

Everything you always wanted  
to know about SSDs

But were afraid to ask.

# Remember the SST?? The Supersonic Transport?



The Concorde supersonic transport had an ogival delta wing, a slender fuselage and four underslung Rolls-Royce/Snecma Olympus 593 engines.



The Tupolev Tu-144 was the first SST to enter service and the first to leave it. Only 55 passenger flights were carried out before service ended due to safety concerns. A small number of cargo and test flights were also carried out after its retirement.

What does the SST have in common with an SSD? They're both very fast.

# What's an SSD?

Solid State Drive

*Noun* COMPUTING

a storage device containing nonvolatile flash memory, used in place of a hard disk because of its much greater speed.

"a decent SSD offers arguably the biggest jump in performance for your general PC experience"

non·vol·a·tile

/,nän'välədl/

*adjective*

adjective: **non-volatile**; adjective: **nonvolatile**

(of a computer's memory) retaining data even if there is a break in the power supply.

# HDD

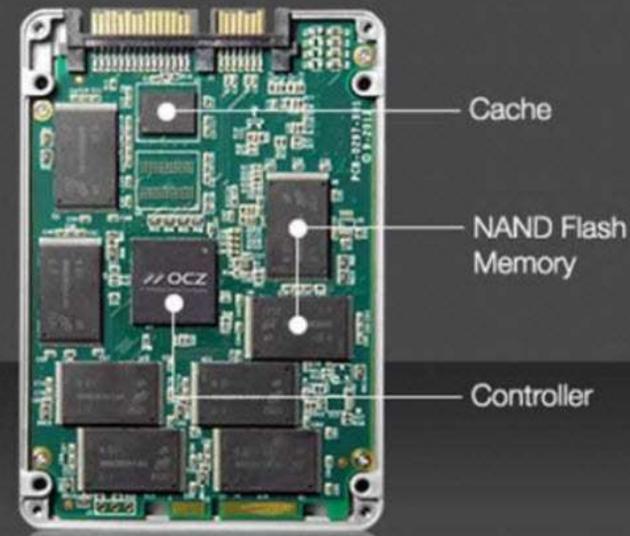
3.5"



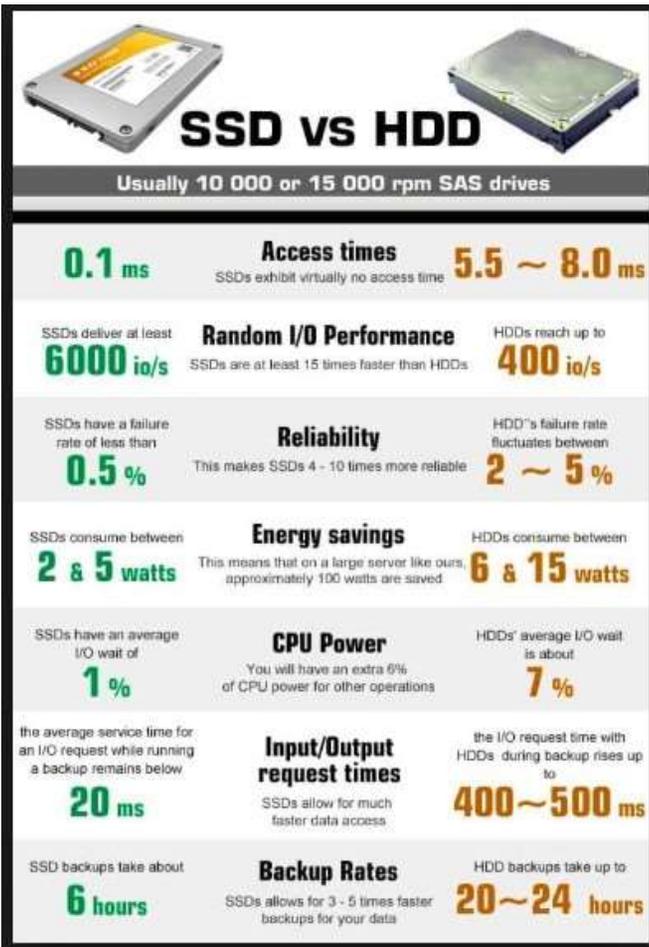
Shock resistant up to 350g/2ms

# SSD

2.5"



Shock resistant up to 1500g/0.5ms



**SSD vs HDD**  
Usually 10 000 or 15 000 rpm SAS drives

<b>0.1 ms</b>	<b>Access times</b> SSDs exhibit virtually no access time	<b>5.5 ~ 8.0 ms</b>
SSDs deliver at least <b>6000 io/s</b>	<b>Random I/O Performance</b> SSDs are at least 15 times faster than HDDs	HDDs reach up to <b>400 io/s</b>
SSDs have a failure rate of less than <b>0.5 %</b>	<b>Reliability</b> This makes SSDs 4 - 10 times more reliable	HDD's failure rate fluctuates between <b>2 ~ 5 %</b>
SSDs consume between <b>2 &amp; 5 watts</b>	<b>Energy savings</b> This means that on a large server like ours, approximately 100 watts are saved.	HDDs consume between <b>6 &amp; 15 watts</b>
SSDs have an average I/O wait of <b>1 %</b>	<b>CPU Power</b> You will have an extra 6% of CPU power for other operations	HDDs' average I/O wait is about <b>7 %</b>
the average service time for an I/O request while running a backup remains below <b>20 ms</b>	<b>Input/Output request times</b> SSDs allow for much faster data access	the I/O request time with HDDs during backup rises up to <b>400 ~ 500 ms</b>
SSD backups take about <b>6 hours</b>	<b>Backup Rates</b> SSDs allows for 3 - 5 times faster backups for your data	HDD backups take up to <b>20 ~ 24 hours</b>

## SSD vs HDD

Here's a good article comparing the two devices.

<https://tinyurl.com/ybyc2x5c>

# What is the lifespan of newer Solid State Drives??

<https://tinyurl.com/y9o26nhq>

Samsung states that their [Samsung SSD 850 PRO SATA](#), with a capacity of 128 GB, 256 GB, 512 or 1 TB, is “built to handle 150 terabytes written (TBW), which equates to a 40 GB daily read/write workload over a ten-year period.” Samsung even promises that the product is [“withstanding up to 600 terabytes written \(TBW\).”](#)

# How's my SSD doing??

<https://tinyurl.com/y7eo2zh5>

The screenshot shows the CrystalDiskInfo 8.0.0 interface for a Samsung SSD 850 EVO 500GB 500.1 GB. The health status is 'Good' (100%) and the temperature is 100 °F. The drive is identified as C: and has a total capacity of 500.1 GB. The interface displays various attributes and their current, worst, and threshold values, along with raw values.

ID	Attribute Name	Current	Worst	Threshold	Raw Values
05	Reallocated Sector Count	100	100	10	0
09	Power-on Hours	99	99	0	2167
0C	Power-on Count	98	98	0	1036
B1	Wear Leveling Count	99	99	0	3
B3	Used Reserved Block Count (Total)	100	100	10	0
B5	Program Fail Count (Total)	100	100	10	0
B6	Erase Fail Count (Total)	100	100	10	0
B7	Runtime Bad Block (Total)	100	100	10	0
BB	Uncorrectable Error Count	100	100	0	0
BE	Airflow Temperature	62	46	0	38
C3	ECC Error Rate	200	200	0	0
C7	CRC Error Count	100	100	0	0
EB	POR Recovery Count	99	99	0	12
F1	Total LBAs Written	99	99	0	6202878822

One quick setting change:  
Click on "Function", then "Advanced Features"  
Finally "Raw Values"  
Set the Raw Values to 10[Dec]  
That way the numbers reported will look  
Normal.

**SAMSUNG** Magician

SSD Samsung SSD 850 EVO 500GB < 01 / 02 >

Drive Condition: **Good**  
Firmware Version: **Latest**  
Total Bytes Written: **2.9 TB**  
Currently installed version: **EMT03B6Q**  
[S.M.A.R.T.](#)

S3PTNF0JA75035Y | Genuine

<b>Interface</b> SATA 6.0Gb/s	<b>AHCI Mode</b> Activated	<b>TRIM Status</b> Enabled	<b>RAPID Mode</b> ⊘ Not supported
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**Total Capacity**  
**466 GB**

**C: Samsung SSD**  
464GB (282GB Free)

System Compatibility | Performance Benchmark



## Data Loss & Data Recovery

Data loss is common for both SSD and HDD. Hard drives primary reason for data loss is due to physical failures, normal wear & tear. SSD drives although not having a mechanical part is less prone to physical failure. Its read/write cycle has an impact on the creation of bad sectors which is a significant reason for data loss is SSD drive.

Data recovery for **SSD and HDD** is possible. However, the level of complexity differs.

### HDD Data Recovery

The usage of magnetic recording to store data is what makes HDD different from SSD. For hard drives more or less the make is similar and recovery is not a complicated process. But for SSD data recovery is complex. The SSD's are more durable and less prone to mechanical failure. They are still susceptible to firmware corruption, electrical damage or controller failure. Hard drives on the other exhibit signs of failure, like the constant crashing of the system, clicking sound or taking time to access file & folders.

**Hard drive recovery** is less intricate. HDD was the primary storage device for users for many years. Various research & advancements have done to improve the quality, failure rates, etc.

### SSD Data Recovery

SSDs don't provide indications, such as abnormal noises, that they are close to failure. It just doesn't boot. Flash also fails in a cascading manner. Both hard drives and SSDs can have bad sectors that lead to data loss. But for the latter, it takes an only a small percentage to make the drive inaccessible. SSD recovery is expensive as compared to hard drive recovery. The use of controller technology in SSD drives makes **SSD data recovery** complicated.

SSD's lose data on a higher rate in comparison to HDDs. SSD's over the period develop bad sectors which causes them to lose data stored on them. This makes SSD recovery little complicated if not reported timely. We strongly recommend users to take regular back up system if using SSD drives.



**If you decide to switch to a Solid State Drive, you must continue to backup your computer. It may be even more important with an SSD.**

# Where to buy? The Price is Right.

Amazon

<https://tinyurl.com/y4damngp>

Walmart

<https://tinyurl.com/y3lmaheq>

Tiger Direct

<https://tinyurl.com/y623uqpl>

NewEgg

<https://tinyurl.com/ydzy2xvq>

Best Buy

<https://tinyurl.com/y6ywvgrx>

Prices are subject to change.

What else do I need?  
If you are going to do this yourself, you need  
a SATA to USB cable or dock  
to connect your new SSD to your computer.



Here's a link, price is subject to change

<https://tinyurl.com/y6x88ku9>

StarTech.com SATA to USB Cable - USB 3.0 to 2.5" SATA III Hard Drive Adapter - External Converter for SSD/HDD Data Transfer (USB3S2SAT3CB)

by StarTech

★★★★★ 5,925 customer reviews | 793 answered questions

#1 Best Seller in SATA Cables

List Price: \$17.99

Price: \$9.51 **prime** FREE One-Day

You Save: \$8.48 (47%)

Get \$60 off instantly: Pay \$0.00 upon approval for the Amazon.com Store Card.

Size: 2.5 Inch SATA

2.5 Inch SATA

2.5 Inch/3.5 Inch SATA

2.5 Inch/3.5 Inch SATA/IDE

3.5 Inch SATA/IDE

eSATA (SATA III)

Style: USB 3.0

USB 3.0

USB 3.1 (10 Gbps)

USB 3.1 (10 Gbps) (USB-C)

USB 2.0

- QUICKLY ACCESS A SATA SSD OR HDD: Add drive space to your laptop by connecting to a SATA 2.5" SATA SSD or HDD using this SATA to USB cable—you can connect to an external drive to add storage, perform backups, create disk images, implement data recoveries, and transfer content to your laptop
- FAST TRANSFER SPEEDS WITH UASP: The SATA to USB adapter supports USB 3.0 data transfer speeds of 5Gbps. But, you can experience transfer speeds up to 70% faster than conventional USB 3.0, when connected to a computer that also supports UASP.
- CONNECT FROM ANYWHERE: The hard drive USB adapter is a portable solution that tucks away nicely in a laptop bag with no external power required
- SAVE TIME: The hard drive transfer cable lets you easily swap between drives with no need to install the drive inside an enclosure—just plug and play.
- RELIABILITY GUARANTEED: StarTech.com offers a competitive 2-year warranty plus lifetime support on this SATA to USB converter

## What's the process?

Before you begin the process of “Cloning” your hard drive, you should run all of the clean-up software to make sure what you are copying is clean and hopefully free of viruses.

Run CCleaner, SuperAntiSpyware, and Malwarebytes.

May as well start with a clean drive to clone.

**Back Up Your Old Hard Drive. Very Important.**

# What's the process?

Connect your new SSD to your computer with the SATA cable you bought.

Run your cloning software such as EaseUS, Macrium Reflect or Partition Wizard or software provided by your SSD manufacturer. I know Samsung provides their own.

Tell it to clone your existing drive onto your new SSD.

The source is your old C: drive (all partitions) and the Target is the new SSD connected by SATA cable.

In general, if you want to clone your C: drive, you would select all of the “partitions” on the C: drive to clone. Without the system partitions, the new drive won't boot.

If all goes well, when completed, you should be able to remove the old HDD and replace it with your new SSD. Hit the switch and you've upgraded your machine to a new SSD.

# How to clone links using free software:

Dick Evans Article in Dave's Computer Tips Using EaseUS

<https://tinyurl.com/y5zb3bxy>

Using EaseUS

<https://tinyurl.com/mumsg9x>

Using Macrium Reflect

<https://tinyurl.com/y9erpcnl>

Using Partition Wizard

<https://tinyurl.com/yy9s2swd>

YouTube Video Tutorial Using Macrium

<https://tinyurl.com/y56cw5c9>

# Links to Cloning Software:

Macrium Free

<https://www.macrium.com/reflectfree>

EaseUS Todo Free

<https://www.easeus.com/backup-software/tb-free.html>

Partition Wizard Free

<https://www.partitionwizard.com/free-partition-manager.html>

# Common Problems:

The most common problem I've encountered is cloning to bigger or smaller SSD. Sometimes the cloning software has to be tweaked to adjust for the different sized drives. EaseUS and Partition Wizard seem to handle these issues fairly easily. Macrium gets a bit trickier.

Cloning to a larger SSD (using Macrium)

<https://tinyurl.com/y42d2jy8>

Resizing partitions in Macrium Reflect, larger drive to smaller etc.

<https://tinyurl.com/ycl79n9u>

Computer won't boot with the new drive installed

<https://tinyurl.com/y56lhr8t>

Remember those famous words from tv.  
No. Not “It’s Huge”.

Rather “We’re here to help.”

The Computer Group can help you  
make that change from HDD to SSD.

# USB memory sticks and USB External drives.

As an aside, if you have Windows 10 version 1809 on your computer, you can now safely remove your USB sticks and drives from your computer without fear of losing any data? As long as you are not in the middle of saving something, you can pull the USB device. No more clicking on the USB icon on the bottom right of the screen and then clicking on Eject for the particular device you want to remove.

See the attached article.

<https://tinyurl.com/y5utqm4t>