DATA RECOVERY TOOL

PC-3000

EXPRESS

HARDWARE-SOFTWARE SYSTEMS
FOR RECOVERING DATA
FROM SATA/PATA/USB HDD,
SATA SSD, RAID

TECHNICAL SPECIFICATION

ACELab®

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The PC-3000 Express Product Overview

The PC-3000 Express is the professional data recovery solution used by both small data recovery and digital forensic labs for urgent tasks as well as big data recovery companies and digital forensic labs with a big flow of cases. It is a hardware-software solution perfect for diagnostics, repair, and data recovery from SATA/PATA HDD. With the PC-3000 SSD software add-on you can also deal with SATA SSD using your PC-3000 Express. Data Extractor Express RAID Edition will let you solve RAID cases as well.
The PC-3000 Express System is highly recommended when the time and speed of data recovery are top priority. It is the best solution for fast data recovery jobs requiring maximum efficiency.

Types of damages

Physical HDD malfunctions: damaged PCB, problems with magnetic disks, reading/writing heads, preamplifier, firmware, and service data.

Physical SSD malfunctions*: damaged PCB, controller, corruption of firmware, service data, etc.

Logical problems: corruption of volume structures, damaged file system structures, and combinations of those problems.

What's special about the PC-3000 Express Rev.2.0.

- Broad support of all generations of SATA/PATA HDD (500MB-8TB) with proven over time hardware platform
- More efficient HDD diagnostics due to the oscilloscope functions of the Intelligent Power Supply Unit
- Better compatibility with modern PC power supply units as a result of substitution of the old 4-pin PATA Power Connectors with SATA Power connectors
- The increase of the data transfer rate and improvement of the SATA ports stability thanks to the new circuit design of the Serial ATA 3.0 GB/s bridges

6-port* tester-board | 4 SATA ports with speed up to 150 MB/s + 2 PATA ports with speed up to 133 MB/s

4 HDD/SSD/RAID members | can be connected to the PC-3000 Express at the same time. Thus, you can restore either 4 SATA drives or 2 SATA and 2 PATA drives or 3 SATA and 1 PATA drives.
The total number of connected RAID members can be increased with motherboard ports, image files and the PC-3000 Hybrid System.**

* SATA0 and SATA1 are the primary ports, SATA2 and SATA3 ports are switchable with the PATA ports (PATA0 and PATA1).
** The PC-3000 Hybrid System consists of the PC-3000 Express System + PC-3000 SAS System + DE RAID Edition plugged into one computer

The PC-3000 Express Systems:

Together with other ACE Lab's software products, the PC-3000 Express forms the fastest, most efficient and powerful systems that ever existed to recover data from SATA/IDE HDDs, RAID and SSD:

SATA/PATA HDD data recovery

PC-3000 Express System
(PC-3000 Express + Data Extractor Express)

SATA/PATA HDD & RAID data recovery

PC-3000 Express RAID System
(PC-3000 Express + Data Extractor Express RAID Edition)

SATA/PATA HDD & SSD data recovery

PC-3000 Express SSD System
(PC-3000 Express + Data Extractor Express + PC-3000 SSD)

SATA/PATA HDD & SSD & RAID data recovery

PC-3000 Express Ultimate System
(PC-3000 Express + Data Extractor Express RAID Edition + PC-3000 SSD)

Supported devices:

HDD (3.5″, 2.5″, 1.8″)	Supported interfaces:	SATA (Serial ATA) and USB devices compliant with the Mass Storage Device specification, i.e. external USB 2.0/3.0 HDD and USB Flash drives with logical issues (File System corruption, deleted data). SSHD (Solid State Hybrid Drive). PATA (IDE) – via the built-in PATA0/PATA1 ports
	Supported vendors:	Seagate, Western Digital, TOSHIBA, HITACHI / IBM (HGST), Samsung, Maxtor
	Supported capacities:	From 40 GB and more (without upper limit)
	List of supported HDDs:	http://blog.acelaboratory.com/hdd-list.html
SSD*	Supported interfaces:	SATA II/III mSATA – via a special SATA-mSATA adapter from ACE Lab which can be bought optionally M.2 SATA – via a special SATA-M.2 (SSD) adapter from ACE Lab which can be purchased optionally Micro SATA, PATA, LIF, ZIF, Apple proprietary interface - via additional adapters from third-party vendors
	Supported vendors:	OCZ, Corsair, Crucial, RunCore, A-DATA, G.Skill, Micron, Plextor, Intel, Samsung, Seagate, SanDisk, Kingston, Smartbuy, Silicon Power, PNY, AMD, Lexar, Transcend, Patriot, GoodRam, Kingspec, Toshiba, Apacer, DEXP, KingDian, Lite-On, QUMO, RevuAhn, Western Digital, HP, etc. More manufacturers are added with the updates
	Supported capacities:	From 32 GB and more (without upper limit)
	List of supported SSDs:	https://blog.acelaboratory.com/pc-3000-ssd-list-of-supported-ssd-drives-regularly-updated.html
RAID**	Supported virtual RAID levels:	▶ 0 (Stripe), 1 (Mirror), 1E Offset and Adjacent, JB0D, 4, 5, 5E, 5EE, 6 and 6-Adaptec ▶ Various combined levels: 10, 50, 51, 60 and others (due to the possibility to use virtual RAID array as a member) ▶ Software-based RAID and multi-disk storage systems: LDM and mdadm structure analysis, WSS (Windows Storage Spaces), ZFS RAID-Z, BtrFS RAID, Apple Fusion Drive (HFS+, APFS); ▶ Custom configurations that are set by user with the tabular (matrix) presentation
File Systems		FAT, exFAT, NTFS, HFS+, APFS, EXT2/3/4, XFS, ReiserFS, BtrFS, VMFS, UFS1/2, ZFS, DHF4.1, WFS0.x (for video recorders) and virtual machine images

* to work with Solid-State drives the PC-3000 solution which supports SSD is needed: PC-3000 Express SSD or Ultimate Systems
** to work with RAID the PC-3000 solution which supports RAID arrays is needed: PC-3000 Express RAID or Ultimate Systems

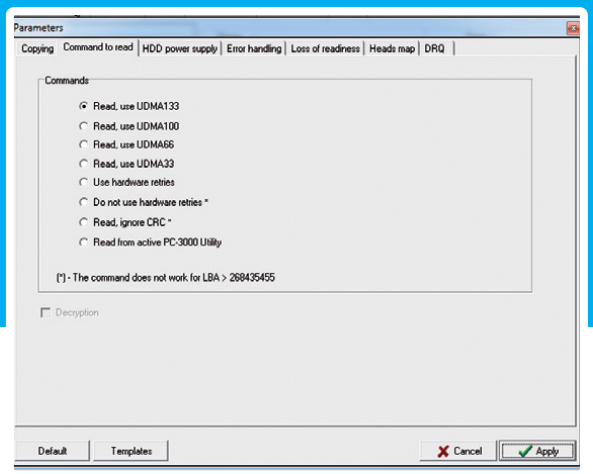
Key Features of PC-3000 Express Systems to Deal with Damaged Storage Media

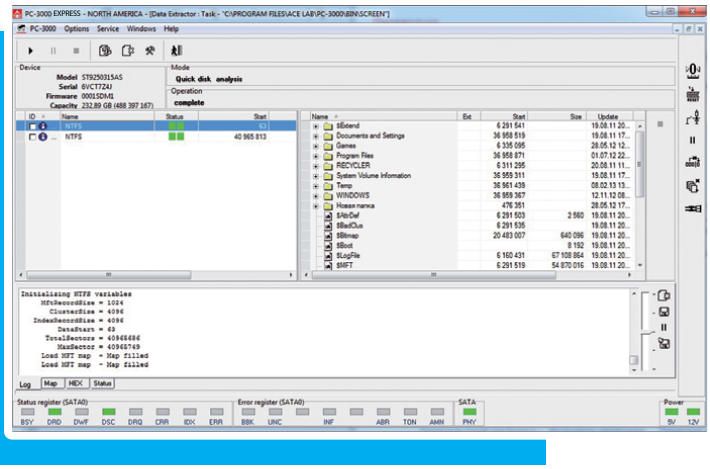
The PC-3000 Express Systems consist of hardware-software and software parts: Data Extractor (for HDDs), Data Extractor Express RAID Edition (for RAID), and PC-3000 SSD (for SSD). Depending on the system, it is possible to use different features to recover data from the widest range of damaged storage media.

Key Features to deal with Hard Disk Drives:

The PC-3000 hardware-software system allows users to create a «shadow» copy of the read data and use this copy for further work. It minimizes the handling of bad drives. Moreover, the Data Extractor has an extended functionality for working with damaged HDD:

- Reading HDD in technological mode
- Reading by head map
- Reading mode selection (UDMA 133/100/66/33, PIO 4/3/2/1/0)
- Read forward and backward
- Read ahead (cache function) disabling
- Autorelocation disabling
- Reading with hardware and software retries
- Reading with ignoring ECC
- Power supply control
- Software and hardware resets
- Virtual translator mode for recovering data from HDDs with corrupted dynamic translators
- Flexible map operation functionality





Quick Disk Analysis mode

This mode allows to find the partitions which are not available anymore because the disk structure is lost: MBR, GPT, Apple partition table, etc. It enables to estimate the partition integrity and view a file/folder tree.

Advanced RAW Recovery mode

The mode allows recovery of the most part of user data even if the file system is catastrophically damaged. The RAW Recovery mode searches and analyses the integrity of files irrespective of the file system structure. It supports a broad range of user data (images, audio/video files, archives, etc.) and file system metadata. The regular expression mechanism allows to add the personal search settings.

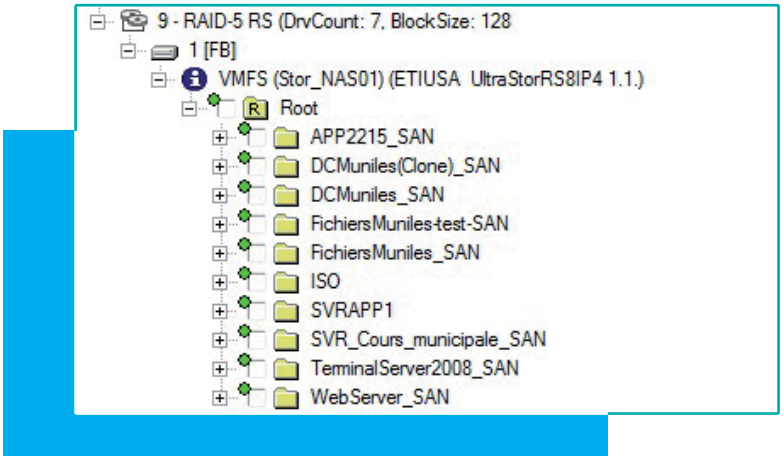
Key Features to deal with RAID:

The hardware-software combination enables to solve the most complex RAID cases when one or several drives have not only logical (deleted partitions, virus attacks, etc.) but also serious physical damages.

Working with built RAID array

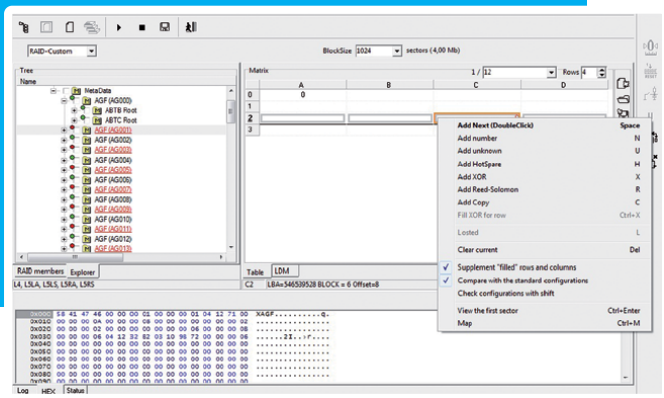
Features:
Ability to work with a virtual RAID array on-the fly (as with a conventional drive without need for imaging of virtual RAID):

- Reviewing all supported file systems
- Various logical recovery modes
- Mounting of virtual RAID to Operating System



Specialized features:

- Recovering data from redundant RAID arrays (block copies, XOR, Reed-Solomon)
- Checking the integrity of data for RAID arrays with redundancy
- Building various «Sub-maps» for specific RAID members



Determining the array configuration

Specialized features make it easier to determine the RAID configuration:

- Auto-detection mode based on the analysis of RAID metadata (mdamd, LDM, etc.).
- Unique auto-detection mode based on the analysis of file systems and user data
- Powerful interactive mode helping to easily determine even the unusual configurations.
- RAID member statistics is effective and robust way that allows to determine RAID parameters.
- Flexible automatic operations enabling the user to control the process.
- Useful search tools help to define numerous RAID parameters (detecting the size, reviewing the file system structures, metadata with disk structure, analysis of the information from LDM, etc.).
- The possibility to determine the array parameters without any effect on the damaged HDDs.

Working with damaged HDDs in RAID

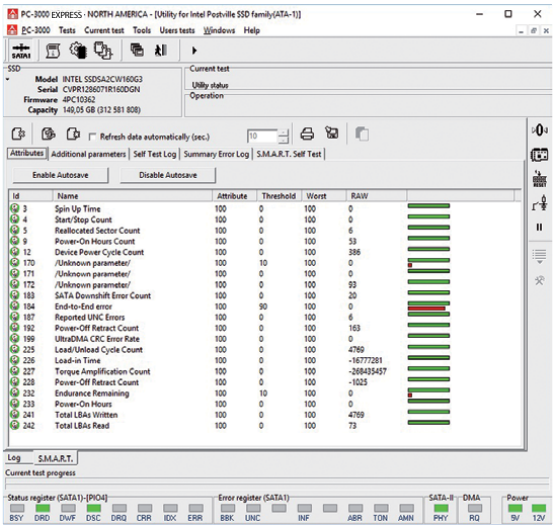
The Data Extractor RAID Edition software can work with several damaged HDDs connected to the PC-3000 ports within one task at the same time. The total number of connected HDDs can be increased by using motherboard ports (or using the additional SAS (SCSI) controllers) and drive images.

Key features:

- A full or partial data copy from any HDD included in the RAID
- It is possible to create and use a virtual translator for any HDD in the RAID or the whole virtual RAID
- Efficient interaction with the specialized PC-3000 Utilities for HDDs connected to the PC-3000 ports (power supply management, reset commands, choice of reading command, work in technological mode, etc.)
- Redundancy usage with the purpose of data recovery from the damaged HDDs
- The possibility to skip a damaged HDD while determining the array configuration or to use the data taken from a copy
- Integrated logical analysis features that allow to read only the minimally necessary amount of data from the storage device, thus reducing the workload and increasing the chances of successful recovery

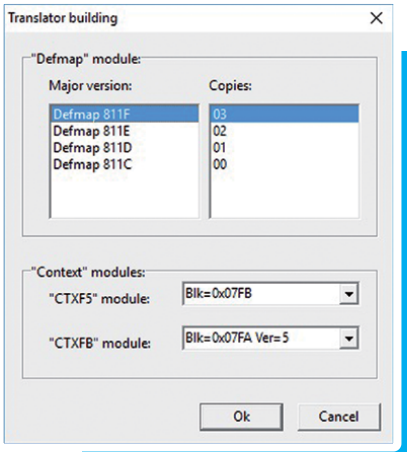
Key Features to deal with SSD:

The PC-3000 SSD Software contains a set of specialized utilities which enable to deeply diagnose SSDs, perform service operations, rewrite the drive microcode, get a direct access to memory chips, carry out low-level formatting blocking the damaged cells and placing their addresses into the defect table, as well as perform many other useful operations. The PC-3000 SSD Software is launched from the main window of the PC-3000 Express System by clicking the button on the toolbar.



- Diagnose an SSD in technological mode
- View the logs of drive defects (G-List, P-List)
- Perform low-level formatting to hide the discovered defects
- Reset the logs and S.M.A.R.T. parameters
- Search for the damaged memory chips
- Provide direct access to the content of memory chips so that you do not need to unsolder the chips

- Emulate the translator operation in order to get an access to user data
- Load the microcode into the drives RAM
- Read and write the content of the SSD ROM
- Verify and restore the SSD service information
- View the password and reset the password that was earlier set on the SSD
- Turn off background processes in the SSD to prevent data damage
- Work with the Data Extractor

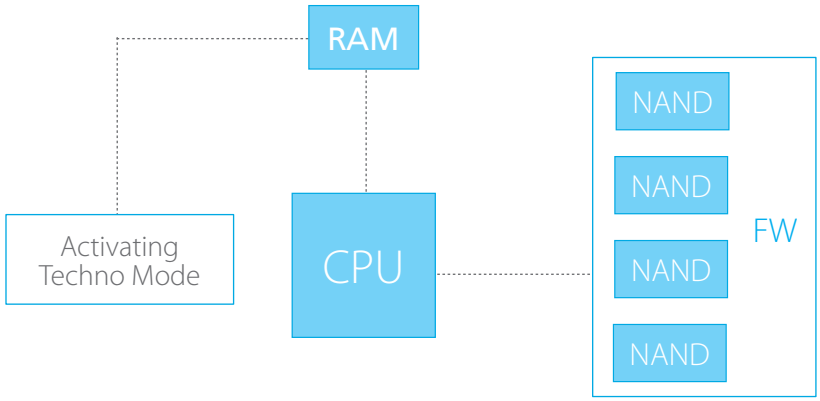


How the Techno Mode works

Almost all present-day SSDs have the hardware data encryption. So, the chip-off method becomes useless to access the data on a damaged device. In this case, the Techno Mode is the only possible way to restore logical access to data on the SSD.

How the Techno Mode works:

1. Loader uploading in SSD RAM



- Drive works in Techno Mode
- CPU is working in single Channel mode
- SSD is using custom Translator
- Extended capacity is available
- TRIM is disabled
- Service Area is unlocked

2. Access to NAND chips

System requirements

Minimal system requirements:

CPU: Intel Core i5 (Quad Core)
RAM: 8 GB
Storage configuration: 1 TB HDD
LCD Monitor: 22", 1920x1080
Operating system: Windows 7 (SP), 8, 10, x86, x64

Recommended system requirements:

https://blog.acelaboratory.com/pc-3000-best-pc-configuration-for-ace-lab-products-will-be-updated-in-future.html

PC-3000 Express System delivery kit

1.	PC-3000 Express controller	– 1 pc.	14.	PC-WD 2.5" adapter	– 1 pc.
2.	PC-USB PWR adapter	– 1 pc.	15.	ATCS, ATDA probe unlock	– 1 pc.
3.	PC USB TERMINAL 3 adapter	– 2 pcs.	16.	USB 2.0 cable	– 2 pcs.
4.	PC-2" adapter	– 1 pc.	17.	SATA RAID edition (100 cm) cable	– 4 pcs.
5.	SATA-micro SATA adapter	– 1 pc.	18.	UDMA80 (80cm) flat cable	– 2 pcs.
6.	MX-SAFE adapter	– 1 pc.	19.	IDC10 (30 cm) cable	– 2 pcs.
7.	PC-FUJ.SATA adapter	– 1 pc.	20.	MX-SAFE power cable	– 1 pc.
8.	PC-QUANTUM adapter	– 1 pc.	21.	SATA HDD (100 cm) power cable	– 2 pcs.
9.	PC-SAMSUNG adapter	– 2 pcs.	22.	PATA HDD (85 cm) power cable	– 2 pcs.
10.	PC-SEAG.SATA adapter	– 2 pcs.	23.	PATA-SATA (15 cm) power adapter	– 2 pcs.
11.	PC-SEAGATE adapter	– 2 pcs.	24.	PC-3000 Express software, resource database	– 1 pc.
12.	PC-TOSH.SATA adapter	– 2 pcs.			
13.	PC-WD 3.5" adapter	– 1 pc.	25.	User manual	– 1 book

PC-3000 Express RAID System delivery kit

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13.	PC-WD 3.5" adapter	– 1 pc.	26.	Data Extractor RAID manual	– 1 book

PC-3000 Express SSD System delivery kit

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12.	PC-TOSH.SATA adapter	– 2 pcs.	25.	User Manual	– 1 book
13.	PC-WD 3.5" adapter	– 1 pc.	26.	PC-3000 SSD Manual	– 1 book

PC-3000 Express Ultimate System delivery kit

1.	PC-3000 Express controller	– 1 pc.	15.	ATCS, ATDA probe unlock	– 1 pc.
2.	PC-USB PWR adapter	– 1 pc.	16.	USB 2.0 cable	– 2 pcs.
3.	PC USB TERMINAL 3 adapter	– 2 pcs.	17.	SATA RAID edition (100 cm) cable	– 4 pcs.
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