

UTC3100 and 3170 POS RAID Information

Introduction

The UTC3100 and 3170 POS systems may be purchased in a RAID configuration. RAID is defined by Intel as: Redundant Array of Independent Drives: allows data to be distributed across multiple hard drives to provide data redundancy or to enhance data storage performance.

The UTC RETAIL systems are configured as RAID 1 (mirroring): The data in the RAID volume is mirrored across the RAID array's members. Mirroring is the term used to describe the key feature of RAID 1, which writes duplicate data to each member; therefore, creating data redundancy and increasing fault tolerance.

So what is a Volume? RAID Volume: A fixed amount of space across a RAID array that appears as a single physical hard drive to the operating system. Each RAID volume is created with a specific RAID level to provide data redundancy or to enhance data storage performance.

What is a RAID array? RAID Array: A logical grouping of physical hard drives.

Now that we covered the terms, let's try to make some sense of them.

RAID 1 (Mirroring)

A RAID 1 array contains two hard drives where the data between the two is mirrored in real time to provide good data reliability in the case of a single disk failure; when one disk drive fails, all data is immediately available on the other without any impact to the integrity of the data.

The following table provides an overview of the advantages, the level of fault-tolerance provided and the typical usage of RAID 1.

RAID 1 Overview

Hard Drives Required:	2
Advantage:	100% redundancy of data. One disk may fail, but data will continue to be accessible. A rebuild to a new disk is recommended to maintain data redundancy.
Fault- tolerance:	Excellent – disk mirroring means that all data on one disk is duplicated on another disk.
Application:	Typically used for smaller systems where capacity of one disk is sufficient and for any application(s) requiring very high availability.

Note: A hard drive (HDD) is an electro-mechanical device that has a specific failure rate predicted by the manufacturer. The MTBF, or Mean Time Between Failure specification is only an average; UTC RETAIL has seen hard drives fail 2 days after installation, and other hard drives still running after 10 years of use. The possibility of failure is why data backups must be performed; a HDD could fail at any time. A RAID 1 configuration allows the POS unit to continue to operate because the two HDDs in the RAID 1 Volume contain identical information. However, a RAID1 system is not a substitute for a data backup system. The HDD data must still be backed up according to industry standards. This means at a minimum, your data should be backed up onto media or a system that is off-site.

POS Configuration

UTC RETAIL RAID POS units are assembled with 2 identical hard drives (HDDs). When the POS is first booted at the factory, the boot screen identifies the two HDDs. The BIOS is accessed and the RAID functionality is enabled, as seen in the images below.

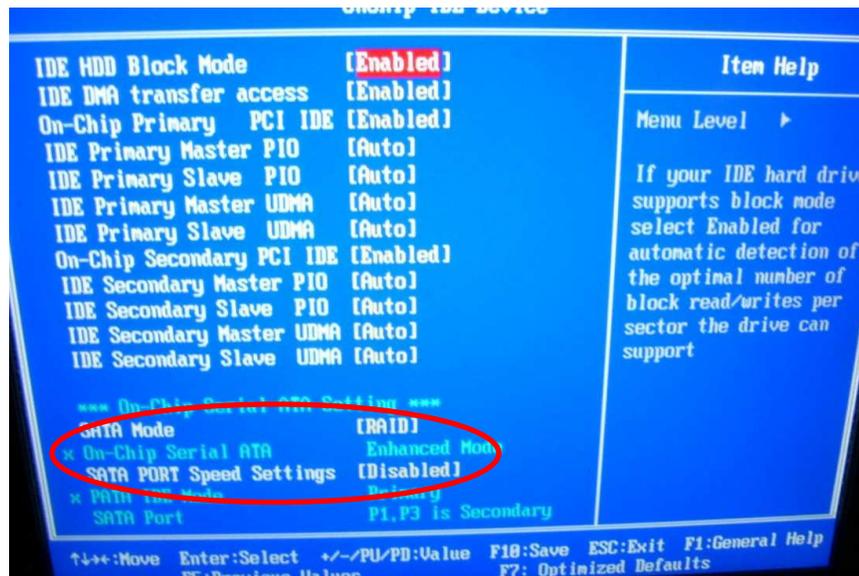


Figure 1, UTC3100 BIOS, RAID screen

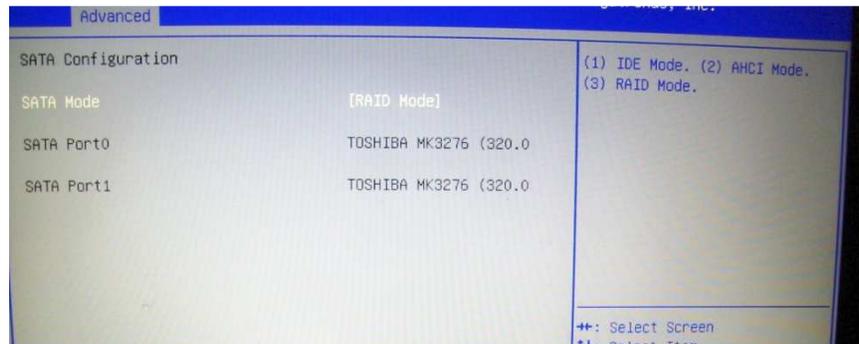


Figure 2, 3170 BIOS, RAID screen

After the BIOS is set, the Intel motherboard ROM is configured. On the UTC3100, the screen will be called "Intel Matrix Storage Manager option ROM v5.6.2.1002 ICH7R wRAID5". On the 3170, the screen will read " Intel Rapid Storage Technology – Option ROM – 10.1.0.1008 ". On both systems, CTRL+I is used to access the Setup functions. The setup of the Intel ROM does not need to be accessed or changed after initial setting.

Seen below are Intel screens for the POS units after the RAID ROM has been configured. The two HDDs in the array have been configured to be Volume0, in a RAID1 setup. The two HDDs are identified to be Members of the Volume and the Volume status is Normal, meaning no errors have been detected.

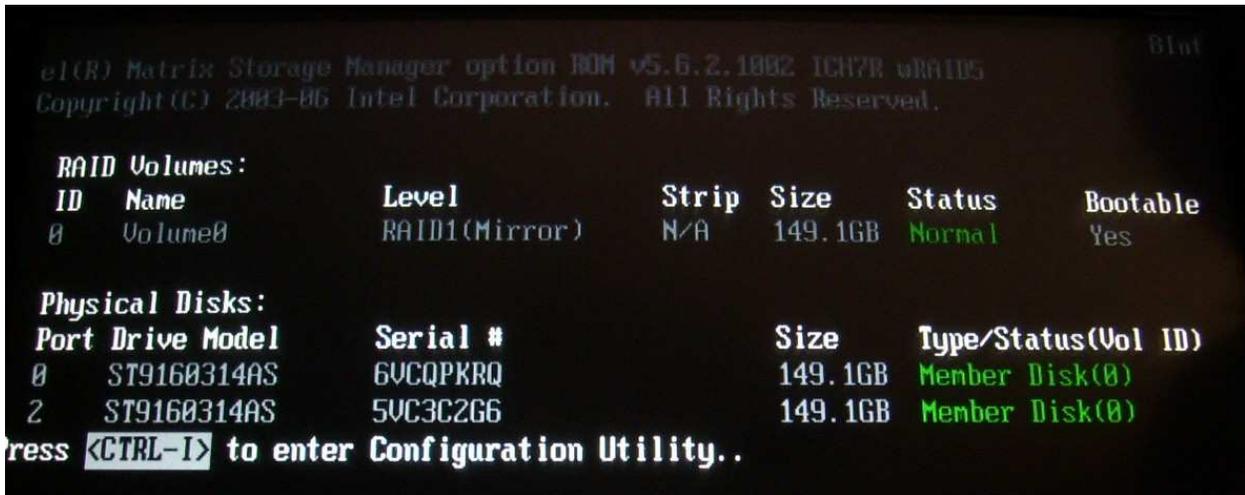


Figure 3, UTC3100 RAID screen

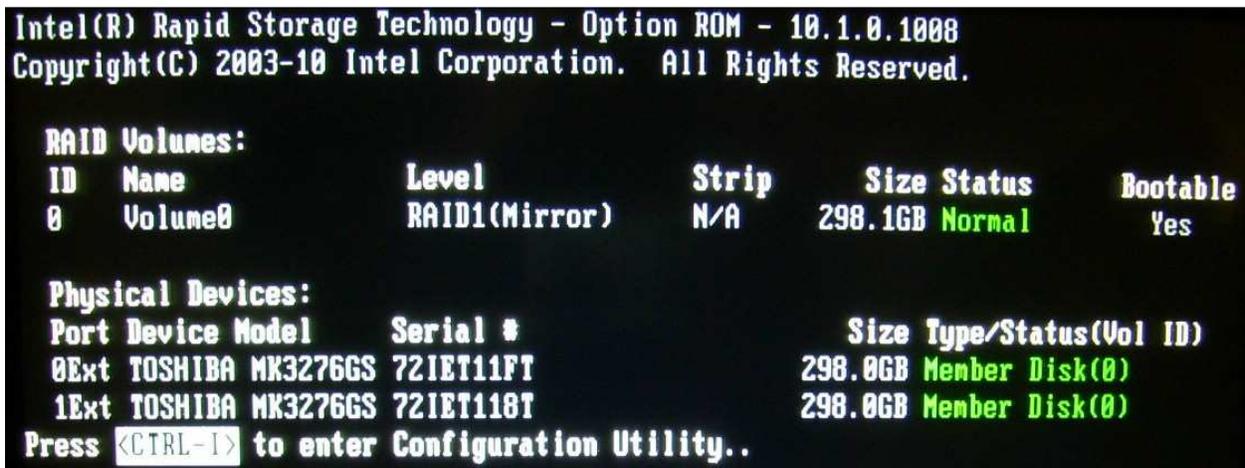


Figure 4, 3170 POS RAID screen

In the operating system, the Volume will be identified as single drive C.

Windows Desktop

At the POSReady 2009 Desktop, the System Tray has an icon for the Intel Rapid Storage Technology software.



At the POSReady 7 Desktop, Notification Area has an icon for the Intel Rapid Storage Technology



software.

In each O/S, the HDD with the green check mark is the indication the RAID array is in normal functioning status. For the remainder of this document, screen shots will be from the POSReady 2009 software. The display differences between POSReady 2009 and Windows 7 / POSReady 7 are negligible; the functionality is the same.

Right-click the check marked HDD, select Open Application and the Status screen of the Array is seen. The Array is identified as Volume0.

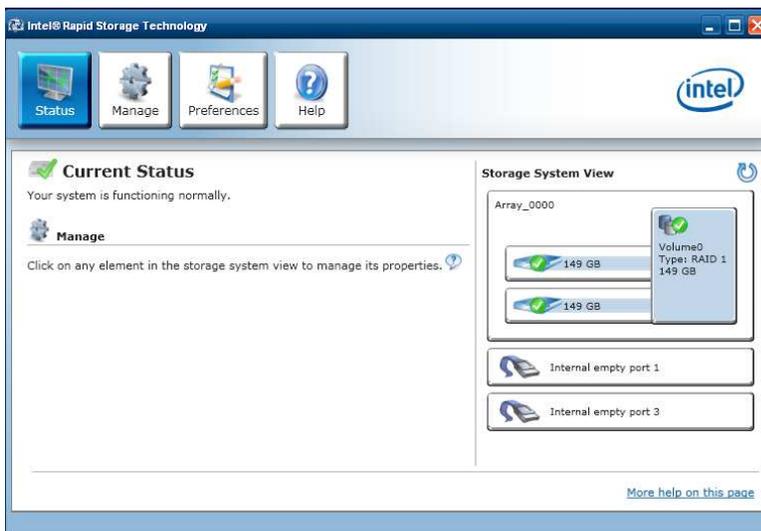


Figure 5, Array Function Normal

Select one of the HDDs on the Status screen, then select the Manage screen and information regarding the specific HDD can be found.



Figure 6, HDD Information

Windows sees this Array as a single drive, as can be checked in Disk Management and Windows Explorer.

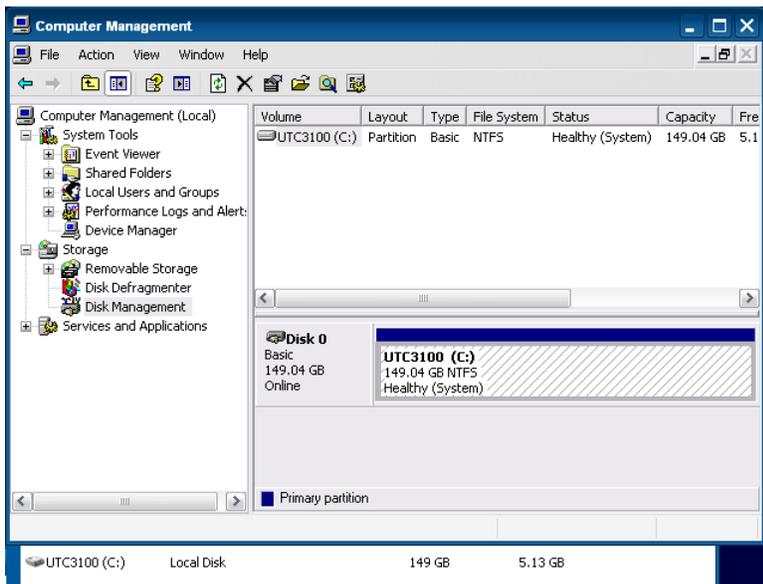


Figure 7, Disk Management and Explorer

Errors

Verify

You may boot your system and find the Intel BIOS screen is telling you the Volume status is Verify.

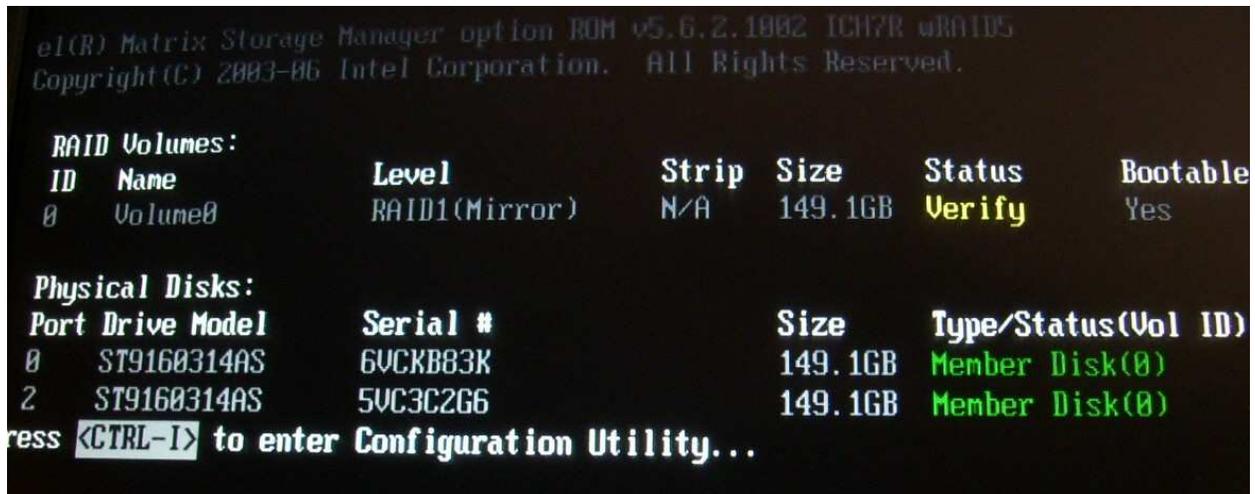
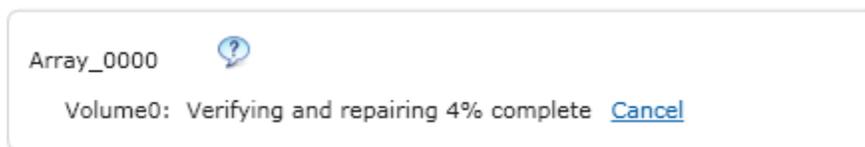


Figure 8, Volume0 in Verify Status

The RAID volume data verification process identifies any inconsistencies or bad data on a RAID 1 volume. The RAID volume data verification and repair process identifies and repairs any inconsistencies or bad data on a RAID 1 volume.

RAID1	Verify	Verify and Repair
	Bad blocks are identified	Bad blocks are reassigned.
	Data on the mirror drive is compared to data on the source drive.	If the data on the mirror drive does not match the data on the source drive, the data on the mirror is overwritten with the data on the source.

The system tray icon for the Intel software shows an hour glass: . Opening the software and looking at its status reveals the Verify and Repair process is occurring:



The POS may be used while the Verify & Repair process is being performed. The time to complete the process is dependent on the amount of data on the HDDs. The system will inform you when the process



The verification process can also be identified by review of the Event Viewer → Application log.

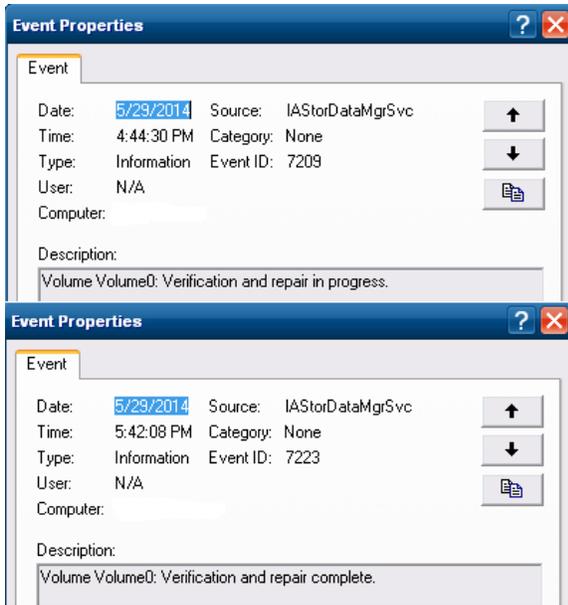
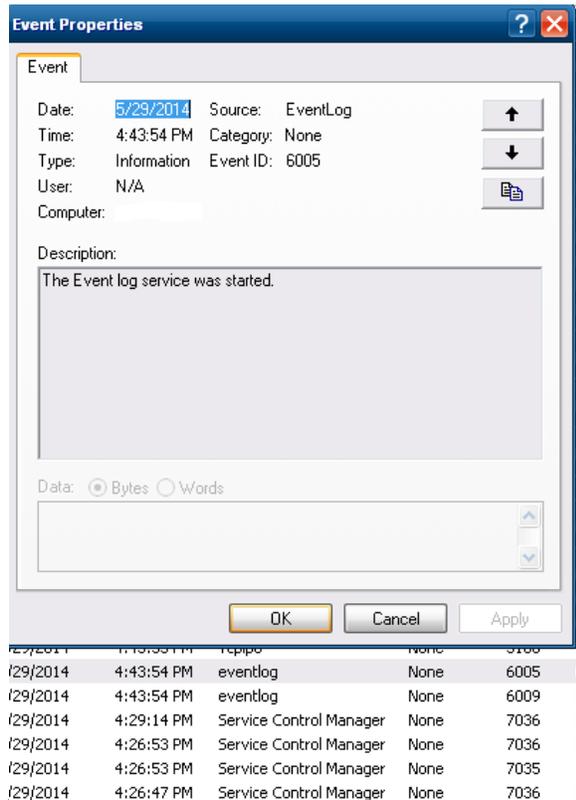


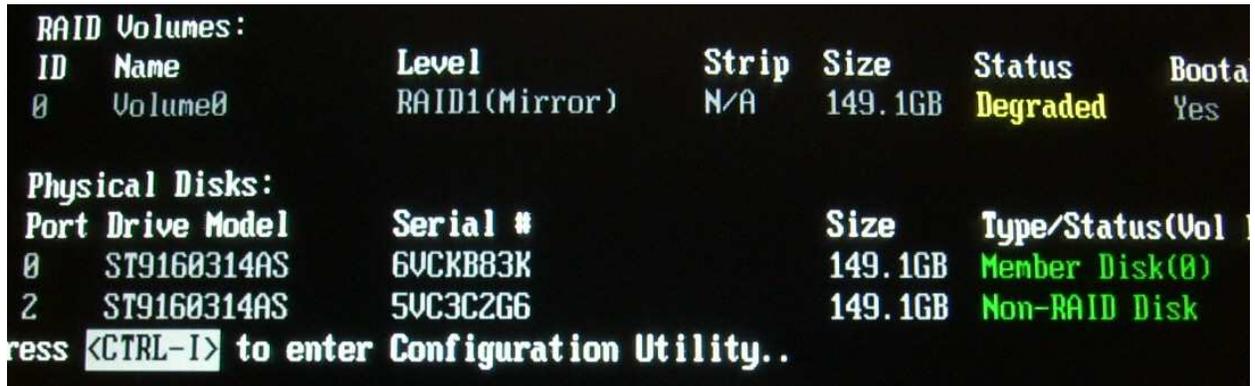
Figure 9, Application Event Viewer

A system crash generally is the cause for the verification and repair need. A crash can be identified by inspecting the System Event Log. For example, this Event ID: 6005 shows the log starting up when Windows was started up. However, there is no previous Event ID: 6006, showing the log was shutdown when Windows was shutdown. The only reason Windows did not shutdown the log was because there was a power loss, causing Windows to crash.



Rebuild

If a HDD is changed in the array, the Intel ROM software will indicate the RAID Volume is degraded:



```
RAID Volumes:
ID   Name           Level           Strip  Size   Status   Boota
0    Volume0       RAID1(Mirror)  N/A   149.1GB Degraded Yes

Physical Disks:
Port Drive Model   Serial #       Size   Type/Status(Vol
0    ST9160314AS    6VCKB83K      149.1GB Member Disk(0)
2    ST9160314AS    5VC3C2G6      149.1GB Non-RAID Disk

Press <CTRL-I> to enter Configuration Utility..
```

Figure 10, RAID Degraded

A RAID volume exists, but a HDD in the volume was replaced and upon restart, the software detects this change. When the Configuration Utility is accessed the new HDD may be added to the volume.



```
[ DEGRADED VOLUME DETECTED ]
"Degraded" volume and disk available for rebuilding detected. Selecting
a disk initiates a rebuild. Rebuild completes in the operating system.

Select the port of the destination disk for rebuilding (ESC to exit):
Port Drive Model   Serial #       Size
2 ST9160314AS      5VC3C2G6      149.1GB

[↑↓]-Previous/Next  [ENTER]-Select  [ESC]-Exit
Port Drive Model   Serial #       Size   Type/Status(Vol ID)
ST9160314AS       6VCKB83K      149.1GB Member Disk(0)
ST9160314AS       5VC3C2G6      149.1GB Non-RAID Disk
```

Figure 11, Add HDD to the Volume

After the HDD is added, the software indicates the Volume must be rebuilt and it will be performed within the Operating System.

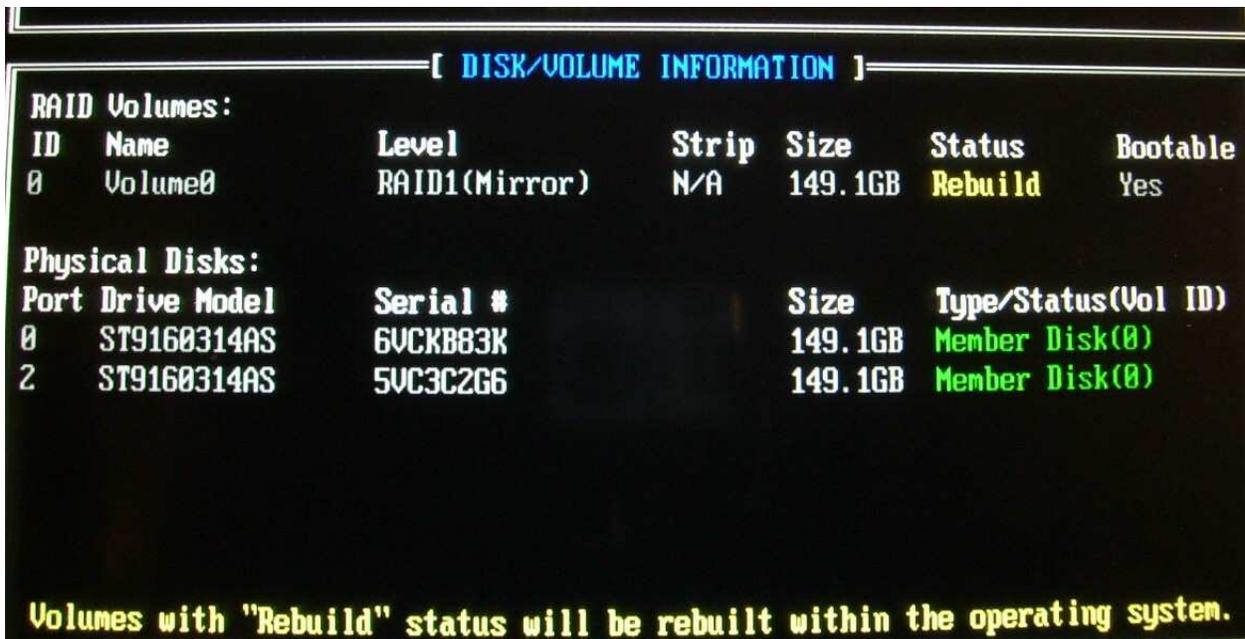


Figure 12, Volume with Rebuild Status

The System Tray icon for the Intel RST software will show an hourglass indicating an action is taking place. Open the software and the status screen gives information about the rebuild.



Figure 13, Volume Rebuilding

The software reports: "Your system is functioning normally.". This indicates the system is up and running, and the RAID1 process is operating correctly. To the right two HDDs have a green checkmark and one HDD shows a yellow exclamation point. The two checkmarks indicate the two HDDs in the volume area functioning OK, the yellow exclamation point is referencing the HDD that is "missing". To the left is the message the volume is rebuilding and when it is completed, the software will inform you.



Figure 14, Rebuild Complete

HDD Failure

When a HDD fails, it may appear to the system that it is missing. To repair the system, make a complete backup of the data on the system and then contact UTC RETAIL to arrange a system repair.



Figure 15, System Tray, HDD Failure

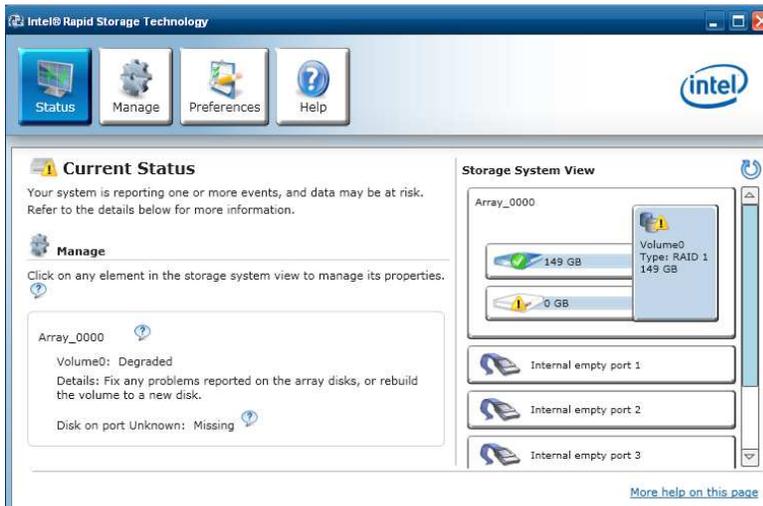


Figure 16, HDD Failure

Conclusion

POS systems offered by UTC RETAIL with RAID 1 provide an excellent setup of data redundancy. The Intel software has several customizations the end user may apply – Change the Volume type, Write-Cache buffering flushing, Cache Mode, Initialization of a Volume and Verification On Demand are some options. The user of a UTC3100 or 3170 POS in a retail environment should not modify the system settings. Let the system run and monitor itself. If and when needed, it will attempt to correct and repair any errors detected. The software will inform the user of its status via the GUI and the Windows System Event logs. Any software customizations and experiments should be done by an IT expert and on a system in an offline condition or lab environment.