



ATA Enabler for DOS

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ATA Enabler for DOS

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APSOFT.
Sonnenstrasse 26b
85622 Feldkirchen
Germany

Tel: +49 (0) 89 900 479 0
Fax: +49 (0) 89 900 479 11
Internet: <http://www.tssc.de>

Table of Contents

Introduction	v
Features and Limitations	v
Enabler Versions	vi
ATAENAB	vi
CBATA	vi
UNATA	vi
Installation	7
Memory Requirements.....	7
Example of config.sys.....	7
Special Note for Toshiba Notebooks.....	8
Fine-tuning	8
Command Line Options.....	9
Common Command Line Options.....	9
ATAENAB and UNATA Specific Options.....	10
CBATA and UNATA Specific Options.....	11
Initialization File	13
Common Section	13
Socket Sections.....	14
PCI Sections.....	15
MemFilter, PreFilter, MemFilter0, MemFilter1	15
IoFilter, IoFilter0, IoFilter1	16
IRQ	16
ISAEnable	16
VGAEnable.....	16
ExCABase.....	16
LegacyBase.....	16
PrimaryBus, SecondaryBus, SubordinateBus	17
CISBase ATAloBase ReadVerifyRetry LBAMode DriveLetter.....	17
Additional information	19
How to get Technical Support for ATA Enabler	19
Example of INI file.....	20

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Introduction

This manual provides an overview of the ATA Card Enabler family for DOS. All released versions are collectively named “ATA Enabler” throughout this manual.

ATA Enabler is a small, but powerful driver supporting ATA cards and IDE Hard Disks connected via the PCMCIA-2-IDE PC Card adapter.

Due to the small memory footprint of the resident part the enabler is an ideal solution for use in various disk-cloning schemes. Both, Symantec Norton Ghost and Power Quest Disk Copy, are supported.

Features and Limitations

ATA Enabler supports both, original DOS (e.g. MS-DOS 6.22) as well as DOS included with Windows 95/98. Resident part of ATA Enabler occupies approximately 29 kB of memory (depending of number of ATA cards inserted).

ATA Enabler can be loaded via CONFIG.SYS, AUTOEXEC.BAT, or simply started from DOS command prompt.

ATA Enabler can be unloaded, except if it is loaded from CONFIG.SYS. Besides ATA Enabler prevents second load of itself.

ATA Enabler provides full LBA support for disks of any size. Large disks are supported.

ATA Enabler provides full INT 13h support, including extension. Most utilities (FORMAT.COM, FDISK.EXE, Norton Utilities, etc.) are supported.

In comparison with any competitive product ATA Enabler doesn't need an IRQ. Therefore, user does not need to care about resource conflicts.

ATA Enabler may support simultaneously up to 10 ATA cards (or Hard Disks). Number of supported partitions is limited only by number of available drive letters. Number of physical PC Card adapters is not limited.

User may freely assign drive letters to partitions, except if ATA Enabler is loaded from CONFIG.SYS.

ATA Enabler does not provide hot-swap support. The ATA Card (or Hard Disk) should be connected to the computer before ATA Enabler is started.

ATA Enabler cannot be loaded in the Windows DOS session.

ATA Enabler will not support ATA Cards without CIS, and ATA Cards with CIS where CISTPL_CONFIG, CISTPL_FUNCID, CISTPL_VERS_1, or CISTPL_CFTABLE_ENTRY are missing.

ATA Enabler configures all cards to ATA mode (16 continuous I/O). Neither primarily IDE nor secondary IDE modes are supported.

ATA Enabler provides a set of flexible configuration options via command line or external .INI file.

Enabler Versions

There are three versions of ATA Enabler released: ATAENAB, CBATA and UNATA. All three versions share common features and differ only by a set of supported PC Card adapters.

ATAENAB

ATAENAB is designed for Intel PCIC compatible PC Card adapters. (E.g., Intel Step A, B and C, Vadem VG-365/465/468/469, Ricoh RF5C266/366/269/369, Cirrus Logic CL-PD6710/6720/6722/6729/6730, Toshiba ToPIC, etc.)

ATAENAB will also work on most CardBus adapters, but only if the CardBus adapter is properly configured by the Computer BIOS. Most of today's notebooks BIOS will provide proper CardBus initialization.

ATAENAB will not work on CardBus adapters that are not initialized by BIOS.

CBATA

Compared to ATAENAB, CBATA is especially designed to work on CardBus adapters.

In case a CardBus adapter is not properly initialized, CBATA is able to update the CardBus adapter configuration. Most of the required initialization can be done automatically without user intervention. However, if required, user will be able to control most settings, either via command line parameters or, in complicate cases, via external .INI file.

UNATA

UNATA combines the best features of ATAENAB and CBATA in one driver; of course at a price of a slightly larger memory footprint compared to ATAENAB and CBATA.

UNATA is recommended for mixed CardBus/PCIC environments and for Toshiba Laptops where the PC Card adapter mode can be set via BIOS Setup (ToPIC 95/97/100 can work either in PCIC compatible or in CardBus mode).

Installation

The ATA Enabler may be installed either in CONFIG.SYS, AUTOEXEC.BAT or started from DOS command line. It's possible to relocate enabler into upper memory using DEVICEHIGH or INSTALLHIGH statements in CONFIG.SYS.

The ATA Enabler provides several command line switches allowing fine-tuning of the driver. In more complicated cases you may create an initialization file with very detailed configuration instructions.

It is recommended that you fine-tune CardBus Enabler switches starting CardBus Enabler from the command line. After switches are set, you can place call of CardBus Enabler either to CONFIG.SYS or to AUTOEXEC.BAT.

Memory Requirements

All versions of ATA Enablers require 4 kB of memory to access the ATA Card Information Structure (CIS). This memory is shareable amongst all installed ATA cards.

In addition CBATA and UNATA require 4 kB of memory per CardBus socket to establish the memory access to CardBus registers.

Example: You are using CBATA and want to support 2 ATA cards; then you will need 12 kB of memory (2 x 4 kB for two CardBus sockets + 4 kB CIS access).

The required memory should not be shadowed by BIOS and should be excluded from memory management by EMM386.EXE.

Most computers provide such non-shadowed memory at address 0xD0000, so by default all ATA Enablers will use the address above. However, if your PC provides a large free upper memory block it may be better to move the used memory window to the beginning or end of such memory block.

Example of config.sys

Let's say we are working with a computer that provides 144 kB of free upper memory from 0xCC000 through 0xEFFFFF. We will be using CBATA and 2 ATA cards. As we saw above, we will need 12 kB of memory to support such a configuration. If we use the default memory address, we will split the upper

memory into three regions, reducing the biggest available memory block to 116 kB:

0xCC000 – 0xCFFFF	16kB	Free
0xD0000 – 0xD2FFF	12kB	Used by us
0xD3000 – 0xEFFFF	116kB	Free

We can optimize the memory management by shifting our memory window to the beginning or to the end of the available upper memory. For example:

```
...
DEVICE=C:\DOS\HIMEM.SYS /TESTMEM:OFF
DEVICE=C:\DOS\EMM386.EXE NOEMS X=ED00-EFFF
DOS=HIGH,UMB
...
DEVICEHIGH=C:\CBATA.EXE /M:0xED000 <other switches>
...
```

In the above example our memory window is shifted to the end of the available upper memory, address 0xED000. Please notice that used memory is excluded from EMM386.EXE memory management (via X=ED00-EFFF switch) and included by CBATA (via /M:0xED000 switch).

Special Note for Toshiba Notebooks.

If you are using ATAENAB on Toshiba notebooks please make sure that you set the PC Card adapter either to Auto-Select mode, or to PCIC mode via BIOS setup. The CardBus/PC-Card 16 mode is not supported. When using CBATA please make sure that you set the PC Card adapter to CardBus/PC-Card 16 mode. The PCIC and Auto-Select modes aren't supported. UNATA works in either mode.

Fine-tuning

The fine-tuning could be performed either in standard installation mode via command line options, or in advanced installation mode via an external INI file.

Following chapters describe both modes in detail.

In both modes several optional parameters require a numeric value. Any numeric value could be entered as decimal (default form) or hexadecimal (with 0x prefix) number. For example: /PI:10 and /PI:0x0A both specify IRQ 10.

In both modes several optional parameters require <use> values. Use values may typically be specified as ON, OFF or AUTO in upper or lower case.

Command Line Options.

Command line options can be specified in any order, either in upper case or in lower case. Typical parameters start with slash (/) or dash (-) followed by one or two letters (e.g. /H or /VR).

Some command line options require an additional value. In this case parameters should be followed by colon (:) or equal (=) then value (e.g. /M:0xEC000 or /IO=150).

Command line options are separated by spaces.

Common Command Line Options

Following options are common for all versions of ATA Enablers.

/H | ? Print online help

/E Silent mode: No display output.

Resource Management

/M:n Start address of memory pool (Default: 0xD0000)

/IO:n Start address of I/O pool (Default: 0x150)

Diagnostics and Fine-tuning

/V[:<file>] Verbose mode: Configuration steps will be outlined on console or to file (if file pathname is specified).

/FL Flush log file to disk immediately after each update (may be useful in case of system hang).

/ID Displays identified drive information

`/LS` Disables use of LBA mode.

Some old ATA PC cards (e.g., Seagate Technology ST7050P) support LBA mode improperly. If you've detected numerous errors during read/write of such a PC card, try to disable the LBA support.

`/VR` Enable numerous scanning by Read Verify command during formatting.

On some ATA cards not all 'bad' sectors are detected during the format process. In this case try to enable numerous scanning by Read Verify command during formatting.

This parameter, if specified, applies to all drives supported by ATA Enabler.

`/Ln:Letter` Specifies the drive letter assigned to ATA partition 'n', where n could be in range of 0 to 9. (E.g., `/L0:M /L1:K /L2:Z`.)

Drive letters selected by the user can only be taken into account if the ATA Enabler is loaded in TSR mode (e.g., from AUTOEXEC.BAT or command line), and will be ignored if the device driver is loaded from CONFIG.SYS .

User may assign more than 10 drive letters using the .INI file.

`/F=filename` Specifies the initialization file pathname.

By default the initialization file has the same name as the Enabler, but with extension .INI (i.e., ATAENAB.INI, CBATA.INI and UNATA.INI correspondingly). Enabler will be looking for the .INI file in the same subdirectory where enabler itself is located.

Using `/F` parameter user may override path and name of the default initialization file. (E.g., `/F:E:\Settings\ata.ini`)

Unloading

`/UL` Unload resident part (not supported, if driver is loaded via config.sys)

ATAENAB and UNATA Specific Options

Following command line options are for ATAENAB and UNATA only. Using them the user may override the default base address of the PC Card adapter or override the default socket number.

In case of UNATA: Parameters only apply to non-CardBus sockets.

`/B:n` PCMCIA adapter base I/O address (Default: 0x03E0)

`/S:n` PCMCIA socket number (Default: 0)

Please notice, that if you want to support more than one non-CardBus socket using ATAENAB or UNATA, you will have to create an INI file.

CBATA and UNATA Specific Options

Following command line options are for CBATA and UNATA only. Using them the user may control the initialization of CardBus sockets.

On most of recently made notebooks the BIOS will configure the interrupt mode properly. You should not specify `/PI`, `/MI`, `/MX` and `/OZ` options unless you are sure that the interrupt mode is not set properly.

`/PI:n` PCI Interrupt level (Default: 0x0B)

`/BS` Performs PCI bus scan and termination. Information will be displayed on console

`/FI` Force updating of PCI IRQ routing table for socket (even if selected IRQ is already in table)

`/EC:<use>` ON Use external power switch clock for adapter.
OFF Use power switch clock generated by PCI clock

Note: This switch is ignored for all PC Card adapters except Texas Instruments PCI121x/122x and TI PCI125x/14xx/44xx families.

- `/IM:m` Set interrupt mode. Possible values are:
- | | | |
|------|---|---------------------------------------|
| Par | TI1130/1x31: | use parallel ISA-type interrupts |
| | TI12xx/14xx/44xx: | use parallel ISA and PCI interrupts |
| | CL-6832, OZ6832: | use External-Hardware Interrupt mode |
| | Ricoh RB5C478: | use parallel interrupt mode |
| Ser | TI1130/1x31: | use serialized interrupt type scheme |
| | TI12xx/14xx/44xx: | use serialized ISA and PCI interrupts |
| | CL-6832, OZ6832: | use PC/PCI Serial Interrupt protocol |
| | Ricoh RB5C478: | use serialized interrupt mode |
| PPci | TI 12xx/14xx/44xx, CI-6832, OZ6832: use parallel PCI interrupts only | |
| ISPP | TI 12xx/14xx/44xx only: use serialized ISA and parallel PCI interrupts. Will be ignored for all other adapters. | |
| Pway | CL-6832, OZ6832: use PCI/Way Interrupt Signaling mode. Will be ignored for all other adapters | |
- `/MX:<use>` Initialize the multiplex IRQ routing register. This switch is only used on TI PCI122x/125x/14xx/44xx adapters and is ignored for all other adapters.
- `/OZ:97:<use>` O2Micro PC Card adapter only: set/reset PC97 IRQ bit
- `/OZ:IL:<use>` O2Micro PC Card adapter only: set/reset ISA Legacy bit

Initialization File

The initialization file is a text file that contains special settings. These settings allow you to configure computer hardware components so your CardBus adapters and/or ATA cards become functional.

Any text in the .INI file starting after the semicolon (;) to end of the line, is interpreted as a comment.

Using the INI file you may set both, system-wide and per-socket parameters in any combination.

There are three types of sections defined: Common, Socket and PCI.

Common Section

Only one [Common] section can be defined in INI file. The Common Section defines ATA configuration parameters that apply to all ATA cards in the system. Following parameters are defined: 'CISBase', 'ATAIoBase', 'ReadVerifyRetry', 'LBAMode' and 'DriveLetterN' (where N is a number between 0 and 9).

These parameters represent an alternative for command line options /M, /IO, /VR, /LS and /Ln correspondingly.

Example:

```
[Common]
CISBase = 0xEC000
ATAIoBase = 0x800
ReadVerifyRetry = Off
LBAMode = On
DriveLetter0 = M
DriveLetter1 = K
DriveLetter2 = Z
```

Socket Sections

Socket Sections is interpreted only by ATAENAB and UNATA and can only be used for non-CardBus sockets. Both enablers support up to 8 non-CardBus sockets. The socket configuration of such sockets should be described in sections [Socket0] to [Socket7].

Following values are defined for Socket Sections: 'LegacyBase', 'Socket', 'CISBase', 'ATAIoBase', 'ReadVerifyRetry', 'LBAMode' and 'DriveLetterN' (where N is a number between 0 and 9).

Parameters in Socket Sections represent an alternative for command line options /B, /S, /M, /IO, /VR, /LS and /Ln correspondingly.

Parameters specified in Socket Sections override parameters specified in Common Section and Command Line. Using them you may control initialization order and execution mode. For example, you may enable LBA mode by default, but disable it for selected socket.

Example:

```
[Socket0]
LegacyBase = 0x3E2
Socket = 1
CISBase = 0xEC00
ATAIoBase = 0x800
ReadVerifyRetry = Off
LBAMode = On
DriveLetter0 = M
DriveLetter1 = K
DriveLetter2 = Z

[Socket1]
LegacyBase = 0x3E0
Socket = 0
LBAMode = Off
DriveLetter0 = Y
```

Please note, that [Socket1] definition omits several settings (such as ATAIoBase). In this case settings from [Common] section or command line will be used.

PCI Sections

PCI Sections is interpreted only by CBATA and UNATA and can only be used for CardBus sockets and PCI-2-PCI bridges. Both enablers support any number of CardBus sockets.

All section names are relative to original PCI subsystem configuration. You can see that configuration if you switch program to verbose mode. (/V key) or use the /BS switch.

In order to specify the required configuration of the PCI device, you need to know the location of the device. This location is specified in Bus:Device:Function form. Location 0:A:1 describes the first function of PCI device number 10 ("A" in hexadecimal format) located on PCI bus 0. Initialization file section used for the configuration of such a device should have the name [0:A:1].

Value names depend on device type.

For CardBus adapters, following values are defined: 'IoFilter0', 'IoFilter1', 'MemFilter0', 'MemFilter1', 'ExCABase', 'LegacyBase', 'IRQ', 'ISAEnable', 'VGAEnable', 'CISBase', 'ATAIoBase', 'ReadVerifyRetry', 'LBAMode' and 'DriveLetterN' (where N is a number between 0 and 9).

For PCI-to-PCI bridges, following values are defined: 'IoFilter', 'MemFilter', 'PreFilter', 'IRQ', 'ISAEnable', 'VGAEnable'.

**MemFilter,
PreFilter,
MemFilter0,
MemFilter1**

These parameters define the CardBus or PCI-to-PCI bridge memory filter base and limit (or size) both memory filters (prefetchable and non-prefetchable).

The CardBus base and size values should have 4K alignments according to Yenta specification and limit (maximum address) should be aligned to 4K minus one.

Following formats could be used to specify bridge memory filter ranges:

BaseAddress:Limit. This means that we define the first and exactly the last integer number in a range (e.g., 0xA0000000:0xA0000FFF specifies 4K ranges). If you wish to disable positive decoding of PCI-to-PCI bridge's filter range, please specify something like: 200000:1ffff.

If you prefer to specify filter size rather than filter max address you should use BaseAddress,Size format, where Size by default is a literal decimal number. In this case you also could use 'M' or 'K' postfixes (e.g., 0xA0000000,1M specifies 1M memory filter starting at 0xA0000000 address).

Attention! All values are treated as hexadecimal even if there is no "0x" prefix.

Examples:

```
MemFilter0=A0000000h:A0000fffh      4K memory range
MemFilter0=A0000000h,4K             4K memory range
MemFilter0=A1000000h:A1001fffh,Pre  8K pref. memory
MemFilter0=A1000000h,8K,Pre        8K pref. memory
```

**IoFilter,
IoFilter0,
IoFilter1**

This is the bridge I/O range base and limit (or size). For CardBus base and size values must have double-word alignment.

Examples:

```
IoFilter = 0xD000:0xD00F           16-bytes I/O range
```

IRQ

CardBus interrupt line settings. According to PC/AT architecture this value must not exceed 15.

```
IRQ = 10                          10th interrupt
```

ISAEnable

Control setting of ISA Enable bit in Bridge Control Register. Valid values are 0 and 1.

Example:

```
ISAEnable = 1                      Set ISA Enable bit
```

VGAEnable

Control setting of VGA Enable bit in Bridge Control Register. Valid values are 0 and 1.

Example:

```
VGAEnable = 0                      Reset VGAEnable bit
```

ExCABase

This option is used to mountain CardBus socket register/ExCA registers base address register. Available values: any 32-bit hexadecimal number aligned to 4K boundaries.

Example:

```
ExCABase = D8000000h
```

LegacyBase

This is PC Card 16-Bit IF legacy mode base address. Available values: any 16-bit hexadecimal number aligned to double-word boundary.

Example:

```
LegacyBase = 3e0h
```

**PrimaryBus,
SecondaryBus,
SubordinateBus**

These options control bus number assignments for PCI-to-PCI and CardBus bridges. Available values: any decimal number not greater than 255.

Example:

```
[0:A:0]                                TI PCI1131 socket
PrimaryBus      = 0
SecondaryBus    = 1                Set sec. bus to 1
SubordinateBus  = 3                Set sub. bus to 3
```

```
; Now socket 0 of TI PCI1131 CardBus adapter accepts
; I/O requests to buses from 1 to 3 inclusive
```

```
[0:A:1]                                TI PCI1131 socket
PrimaryBus      = 0
SecondaryBus    = 4                Set sec. bus to 4
SubordinateBus  = 4                Set sub. bus to 4
```

**CISBase
ATAIoBase
ReadVerifyRetry
LBAMode
DriveLetter**

Card entries 'CISBase', 'ATAIoBase', 'ReadVerifyRetry', 'LBAMode' and 'DriveLetterN' (where N is a number between 0 and 9). define configuration of ATA card.

Example:

```
[0:A:1]                                Card in Socket 1
CISBase = 0xEC000
ATAIoBase = 0x800
ReadVerifyRetry = Off
LBAMode = On
DriveLetter0 = M
DriveLetter1 = K
DriveLetter2 = Z
```

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Additional information

How to get Technical Support for ATA Enabler

Please send an E-mail in English (we can't process technical support questions in any other language) to [technical support](mailto:support@tssc.de) (support@tssc.de).

In your request please specify:

1. Description of your problem.
2. The memory card name and manufacturer **exactly** as it appears on the card.

Please attach to your e-mail following files:

1. Please run ATA Enabler with /V[:<file>] /ID switches (plus all parameters you normally use), capture the output to the file and attach it to your e-mail. E.g.
C:\>UNATA /M:0xC8000 /V:LOG.TXT /ID
or
DEVICE = UNATA.EXE /M:0xC8000 /V:LOG.TXT /ID
2. CONFIG.SYS
3. AUTOEXEC.BAT
4. Enabler initialization file if one exists.

Example of INI file

Following sample shows an example of UNATA initialization file for the system with one CardBus and one PCIC compatible adapter

```
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;;          UNATA Enabler. Sample of Initialization file
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

; PCI-2-PCI Bridge between bus 0 and bus2
[0:1E:0]
PreFilter=0x60000000:0x60FFFFFF

; CardBus socket 0
[2:B:0]
ExCABase=0xD2000                                ; Set ExCA address to 0xD2000
CISBase=0xD3000
ATAIoBase = 0x150
ReadVerifyRetry=Off
LBAMode=On
DriveLetter0=M
DriveLetter1=K
DriveLetter2=Z

; PCIC Socket 1
[Socket0]
LegacyBase=0x3E0
Socket=1
CISBase=0xD3000
ATAIoBase=0x140
ReadVerifyRetry=Off
LBAMode=On
DriveLetter0=N
DriveLetter1=O
```

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