Kernel of PC-3000 for Windows

Contents

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru
www.acelaboratory.com

Unauthorized copy of distribution
of these documents is prohibited

1

1. **S**etting

The settings menu (Tools/Settings) allows the operator to define global settings for PC-3000 kernel and utilities. General appearance of the settings dialog:
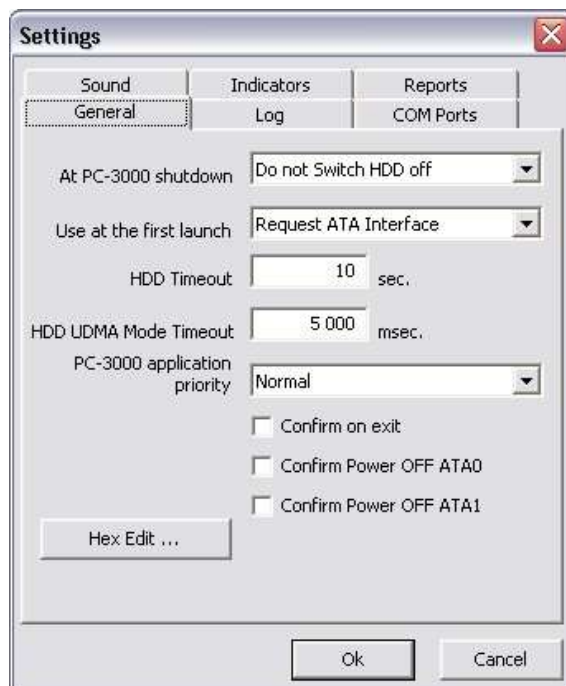

Fig. 1.1

■ 1.1. **T**he «General» tab

Option	Description
At PC-3000 shutdown	Opportunity to choose power supply status when the utility is closed: turn power off, leave power on or display a prompt for power-off.
Use at the first launch	At PC-3000 launch power supply switch will be displayed for the ATA0 and ATA1 interfaces. If you choose to «Request ATA Interface» in the menu, the toolbar will contain an additional switch that the operator can use to select the port, which will be controlled by the power supply button.
HDD Timeout	Maximum time allowed for a drive to reach readiness. When the period expires, a «readiness timeout» error will be generated. If you define a small interval here, many features of suite utilities will cease to function producing «readiness timeout» errors. Therefore the setting requires caution!
HDD UDMA Mode Timeout	Time period for data exchange expectation in UDMA mode. The period should be set to a sufficiently small value to avoid wasting time for attempts of HDD «fast reading» when a drive takes too long to reach readiness.
PC-3000 application priority	The option allows the operator to define PC-3000 priority. If you specify high priority, some tests and copying will be performed 5 to 10% faster, but all other programs running on the computer will be stopped during the procedure altogether (computers with single CPU) or they will function slowly. One more inconvenience of high priority: if a PC-3000 task freezes, there is practically no way to terminate it (invoke its emergency shutdown).
Confirm on exit	You can enable output of a confirmation prompt displayed when exit from the PC-3000 application is selected. It can be helpful for those users who miss the utility close button and occasionally close the whole program shell instead.

2

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru
www.acelaboratory.com

Hex Edit ...	The HEX editor settings can be configured: colors, font size, its typeface, etc.
PC-3000 universal utility…	When the settings dialog is opened in different utilities, the button is replaced with the settings button of the corresponding utility. In this case the settings dialog has been opened from the universal utility.

1.2. The «Log» tab

Option	Description
Show log	The option allows the operator to disable the log window display in all utilities.
Log Size	The option defines maximum number of lines, which can be displayed in the log window. If the value is exceeded, the utility clears the log window and starts filling it again.
Log window background	Here you can specify the background color for the log window. It is white by default.
Message	Colour of message text. It is black by default.
Error	Colour of error text. It is red by default.
Font	Here you can select the font for message text. You are advised to choose fixed width fonts. If a font with variable character width is used, the columns in log tables will appear shifted.
Font Size	The option defines font size.

1.3. The «COM Ports» tab

Many utilities of the PC-3000 suite use serial port for HDD diagnostics. When the PC-USB-TERMINAL device is installed, it is mapped to a serial port; the corresponding port number is specified as the value for this setting.

Option	Description
COM port for the utility using ATA-0 interface	The option defines the serial number port, which will be used by the utility working with ATA0 interface. If a nonexistent port is defined, utilities that open it at startup will display an error message and fail to launch! Therefore it is essential to specify a port actually existing in the system.
COM port for the utility using ATA-1 interface	The option defines the serial number port, which will be used by the utility working with ATA1 interface. If you do not plan using two utilities concurrently working with a HDD through a serial port, you can define the same serial port for ATA-0 and ATA-1.

1.4. The «Sound» tab

Some HDD testing procedures are rather long (e.g., format in factory mode, surface testing, etc.). Therefore, the utility supports sound signals for completion of those processes.

Option	Description
Sound for process completion on ATA-0 channel	Here you can select the WAV file, which the program will play when the procedure using channel ATA-0 completes.
Sound for process completion on ATA-1 channel	Here you can select the WAV file, which the program will play when the procedure using channel ATA-1 completes.

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru
www.acelaboratory.com

Unauthorized copy of distribution
of these documents is prohibited

3

1.5. The «Indicators» tab

You can configure the colors of the indicators reflecting the status of HDD status and error registers.

Option	Description
Status set	Status indicator color corresponding to the «1» value of the register bit.
Status reset	Status indicator color corresponding to the «0» value of the register bit.
Error	Error indicator color corresponding to the «1» value of the register bit.

1.6. The «Reports» tab

Option	Description
Report window color	Background color for the report window.
Message	Color of message text.
Error	Color of error messages.
Warning	Color of warning messages.
Font	Here you can select the font for message text. You are advised to choose fixed width fonts. If a font with variable character width is used, the columns in log tables will appear shifted.
Font Size	The option defines font size.

2. Scripts

«Scripts» interactive mode (Tools/Scripts) is designed for management of user scripts (creation, removal, relocation, editing, etc.).
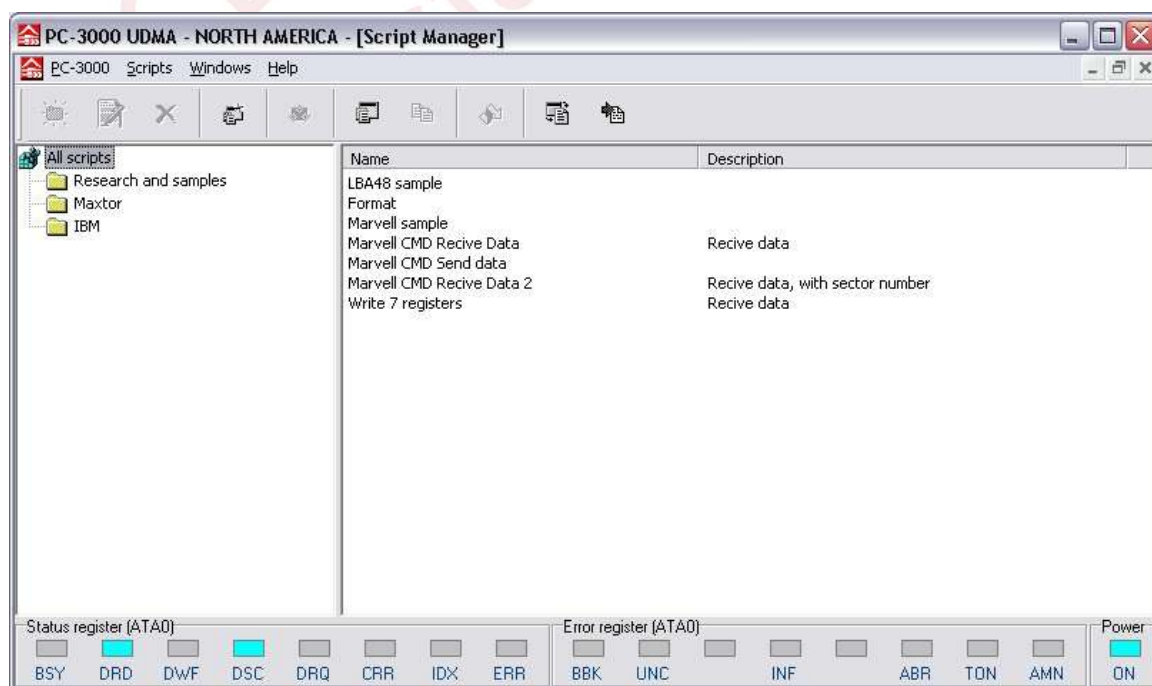

Fig. 2.1. Script Manager.

The script engine included into PC-3000 kernel is a very powerful tool for extension of the suite functionality. It is an entry point that can be used to plug in and execute practically any custom program code. Users have two opportunities:

- ◆ Development of scripts based on PC-3000 object model.

- ◆ Development of suite extension scripts based on OLE automation and your favorite IDE. Then the created object can be integrated into PC-3000 with a plug-in script.

What are the benefits of such approach?

You do not have to develop low-level code for access to HDD. In Win32 environment access to HDD is performed through a WDM driver using «DeviceIoControl» calls. The object model allows programming in terms like «end command» «eceive data» «ransfer data» etc. PC-3000 utilities use the same software mechanisms.

Visual Basic Script» used in the script engine is a modern language providing advanced syntax and support for «OleAutomation», which is an essential aspect. It allows users to bypass its limitations quite easily with development of specialized objects. Development of specialized software code is much more efficient than use of various formal interfaces for sending of ATA commands since it allows different manipulations with data both for programming of HDD registers and for writing/reading to/from a drive. Thus, you can implement your specific knowledge about drives in certain software modes, which will be similar to the functionality provided by internal PC-3000 utilities. Please refer to the documentation on PC-3000 object model for information about scripts development and use.

Function	Description
	New project (Ins). Creates a new script project.
	Edit (F2). Opens the selected script project for editing.
	Delete project (Del). Deletes the selected script project.
	New subfolder (Ctrl+N). Creates a folder. You can drag and drop script projects between folders with the mouse!
	Type library (Ctrl+L). Opens a dialog for selection of connected (visible) type libraries.
	Units (Ctrl+U). Displays all connected features in the script engine as a list.
	Copy (Ctrl+C). Creates a copy of the selected project. The feature is helpful while creating a new project that differs a little from an existing one.
	Run (F9). Runs a script.
	Export script. Exports the selected script to an «spf» file. The feature is convenient for exchange of scripts.
	Import script. Imports a script from «spf» file into the system.

For details on the script engine you are advised to refer to the special documentation file available in your individual updates folder at Info_PC3000/CHM/PC3000PCIObjectModel.chm. Technical support forum also contains a section devoted to programming for PC-3000 and discussion of the issues related to the use of the script engine.

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru   Unauthorized copy of distribution   5
www.acelaboratory.com   of these documents is prohibited

3. Database

3.1. Use of HDD firmware database

Utilities included into PC-3000 for Windows support saving HDD firmware both as individual module files (compatible with PC-3000 DOS) or in a general database. The database of PC-3000 product suite is intended for storage, arrangement and searching (upon requests from utilities) of resources providing also for data exchange between PC-3000 users. The database software version in PC-3000 offers some additional features although it preserves the concept and appearance of program modes introduced in PC-3000 PCI.

You are advised to store temporary resources as individual files saved on disk within a corresponding profile structure. Master copies of resources from known good drives should be preserved in database to use them with automated modes of the utilities (resource search, applicability checks, exchange of resources, etc.). The module used for operations with the database was updated in PC-3000 version 3.0.

3.2. New format of the resource database

The database of PC-3000 PCI used Paradox 5.x format. For access to the database files the application employed Borland Database Engine (BDE) libraries included into the distribution package of PC-3000 PCI. PC-3000 version of the product uses a revised format and, consequently, a new method for access to its database. PC-3000 UDMA includes a new database server for management of PC-3000 resources based on Local Firebird SQL Server 2.0.0. It is the so-called local or embedded version of the Firebird SQL Server, which in turn is an evolutionary offspring of the Interbase server family. Access to a Firebird server is provided directly through its client plug-in library. Thus, the database formats in PC-3000 PCI and PC-3000 are completely incompatible. PC-3000 PCI users can run the PCMigrationTool utility to convert their databases to the new format.

3.3. Reasons for database format replacement

The choice of the Paradox 5.x format and BDE was determined first of all by their availability for free distribution although they were not perfect from the technical viewpoint. It resulted in multiple problems occurring during work with the database and certain limitations of its functionality (in particular, the lack of opportunities for creation of a database shared between several installed product instances). Most of the problems were caused by the client-based architecture of the database that had no server of its own. At the same time, SQL servers of the Interbase family proved to be a very reliable and simple server-based system for data storage that requires practically no maintenance.

3.4. Database viewing and management tools

The database viewing tool can be accessed from the main PC-3000 «Utility selection» window, or from «the Tools» – «Database» menu.
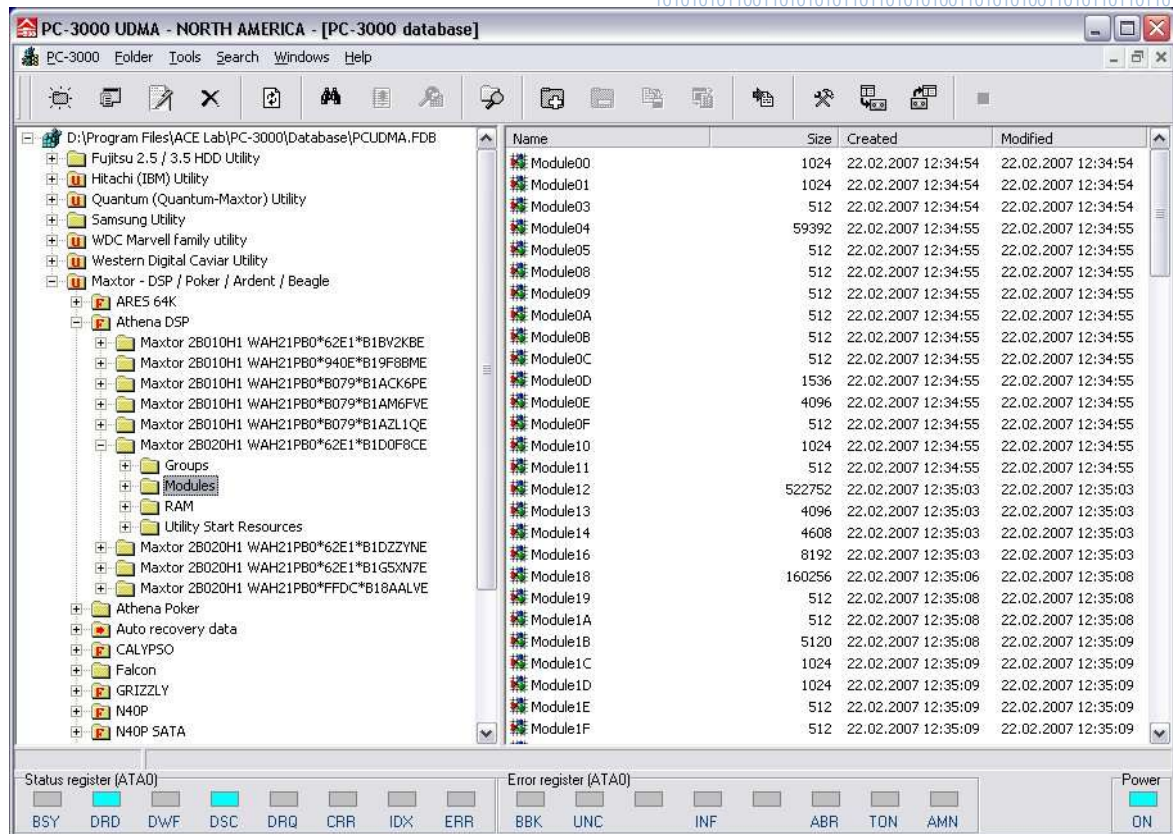
6

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru
www.acelaboratory.com

Fig. 3.1. Appearance of the DB viewing and management window.

Resource data for each single HDD are arranged so that users can assume that a file system (and, consequently, file-based data organization) is used to store the information. It means that the database features virtual directories (folders) containing resources and subfolders. The structure of virtual folders is practically independent from the utilities; it can be described using the following hierarchy:

1) Utility folder

2) HDD family folder

3) Folder containing HDD resources (Model Firmware SerialNumber)

4) Folder containing resources of a specific type (modules, SA tracks, ROM, etc.).

Attention! «Database» interactive mode is shared between all utilities of the suite. However, when the universal utility or a specialized one is started in the «Database» mode, the folder associated with that utility will be displayed. Access to all data for all utilities is available from the database in the «Utility selection» mode.

The window containing the tree of database directories provides a shortcut menu including the following commands:

Menu item	Description
New (Ins)	Creates a folder on the current level.
Child folder (Ctrl+N)	Creates a folder one level lower.
Edit (F2)	While editing/creating an existing/new module, the program displays a window containing its name, data type and a form of two pages: Data and Profile. The Data tab is a standard binary data editor (please see details in the descriptions of HexEdit binary editor). For convenience several data types are used: ♦ Custom data ♦ Microprogram

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru
www.acelaboratory.com

Unauthorized copy of distribution
of these documents is prohibited

7

	♦ ROM dump
	♦ RAM dump
	♦ Adaptive data
	♦ Tracks
	♦ Text data.
	The Profile tab is a list containing additional information about the drive from which the data was received. The list consists of two columns – Parameter, containing parameter name and Value (parameter value respectively). Parameter value can be a string, an integer or real number, a logical value or date.
Delete (Del)	Removes record from DB. The operation cannot be applied to non-empty directories. To remove such directories, the Delete recursively command should be used.
Delete recursively	Removes the selected item with all its subitems.
Refresh (F5)	Updates the information displayed in the window. You can open the database tool while saving resources from a utility to DB; the feature can be used to monitor appearance of resource records in the corresponding directory.
Add folder to export list (Ctrl+E)	Adds the currently selected folder to the list for export. If the list window is not displayed, this command opens it.
Export	Creates a *.pcr file and writes to it the resources from the export list.
Search (Ctrl+F)	The database supports search based on various criteria. The Search window contains four tabs: Name and location, Date, Data and Profile. First two tabs (Name and location and Date) allow searching by the name of data module, its location and creation time, which is standard for most applications. The Data tab allows searching for data fragments (the required string can be loaded from file). The Profile tab contains tools for data search based on records in profiles of DB modules. The operator has then to specify the profile parameter title, search operator (=, <, □, >, □, IN, Contains) and the value. The lower form part displays as search result the modules containing the specified information. ***Attention!*** Profile-based search is implemented in automatic mode in specialized utilities of the suite. E.g., it is used for modules recording to HDD and when a malfunctioning drive has to be started using data loaded from the database. The mode is of limited use in the universal utility.
Search panel	Enables/disables the search panel. It is available if search has been started.

The window containing the database files (modules) provides a shortcut menu including the following commands:

Feature	Description
New (Ins)	Allows manual resource creation.
Edit (F2) or double click with the mouse	While editing/creating an existing/new module, the program displays a window containing its name, data type and a form with two pages: Data and Profile. The Data tab is a standard binary data editor (please see details in the descriptions of HexEdit binary editor). For convenience several data types are used: ♦ Custom data ♦ Microprogram ♦ ROM dump ♦ RAM dump ♦ Adaptive data

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru
www.acelaboratory.com

	♦ Tracks ♦ Text data. The Profile tab is a list containing additional information about the drive from which the data was received. The list consists of two columns – Parameter, containing parameter name and Value (parameter value respectively). Parameter value can be a string, an integer or real number, a logical value or date.
Delete (Del)	Removes record from DB. The operation cannot be applied to non-empty directories. To remove such directories, the Delete recursively command should be used.
Refresh (F5)	Updates the information displayed in the window. You can open the database tool while saving resources from a utility to DB; the feature can be used to monitor appearance of resource records in the corresponding directory.
Import (Ctrl+I)	–
Run	–

Toolbar of the «Database» page duplicates the items of the context menu used most often:

Toolbar function	Description
	Close. Appears when an interactive mode is selected in the current utility.
	New (Ins). Creates a folder on the current level.
	Child folder (Ctrl+N). Creates a folder one level lower.
	Edit (F2). While editing/creating an existing/new module, the program displays a window containing its name, data type and a form of two pages: Data and Profile. The Data tab is a standard binary data editor (please see details in the descriptions of HexEdit binary editor). For convenience several data types are used: ♦ Custom data ♦ Microprogram ♦ ROM dump ♦ RAM dump ♦ Adaptive data ♦ Tracks ♦ Text data. The «Profile» tab is a list containing additional information about the drive from which the data was received. The list consists of two columns – «Parameter», containing parameter name and «Value» (parameter value respectively). Parameter value can be a string, an integer or real number, a logical value or date.
	Delete (Del). Removes record from DB. The operation cannot be applied to non-empty directories. To remove such directories, the «Delete recursively» command should be used.
	Refresh (F5). Updates the information displayed in the window. You can open the database tool while saving resources from a utility to DB; the feature can be used to monitor appearance of resource records in the corresponding directory.

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru
www.acelaboratory.com

Unauthorized copy of distribution
of these documents is prohibited

9

	Search (Ctrl+F). The database supports search based on various criteria. The Search window contains four tabs: Name and location, Date, Data and Profile. First two tabs (Name and location and Date) allow searching by the name of data module, its location and creation time, which is standard for most applications. The Data tab allows searching for data fragments (the required string can be loaded from file). The Profile tab contains tools for data search based on records in profiles of DB modules. The operator has then to specify the profile parameter title, search operator (=, <, □, >, □, IN, Contains) and the value. The lower form part displays as search result the modules containing the specified information. ***Attention!*** Profile-based search is implemented in automatic mode in specialized utilities of the suite. E.g., it is used for modules recording to HDD and when a malfunctioning drive has to be started using data loaded from the database. The mode is of limited use in the universal utility.
	Go to results (Ctrl+Enter). Moves to the location of the found resources in database.
	Search panel. Enables/disables the search panel. It is available if search has been started.
	Add folder to export list (Ctrl+E). Adds the selected folder to the list for export.
	Remove folder from export list (Ctrl+D). Removes folder from the list for export. Database content will not be affected by the operation.
	Export. Creates a *.pcr file and writes to it the resources from the export list.
	Export panel. Enables/disables the export panel. It becomes available if something has been added to the export list.
	Start import. Allows importing resources from a *.pcr file saved during export.
	Access to database. Configuration of database access.
	DB Backup. Creates an archive of the database.
	DB restoration. DB content loading from archive.
	Reindexing. Updates index records in the database. The command can be used for optimization of the information stored in database.

■ 3.5. Exchange of resources among PC-3000 users

In order to add to a database resources of HDD retrieved by another user of the product, the following steps are required:

♦ Export to a file the information in source database.

♦ Deliver the file to another PC-3000 user (e.g., e-mail it).

♦ Import the received data into the destination database.

3.5.1. Data export procedure

1) Enter the interactive database access mode (using the «Tools» menu).

2) Use the tree of virtual directories to find the folders containing the data to be exported (the database will export all data in subdirectories, too).

3) In the right-click menu of the virtual directories tree select «Add folder to export list»; the folder will be added then to a list in the lower part of the screen.

4) If you need to specify several folders, repeat the same steps for them (keep in mind that all child folders will be removed from export list if their parent folder is added to the list).

5) Select the «Export» command from the right-click menu or use the corresponding toolbar button to the same effect and enter the name for the file being exported.

After export completion the database will generate a file containing the resources stored in the selected folders.

3.5.2. Data import procedure

1) Enter the interactive database access mode (using the «Tools» menu).

2) Use the «Start import» toolbar button to perform the corresponding command.

3) Specify the received resource file.

After import completion the resources from the specified file will be added to the destination database.

3.5.3. Peculiarities of the import procedure

The import procedure has a peculiarity: it is incremental. It means that the database does not add the data mechanically. Instead, it checks the presence of the imported resources and only adds resources if they are really new. If some resource data are already present in database, the software compares the data to the resources being imported. If the data matches, the resources being imported are ignored. If resource data differ, a copy of the current resources will be created in database; then the imported resource data will replace the current data.

Thus, if you accidentally import a file twice, there will be no duplicates in your database because the second time all imported resources will be ignored.

■ 3.6. Configuring database access

Normal operation of the PC-3000 UDMA product suite does not require additional configuration of the database access. As a rule, the need to change configuration arises in the following cases:

♦ If you need to specify an alternative database file location.

♦ If a user wishes to create a shared database.

You need clear understanding of the database architecture to configure access to it properly. Database access can be conventionally subdivided into the following layers.

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru
www.acelaboratory.com

Unauthorized copy of distribution
of these documents is prohibited

11

1) Application acting as database client (PC-3000 UDMA or PC-3000 SCSI)

2) Data storage server (Program Files\ACE Lab\PCDataStorage\PCDataStorage.exe)

3) Client software of the Firebird serve (the GDS32.DLL library)

4) Firebird server

5) Database file.

In case of an embedded Firebird server, layers 3 and 4 are combined, i.e. the GDS32.DLL library acts as a server and interacts directly with a database file instead of providing for interaction with a Firebird server.

Database access is configured at layer 2 using management of the PCDataStorage.exe program settings.

Running PCDataStorage.exe is displayed as a system tray icon. The program starts automatically when PC-3000 attempts to contact it. PCDataStorage has its own right-click menu that can be used to configure its settings.

In order to change the database file location or the policy for DB backup, select «DB Access configuration» in the menu, then choose one of the registered databases (e.g., «PC-3000 » or «PC-3000 SCSI»).
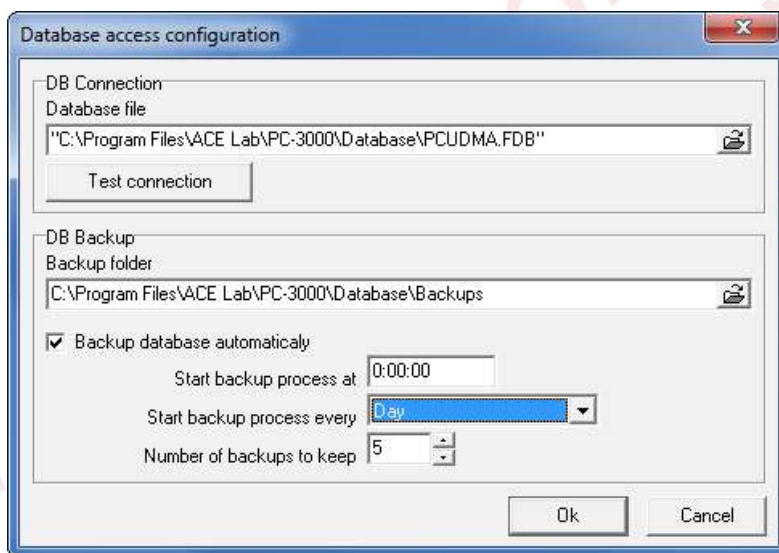
Fig. 3.2.

Creation of a shared database requires considerably more steps, including possible modification of your network structure. To do so, perform the following steps:

1) Add all workstations to a LAN with TCP/IP support enabled.

2) Install Firebird SQL Server on one of the network hosts (further referred to as «server»).

3) Copy the database file from one of the workstations to the server.

4) Configure PCDataStorage on all workstations. To do so, perform the following steps:

♦ Launch PCDataStorage.

♦ Use its menu to select «DB Server access configuration»; then the program will display the corresponding window.

♦ Select «Alternate Database Server (local or remote)».
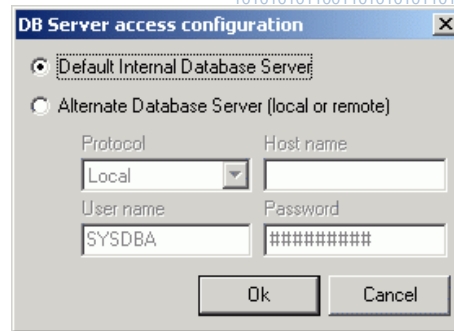
Fig. 3.3

5) Use the «Protocol» parameter to specify «Local», if Firebird server is installed on the PC running PC-3000 and «TCP/IP» if Firebird server is installed on another LAN host (enter the host name in the «Host name» field).

6) Specify user name and password for the SQL server in the «User name» and «Password» fields (default values are «SYSDBA» and «masterkey» respectively).

7) Open the «DB Access configuration» window (see above).

8) Specify the database file name.

   Attention! The local file name should be specified, i.e. the path to the »\Program Files\ACE Lab\PC-3000\Database\PCDATA.FDB» file on the »server» computer.

9) Network access to the database file is not required.

■ 3.7. DB backup

Although Firebird SQL server increases considerably the reliability of data storage, it cannot dismiss entirely the need to create backup copies. The database software provides features necessary for backup copying of its data. Besides, since the database is stored in a single file, you can also create its backup copies using regular OS copying tools. When a regular Firebird server is used as your SQL server, you can use its backup functionality (please see relevant SQL server documentation). In that case the corresponding features of the SQL server are more preferable because all Interbase servers support database backup copying during operation.

When a copy is created using PC-3000, the software allows creation of backup copies as follows.

3.7.1. Backup using PC-3000 UDMA database server

Single database copy:

   ♦ Select «Backup database» from the right-click menu of the PC-3000 UDMA database server.

   ♦ Select a database from the list of bases registered on the server and specify the file name for the copy:

Configuration of the database backup policy.

   ♦ Enter the database access configuration mode.

   ♦ Use the «DB Backup» group to specify the destination folder for future backup copies.

   ♦ Enable the «Backup database automatically» checkbox.

   ♦ Define other settings of the policy:

   - Start backup process at – time when the copying process will be started.
   - Start backup process every (Day, Week, Month);
   - Number of backups to keep – the number of copies preserved in the specified folder; files that exceed the number will be deleted (beginning with files with the earliest modification date).

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru   Unauthorized copy of distribution   13
www.acelaboratory.com   of these documents is prohibited

3.7.2. Backup using PC-3000 client software

♦ Single database copy:

♦ Enter the interactive mode for manipulations with the database.

♦ Click the «Backup» toolbar button to perform the corresponding command.

♦ Specify the file for backup copy.

The policy for backup database copying is configured similarly to the server database settings.

3.8. PCMigrationTools features

The PCMicrationTools utility offers the following functionality:

♦ Convert an original DB to the new format entirely.

♦ Convert resource export files.

♦ Index data in database to speed up search for HDD resources.

To start using PCMigrationTools, you should run PCDBMigrationSetup to install the utility. Its installation is necessary because the distribution package of PC-3000 no longer includes BDE (PCDBMigrationSetup will install BDE). The installation procedure requires no special steps except for specification of the target folder.

3.9. Database conversion procedure

1) Launch PCMigrationTools.

2) Press the «Start DB conversion» button.

3) If there is PC-3000 PCI installed in your system, the program will detect its database location automatically.

4) If the program fails to find the original database, it will display a corresponding notification.

5) Specify the database where the program should record the converted data (the destination database). To do that, you should select one of the registered databases (e.g., «PC-3000» or «PC-3000 SCSI»), then the utility will locate the corresponding database file.

6) Confirm or modify the results of automatic detection displayed on the screen.

7) Then the database conversion process starts; its progress will be registered in the log.

3.10. Conversion procedure for resource files

1) Launch PCMigrationTools.

2) Press the «Convert resource file(s)» button.

3) Use the program window to specify the (original and target) files for conversion.

4) Then the resource file conversion process starts; its progress will be registered in the log.

3.11. Database indexing procedure

This action is not mandatory. Indexing is performed during conversion of databases and resource files and when resources are added to a database by the utilities included into PC-3000. However, such need may arise if the indexing algorithms are modified.

1) Launch PCMigrationTools.

2) Press the «Update search keywords» button.

3) Select the database that must be indexed. To do that, you should select one of the registered databases (e.g., «PC-3000» or «PC-3000 SCSI»), then the utility will locate the corresponding database file.

Then the indexing process starts; its progress will be registered in the log.

14   Unauthorized copy of distribution
of these documents is prohibited

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru
www.acelaboratory.com

4. ATA Commander

ATA Commander mode is introduced in PC-3000 beginning with the UDMA version. It allows a rather convenient opportunity for generation of ATA commands to drives connected to the PC-3000 board ports. The mode is intended for professional experts who are sufficiently qualified to use it. Novice users should first learn its features. Basic notions and standard commands are described in the ATA specification. It is available for downloading at http://www.t13.org.

Attention! ACE Lab does not disclose to users factory commands and does not provide consultations regarding them.

ATA Commander can be launched using the «Utility selection» → «Tools» → «ATA Commander» menu or the [Alt]+[A] keyboard shortcut. ATA Commander cannot be started from the menu of a running utility. However, the editor can function simultaneously with a running utility.

Attention!! There are **no guarantees** whatsoever regarding correct operation of utilities and simultaneous generation of ATA commands!
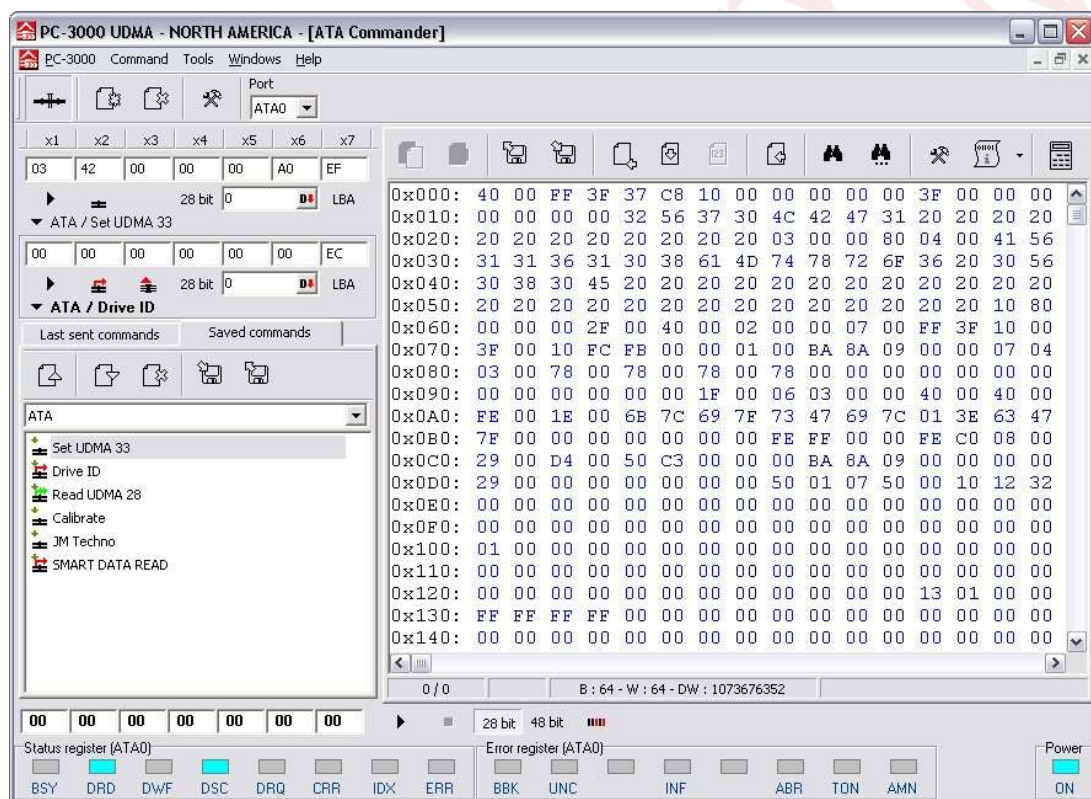
Fig. 4.1.

4.1. ATA command generation window (command editor)

Appearance of ATA command editor:

Fig. 4.2.

The window used to send a command consists of 7 lines for entry of hexadecimal values. Information from those lines will be sent to drive when a command is started. Meaning of the registers:

x1 – Features,
x2 – Sector Count,
x3 – LBA Low,
x4 – LBA Mid,
x5 – LBA High,
x6 – Device,
x7 – Command

In addition to entry lines, there are controls that define some parameters of command generation and provide a few convenient features.
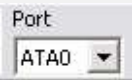
The «Command» button transfers a command to drive or sends/receives data if the corresponding option in the settings is enabled.

The data transfer direction button determines the vector of data exchange.

Data transfer type	Description
No data	The mode for command generation without subsequent data exchange.
Receive PIO data	After command generation data will be received from HDD (reading) in PIO4 mode.
Transmit PIO data	After command generation data will be transferred to HDD (writing) in PIO4 mode.
Receive UDMA data	After command generation data will be received from HDD (reading) in UDMA mode currently used in that HDD.
Transmit UDMA data	After command generation data will be transferred to HDD (writing) in UDMA33 (ultra DMA mode 2).
Script	In that case command parameters will be transferred to the specified script selected by pressing the button displayed instead of the data exchange button. The script can use the register values from command editor and data from HEX editor. If you select this method for command generation, the next button will be redefined to select the script from the database of PC-3000 plug-in scripts.

The next button initiates data receipt/transfer. It is used in cases when data exchange is controlled manually. Then the toggle button of LBA28/LBA48 command type follows. It is followed by the LBA entry field and «LBA» button. Pressing the button converts the entered LBA sector into the entry lines for command registers corresponding to the bytes containing LBA value. Below there is a button with the command name, pressing it displays a menu with the following options:

Menu item	Description
Save	Saves the current values, settings and command data buffer to file: ATANamedCmd.dat
Save as	Allows command saving under a different name. All command settings including its data buffer are copied. The feature is convenient for command cloning.
Rename	Renames the current command.
Save as script	Saves a command as script. Scripts also contain an integrated data buffer in addition to the command itself. The feature is convenient (while preparing commands for the «User tests» menu in utilities) since it allows configuring and saving a command as a program without any actual programming!

The system support 1 to 4 windows of command editors. You can switch between the command generation windows by selecting any entry line or pressing a button. The buffer displayed in HEX editor and belonging to the current command editor will be switched automatically.

16 Unauthorized copy of distribution
of these documents is prohibited

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru
www.acelaboratory.com

4.2. Toolbar

Toolbar button	Description
	Add command editor. Opens a new editor for ATA commands.
	Remove command editor. Removes active editor for ATA commands.
Port ATA0	*Port.* Allows selecting an active ATA port of the PC-3000 board.
ATA0	*HDD power supply.* Displays the status of the selected ATA channel managing also its power supply. Currently selected channel is displayed in the section for port selection.
	Settings. Allows selection of the data receipt/transfer method for commands using data exchange, the following options are available: ♦ Receive/transfer data automatically ♦ Receive/transmit data using exchange button ♦ Receive/transmit data sector by sector using exchange button *Attention!* In case of automatic data exchange you should specify correctly the data transfer direction in PIO mode. If you send a writing command while reading mode is specified in the program, the HDD will not turn off the DRQ bit no matter how much data is read. That will result in PC-3000 buffer overflow.

4.3. The «Saved commands» tab

The tab contains a list of commands saved earlier. Commands are sorted by category so they are grouped in accordance with their purpose.

Toolbar button in the «Saved commands» tab	Description
	Use command (Enter) Loads the selected command into the active window.
	Edit (F2). Allows editing of the category and name of the saved commands.
	Delete (Del). Removes a saved command from reference.
	Export commands (Ctrl+E). Upon selection the button opens a dialog where you can choose the commands for export. These commands will be saved as well.
	Import commands (Ctrl+I). Imports commands from a saved file. Please note that if commands sent through a script are imported, the corresponding scripts are not transferred. To transfer such commands properly, you should export and then import the scripts, too. Then specify again for each command the script that should be used to send it.

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru
www.acelaboratory.com

Unauthorized copy of distribution
of these documents is prohibited   **17**

4.4. The «Last sent commands» tab

The tab allows the operator to view the history of sent commands. Data corresponding to a command in history are **not preserved**!

Toolbar button in the «Last sent commands» tab	Description
![use command button]	*Use command (Enter).* Loads the selected command into the active window.
![delete button]	*Delete.* Removes the selected command from list

4.5. Peculiarities of the HEX editor

The HEX editor panel in ATA Commander mode provides in addition to standard features an opportunity to use HEX editor plug-in modules developed for PC-3000 utilities.

HEX editor toolbar button.	HEX editor toolbar button.
![plug-ins selection button]	*Plug-ins selection.* Allows the operator to create a list of plug-ins displayed after pressing the plug-in launch button.
![plug-in launch button]	*Plug-in launch button.* Runs the extension module for the data in current window. Plug-ins can belong to one of two possible types: they can apply to the entire data area or to the selected area only.
![hex calculator button]	*HEX- calculator.* A simple calculator is available for convenient computing BYTE (8bit) 0x00 + - 0x00 = 0x00

4.6. Monitor of ATA registers

The figure below demonstrates the line containing the status monitor for registers and associated buttons.

| 00 | 00 | E8 | 03 | 00 | E0 | 52 | ▶ | ■ | 28 bit | 48 bit | ⅢⅢ |

Fig. 4.3.

Button	Description
▶	*Start monitoring.* It starts continuous reading of all registers of ATA drive and displays read values to the fields corresponding to the registers. Monitoring consumes 100% of CPU resources because it is performed non-stop.
■	*Stop.* Stops monitoring started earlier.
28 bit	*28 bit.* Sets the byte mode of register reflection corresponding to regular ATA commands.
48 bit	*48 bit.* Sets the byte mode of register reflection corresponding to LBA48 ATA commands.
ⅢⅢ	*«Highlight changes with color» button.* When the mode is enabled, the changing value in register will be displayed in red.

5. Utility features inherited from PC-3000 kernel

PC-3000 kernel provides some features, which are available from all universal and specialized utilities. The features are gathered in the «Tools» menu which looks as follows:
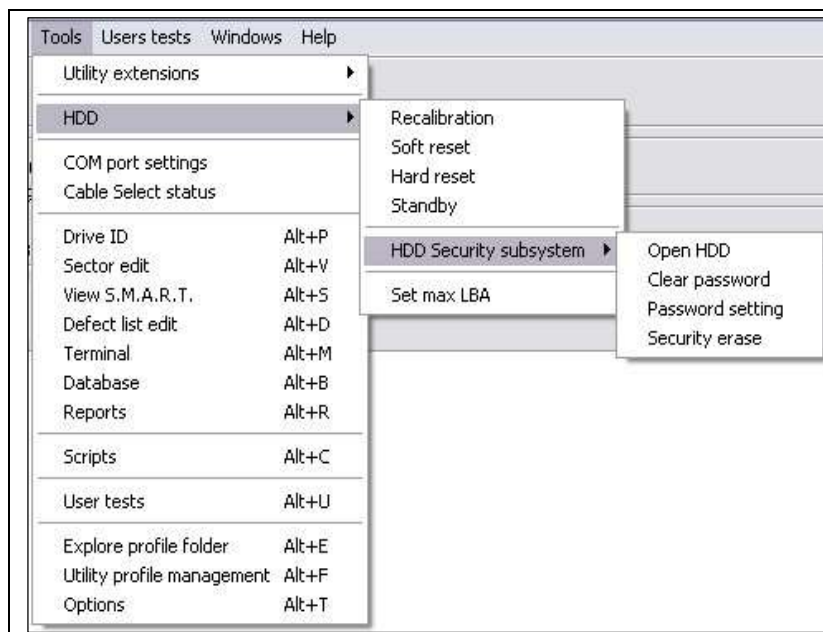

Fig. 5.1.

■ 5.1. The «Tools» menu

Menu item	Description
Utility extensions	The content of utility extensions submenu depends upon the current utility (see corresponding utility manuals).
HDD	The submenu contains basic system commands for operations with drive: recalibration, soft and hard reset, sleep command, HDD security subsystem and maximum LBA setting.
COM port settings	The mode is used to specify the COM port parameters. Users can configure the following settings: ◆ rate selectable from the list (110, 300, 600, 1200, 2400, 4800, 9600, 10400, 14400, 19200, 38400, 56000, 57600, 115200, 128000) or defined manually ◆ parity control (NOPARITY, ODDPARITY, EVENPARITY, MARKPARITY, SPACEPARITY) ◆ stop bits (ONESTOPBIT, ONE5STOPBITS, TWOSTOPBITS) ◆ byte size.
Cable Select Status	The option controls the Cable Select line of the ATA connector. When enabled, it means that the Cable Select line is grounded on the PC-3000 UDMA board, otherwise the line is disabled.
HDD ID	The mode displays on-screen the HDD ID tab containing all drive specifications. Users can choose between two display modes: «Group mode» and «Full mode».
Sector editor	Please see the «Sector editor» section for details.
View S.M.A.R.T.	Please see the «View S.M.A.R.T.» section for details.

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru
www.acelaboratory.com

Unauthorized copy of distribution
of these documents is prohibited

19

Defect list editor	Please see the «Defect list editor» section for details.
Terminal	The Terminal mode is intended for work with a drive via USB connector of the computer and PC-USB-TERMINAL adapter included into the package of PC-3000 for Windows. ALT, CTRL, SHIFT toolbar buttons allow using the combinations of keys, which act as hot keys in Windows being therefore intercepted before the terminal window receives the appropriate signal.
Database	Please see the «Database» section for details.
Reports	The Reports mode is designed to display detailed information about the results of drive testing.
Scripts	Please refer to the «Scripts» section for description.
User tests	Allows filling the User tests menu of the current utility with the calls for corresponding scripts. The feature is helpful if certain additional functionality of a utility is implemented in scripts.
Explore profile folder	When a utility mode that requires saving various HDD data is initiated, the utility creates for each drive a special profile folder for storage of such data. Selection of this menu item opens the standard Explorer application and uses it to browse to the profile folder of the current drive.
Utility profiles management	Allows management of registered profiles belonging to the current utility.
Settings	Please refer to the «Settings» section for description.

5.2. The «Tools / HDD» menu

Menu item	Description
Recalibration	Sends the Recalibration (10h) command to HDD.
Soft reset	The command for soft HDD reset is executed by setting the SRST bit in the Device control register resulting in the restart of the drive interface circuit.
Hard reset	The command for hard reset is executed when the RESET interface signal is sent to drive for 500 msec.
Sleep	The E6h («Sleep») system command will be sent to drive. This command stops rotation of the drive spindle. It is used for implementation of the «HotSwap» mode in which a live controller board initialized on a normal drive is installed then to a HDA containing damaged service information.
HDD Security subsystem	Please see the «HDD Security subsystem» section for description.
Set max LBA	The mode allows «trimming» of drive capacity from the end (decreasing the number of available LBA). You can record the selected value for temporary use (to drive RAM) or to the service data area (on disk). In the latter case the parameter value will be preserved after HDD restart.

5.3. Security subsystem

Security subsystem is present in all drives designed in accordance with the ATA-5 standard or later. Its advantage is in the fact that no actual data encryption takes place (i.e. there is no risk of losing all the data if the storage/encryption algorithm fails), but it can be accessed using password or specialized utilities known to just a limited circle of specialists. Unfortunately, for reasons yet unknown that security system causes failures exceptionally often. The module where the password is stored may turn out to contain garbage without any reason just like the password itself or the flags indicating the status of the security subsystem. In that case any attempt to access a HDD (except for the password subsystem and HDD ID, of course) makes it return an ABRT error. The problems can be solved using the PC-3000

suite. For all supported drives (except for the models in development stage) the suite allows password removal **without data loss**. To do that, you will have to use the universal PC-3000 utility from the suite. Description of these features requires some information about the corresponding standard for IDE drives.

The standard specifies the following functions:

♦ **Password setting.** The function completes successfully if a drive has been opened first (see further). Please keep in mind during password setting: there are 2 password types (master and user); there exist 2 security levels (high and maximum). Master password is initially set at the factory (although it can be redefined). Its presence or absence does not affect the password setting/deactivation in a HDD. (Its setting does not lock the drive and its removal does not unlock HDD). Master password can only be used to open a drive in high security mode and, sometimes, to erase it (password resetting together with user data erasing).

♦ **Open HDD.** The function opens access to data stored on drive until power supply is switched off or the reset signal is sent. Then the operation has to be repeated. Please keep in mind that on maximum security level a drive can only be opened with the user password only. A master password sent in that case will not produce results other than error. In high security mode a drive can be opened using both the master and user password.

♦ **Clear password.** The function is intended for permanent password removal (i.e. the password is indeed removed entirely and there is no need to open the drive after the power is switched off or a reset signal is sent). To allow proper execution of the function, the HDD has to be opened first. The function requires transfer of the type and text string of the password being removed in a sector with specific structure sent after the command.

♦ **Security Erase.** The function is intended for erasing of HDD content if you do not know the password for access to it. According to the standard, the command consists of 2 instructions sent one after another and a sector with special structure, which contains master password in addition to other data.

Furthermore, the standard defines several additional functions like «freeze drive», which are of little use for this aspect.

Any utility of the suite allows viewing the password-related information using the HDD ID command from the tools menu. Then check the Security system group in the HDD ID information. In addition to the password support in the drive, it contains the following flags:

Flag	Description
Password set	Flag means that a master or user password is set in the drive.
HDD Locked	Flag is set when a password is present if the command to open HDD has not yet completed successfully.
HDD Frozen	Specific drive mode in which just the HDD ID return command is working. A drive exits the mode after a reset or if its power supply is switched off and on again. It is used to block a drive in case when its restart is complicated because of seals, etc.
Wrong password count exceeded	The drive supports the counter for incorrect attempts to open it. Counter overflow «freezes» the drive until a reset or power supply switching off/on.
Security Erase support	The flag means that there is an opportunity to erase the password together with all user data.
Security level	As we have mentioned, there are 2 security levels. The flag indicates the level currently enabled on a HDD.
Master code	The parameter is unclear even in the ATA standard. It has been introduced for control of password versions or to implement an additional protection mechanism. If the master code retrieved from drive (HDD ID) is equal to 0000 or FFFE, the drive does not support that method.

5.3.1. Managing the HDD security system

The use of HDD security subsystem for access to user data implies password knowledge. If the password is unknown, to gain access you will have to use a specialized utility to erase password and preserve the data or to retrieve a text string containing the password.

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru
www.acelaboratory.com

Unauthorized copy of distribution
of these documents is prohibited

21

The HDD security subsystem menu provides the following opportunities:

Menu item	Description
Open HDD	Sends the «open HDD» command from the ATA standard. Its selection brings up a dialog *(Fig. 5.2)* where you can define the password type and text. After entry confirmation the corresponding ATA command will be performed. Password type and text are preserved until program restart.
Clear password	Sends the command to clear the password for the password type and text placed in memory earlier (while opening a drive / setting password / loading password).
Password setting	Sends the «set password» command from the ATA standard. Its selection brings up a dialog where you can define the password type and text. After entry confirmation the corresponding ATA command will be performed. Password type and text are preserved until program restart.
Security Erase	Sends the «Security Erase» command from the ATA standard. As we have mentioned, the operation requires transfer of the master password. Therefore, the command must be preceded with drive opening using master password.
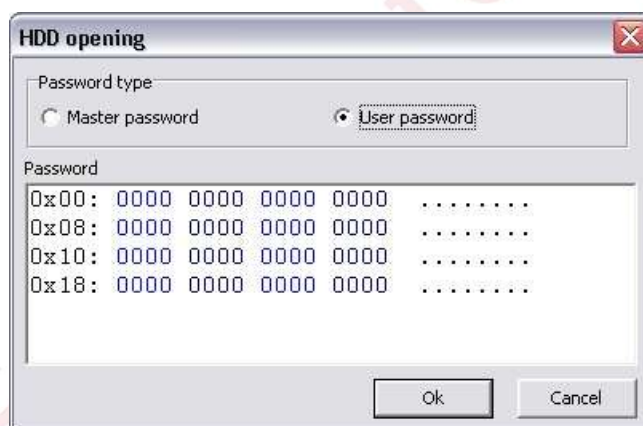
Fig. 5.2. «Opening HDD» dialog.

5.3.2. Examples of password removal

Exampel 1.

Situation: user password is identified and known, in that case the information about master password and security level is irrelevant.

2 commands should be sent from the menu in sequence: «Open HDD» (with known user password) and «Clear password». Then you will be able to access the drive data including even the power supply switch field.

Exampel 2.

Situation: set user password is unknown, master password is known or not set, security level is high.

In that case you will have to «Open HDD» with the known master password (or an empty string if it is not set), send the command to «Set user password» with any parameter and then the command to «Clear password». Here you will also be able to access the drive data including even the power supply switch field.

Exampel 3.

Situation: set user password is unknown, master password is known or not set, security level is maximal.

In such case you will be unable to gain access to data without a specialized utility that can reset passwords. You can only perform «Security Erase» procedure and after its successful completion data from the drive will be deleted as well as the user password. Security level will be set to high. To perform the operation, 2 commands must be invoked from the menu in sequence: «Open HDD» (using known master password) (the drive will return error, but that is

normal because that part of the procedure is used to fill the service data block), and then the «Security Erase» command.

■ 5.4. Sector editor

Sector editor is intended for viewing and editing of single or multiple sectors of a HDD. Sector editor also supports data loading from file, data saving to file and sector filling with random or specified values.

Attention! The use of sector editor (namely, when data is being written from the editor to disk surface) can result in destruction of user data! Before editor launch the program displays a warning, which allows starting the editor in read only mode.
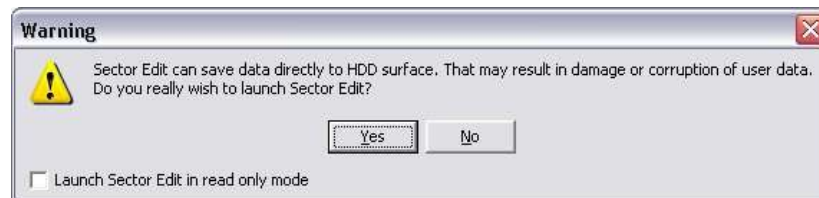
Fig. 5.2. Warning window at the start of sector editor.

Fig. 5.3. Sector editor.

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru
www.acelaboratory.com

Unauthorized copy of distribution
of these documents is prohibited

23
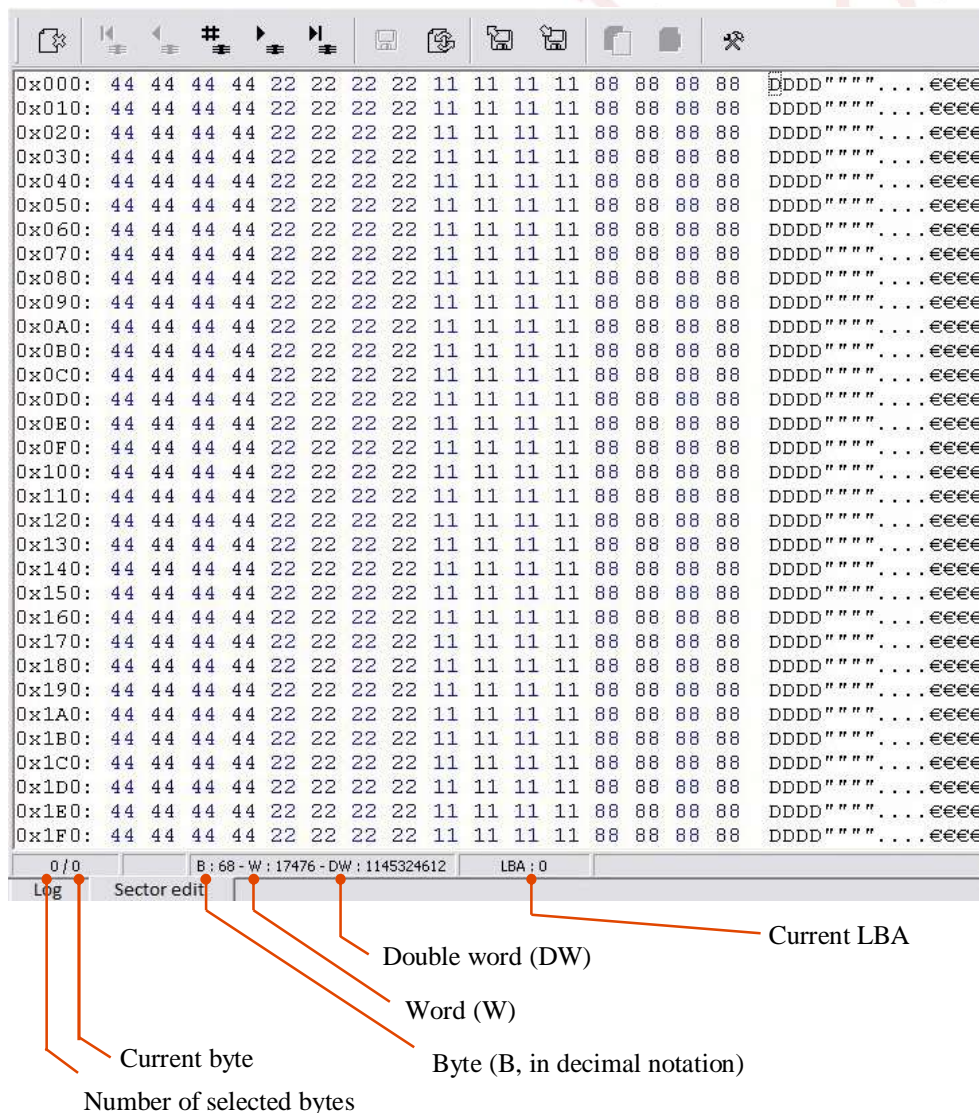
The operations toolbar of the sector editor contains the following buttons:

	–	Close;
	–	First (Ctrl+Home);
	–	Previous (Ctrl+Left);
	–	Goto (Ctrl+G);
	–	Next (Ctrl+Right);
	–	Last (Ctrl+End);
	–	Write to HDD, LBA XX (Ctrl+S);
	–	Discard editing results(Ctrl+R);
	–	Load from file;
	–	Save to file;
	–	Copy (Ctrl+C);
	–	Paste (Ctrl+V);

The context menu in the sector editor contains the following items:

◆ First (Ctrl+Home)
◆ Previous (Ctrl+Left)
◆ Custom (Ctrl+Enter)
◆ Next (Ctrl+Right)
◆ Last (Ctrl+End)
◆ Save (F2)
◆ Discard editing results (Esc)
◆ Load from file (Ctrl+O)
◆ Save to file (Ctrl+S)
◆ Set bookmark (Bookmark 1 … Bookmark 0)
◆ Goto bookmark (Bookmark 1 … Bookmark 0)
◆ Pattern
◆ Edit integers and bits
◆ Find
◆ Find next

The: First, Previous, Custom, Next, and Last items are intended for navigation between HDD sectors.

«Save» – all changes made by the operator within the editor are recorded to HDD after selection of this command only; all modifications are highlighted in the editor with background colour and «mod.» and «Edit» indicators appear in the status line.
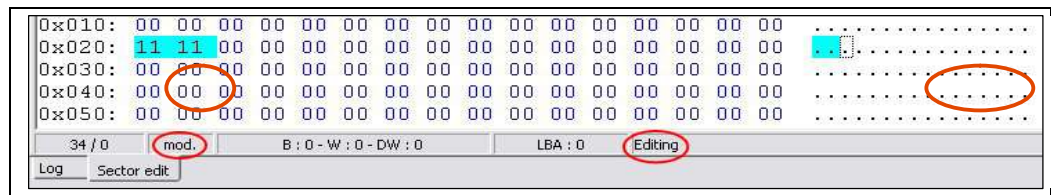
Fig. 5.4. Status line of the sector editor.

«Discard editing results» – until all recent changes made in the editor are saved to drive, the operator can restore all the data to the original state.

«Load from file and Save to file» – sector editor allows data loading from file and saving data from the editor to file.

«Set bookmark» – up to 10 bookmarks can be set in the sector editor; you can move to the required one selecting the «Goto bookmark» command.
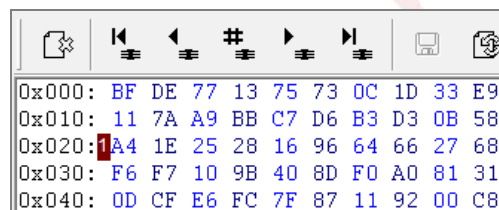
Fig. 5.6. Sector editor with a set bookmark.

«Pattern» – this context menu item allows filling the **selected data area** with specified values (operator «=») or its modification using the «And», «Or» and «XOR» operators.

Fig. 5.5. Filling pattern configuration dialog

«Find» – context menu command searching for the specified data string.
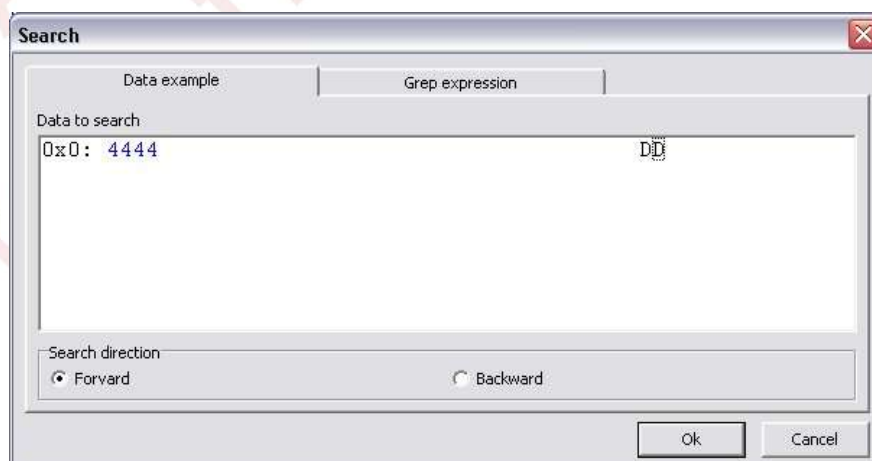
Fig. 5.6. Search configuration dialog.

Important note! Since string length is unknown in advance, hex data entry for search is supplemented with zeroes to the right. To remove excess zeroes, press [Insert], then use [Del] or [BackSpace] key.

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru   Unauthorized copy of distribution   25
www.acelaboratory.com   of these documents is prohibited

5.5. Defect list editor

Defect list editor is used to display the file containing HDD defect lists (P and G -Lists), and the results of surface scanning tests saved to a file earlier.
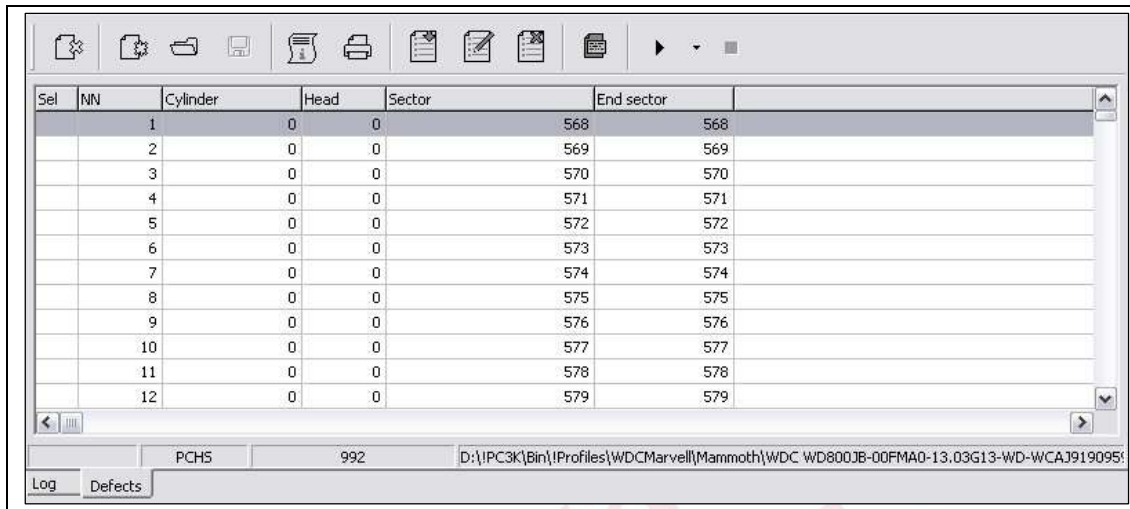
Fig. 5.7. Appearance of the defect list editor window.

Toolbar features are duplicated in the context menu.

Toolbar button	Description
	Close. Closes the interactive mode for editing of defects.
	New defect list (Ctrl+N). Creates a file containing new defect list and displays the list. Two file types are supported: LBA and CHS. Consequently, the defect list files can have *.lba or *.chs extension.
	Open defect list (Ctrl+O). Opens a file containing defect list.
	Save defect list (Ctrl+S). Saves a defect list. Saving is available if a list has been modified.
	Save defect list as text. Saves defect list data as text file. Such file cannot be loaded back into defect list editor.
	Print preview (Ctrl+P). Displays the current defect list before printing.
	Add (Ins). Adds a defect in specified list format (LBA or CHS).
	Edit (F2). Allows modification of the selected defect.
	Delete (Del). Removes the selected defect.

26   Unauthorized copy of distribution
of these documents is prohibited

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru
www.acelaboratory.com

	🖬	***Add defect list.*** Allows the operator to add to the current defect list a file containing another defect list of the same format.
	▶ ▾	***Run.*** Starts the selected feature of the current utility. Different utilities of the PC-3000 suite provide a number of specialized features for operations with defect lists. You can stop a running process using the «Abort» command.
	■	***Abort.*** Stops the running process, for example, relocation of defects.

5.6. View S.M.A.R.T.

«View S.M.A.R.T.» (Self-Monitoring, Analysis and Reporting Technology) tool opens the interactive mode for viewing the corresponding attributes, logs, and the start of self-testing procedure.

S.M.A.R.T. is a set of mini subprograms acting as parts of drive firmware and defining the supported diagnostic features. They include:

♦ the set of attributes reflecting the status of individual HDD parameters (up to 30)

♦ internal drive tests (self-test)

♦ S.M.A.R.T. logs (errors, general status, defective sectors, etc.).

S.M.A.R.T. mode provides to users important information about drive status, which cannot be obtained using other methods (e.g., testing). That applies, first of all, to such drive attributes as power-on hours count, reallocated sectors count, etc. (the first one allows you to estimate how long a drive has been used, the second reflects the disk surface condition).
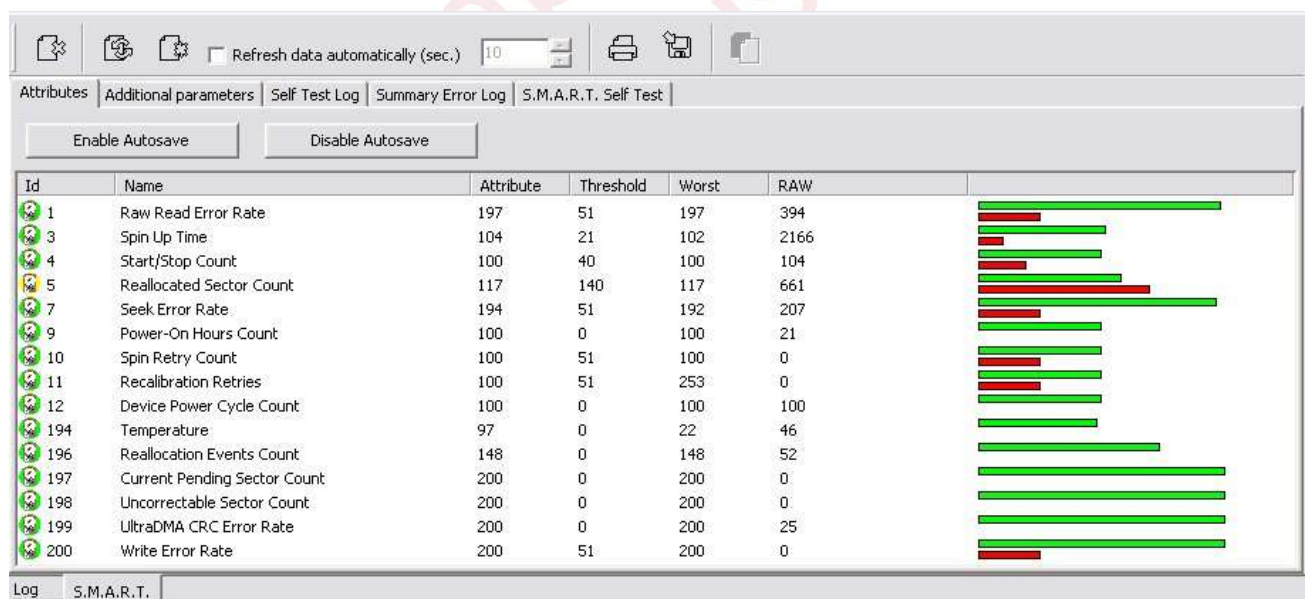
Fig. 5.8. Appearance of the interactive S.M.A.R.T. monitoring mode.

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru
www.acelaboratory.com

Unauthorized copy of distribution
of these documents is prohibited

27

Toolbar for all tabs of the S.M.A.R.T. page contains the following buttons:

Toolbar button	Description
	Close. Closes interactive S.M.A.R.T. monitoring mode.
	Refresh S.M.A.R.T. Data. (F5). Re-reads the values of S.M.A.R.T. attributes.
	Reset stored S.M.A.R.T. data. Clears the attributes saved earlier.
	Refresh data automatically (sec.) Enables/disables automatic updating of parameters. It is convenient for monitoring of S.M.A.R.T. attributes evolution during drive testing.
	Print. Prints the attributes.
	Save S.M.A.R.T. Data. Saves the table of attributes to a text file.
	Copy commands information. Allows copying of command register values from S.M.A.R.T. error log.

5.6.1. The «Attributes» tab

Values in the columns of the attributes table:

Table column	Description
ID	Identifier of the monitored parameter. Some attributes are standard while others are vendor-specific.
Name	Name of the monitored parameter ID. Please note that different HDD manufacturers can associate the same identifiers with different monitored parameters. In specialized utilities unknown names can be substituted with known ones.
Attribute	They are used to reflect relative reliability of individual drive attributes. Allowed attribute values range from 1 to 253. Initially the attributes have maximum values. HDD wear and failures during work decrease the values of reliability attributes. Thus, high attribute values mean that the probability of drive malfunction is low and, consequently, low values indicate low drive reliability meaning that it is very likely to fail. As a rule, upper thresholds of attribute values are set to 100 (IBM, Quantum, Fujitsu) or 253 (Samsung, Maxtor). However, there are exceptions; thus, in Western Digital and Seagate HDD some reliability attributes have highest value of 200 while the maximum value for the rest is 100.
Threshold	HDD designers specify the borderline values (thresholds) for each reliability attribute. If at least one of the attribute values is lower than the corresponding threshold, it means that further data storage on such drive can be risky. The structure and number of reliability attributes are defined by manufacturers individually for each HDD type.
Worst	Worst attribute values. Many attribute values can decrease and increase, if no failures occur for a long while. Therefore for some attributes it makes sense to preserve the worst value.
RAW	Real (not converted) attribute values or the value of an additional parameter, for example, temperature.

As an example we can consider the «Power-on Hours Count» attribute. Its real value shows the number of hours (or minutes/seconds, depending upon the manufacturer) during which the drive has worked. If the attribute decreases to critical level, it means that the drive has used up its lifetime (MTBF - Mean Time Between Failures). In practice even decrease of the attribute to zero value does not actually mean total inability to work and such drive can continue to operate normally. |

Id	Name	Attribute	Threshold	Worst	RAW	
1	Raw Read Error Rate	197	51	197	394	
3	Spin Up Time	104	21	102	2166	
4	Start/Stop Count	100	40	100	104	
5	Reallocated Sector Count	117	140	117	661	

Fig. 5.9. Example of values approaching the threshold.

Attention! Some parameters displayed in the list of attributes are not described in the ATA specification; in most cases vendors use them for a specific HDD family.

Attribute parameters: value, «Worst» and «RAW» can be indicated using two numbers, for example, 239: +10. The first one is the attribute value read during first S.M.A.R.T. launch for that drive. The second value shows attribute evolution (relatively to the first value) during subsequent checks of S.M.A.R.T. drive parameters. You can use the «Reset stored S.M.A.R.T. data» toolbar button to make the first value the main one.

5.6.2. The «Additional parameters» tab

The «Additional parameters» tab contains supplementary information of drive S.M.A.R.T. described in ATA specification. Please refer to the ATA specification for relevant details.

Attributes	Additional parameters	Self Test Log	Summary Error Log	S.M.A.R.T. Self Test

Parameter	Value
Off-line data collection status	84 - Off-line data collection activity was suspended by an interrupting command from host.
Percent Self-Test Remaining	0
Self-test execution status	00 - The previous self-test routine completed without error or no self-test has ever been run
Total time in sec. to complete off-line data collection	2580
EXECUTE OFF-LINE IMMEDIATE implemented	☑
Abort/Restart off-line by host	☐
Off-line read scanning implemented	☑
Short and Extended self-test implemented	☑
Conveyance self-test implemented	☑
Selective self-test implemented	☑
Low Power mode save data	☑
SMART Attribute Autosave Command Support	☑
Self-test routine recommended polling time	2 min
Extended self-test routine recommended polling time	34 min
Conveyance self-test routine recommended polling time	5 min

Fig. 5.10. Additional parameters.

5.6.3. The «Self Test Log» tab

The log contains information about the results of performed internal drive testing commands. The log can contain up to 21 record. When the limit is exceeded, the drive starts filling the log from the beginning overwriting record 1 with record 22, record 2 – with record 23, etc. Each log record contains a register with test number, status code of test execution , time of test start/interruption, number of the current test checkpoint (or stop point) and LBA of the sector, where test has been interrupted/stopped.

When the mouse pointer is pointed at a log record, the program displays a tip containing test name and its progress status.

Attributes	Additional parameters	Self Test Log	Summary Error Log	S.M.A.R.T. Self Test

Test Code	Test Status	Time (hour)	Check Point	Failing LBA	Vendor Specific Data
01	75	66	4	228	05 9C 01 00 00 E4 00 03 00 00 16 00 00 00 00
04	74	122	5	450 834	05 2A 03 00 00 52 03 03 00 00 16 00 00 00 00
00	00	0	0	0	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00	00	0	0	0	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

Fig. 5.11. The «Self Test Log» tab.

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru   Unauthorized copy of distribution   29
www.acelaboratory.com   of these documents is prohibited

5.6.4. The «Summary Error Log» tab

The log contains information about the general number of errors registered by a drive after its first start (or firmware update) and detailed records about the last 5 errors. The log contains for each of the 5 recorded errors 5 last commands sent to the drive. The log contains all UNC, IDNF errors, servo system failures, read/write errors, etc. For each command the log contains values of all registers, time and drive status at the moment when the command was sent. Errors caused by unsupported commands or commands with invalid parameters are not registered in the log.

If a drive supports Comprehensive Error Log, then Summary Error Log duplicates last five records from the Comprehensive Error Log.

Reg Error	Sector Count	LBA	Reg Status	State	Time (hour)	Extended Error Info
04-ABR	16	235 264	51	00	0	E2 23 00 00 00 24 00 00 FF FF 0F 00 FF FF ...
00-	0	0	00	00	0	00 00 00 00 00 00 00 00 00 00 00 00 00 00 ...
00-	0	0	00	00	0	00 00 00 00 00 00 00 00 00 00 00 00 00 00 ...
00-	0	0	00	00	0	00 00 00 00 00 00 00 00 00 00 00 00 00 00 ...
00-	0	0	00	00	0	00 00 00 00 00 00 00 00 00 00 00 00 00 00 ...

Fig 5.12. Summary Error Log.

5.6.5. The «S.M.A.R.T. Self Test» tab

There are two methods used to launch S.M.A.R.T. tests: off-line start or captive start. HDD always save test results in S.M.A.R.T. data.

In case of an offline start the drive reports successful command completion **BEFORE** its **ACTUAL** execution and only then performs the test. In that case the BSY interface flag remains not set, so the drive is ready to begin execution of the next interface command suspending the test. In fact, the test is running in background mode.

Enabled «Wait for completion» flag blocks execution of all operations with a drive until completion of the started test.

During test launch in captive mode, the BSY interface flag will be set and the drive will start test execution in real time. Any interface command during the test will interrupt and stop the testing procedure; the drive will then start processing the command.

The operator can select one of the following tests:

♦ Execute SMART off-line routine immediately in off-line mode (Test Code = 0)

♦ Execute SMART Short self-test routine immediately in off-line mode (Test Code = 1)

♦ Execute SMART Short self-test routine immediately in off-line mode (Test Code = 2)

♦ Execute SMART Short self-test routine immediately in off-line mode (Test Code = 3)

♦ Execute SMART Short self-test routine immediately in off-line mode (Test Code = 4)

♦ Abort off-line self-test routine (Test Code = 127);

♦ Execute SMART Short self-test routine immediately in off-line mode (Test Code = 129)

♦ Execute SMART Short self-test routine immediately in off-line mode (Test Code = 130)

♦ Execute SMART Short self-test routine immediately in off-line mode (Test Code = 131)

♦ Execute SMART Short self-test routine immediately in off-line mode (Test Code = 132)

30 Unauthorized copy of distribution of these documents is prohibited

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru
www.acelaboratory.com

Fig. 5.13. S.M.A.R.T. Self Test.

ACE Laboratory Ltd Russia
Technical Support: ts@acelab.ru   Unauthorized copy of distribution 31
www.acelaboratory.com   of these documents is prohibited