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SAS-2 Integrated RAID Configuration Utility (SAS2IRCU)

User Guide

Version 1.1
November 2012

DB15-000933-01

Revision History

Version and Date	Description of Changes
Version 1.1, November 2012	<ul style="list-style-type: none">■ Added information about new commands DELETEVOLUME, BOOTIR, BOOTENCL, and HELP.■ Added support for 4-KB sector disk drives.■ Updated information about supported operating system architecture, supported LSI controller chips, and supported operating systems.
Version 1.0, February 2012	Initial release of this document.

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Document Number: DB15-000933-01
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SAS-2 Integrated RAID Configuration Utility (SAS2IRCU) User Guide

This document explains how to use the command-line-driven SAS-2 Integrated RAID configuration utility (SAS2IRCU) to create Integrated RAID volumes on LSI SAS-2 controllers.

You execute SAS2IRCU commands from a command-line prompt or a shell script. When you use a SAS2IRCU command, the program returns a status value to the operating system when it exits.

You can use SAS2IRCU to quickly and efficiently configure Integrated RAID devices on LSI SAS-2 controllers.



NOTE In this document, the term *disk* means hard disk drive (HDD) and solid state drive (SSD), and the HDDs or SSDs can support either SAS or SATA protocol.

1 Hardware and Software Requirements

SAS2IRCU runs on the following operating system architecture:

- Windows®: x86, x64 (AMD64)
- Linux®: x86, x86_64 (supported with x86 build), PPC64
- UEFI: EFI Byte Code (EBC)
- Solaris®: x86 (or compatible), SPARC®
- FreeBSD®: x86 (or i386), AMD64 (or compatible)

SAS2IRCU operates with storage devices that are compliant with existing SCSI standards.

1.1 Controller Support

SAS2IRCU supports the following LSI SAS-2 controllers and the host bus adapters based on these controllers:

- LSISAS2004
- LSISAS2008
- LSISAS2108
- LSISAS2208
- LSISAS2304
- LSISAS2308

1.2 Operating System and Software Support

SAS2IRCU requires PCI 2.x or PCI 3.0 firmware and MPI v2.0. SAS2IRCU supports the following operating systems.



NOTE LSI® recommends that you use the latest version of the driver for any operating system.

- Windows Server® 2003, Windows XP, Windows Vista®, Windows Server 2008 R2, Windows 7, Windows 8, Windows Server 2012
- UEFI 2.1, UEFI 2.3

- Linux 2.6 Kernel - Red Hat® Enterprise Linux (RHEL) 5 and higher, SUSE® Linux Enterprise Server (SLES) 10 and higher
Requires the Linux driver v00.255.04.00 or greater. LSI recommends that you use the latest version of the driver available on the LSI website.
- MS-DOS® 6.22 and FreeDOS 1.0
SAS2IRCU runs on DOS only if the system BIOS supports 32-bit BIOS services, including the PCI BIOS services. SAS2IRCU uses these services to directly access the controller and its interface registers.
- Solaris 10 update 10, Solaris 11 express (CPU – x86 and x64)
Oracle® provides a built-in Solaris 10 driver for the LSI 3Gb/s and 6Gb/s SAS and SCSI adapters. Installation of an LSI driver is not required. For information about installing the Oracle Solaris 10 driver, refer to the Oracle website. Contact Oracle directly if you have questions about the Oracle driver.
- FreeBSD 7.2 and higher in both 32-bit and 64-bit architecture
- VMware® ESXi 5.0

2 Interface Description

Use this syntax for SAS2IRCU commands:

```
sas2ircu <controller_#> <command> <parameters>
```

Use a space to separate the program name, the controller number, the command, and the parameters fields. The format of *<parameters>* is command specific.

Information passes between the user environment and SAS2IRCU through the command line, the standard output and standard error interfaces, and the program return value. It is possible to redirect the output streams as permitted by the operating system. When the program exits, it returns a value of 0 if the command is successful. Otherwise, it returns a value of 1.

If a command fails, SAS2IRCU prints the IOCStatus and IOCLogInfo on the console. This information is useful in determining the cause of the failure.

3 Commands

The following table lists the SAS2IRCU commands and shows which commands are supported on each operating system. Click the hyperlinks to view information about the commands.

Table 1 SASIRCU Commands

SAS2IRCU Command	Operating System				
	DOS	Linux	EFI	Solaris	FreeBSD
CREATE	X	X	X	X	X
DELETE	X	X	X	X	X
DELETEVOLUME	X	X	X	X	X
DISPLAY	X	X	X	X	X
HOTSPARE	X	X	X	X	X
LIST	X	X	X	X	X
STATUS	X	X	X	X	X

Table 1 SASIRCU Commands (Continued)

SAS2IRCU Command	Operating System				
	DOS	Linux	EFI	Solaris	FreeBSD
CONSTCHK	X	X	X	X	X
ACTIVATE	X	X	X	X	X
LOCATE	X	X	X	X	X
LOGIR	X	X	X	X	X
BOOTIR	X	X	X	X	X
BOOTENCL	X	X	X	X	X
HELP	X	X	X	X	X

The commands are not case sensitive. The individual command descriptions that follow use the following conventions:

- Replace text enclosed in < > with a required parameter, such as a controller number or a volume type.
- Replace text enclosed in [] with an optional parameter.
- Enter parameters enclosed in { } one or more times, as required for the command.
- Do not use the command-line definition characters < >, [], and { } on the command line.

3.1 Common Command-Line Parameters

This section describes command-line parameters that are common to more than one command.

- `<controller_#>`
The unique controller number that the program assigns to each *PCI function* found on supported controller chips in the system, starting with controller # 0. For example, in a system containing two LSI SAS2008 controllers, controller # 0 references the first controller and controller # 1 references the other controller. Use the LIST command to view a list of controllers connected to the system and the controller number for each controller. Valid controller number values are 0 to 255 (decimal).
- `<Enclosure:Bay>`
The enclosure and bay (or slot) of a peripheral device attached to the bus. The argument must use a colon (:) as a separator and must follow the *Enclosure:Bay* format. *Enclosure* is a 16-bit EnclosureHandle value set by the I/O controller (IOC). A value of 0 is invalid. *Bay/Slot* is a 16-bit slot value set by the IOC. Use the DISPLAY command to determine the enclosure number and slot number of a drive.

3.2 CREATE

The CREATE command creates Integrated RAID volumes on LSI SAS-2 controllers.

When you add a disk to an Integrated RAID volume, the volume might not use all of the disk's storage capacity. For example, if you add a 300-GB disk drive to a volume that only uses 200 GB of capacity on each disk drive, the volume does not use the remaining 100 GB of capacity on the disk drive.

The disk identified by the first *Enclosure:Bay* on the command line becomes the *primary disk* drive when you create an Integrated Mirroring (RAID 1) volume. If the controller resynchronizes the disk drives, the data on the primary disk drive becomes available when you access the newly created volume.

When the Integrated RAID firmware creates a RAID 1 volume, it starts a background initialization of the volume. Use the STATUS command to monitor the status of the initialization.

The following restrictions and defaults apply when you create Integrated RAID volumes and hot spare disks:

- All disks that are part of a volume, including hot spares for that volume, must be connected to the same LSI SAS-2 controller.
- The supported RAID levels are RAID 0, RAID 1, RAID 1E, or RAID 10.
- The maximum and minimum disk drives per RAID level are as follows:
 - RAID 0: Max = 10; Min = 2.
 - RAID 1: Max = 2; Min = 2.
 - RAID 1E: Max = 10; Min = 3.
 - RAID 10: Max = 10; Min = 3.
- You can create a maximum of two Integrated RAID volumes per LSI SAS-2 controller.
- You can create one or two hot spare disks per controller. For more information about hot spare disks, see Section 3.6, [HOTSPARE](#).
- Each LSI SAS-2 controller supports a maximum of 14 physical disks for the RAID volumes and hot spares.
- SAS2IRCU does not allow you to create an Integrated RAID volume that combines SAS and SATA hard disk drives.
- SAS2IRCU does not allow you to create an Integrated RAID volume that combines solid-state drives (SSDs) and hard disk drives.
- SAS2IRCU supports disk drives with 512-byte sectors and disk drives with 4-KB sectors. However, an Integrated RAID volume must use all 512-byte-sector drives or all 4-KB-sector drives. You cannot combine the two types of drives in a single Integrated RAID volume.



NOTE Some operating systems do not fully support 4-KB-sector drives. Refer to the documentation for the operating system you are using.

3.2.1 Command Line

```
sas2ircu <controller_#> create <volume_type> <size> {<Enclosure:Bay>}  
[VolumeName] [noprompt]
```

3.2.2 Parameters

- *<controller_#>* – The index of the controller for the newly created volume.
- *<volume_type>* – Volume type for the new volume. Valid values are RAID0, RAID1, RAID10, or RAID1E.
- *<size>* – Size of the RAID volume in MB, or *MAX* for the maximum size available.
- *<Enclosure:Bay>* – The *Enclosure:Bay* value of the disk drive for the new RAID volume. Determine these values from the output of the *DISPLAY* command. DOS does not support addressing by *Enclosure:Bay*.
- *[VolumeName]* – A user-specified string to identify the volume.
- *[noprompt]* – This optional parameter prevents warnings and prompts from appearing while the command is running.

3.2.3 Program Return Value

- 0x00 SUCCESS: Command completed successfully.
- 0x01 FAILURE: Bad command-line arguments or operational failure.
- 0x02 ADAPTER_NOT_FOUND: Cannot find specified adapter.

3.3 DELETE

The DELETE command deletes all RAID 0, RAID 1, RAID 10, and RAID 1E Integrated RAID volumes and hot spare drives from the specified LSI SAS-2 controller. The hot spare is deleted only if it is inappropriate for any of the remaining volumes. The command does not change any other controller configuration parameters. Use the STATUS command or the DISPLAY command to determine the volume ID of the volume you want to delete.

3.3.1 Command Line

```
sas2ircu <controller_#> delete [noprompt]
```

3.3.2 Parameters

- <controller_#> – The index of the controller with the volume or volumes that you want to delete.
- [noprompt] – This optional parameter prevents warnings and prompts from appearing while the command is running.

3.3.3 Program Return Value

0x00 SUCCESS: Command completed successfully.
0x01 FAILURE: Bad command-line arguments or operational failure.
0x02 ADAPTER_NOT_FOUND: Cannot find specified adapter.

3.4 DELETEVOLUME

The DELETEVOLUME command deletes a specific RAID 0, RAID 1, RAID 10, or RAID 1E volume and the associated hot spare drives on the specified controller. The hot spare is deleted only if it is inappropriate for any of the remaining volumes. No other controller configuration parameters are changed.

3.4.1 Command Line

```
sas2ircu <controller_#> deletevolume <volumeID> [noprompt]
```

3.4.2 Parameters

- <controller_#> – The index of the controller with the volume or volumes that you want to delete.
- <volumeID> – The volumeID of the specific IR volume that you want to delete.
- [noprompt] – This optional parameter prevents warnings and prompts from appearing while the command is running.

3.4.3 Program Return Value

0x00 SUCCESS: Command completed successfully.
0x01 FAILURE: Bad command-line arguments or operational failure.
0x02 ADAPTER_NOT_FOUND: Cannot find specified adapter.

3.5 DISPLAY

The DISPLAY command displays information about LSI SAS-2 controller configurations, including controller type, firmware version, BIOS version, volume information, physical drive information, and enclosure. See the following sample output example.

The physical device information section displays the duplicate device of a dual-port SAS drive.

3.5.1 Command Line

```
sas2ircu <controller_#> display [filename]
```

3.5.2 Parameters

- `<controller_#>` – The index of the controller for which you want to display information.
- `[filename]` – An optional valid filename to store the command output to a file.

3.5.3 Program Return Value

- 0x00 SUCCESS: Command completed successfully.
- 0x01 FAILURE: Bad command-line arguments or operational failure.
- 0x02 ADAPTER_NOT_FOUND: Cannot find specified adapter.

3.5.4 Sample Output

Following is a sample of the information that the DISPLAY command returns.

```
Read configuration has been initiated for controller 0
```

```
-----  
Controller information  
-----
```

```
Controller type           : SAS2008  
PI Supports               : Yes  
PI Mixing                 : Enabled  
BIOS version              : 7.00.02.00  
Firmware version         : 00.250.19.0  
Channel description      : 1 Serial Attached SCSI  
Initiator ID              : 112  
Maximum physical devices : 62  
Concurrent commands supported : 266  
Slot                      : 3  
Segment                   : 0  
  Bus                     : 64  
  Device                   : 1  
  Function                 : 0  
  RAID Support             : Yes  
-----
```

```
IR Volume information  
-----
```

```
IR volume 1  
Volume ID                 : 286  
PI Supported              : Yes  
PI Enabled                : Yes  
Status of volume         : Okay (OKY)  
Volume wwid               : 0677c0fb06777e7b  
RAID level                : RAID1  
Size (in MB)             : 139236  
Boot                     : Primary  
Physical hard disks      :  
  PHY[0] Enclosure#/Slot# : 1:0  
  PHY[1] Enclosure#/Slot# : 1:1  
-----
```

```
Physical device information  
-----
```

```
Initiator at ID #0
```

```
Device is a Hard disk
```

```
Enclosure #           : 1
Slot #               : 0
SAS Address          : 5000c50-0-1ab7-3406
State                : Optimal (OPT)
Size (in MB)/(in sectors) : 140014/286749487
Manufacturer         : SEAGATE
Model Number        : ST9146852SS
Firmware Revision   : 0005
Serial No           : 6TB008T700009038TL1L
GUID                : 5000c5001ab73407
Protocol             : SAS
Drive Type          : SAS_HDD
```

Device is a Hard disk

```
Enclosure #           : 1
Slot #               : 1
SAS Address          : 5000c50-0-33ba-3d0e
State                : Optimal (OPT)
Size (in MB)/(in sectors) : 286102/585937499
Manufacturer         : SEAGATE
Model Number        : ST9300603SS
Firmware Revision   : 0006
Serial No           : 6SE35RZL0000B134JFS2
GUID                : 5000c50033ba3d0f
Protocol             : SAS
Drive Type          : SAS_HDD
```

Enclosure information

```
Enclosure#           : 1
Logical ID           : 51234567:89012345
Numslots             : 8
StartSlot            : 0
Primary Boot Slot    : 2
SAS2IRCU: Command DISPLAY Completed Successfully.
```

Integrated RAID Volume State values are as follows:

- Okay (OKY) – The volume is active and drives are functioning properly. User data is protected if the current RAID level provides data protection.
- Degraded (DGD) – The volume is active. User data is not fully protected because the configuration has changed or a drive has failed.
- Failed (FLD) – The volume has failed.
- Missing (MIS) – The volume is missing.
- Initializing (INIT) – The volume is initializing.
- Online (ONL) – The volume is online.

Physical device State values are as follows:

- Online (ONL) – The drive is operational and is part of a volume.
- Hot Spare (HSP) – The drive is a hot spare that is available to replace a failed drive in a volume.
- Ready (RDY) – The drive is ready for use as a normal disk drive, or it is ready to be assigned to a volume or a hot spare pool.
- Available (AVL) – The drive might not be ready, and it is not suitable for use in a volume or a hot spare pool.
- Failed (FLD) – The drive failed and is now offline.

- **Missing (MIS)** – The drive has been removed or is not responding.
- **Standby (SBY)** – The device is not a hard-disk device.
- **Out of Sync (OSY)** – The drive, which is part of an Integrated RAID volume, is not in sync with other drives that are part of the volume.
- **Degraded (DGD)** – The drive is part of a volume and is in degraded state.
- **Rebuilding (RBLD)** – The drive is part of a volume and is currently rebuilding.
- **Optimal (OPT)** – The drive is optimal and is part of a volume.

Physical device Drive Type values are as follows:

- **SAS_HDD** – The drive is a SAS HDD.
- **SATA_HDD** – The drive is a SATA HDD.
- **SAS_SSD** – The drive is a SAS SSD.
- **SATA_SSD** – The drive is a SATA SSD.

Physical device Protocol values are as follows:

- **SAS** – The drive supports SAS protocol.
- **SATA** – The drive supports SATA protocol.

3.6 HOTSPARE

The HOTSPARE command adds a hot spare drive to spare pool 0 or deletes a hot spare drive. The capacity of the hot spare drive must be greater than or equal to the capacity of the smallest drive in the RAID volume. Determine if this is true by using the DISPLAY command on the drive.

The following restrictions and defaults apply when creating hot spare disks:

- You cannot create a hot spare disk unless at least one RAID 1, RAID 10, or RAID 1E volume already exists on the controller.
- You cannot create a hot spare and add it to an inactive Integrated RAID volume.
- For hard-disk drives, you cannot add a SAS hot spare disk if the existing volumes on the controller use SATA disks. You cannot add a SATA hot spare disk if the existing volumes on the controller use SAS disks.
- You cannot add an SSD hot spare to a volume that has HDDs, and you cannot add an HDD hot spare to a volume that has solid state drives.
- For solid-state drives, you cannot add a SAS hot spare SSD to a volume with SATA SSDs and you cannot add a SATA hot spare SSD to a volume with SAS SSDs.
- You can create one or two global hot spares per LSI SAS-2 controller.

3.6.1 Command Line

```
sas2ircu <controller_#> hotspare [delete] <Enclosure:Bay>
```

3.6.2 Parameters

- **<controller_#>** – The index of the controller on which you want to create the hot spare disk.
- **<Enclosure:Bay>** – The *Enclosure:Bay* value for the hot spare disk drive. Determine these values from the output of the DISPLAY command. DOS does not support addressing by *Enclosure:Bay*.
- **[delete]** – This optional command deletes the hot spare disk at *Enclosure:Bay*.

3.6.3 Program Return Value

- 0x00 SUCCESS: Command completed successfully.
- 0x01 FAILURE: Bad command-line arguments or operational failure.
- 0x02 ADAPTER_NOT_FOUND: Cannot find specified adapter.

3.7 STATUS

The STATUS command displays the current status of any existing Integrated RAID volumes and the status of any operation that is currently in progress on the selected controller. If no operation is in progress, SAS2IRCU prints a message indicating this condition before it exits.

3.7.1 Command Line

```
sas2ircu <controller_#> status
```

3.7.2 Parameters

- <controller_#> - The index of the controller with the volumes whose status you want to display.

3.7.3 Program Return Value

0x00 SUCCESS: Command completed successfully.
0x01 FAILURE: Bad command-line arguments or operational failure.
0x02 ADAPTER_NOT_FOUND: Cannot find specified adapter.

3.7.4 Sample Output

Following is an example of the information that the STATUS command returns. In this example, a volume resynchronization is in progress on IR Volume 1, and no operation is in progress on IR Volume 2.

```
Background command progress status for controller 0...
IR Volume 1
  Volume ID                : 6
  PI Supported              : Yes
  PI Enabled                : Yes
  Current operation         : Synchronize
  Volume status             : Enabled
  Volume state              : Degraded
  Volume wwid               : 0e0651445de1ee60
  Physical disk I/Os       : Not quiesced
  Volume size (in sectors) : 70311936
  Number of remaining sectors : 68250624
  Percentage complete       : 2.93% IR Volume 2
IR Volume 1
  Current operation         : None
  Volume ID                : 6
  Volume status             : Enabled
  Volume state              : Optimal
  Volume wwid               : 0e0651445de1ee60
  Physical disk I/Os       : Not quiesced
```

The possible values for the fields in the status data are as follows:

- Current operation: *Synchronize, Consistency Check, OCE, Background Init, or None*
- Volume status: *Enabled or Disabled*
- Volume state: *[Inactive] Optimal, Degraded, Missing, or Failed*
- Physical disk I/Os: *Quiesced or Not quiesced*

3.8 LIST

The LIST command displays a list of all controllers in the system, along with each corresponding controller index. You need the controller index as an input parameter for other SAS2IRCU commands.

3.8.1 Command Line
`sas2ircu list`

3.8.2 Parameters
 None.

3.8.3 Program Return Value

0x00 SUCCESS: Command completed successfully.
 0x01 FAILURE: Command failed.
 0x02 ADAPTER_NOT_FOUND: Cannot find specified adapter.

3.8.4 Sample Output

Following is an example of the output of the LIST command. The format and fields in the output vary depending on the types of installed controllers.

Index	Adapter Type	Vendor ID	Device ID	Pci Address	SubSys Ven ID	SubSys Dev ID
0	SAS2008	1000h	72h	00h:01h:00h:00h	1000h	00dah
1	SAS2008	1000h	72h	00h:05h:00h:00h	1000h	00dah

3.9 CONSTCHK

The CONSTCHK command requests the Integrated RAID firmware to start a consistency check operation on the specified volume.

3.9.1 Command Line
`sas2ircu <controller_#> constchk <volumeId> [noprompt]`

3.9.2 Parameters

- `<controller_#>` – The index of the controller on which the consistency check operation runs.
- `<volumeId>` – The volume ID of an Integrated RAID volume, as listed in the DISPLAY command, on which the consistency check operation runs.
- `[noprompt]` – This optional parameter prevents warnings and prompts from appearing while the command is running.

3.9.3 Program Return Value

0x00 SUCCESS: Command completed successfully.
 0x01 FAILURE: Bad command-line arguments or operational failure.
 0x02 ADAPTER_NOT_FOUND: Cannot find specified adapter.

3.10 ACTIVATE

The ACTIVATE command activates an inactive Integrated RAID volume.

3.10.1 Command Line
`sas2ircu <controller_#> activate <volumeId>`

- 3.10.2 Parameters**
- `<controller_#>` – The index of the controller with the volume that requires activation.
 - `<volumeId>` – The volume ID of an Integrated RAID volume currently in the Inactive state.

3.10.3 Program Return Value

0x00 SUCCESS: Command completed successfully.

0x01 FAILURE: Bad command-line arguments or operational failure.

0x02 ADAPTER_NOT_FOUND: Cannot find specified adapter.

3.11 LOCATE

The LOCATE command locates a specific drive in a volume by turning on its location indicator and flashing its LED. The command works only for drives installed in a disk enclosure. It does not work for drives attached directly to the enclosure.

3.11.1 Command Line
`sas2ircu <controller_#> locate <Enclosure:Bay> <action>`

- 3.11.2 Parameters**
- `<controller_#>` – The index of the controller with the drives that you need to locate.
 - `<Enclosure:Bay>` – The enclosure and bay number of the drive.
 - `<action>` – The possible actions are as follows:
 - ON – Turn on the location indicator of the drive.
 - OFF – Turn off the location indicator of the drive.

3.11.3 Program Return Value

0x00 SUCCESS: Command completed successfully.

0x01 FAILURE: Bad command-line arguments or operational failure.

0x02 ADAPTER_NOT_FOUND: Cannot find specified adapter.

3.12 LOGIR

The LOGIR command uploads or clears the Integrated RAID log information.

3.12.1 Command Line
`sas2ircu <controller_#> logir <action> [filename] [noprompt]`

- 3.12.2 Parameters**
- `<controller_#>` – The index of the controller with the logs that you need to upload or clear.
 - `<action>` – The possible actions are as follows:
 - UPLOAD – Upload the controller logs to a file.
 - CLEAR – Clear the controller logs.
 - `[filename]` – This optional parameter specifies the name of the file to which the logs must be uploaded. The default filename is LOGIR.LOG.
 - `noprompt` – This optional parameter prevents warnings and prompts from appearing while the command is running.

3.12.3 Program Return Value

- 0x00 SUCCESS: Command completed successfully.
- 0x01 FAILURE: Bad command-line arguments or operational failure.
- 0x02 ADAPTER_NOT_FOUND: Cannot find specified adapter.

3.13 BOOTIR

The BOOTIR command selects an existing RAID volume as the primary boot device.

If an IR volume is selected as the boot device, the DISPLAY command displays this information in the IR Volume information section, if the selected IR boot volume is available to the controller. If you attempt to set a failed RAID volume as the primary boot device, the command fails with a warning message. For example, if volume 322 is in the failed state and you attempt to set it as the primary boot device, SAS2IRCU displays the following error message:
SAS2IRCU: Volume specified by 322 is in Failed state!

3.13.1 Command Line

```
sas2ircu <controller_#> bootir <volumeID>
```

3.13.2 Parameters

- <controller_#> - The index of the controller with the RAID volume that you want to select as the primary boot device.
- <volumeID> - The volume ID of the RAID volume that you want to select as the primary boot device.

3.13.3 Program Return Value

- 0x00 SUCCESS: Command completed successfully.
- 0x01 FAILURE: Bad command-line arguments or operational failure.
- 0x02 ADAPTER_NOT_FOUND: Cannot find specified adapter.

3.13.4 Sample Output

The following example of the output of the BOOTIR command shows a RAID volume as the primary boot device, after it was selected with the BOOTIR command. The format and fields in the output vary depending on the types of installed controllers.

```
-----  
IR Volume information  
-----  
IR volume 1  
Volume ID : 174  
Status of volume : Degraded (DGD)  
RAID level : RAID1  
Size (in MB) : 69376  
Boot : Primary  
Physical hard disks :  
PHY[0] Enclosure#/Slot# : 2:8  
PHY[1] Enclosure#/Slot# : 2:11  
-----
```

3.14 BOOTENCL

The BOOTENCL command selects a specific enclosure/slot as the primary boot device. If an enclosure/slot is selected as the boot location, the DISPLAY command displays this information in the Enclosure information section.

3.14.1 Command Line

```
sas2ircu <controller_#> bootencl <Enclosure:Bay>
```

3.14.2 Parameters

- <controller_#> – The index of the controller with the enclosure/slot that you want to select as the primary boot device.
- <Enclosure:Bay> – The enclosure:bay value of the disk drive that you want to select as the primary boot device.

3.14.3 Program Return Value

- 0x00 SUCCESS: Command completed successfully.
- 0x01 FAILURE: Bad command-line arguments or operational failure.
- 0x02 ADAPTER_NOT_FOUND: Cannot find specified adapter.

3.14.4 Sample Output

The following example of the output of the BOOTENCL command shows an enclosure:bay value as the primary boot device, after it was selected with the BOOTENCL command. The format and fields in the output vary depending on the types of installed controllers.

```
-----  
Enclosure information  
-----  
Enclosure# : 1  
Logical ID : 50000000:80000000  
Numslots : 8  
StartSlot : 0  
Enclosure# : 2  
Logical ID : 70000000:6546343f  
Numslots : 38  
StartSlot : 0  
Primary Boot Slot : 2  
-----
```

3.15 HELP

The HELP command displays usage information for the command specified in the input parameter.

3.15.1 Command Line

```
sas2ircu help <commandname>
```

3.15.2 Parameters

- <commandname> – The name of a supported SAS2IRCU command.

3.15.3 Program Return Value

- 0x00 SUCCESS: Command completed successfully.
- 0x01 FAILURE: Bad command-line arguments or operational failure.



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