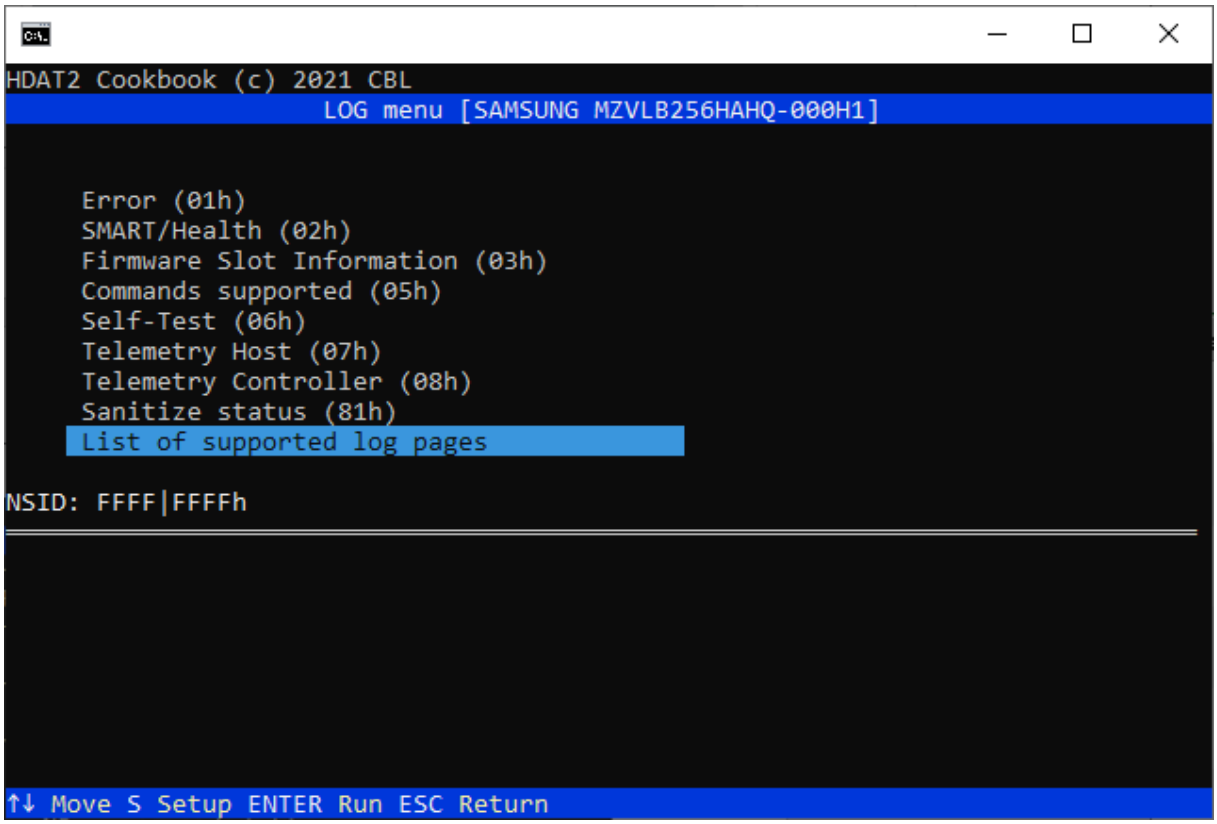

HDAT2 Cookbook (c) 2021 CBL
SMART/Health (02h) [SAMSUNG MZVLB256HAHQ-000H1]
SMART/Health (02h) (NSID=FFFF|FFFFh, 512 bytes)
Critical Warning 00h = 00000000b
Composite Temperature 0146h
-> 326K = 52.85°C = 127.13°F
Available Spare 100%
Available Spare Threshold 5%
Percentage Used 0%
Data Units Read [1,000 units of 512 bytes] 3,845,130 [1.97 TB]
Data Units Written [1,000 units of 512 bytes] 4,110,927 [2.10 TB]
Host Read Commands 178,651,795
Host Write Commands 119,150,732
Controller Busy Time [min] 410
Power Cycles 279
Power On Hours 870
-> 870 hours (36:06 dd:hh)
Unsafe Shutdowns 84
Media and Data Integrity Errors 0
Number of Error Information Log Entries 4,972
Warning Composite Temperature Time 0 min.
Critical Composite Temperature Time 0 min.
↑↓→← Move S► Save D Dump ESC Return

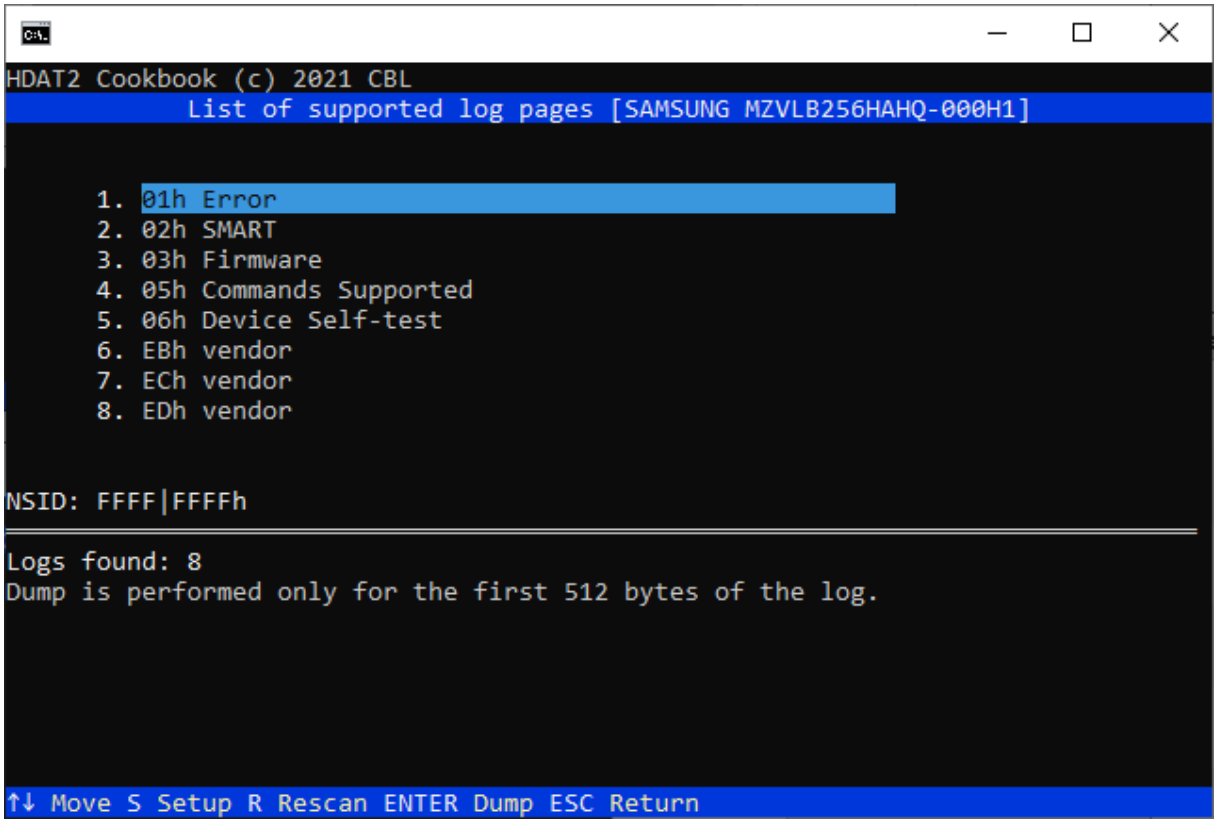

HDAT2 Cookbook (c) 2021 CBL
LOG menu [SAMSUNG MZVLB256HAHQ-000H1]
Error (01h)
SMART/Health (02h)
Firmware Slot Information (03h)
Commands supported (05h)
Self-Test (06h)
Telemetry Host (07h)
Telemetry Controller (08h)
Sanitize status (81h)
List of supported log pages
NSID: FFFF|FFFFh
↑↓ Move S Setup ENTER Run ESC Return


HDAT2 Cookbook (c) 2021 CBL
Firmware Slot Information (03h) [SAMSUNG MZVLB256HAHQ-000H1]
Firmware Slot Information (03h) (NSID=FFFF|FFFFh, 512 bytes)
Active Firmware Info (AFI) 01h = 00000001b
-> Running firmware slot: 1
-> Firmware slot activated next reset: n/a
Firmware Revision for Slot 1 (FRS1) 'EXD70H1Q'
Firmware Revision for Slot 2 (FRS2) ''
Firmware Revision for Slot 3 (FRS3) ''
Firmware Revision for Slot 4 (FRS4) ''
Firmware Revision for Slot 5 (FRS5) ''
Firmware Revision for Slot 6 (FRS6) ''
Firmware Revision for Slot 7 (FRS7) ''
↑↓→← Move S► Save D Dump ESC Return

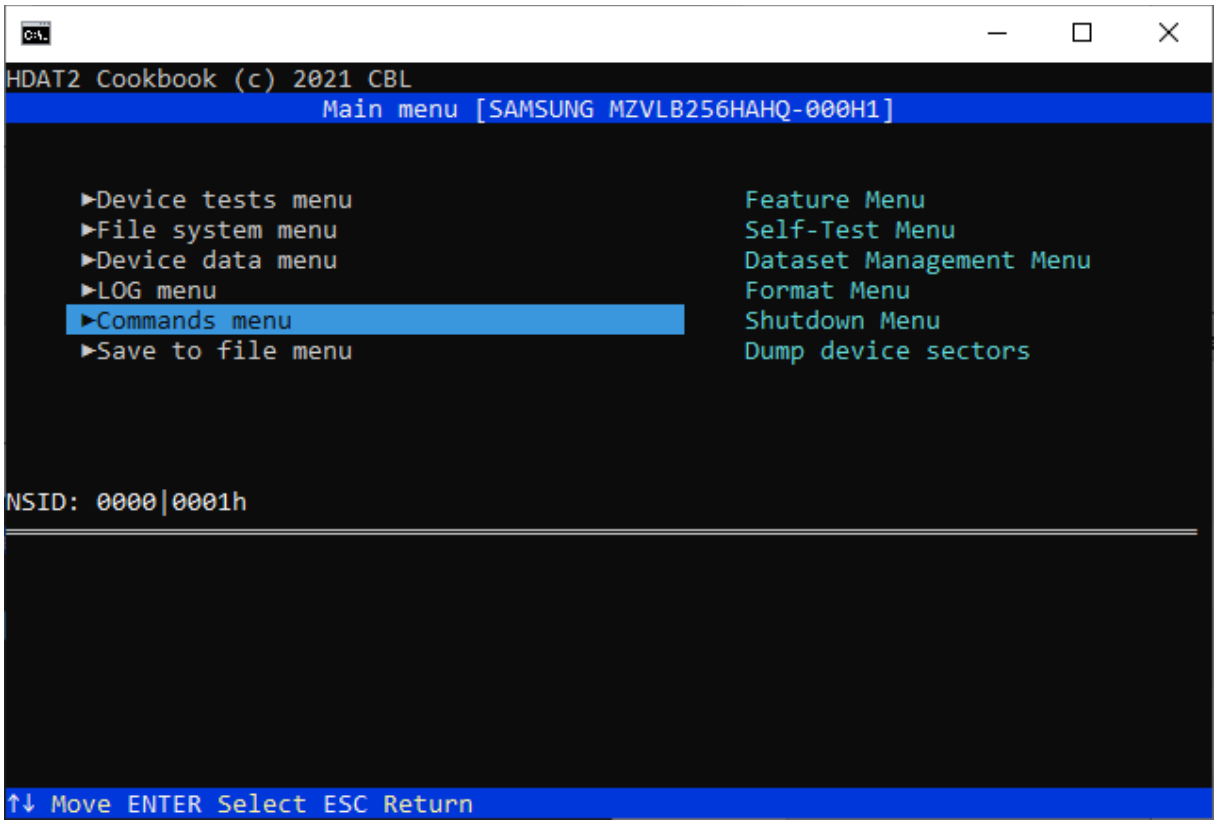

HDAT2 Cookbook (c) 2021 CBL
LOG menu [SAMSUNG MZVLB256HAHQ-000H1]
Error (01h)
SMART/Health (02h)
Firmware Slot Information (03h)
Commands supported (05h)
Self-Test (06h)
Telemetry Host (07h)
Telemetry Controller (08h)
Sanitize status (81h)
List of supported log pages
NSID: FFFF|FFFFh
↑↓ Move S Setup ENTER Run ESC Return

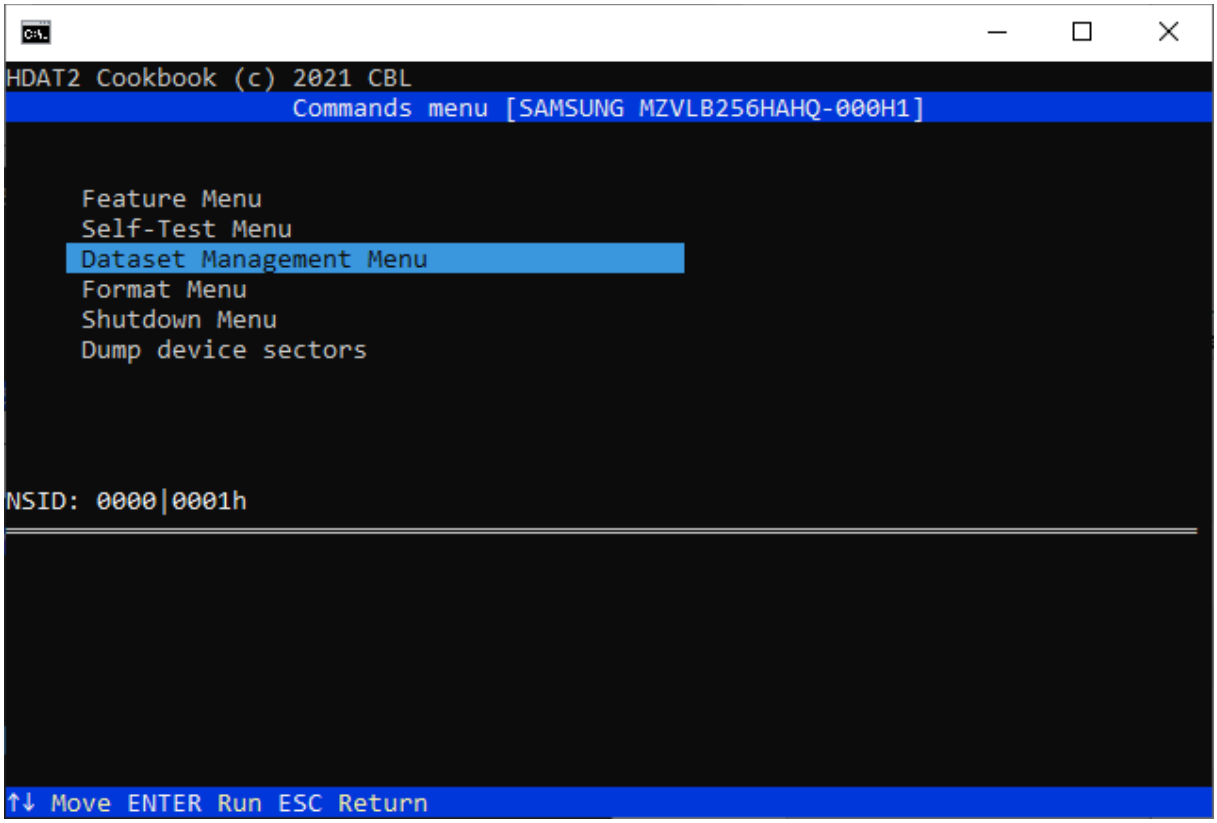

HDAT2 Cookbook (c) 2021 CBL
Commands supported (05h) [SAMSUNG MZVLB256HAHQ-000H1]
Commands supported (05h) (NSID=FFFF|FFFFh, 4,096 bytes)
Command CSUPP LBCC NCC NIC CCC CSE
Admin Command Supported (ACSx)
0 (00h) YES NO NO NO NO no restriction
1 (01h) YES NO NO NO NO no restriction
2 (02h) YES NO NO NO NO no restriction
4 (04h) YES NO NO NO NO no restriction
5 (05h) YES NO NO NO NO no restriction
6 (06h) YES NO NO NO NO no restriction
8 (08h) YES NO NO NO NO no restriction
9 (09h) YES NO NO NO NO no restriction
10 (0Ah) YES NO NO NO NO no restriction
12 (0Ch) YES NO NO NO NO no restriction
16 (10h) YES NO NO NO NO no restriction
17 (11h) YES NO NO NO NO no restriction
20 (14h) YES NO NO NO NO no restriction
128 (80h) YES YES NO NO NO * any namespace
129 (81h) YES YES NO NO NO * any namespace
↑↓→← Move S► Save D Dump ESC Return

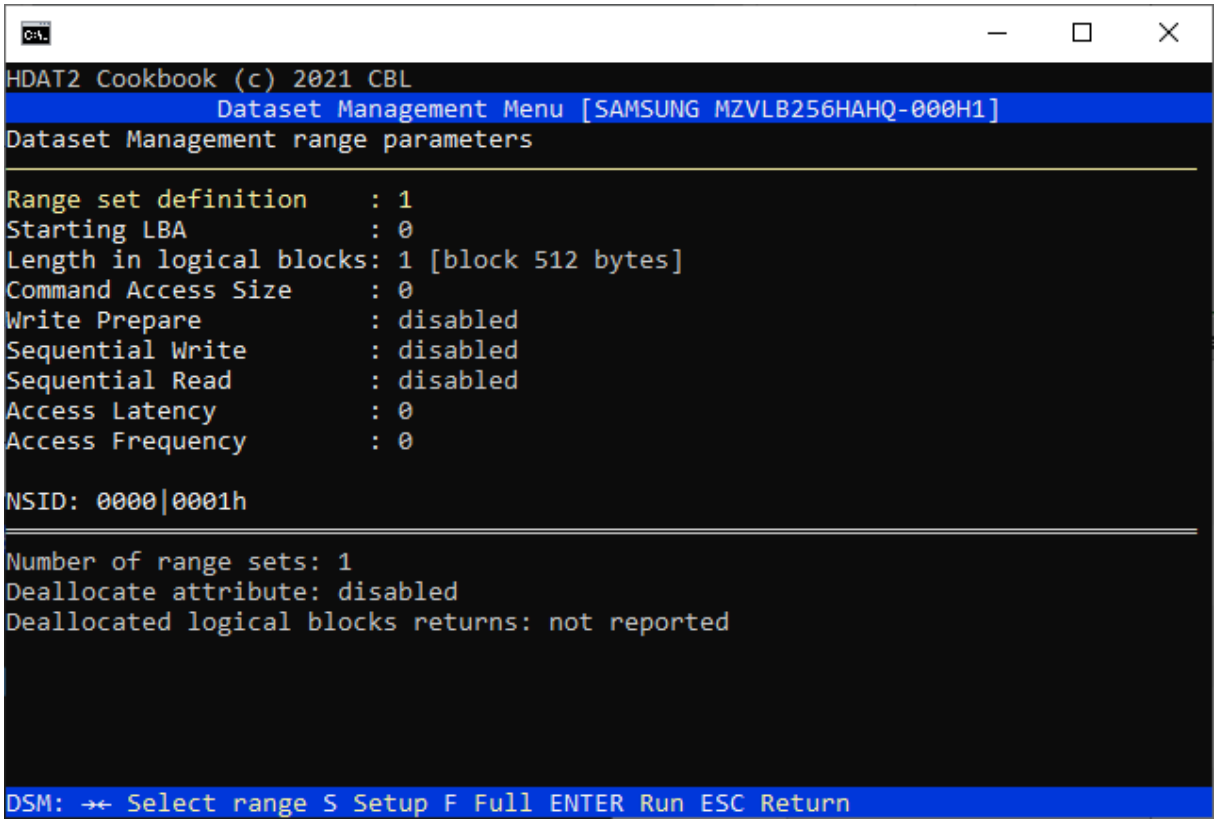

HDAT2 Cookbook (c) 2021 CBL
LOG menu [SAMSUNG MZVLB256HAHQ-000H1]
Error (01h)
SMART/Health (02h)
Firmware Slot Information (03h)
Commands supported (05h)
Self-Test (06h)
Telemetry Host (07h)
Telemetry Controller (08h)
Sanitize status (81h)
List of supported log pages
NSID: FFFF|FFFFh
↑↓ Move S Setup ENTER Run ESC Return

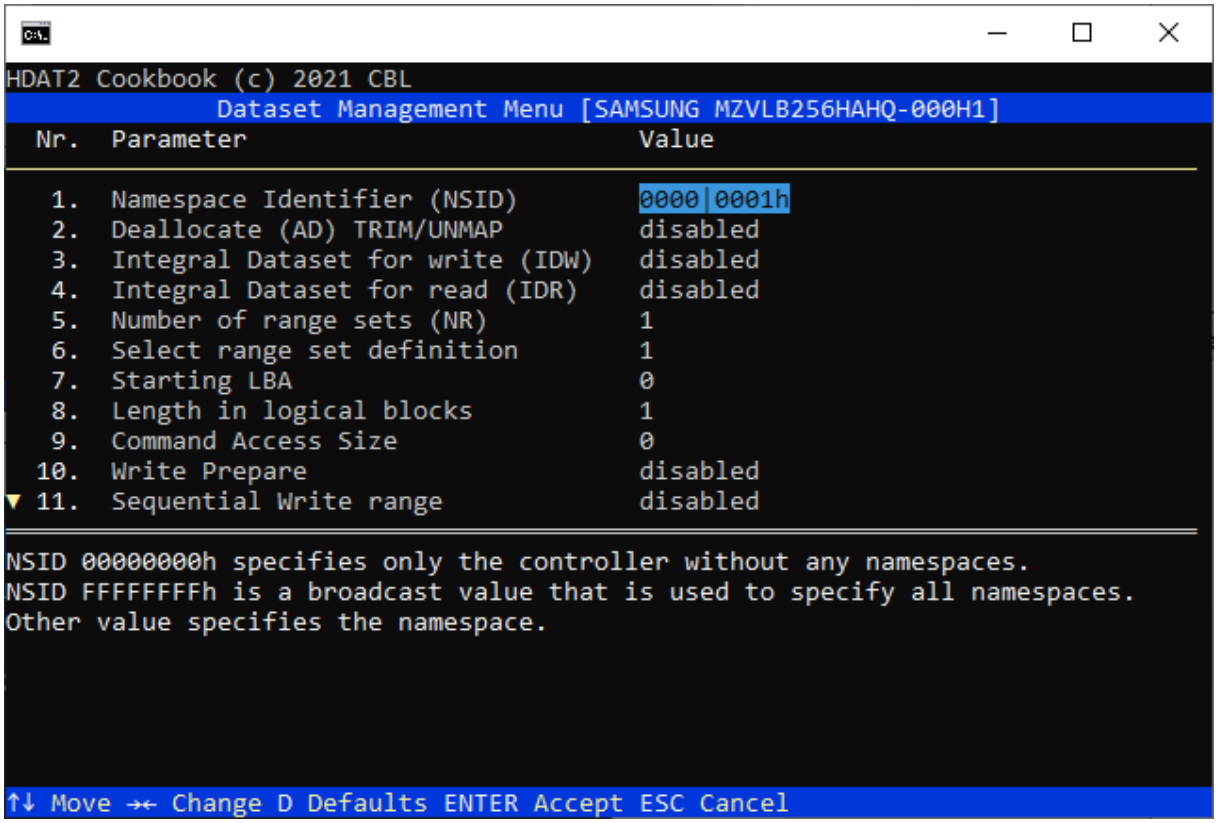


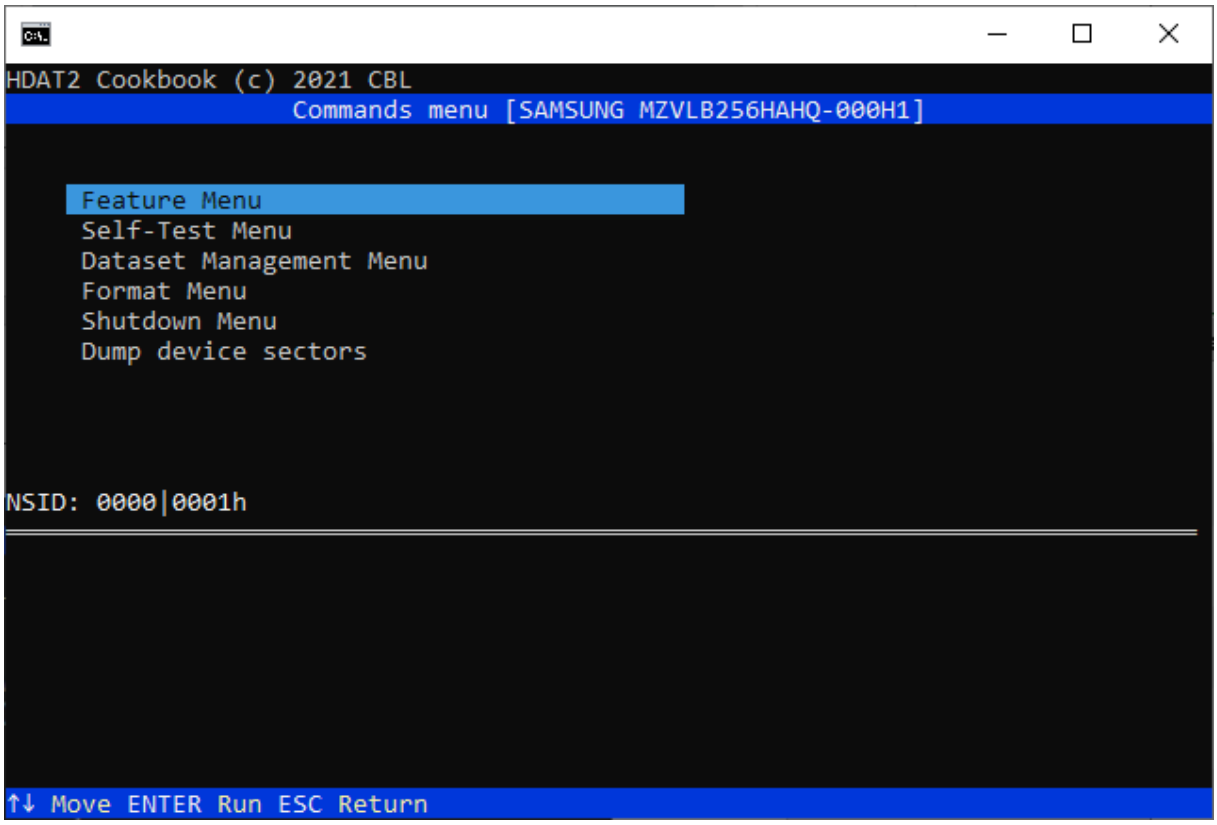
Examples of some commands for NVMe devices

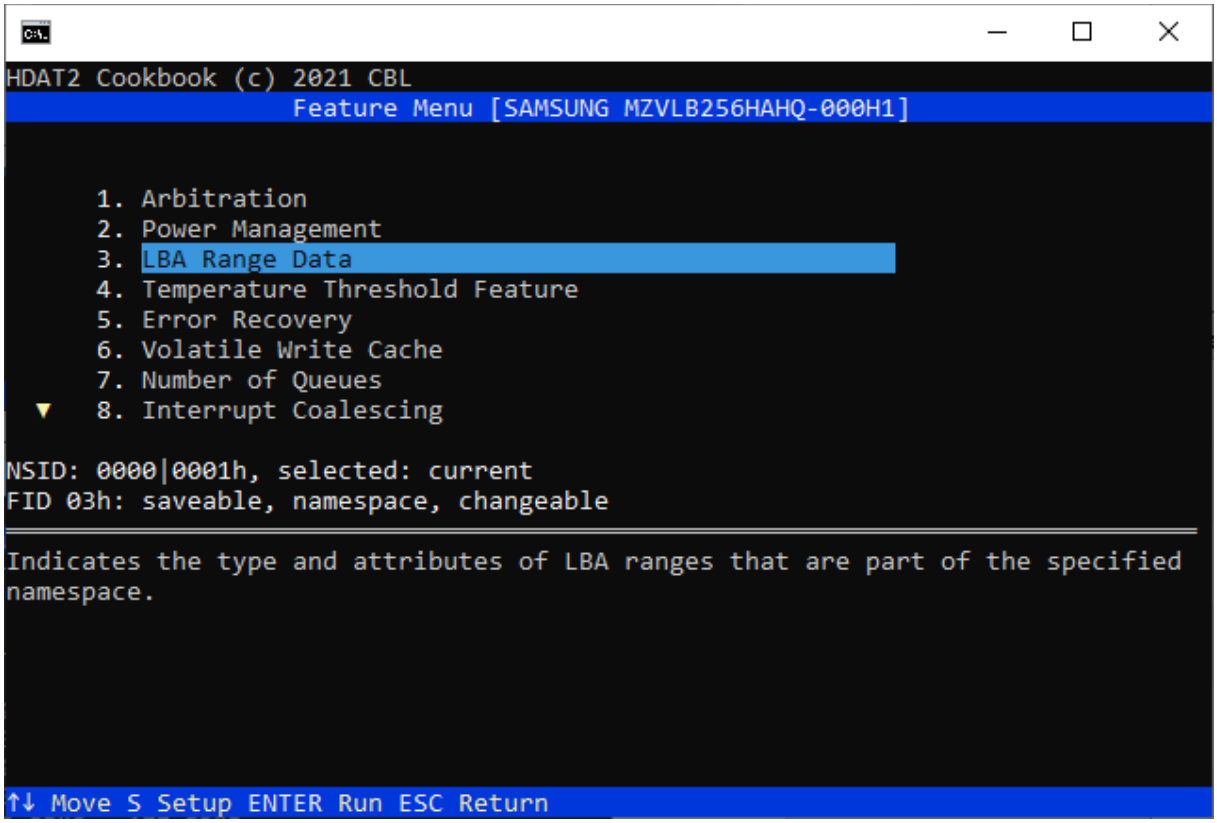


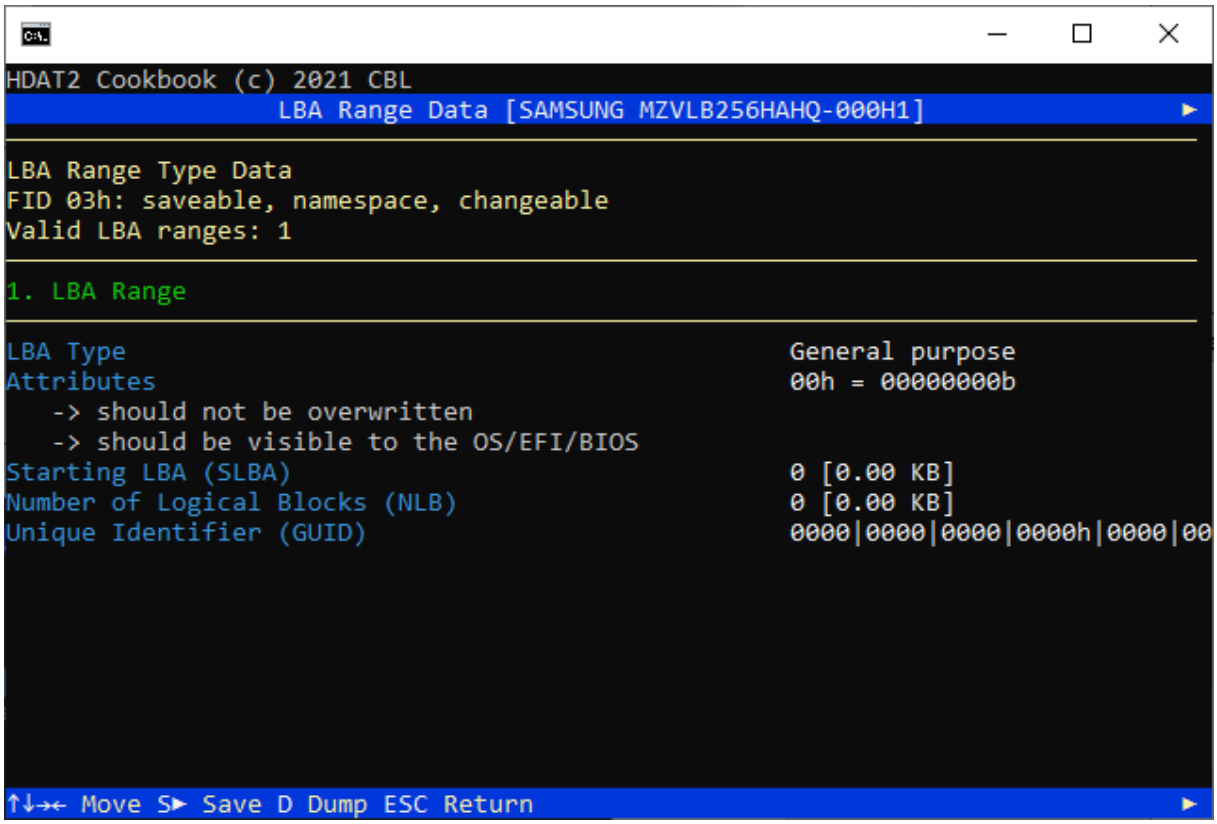

HDAT2 Cookbook (c) 2021 CBL
Commands menu [SAMSUNG MZVLB256HAHQ-000H1]
Feature Menu
Self-Test Menu
Dataset Management Menu
Format Menu
Shutdown Menu
Dump device sectors
NSID: 0000|0001h
↑↓ Move ENTER Run ESC Return

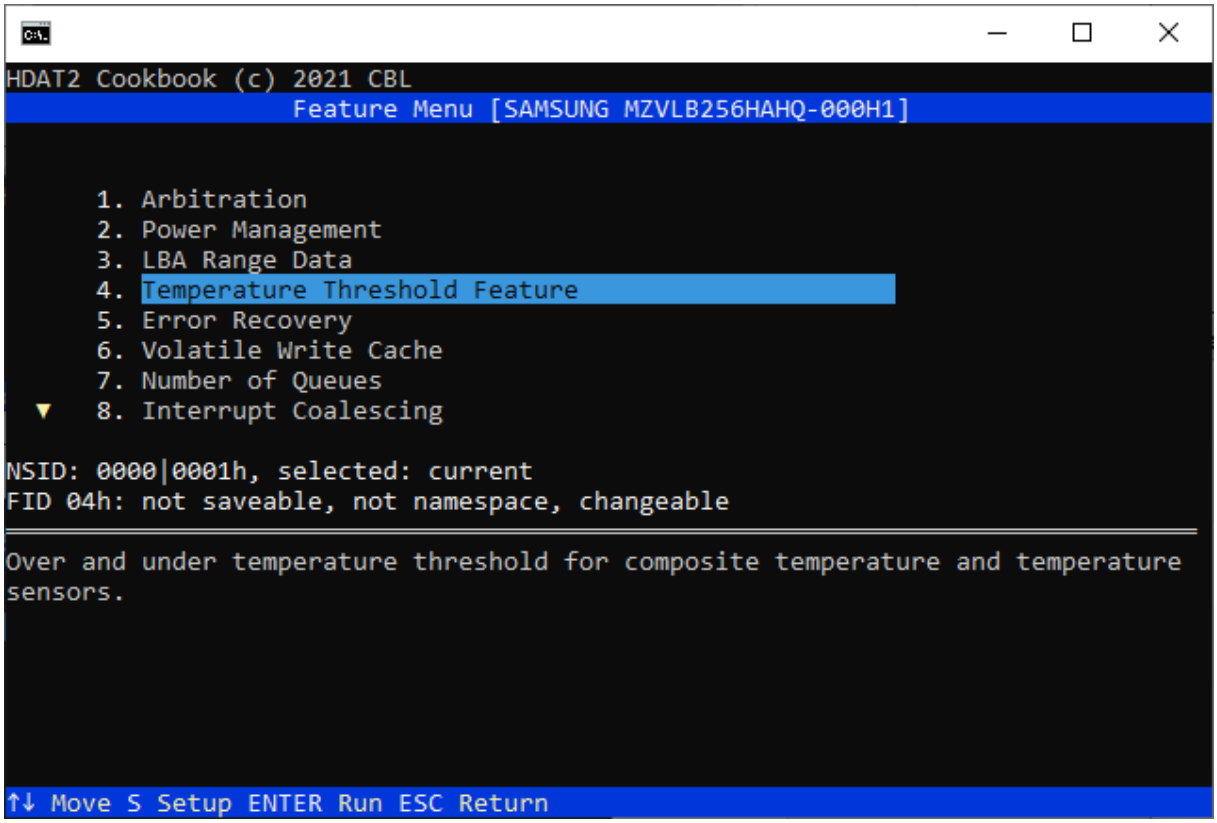

HDAT2 Cookbook (c) 2021 CBL
Dataset Management Menu [SAMSUNG MZVLB256HAHQ-000H1]
Dataset Management range parameters
Range set definition : 1
Starting LBA : 0
Length in logical blocks: 1 [block 512 bytes]
Command Access Size : 0
Write Prepare : disabled
Sequential Write : disabled
Sequential Read : disabled
Access Latency : 0
Access Frequency : 0
NSID: 0000|0001h
Number of range sets: 1
Deallocate attribute: disabled
Deallocated logical blocks returns: not reported
DSM: →← Select range S Setup F Full ENTER Run ESC Return

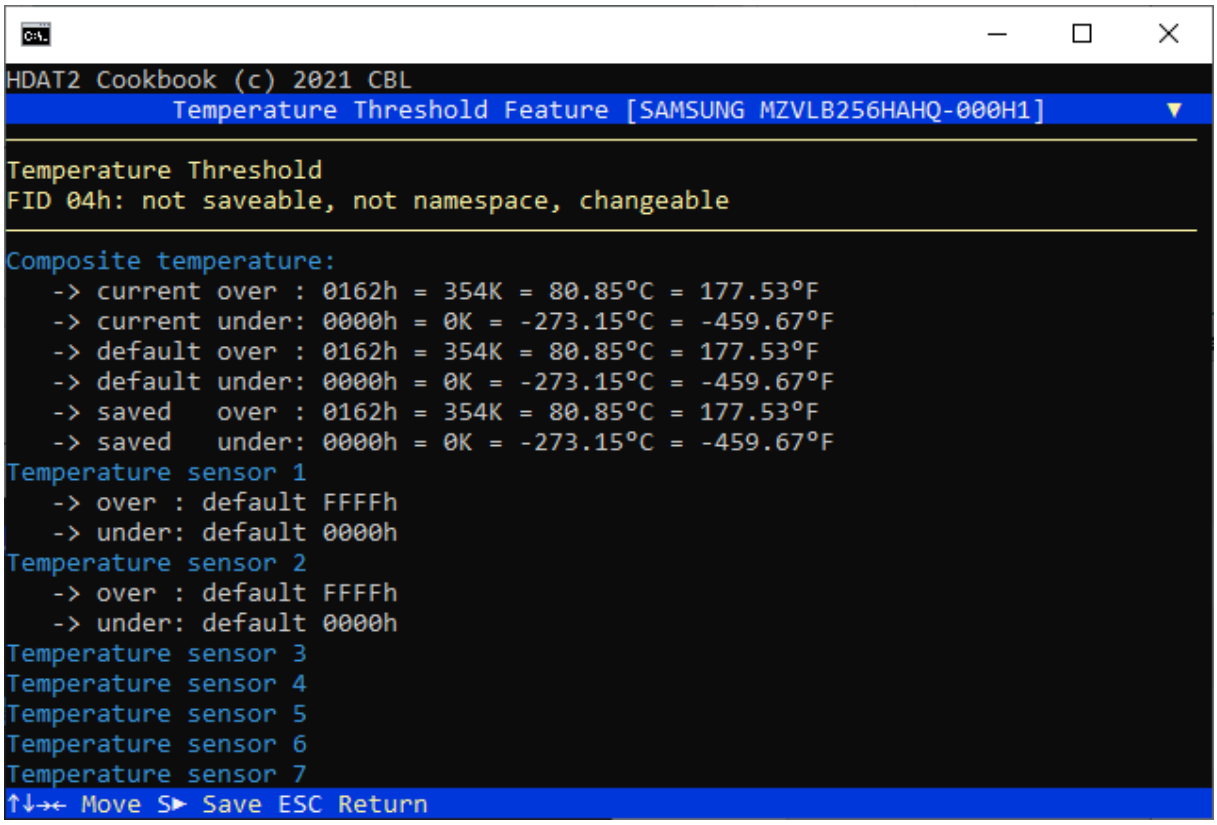

HDAT2 Cookbook (c) 2021 CBL
Dataset Management Menu [SAMSUNG MZVLB256HAHQ-000H1]
Nr. Parameter Value
1. Namespace Identifier (NSID) 0000|0001h
2. Deallocate (AD) TRIM/UNMAP disabled
3. Integral Dataset for write (IDW) disabled
4. Integral Dataset for read (IDR) disabled
5. Number of range sets (NR) 1
6. Select range set definition 1
7. Starting LBA 0
8. Length in logical blocks 1
9. Command Access Size 0
10. Write Prepare disabled
▼ 11. Sequential Write range disabled
NSID 00000000h specifies only the controller without any namespaces.
NSID FFFFFFFFh is a broadcast value that is used to specify all namespaces.
Other value specifies the namespace.
↑↓ Move →← Change D Defaults ENTER Accept ESC Cancel


HDAT2 Cookbook (c) 2021 CBL
Commands menu [SAMSUNG MZVLB256HAHQ-000H1]
Feature Menu
Self-Test Menu
Dataset Management Menu
Format Menu
Shutdown Menu
Dump device sectors
NSID: 0000|0001h
↑↓ Move ENTER Run ESC Return


HDAT2 Cookbook (c) 2021 CBL
Feature Menu [SAMSUNG MZVLB256HAHQ-000H1]
1. Arbitration
2. Power Management
3. LBA Range Data
4. Temperature Threshold Feature
5. Error Recovery
6. Volatile Write Cache
7. Number of Queues
8. Interrupt Coalescing
NSID: 0000|0001h, selected: current
FID 03h: saveable, namespace, changeable
Indicates the type and attributes of LBA ranges that are part of the specified namespace.
↑↓ Move S Setup ENTER Run ESC Return


HDAT2 Cookbook (c) 2021 CBL
LBA Range Data [SAMSUNG MZVLB256HAHQ-000H1]
LBA Range Type Data
FID 03h: saveable, namespace, changeable
Valid LBA ranges: 1
1. LBA Range
LBA Type
General purpose
Attributes
00h = 00000000b
-> should not be overwritten
-> should be visible to the OS/EFI/BIOS
Starting LBA (SLBA)
0 [0.00 KB]
Number of Logical Blocks (NLB)
0 [0.00 KB]
Unique Identifier (GUID)
0000|0000|0000|0000h|0000|00
↑↓→← Move S Save D Dump ESC Return


HDAT2 Cookbook (c) 2021 CBL
Feature Menu [SAMSUNG MZVLB256HAHQ-000H1]
1. Arbitration
2. Power Management
3. LBA Range Data
4. Temperature Threshold Feature
5. Error Recovery
6. Volatile Write Cache
7. Number of Queues
8. Interrupt Coalescing
NSID: 0000|0001h, selected: current
FID 04h: not saveable, not namespace, changeable
Over and under temperature threshold for composite temperature and temperature sensors.
↑↓ Move S Setup ENTER Run ESC Return


HDAT2 Cookbook (c) 2021 CBL
Temperature Threshold Feature [SAMSUNG MZVLB256HAHQ-000H1]
Temperature Threshold
FID 04h: not saveable, not namespace, changeable
Composite temperature:
-> current over : 0162h = 354K = 80.85°C = 177.53°F
-> current under: 0000h = 0K = -273.15°C = -459.67°F
-> default over : 0162h = 354K = 80.85°C = 177.53°F
-> default under: 0000h = 0K = -273.15°C = -459.67°F
-> saved over : 0162h = 354K = 80.85°C = 177.53°F
-> saved under: 0000h = 0K = -273.15°C = -459.67°F
Temperature sensor 1
-> over : default FFFFh
-> under: default 0000h
Temperature sensor 2
-> over : default FFFFh
-> under: default 0000h
Temperature sensor 3
Temperature sensor 4
Temperature sensor 5
Temperature sensor 6
Temperature sensor 7
↑↓→← Move S► Save ESC Return

Frequently Asked Questions

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Q1: I received a 40 GB drive in replacement for a 20 GB model in PC. The drive is reported as 20 GB capacity. How can I get full capacity?

A1: If you see in 'Device List' menu at your disk drive a notice '!SET MAX: HPA IS ACTIVE', use 1. method, otherwise use 2. method.
In program HDAT2 select your disk drive and press Enter to show 'Main Menu'.

1. method:

In 'Device List' menu at your disk drive you see notice '!SET MAX: HPA IS ACTIVE'. Select 'SET MAX (HPA) Menu', then select 'Set Max Address' and press Enter. By default is set so called native size of disk drive and you can just press a key 'S' to setup original capacity of hard drive and remove HPA area.
If the command is aborted, try change 'LBA mode' from 28 to 48 or vice versa (if disk supports 48-bit LBA mode).

2. method:

Select 'Device Configuration Menu', then select 'Restore' and press Enter. If you don't see any error message, in 'Device List' menu press a key 'D' to make new detection of devices or simple make restart of PC's and check capacity of your hard drive.
If you see any error message or in 'Device List' menu at your disk you see a notice '!DCO: FROZEN', then it is possible that BIOS was sent a command DCO Freeze and all subsequent DCO commands will be aborted now. How to try bypass this state see answer no. 2.

Q2: How to bypass a Security and/or DCO frozen state?

A2: Turn off PC, remove ribbon (data) cable from this hard drive (not the power cable), turn on PC and after boot from floppy you can connect ribbon (data) cable back to hard drive and start up HDAT2. Don't worry - program can detect this device.
Notice: this is valid only for PATA drivers, not for SATA drivers.
If you have SATA drive in Security and/or DCO frozen state, simple solution is connect this drive to PC with BIOS which does not set security mode.

Q3: Can I remove non-existent bad sectors from the file table FAT?

A3: Yes, with file-system version program HDAT2FS or HDAT2 you can test FAT12/16/32.

select your drive and press Enter to run Menu
select 'File Level Tests Menu' and press Enter
select 'Read File System from MBR' and press Enter
for item 'All' press 'C' to check detected items
go to 'Table' item and 2-times press Enter to run Utility menu
press 'T' to setup test for file table FAT
if you want to update file table press 'W' for update
press Enter to run
This procedure will first compare both FAT copies and second tests all FAT entries for bad sectors. If program will find 'bad sector' entry, then all sectors in this cluster will be tested. If all these sectors are not bad program will remove this record of bad sectors.

Q4: Connecting ATA/IDE Hard Drives

A4: ATA/IDE devices use a ribbon cable to connect to each other. Ribbon cables have all of the wires laid flat next to each other instead of bunched or wrapped together in a bundle. IDE ribbon cables have either 40 or 80 wires. There is a connector at each end of the cable and another one about two-thirds of the distance from the motherboard connector. This cable cannot exceed 18 inches in total length (12 inches from first to second connector, and six inches from second to third) to maintain signal integrity.
40-wire Cables

On the slower older 40-wire ATA cables, the Slave device, usually a CD-ROM or CD-ROM recorder/burner still goes on the END, but you need to set the jumpers as Slave. This is true even if you don't have a hard drive in the Master position. The Master for 40-wire cables goes on the Middle connector.

If you want to use the cable select with the older drive on a 40-wire cable, you'll have to consult the maker of the drive for the instructions.

80-wire Cables

On the ATA66/100/133 standard 80-wire cable, the Master hard drive or your boot hard drive goes on the END of the cable. This is true whether or not you use the Master/Slave style or the Cable Select style.

The 40-pin 80-conductor cable is orientation specific. The cable connectors are color-coded: blue for the host connector, black and gray for the primary and secondary disk drives. The blue connector should be installed into the Primary IDE connector.

The blue connector attaches to the motherboard.
The black connector attaches to the primary, or master, drive.
The gray connector attaches to the secondary, or slave, drive.

Along one side of the cable is a stripe. This stripe tells you that the wire on that side is attached to Pin 1 of each connector. Wire 20 is not connected to anything. In fact, there is no pin at that position. This position is used to ensure that the cable is attached to the drive in the correct position. Another way that manufacturers use to make sure that the cable is not reversed is by using a cable key. The cable key is a small plastic square on

top of the connector on the ribbon cable that fits into a notch on the connector of the device. This allows the cable to attach in only one position.

Q5: What are the differences between master/slave and cable select?

A5: Two different protocols can be used for jumper ATA devices, including hard disk drives. One is the master-slave relationship. With this protocol, one device is jumpered as master and the other is jumpered as slave. The second protocol is cable select. With this protocol, both devices are jumpered as cable select and their position on the cable dictates which is the master and which is the slave. The end device is master while the device on the middle of the cable is slave. You can use either of these protocols but you cannot mix them on the same data cable.
Computers that use cable-select determine the master and slave drives by selecting or deselecting pin 28, CSEL, on the interface bus. Master and slave drives are determined by their physical position on the cable.

Configuration Using Cable Select

Cable Select is defined in the ATA-2 and ATA-3 specifications and is part of the ATA PnP standard and Microsoft's PC97 standard.

The standard 40-wire ATA ribbon cable and the 80-wire cable give different drive behavior when using Cable Select. If using the standard 40-wire cable, the Master goes in the middle connector and the Slave goes in the end connector. If using the 80-wire cable, attach the blue end connector to the system board or host controller, the gray middle connector to the Slave, and the black end connector to the Master.

All newer ATA hard drives can be jumpered as Cable Select (CS or CSEL). This is an alternate way to indicate which drive is master and which drive is slave (instead of jumper one drive as master and one drive as slave). Cable Select jumper requires a special IDE cable with wire 28 not connected to one of the drive connectors, which would configure the drive attached to that connector as the slave drive.

In order to use Cable Select jumper, several conditions must be met. Both drives on a channel must support CSEL, both drives must be jumpered as CSEL, a CSEL cable must be used, and the host interface connector must support CSEL. For the host interface to support Cable Select, wire 28 must be grounded.

Although the Cable Select specification may simplify things in the future, there will probably be lots of confusion, especially on legacy systems, as this starts to be introduced. One problem will be in selecting the correct cable. Supposedly, the cables used for Cable Select will be clearly marked, with each connector labeled as Device 0 (or Master) or Device 1 (or Slave). If not clearly marked, it may not be easy to identify a CSEL cable visually. wire 28 can be checked for continuity.

A Cable Select cable can be constructed in various ways. Pin 28 may be not connected to the connector at the end of the cable or to the connector in the middle of the cable. Another design would have the host interface connector in the middle and the two drives would plug into each end of the cable, with the connector at one of the ends not connected to pin 28.

If both drives are set for CSEL and the host interface supports CSEL, but a regular cable is used, both drives will be seen as master.

A Cable Select cable can be used with master/slave drive jumper.

Another problem will be with host interfaces on legacy motherboards and controller cards. If pin 28 is not grounded on the host interface, drives connected to either connector on the CSEL cable will be seen as slave. It will be common to find that pin 28 is open or high on many older IDE interfaces. This can be checked with a voltmeter.

Q6: Host Protected Area (HPA) vs. 28/48-bit LBA mode

A6: There is a problem of incompatibility on some hard drives (e.g. Seagate and/or in an external Maxtor One Touch) when you are using 48-bit command for removing Host Protected Area (HPA) created with 28-bit command.
48-bit command cannot remove HPA created with 28-bit command and vice-versa.
Following solution is for disk supports 48-bit LBA mode only and if you have HPA greater than 127 GB.
Notice:

"Some vendor-specific external drive enclosures (Maxtor) are known to use HPA to limit the capacity of unknown replacement hard drives installed into the enclosure. When this occurs, the drive may appear to be limited in size (e.g. 128 GB). In this case, one must use software utilities that use READ NATIVE MAX ADDRESS and SET MAX ADDRESS to change the drive's reported size back to its native size."

Solution:

1. Power-on PC, boot and start HDAT2.
2. In 'SET MAX (HPA) Menu' select 'Set Max Address'. Change 'LBA mode' from 48 to 28-bit LBA mode and press 'S' key to set maximal address for 28-bit LBA mode (127 GB).
3. Power-off PC (Important !), power-on PC, boot and start HDAT2.
4. In 'SET MAX (HPA) Menu' select 'Set Max Address'. Leave the selected 48-bit 'LBA mode' (or change 'LBA mode' from 28 to 48-bit LBA mode) and then press 'S' key to set maximal address for 48-bit LBA mode.
5. After restart you should get the full (native) capacity of hard drive.

Q7: Change of DCO Modify item is always aborted (abort command)

A7: Some hard drives (Maxtor) allow to modify DCO always, the other hard drives (Seagate) allow to modify DCO one times only.
Example of the restrictions on changing of bits:

If a user attempts to change maximum LBA address (SET or RESTORE) after establishing a protected area with SET MAX address, the device will abort that command.

If the user attempts to disable Security feature when the device is enabled and the Security feature is set, the device will abort that command.

If you always got an error message (aborted command) when you want to change any item in DCO Modify menu, you should first run a 'Restore' item to restore default settings and then you can go to Modify menu.

Q8: What is Spread Spectrum Clocking (SSC)?

A8: Spread Spectrum Clocking is a way to lower electromagnetic interference or EMI. This is important for storage solutions that are required to pass FCC and other agency certifications. Today, some Serial ATA disk drives implement SSC, some allow you to turn this feature on/off, and some do not implement SSC; it is anticipated that all will implement this feature in the near future.
The technique of modulating the operating frequency of a circuit slightly to spread its radiated emissions over a range of frequencies rather than just one tone. This reduction in the maximum emission for a given frequency helps meet FCC requirements.

Newer Serial ATA (3Gbps SATA) interface disc drives may employ a standard technology called Spread Spectrum Clocking (SSC) which helps to reduce electronic emissions (EMI) in large, multi-drive systems. Single drive environments do not need SSC to meet EMI requirements.

3Gbps means doubled interface speeds, which also means greater signal noise and electromagnetic emissions. As in the processor settings in many motherboard's BIOS, spread spectrum clocking can reduce emissions to meet regulations.

In a single-drive environment, it's not necessary, but when you've got two or more drives, and they're all running at 3Gbps, that's when you've got a lot of electrical noise going on, and the spread spectrum feature is recommended. This is more for safety than reducing data errors, which most drives' ECC code will correct automatically.

A small number of SATA host products do not support this SSC standard feature. Similarly, RAID controllers may need to enable SSC on drive configurations with SSC disabled by default to reduce EMI.

Disable SSC: Host products that do not support SSC cannot detect the presence of the disc drive. Therefore, in order to disable SSC the drive must be attached to another host platform that does support SSC so that the feature can be disabled. Once SSC is turned off, the drive can be returned to the original host system.

Enable SSC: If the drive has SSC turned off by default and SSC is required for a large multi-drive environment, the target system is usually supported by the SSC software. RAID controllers, however, can pose a barrier to communicating with the SATA at the low hardware level required to make the SSC change. If your RAID controller is not supported then a more standard SATA system may be needed to toggle SSC on the drive. Once SSC is turned on, the drive can be returned to the original RAID controller.

There are many accounts on the Internet about problems arising from HBAs (Host Bus Adapter) not supporting SSC as required. Disk drive vendors that tried turning on SSC have had to provide consumers special programs or jumpers to turn SSC off so they will work in non-compliant systems.

Intel
Apple
Apple discussions
SeriTek controller/Hitachi hard disks
Seagate
Western Digital
Hitachi

Due to this problem, users believe that SATA 3Gb/s HDD's are not compatible with SATA 1.5Gb/s controllers. This is inaccurate as the technology is definitely backwards compatible.

Q9: SATA NCQ / eSATA / xSATA

A9: NCQ: NCQ (Native Command Queuing) debuted in many 1.5Gbps drives as a refinement of earlier CQ schemes used in SCSI drives. When a supporting controller sends NCQ-enabled commands to a drive, the drive will intelligently prioritize up to 32 of those commands before performing the reads/writes. Because the controller triggers CQ, the user can enable/disable it in the OS, as from Windows XP's Device Manager. That applications that take advantage of the multithreading features of dual-core and/or Hyper-Threaded processors should complement NCQ for faster throughput.

Explains Native Command Queuing (NCQ) Seagate
http://www.seagate.com/docs/pdf/whitepaper/D2c_tech_paper_intc-stx_sata_ncq.pdf

eSATA: More of a cable and connector redesign than a fundamental change, eSATA means data cables with better shielding and connectors that are harder to accidentally dislodge or break. The external drive's power is still supplied separately. eSATA headers are rectangular instead of L-shaped, so eSATA cables won't work inside most PCs. The working group came up with eSATA to address the fact that users were already connecting SATA drives externally because the interface outpaces USB 2.0 and FireWire

800Mbps. Shielding that was adequate for use inside a computer case, wasn't good enough outside the box.

xSATA: This option allows the use of much longer external data cables of up to 8 meters in length.

Q10: Can I cut down size of hard drive?

A10: Yes. In 'Device List' menu select your disk drive. Select 'SET MAX (HPA) Menu', then select 'Set Max Address' and press Enter. Now you can choose your required size of hard drive. It should be smaller as native (maximal) size of drive, of course. See also question no. 1.

Q11: How can I determine supported media format of CD/DVD drive?

A11: In 'Device List' menu select your CD/DVD drive. Select 'Device Information Menu', then select 'Get Configuration' and press Enter. Now you will see list of supported profiles of your drive.

Q12: Portable computer with Windows Vista has problem with power consumption.

A12: Power consumption may be slightly more than expected on a portable Windows Vista-based computer that uses a SATA hard disk that does not support Host-Initiated Link Power Management.
This problem may occur if the SATA hard disk does not support HIPM. In this case, Windows Vista may not use DIPM for power management. Therefore, the Windows Vista power management feature is less able to efficiently manage power consumption.
See MS Article ID: 932079.

Q13: Host Protected Area (HPA) from BIOS.

A13: Some motherboards has incorporated the HPA feature in the BIOS. This feature allows information contained in the first partition of the Hard Drive to be copied to a hidden HPA partition on the same drive where it is immune from attack.
If the HPA is removed from the HD the area of use will be available at the end of the drive as 'Unallocated'.
E.g. Gigabyte's Xpress Recovery.

Q14: The Hidden Protected Area (hidden partition).

A14: The Hidden Protected Area is a special area (hidden partition) (usually a few gigabytes in size) located at the end of a hard disk. It is preinstalled on the hard disks of some PC's (e.g. IBM). It is normally hidden to the software running on this PC. It includes all the software and data needed to recover the preloaded state of the PC. This HPA also includes some diagnostic tools and a backup tool. Some vendors are using the HPA instead of providing rescue media.
It is referred to as the Predesktop Area in the BIOS Setup Utility. That hidden partition is not an HPA.

Q15: I cannot remove Host Protected Area (HPA) on Dell notebook (Media Direct HPA).

A15: With HDAT2 program you did the first half of the fix but missed the second part. The Dell MBR (Master Boot Record at sector 0) calls special code in LBA sector 3 to re-enable the HPA anytime you boot from the hard disk. After you unhide the HPA, in order for it to stay unhidden you need to either get rid of the Dell MBR (so LBA-3 does not get called) or you need to disable LBA-3 (wipe LBA sector 3). (search on Google for 'dell hpa mediadirect')

Q16: I cannot read SMART for USB/FireWire hard drives.

A16: It all depends on the chip your USB/FireWire enclosures with drive have. The protocol USB-IDE bridge between the USB and ATA protocols should support SMART data and correctly send SMART data over those interfaces. If you cannot see the SMART menu, your drive cannot send SMART data.
Supported bridge chips: Cypress, JMicron and Oxford.
E.g. Western Digital Passport is using Cypress AT2+ USB/ATA interface.

Q17: Western Digital WD5000KS does not spin-up (firmware bug).

A17: Taken over from Google Notebook.
If any controller or software you have enables the "Power-up in Standby" feature on these drives, you cannot disable it. In fact, once that mode is enabled, the drive reports conflicting information.
Western Digital said on the phone the KS line of drives are not a high-enough priority for them to fix the firmware.

Q18: How to non-destructively convert dynamic disks to basic disks.

A18: Read this instruction disk_probe.pdf.

Q19: Hard disk does not spin-up - PUIS (Power-Up In Standby).

A19: The optional Power-Up In Standby (PUIS) feature set allows devices to be powered-up into the Standby power management state to minimize current at power-up and to allow the host to sequence the spin-up of devices.
This optional feature set may be enabled or disabled via the SET FEATURES command or may be enabled by use of a jumper, or both. When enabled by a jumper, this feature set shall not be disabled via the SET FEATURES command.

Once this feature is enabled in a device, the device shall not disable the feature as a result of processing a power-on reset, a hardware reset, or a software reset.

If the device implements this SET FEATURES subcommand and power-up into Standby is enabled, the device shall remain in Standby until the SET FEATURES subcommand is received.

If the device does not implement the SET FEATURES subcommand to spin-up the device after power-up and PUIS is enabled, the device shall spin-up upon receipt of the first command that requires the device to access the media, except the IDENTIFY DEVICE command or the IDENTIFY PACKET DEVICE command.

Solution for HDAT2 program: if you have a hard disk with enabled PUIS (cannot spin up and BIOS cannot recognize this drive) run program with parameter /W Wake/Spin-up the drive:

HDAT2 /W

Without the parameter /W, when PUIS is detected on the disk, the program asks you to turn off PUIS.

List of parameters: HDAT2 /? or HDAT2 /h.

Q20: Windows support for logical units larger than 2 TB.

A20: Disk devices with more than 2 TB of disk space must be converted to GPT format for all of the disk space to be usable. If the device uses MBR format, the disk space beyond 2 TB will be unusable.

Q21: GUID partition table (GPT) disks.

A21: A GPT disk uses the GUID partition table (GPT) disk partitioning system. A GPT disk offers these benefits:

Allows up to 128 primary partitions. (MBR disks can support up to four primary partitions and an infinite number of partitions inside an extended partition.)
Allows a much larger volume size - greater than 2 TB, which is the limit for MBR disks.
Provides greater reliability due to replication and cyclical redundancy check (CRC) protection of the partition table.
Can be used as a storage volume on all x64-based platforms, including platforms running Microsoft Windows XP Professional x64 Edition. Windows Server 2003 SP1 also enables support for GPT in x86 versions of the Windows Server 2003 family.
Notes:
Unlike Windows support for the Intel Itanium platform, Windows x64 Edition and Windows Server 2003 SP1 operating systems support the use of GPT drives only as data volumes. Because the x64 and x86 architectures do not provide support for an EFI boot partition, you cannot use a GPT drive to boot an x64-based computer or an x86-based computer with a legacy BIOS. Therefore, computers running these operating systems must be equipped with more than one physical driver to allow the use of the GPT disk format.

On Intel Itanium platforms, Windows supports the use of GPT drives as boot drives or data volumes.

You can convert only empty, unpartitioned disks (raw drives or empty MBR drives) to the GPT format. To convert a volume that contains data, you must first manually delete the partition.
GPT is part of the EFI specification.

Extensible Firmware Interface (EFI) describes an interface between the operating system and the platform firmware.

Unified Extensible Firmware Interface (UEFI) https://uefi.org/
UEFI computers require at least three GPT partitions:

1. An EFI system partition (ESP) to store the boot applications and other related information (EFI drivers). Windows does not assign a driver letter to the ESP. This partition should not be used for any user or application data files.

2. A Microsoft reserved (MSR) partition, which must be located between the ESP and the Windows operating system partitions.

3. A Windows system partition.

Q22: Physical/Logical sector size 512 bytes or 4096 bytes (8*512 = 4 KB).

A22: Starting in December 2009, hard disk manufacturers began introducing disks that use 4096-byte sectors rather than the more common 512-byte sectors. Although this change is masked by firmware that breaks the 4096-byte physical sectors into 512-byte logical sectors for the benefit of the operating system, the use of larger physical sectors has implications for disk layout and system performance.

(e.g. "Advanced Format Technology" from Western Digital)

The physical medium is organized in 4 KB sectors but the firmware on the drive will present it as if the drive is composed of 512 byte sectors thus making the drive behave as before, so if the driver asks the hard drive to read 64 sectors from LBA 2048, the firmware will translate it and read 8 4 KB sectors from hardware sector 256. As a result, the hard drive now has two sector sizes - the physical one which the physical media is actually organized in, and the logical one which the firmware presents to the outside world.

Some of the existing BIOSs and/or drivers can't cope with drives which report 4 KB physical sector size. To work around this, some drive models lie that its physical sector size is 512 bytes when the actual configuration is 4 KB without offsetting.

Therefore the information about sector size from ATA IDENTIFY DEVICE command returns an incorrect value (e.g. WD, Samsung).

Q23: Error Page Fault when the program starts.

A23: If you start the program HDAT2, you can get the following error:

Page Fault cr2=00400000 at eip=419; flags=3206 Eax=00000300 ebx=00330021 ecx=000000a6 edx=bfeb00bf esi=00000000 edi=00000000 Ebp=00000001 esp=00003ffa cs=87 ds=bf es=b7 fs=0 gs=0 ss=a7 **error=0006**

In this case you have to use another DPMI server HDPMI32.EXE.

If you are using a distribution version from HDAT2 web just type HDAT2x instead of HDAT2. It will load the DPMI server HDPMI32, run HDAT2 and then unload HDPMI32 server from memory.

If you are using another version or only single EXE file on e.g. USB device, you have to download the HDPMI32.EXE file, copy this file to your boot medium and run these commands:

hdpmi32 -r
hdat2
hdpmi32 -u

To get help run

hdpmi32 -?

License: HDPMI is part of the HX DOS extender runtime, which is freeware. It may be used for any purpose.