7.16.7 Input Data

Table 21 — IDENTIFY DEVICE data (part 1 of 10)

Word	O M	S P	FV	Description
0	M	B		General configuration bit-significant information:
			F	15 0 = ATA device
			X	14:8 Retired
			F	7:6 Obsolete
			X	5:3 Retired
			V	2 Response incomplete
			X	1 Retired
			F	0 Reserved
1			X	Obsolete
2	O	B	V	Specific configuration
3			X	Obsolete
4-5			X	Retired
6			X	Obsolete
7-8	O	N	V	Reserved for assignment by the CompactFlash™ Association
9			X	Retired
10-19	M	B	F	Serial number (20 ASCII characters)
20-21			X	Retired
22			X	Obsolete
23-26	M	B	F	Firmware revision (8 ASCII characters)
27-46	M	B	F	Model number (40 ASCII characters)
47	M		F	15:8 80h
			F	7:0 00h = Reserved
		P	F	01h-FFh = Maximum number of logical sectors that shall be transferred per DRQ data block on READ/WRITE MULTIPLE commands
48			F	Trusted Computing feature set options
				15 Shall be cleared to zero
				14 Shall be set to zero
				13:1 Reserved for the Trusted Computing Group
				0 1=Trusted Computing feature set is supported
49	M			Capabilities
			F	15:14 Reserved for the IDENTIFY PACKET DEVICE command.
		B	F	13 1 = Standby timer values as specified in this standard are supported
				0 = Standby timer values shall be managed by the device
			F	12 Reserved for the IDENTIFY PACKET DEVICE command.
		P	F	11 1 = IORDY supported
				0 = IORDY may be supported
		P	F	10 1 = IORDY may be disabled
		B	F	9 1 = LBA supported
		P	F	8 1 = DMA supported.
			X	7:0 Retired

Table 21 — IDENTIFY DEVICE data (part 2 of 10)

Word	OM	SP	FV		Description
50	M				Capabilities
			F	15	Shall be cleared to zero.
			F	14	Shall be set to one.
			F	13:2	Reserved.
			X	1	Obsolete
		B	F	0	Shall be set to one to indicate a device specific Standby timer value minimum.
51-52			X		Obsolete
53	M		F	15:8	Reserved for e06144
				7:3	Reserved
		B	F	2	1 = the fields reported in word 88 are valid
		B			0 = the fields reported in word 88 are not valid
		B	F	1	1 = the fields reported in words (70:64) are valid
		P			0 = the fields reported in words (70:64) are not valid
			X	0	Obsolete
54-58			X		Obsolete
59	M		F	15:9	Reserved
		B	V	8	1 = Multiple sector setting is valid
		B	V	7:0	xxh = Current setting for number of logical sectors that shall be transferred per DRQ data block on READ/WRITE Multiple commands
60-61	M	B	F		Total number of user addressable logical sectors
62			X		Obsolete
63	M	P	F	15:11	Reserved
		P	V	10	1 = Multiword DMA mode 2 is selected
		P			0 = Multiword DMA mode 2 is not selected
		P	V	9	1 = Multiword DMA mode 1 is selected
		P			0 = Multiword DMA mode 1 is not selected
		P	V	8	1 = Multiword DMA mode 0 is selected
		P			0 = Multiword DMA mode 0 is not selected
			F	7:3	Reserved
		P	F	2	1 = Multiword DMA mode 2 and below are supported
		P	F	1	1 = Multiword DMA mode 1 and below are supported
		P	F	0	1 = Multiword DMA mode 0 is supported
64	M		F	15:8	Reserved
		P	F	7:0	PIO modes supported
65	M				Minimum Multiword DMA transfer cycle time per word
		P	F	15:0	Cycle time in nanoseconds
66	M				Manufacturer's recommended Multiword DMA transfer cycle time
		P	F	15:0	Cycle time in nanoseconds
67	M				Minimum PIO transfer cycle time without flow control
		P	F	15:0	Cycle time in nanoseconds
68	M				Minimum PIO transfer cycle time with IORDY flow control
		P	F	15:0	Cycle time in nanoseconds
69-70			F		Reserved
71-74			F		Reserved for the IDENTIFY PACKET DEVICE command.

Table 21 — IDENTIFY DEVICE data (part 3 of 10)

Word	OM	SP	FV	Description
75	O			Queue depth
			F	15:5 Reserved
		B	F	4:0 Maximum queue depth - 1
76-79		S	F	Reserved for Serial ATA
80	M	B		Major revision number 0000h or FFFFh = device does not report version
			F	15:9 Reserved
		B	F	8 1 = supports ATA8-ACS
		B	F	7 1 = supports ATA/ATAPI-7
		B	F	6 1 = supports ATA/ATAPI-6
		B	F	5 1 = supports ATA/ATAPI-5
		B	F	4 1 = supports ATA/ATAPI-4
			F	3 Obsolete
			X	2 Obsolete
			X	1 Obsolete
			F	0 Reserved
81	M	B	F	Minor revision number
82	M			Command set supported.
			X	15 Obsolete
		B	F	14 1 = NOP command supported
		B	F	13 1 = READ BUFFER command supported
		B	F	12 1 = WRITE BUFFER command supported
			X	11 Obsolete
		B	F	10 1 = Host Protected Area feature set supported
		N	F	9 1 = DEVICE RESET command supported
		B	F	8 1 = SERVICE interrupt supported
		B	F	7 1 = release interrupt supported
		B	F	6 1 = look-ahead supported
		B	F	5 1 = write cache supported
		B	F	4 Shall be cleared to zero to indicate that the PACKET feature set is not supported.
		B	F	3 1 = mandatory Power Management feature set supported
		B	F	2 Obsolete
		B	F	1 1 = Security Mode feature set supported
		B	F	0 1 = SMART feature set supported

Table 21 — IDENTIFY DEVICE data (part 4 of 10)

Word	O M	S P	FV	Description
83	M			Command sets supported.
			F	15 Shall be cleared to zero
			F	14 Shall be set to one
		B	F	13 1 = FLUSH CACHE EXT command supported
		B	F	12 1 = mandatory FLUSH CACHE command supported
		B	F	11 1 = Device Configuration Overlay feature set supported
		B	F	10 1 = 48-bit Address feature set supported
		B	F	9 1 = Automatic Acoustic Management feature set supported
		B	F	8 1 = SET MAX security extension supported
		B	F	7 See Address Offset Reserved Area Boot, INCITS TR27:2001
		B	F	6 1 = SET FEATURES subcommand required to spin-up after power-up
		B	F	5 1 = Power-Up In Standby feature set supported
		B	F	4 Obsolete
		B	F	3 1 = Advanced Power Management feature set supported
		N	F	2 1 = CFA feature set supported
		B	F	1 1 = READ/WRITE DMA QUEUED supported
		B	F	0 1 = DOWNLOAD MICROCODE command supported
84	M			Command set/feature supported
			F	15 Shall be cleared to zero
			F	14 Shall be set to one
		B	F	13 1 = IDLE IMMEDIATE with UNLOAD FEATURE supported
		B	F	12 Reserved for technical report INCITS TR-37-2004 (TLC)
		B	F	11 Reserved for technical report INCITS TR-37-2004 (TLC)
		B	F	10:9 1 = Obsolete
		B	F	8 1 = 64-bit World wide name supported
		B	F	7 1 = WRITE DMA QUEUED FUA EXT command supported
		B	F	6 1 = WRITE DMA FUA EXT and WRITE MULTIPLE FUA EXT commands supported
		B	F	5 1 = General Purpose Logging feature set supported
		B	F	4 1 = Streaming feature set supported
		N	F	3 1 = Media Card Pass Through Command feature set supported
		B	F	2 1 = Media serial number supported
		B	F	1 1 = SMART self-test supported
		B	F	0 1 = SMART error logging supported

Table 21 — IDENTIFY DEVICE data (part 5 of 10)

Word	OM	SP	FV	Description
85	M			Command set/feature enabled/supported.
			X	15 Obsolete
		B	F	14 1 = NOP command supported
		B	F	13 1 = READ BUFFER command supported
		B	F	12 1 = WRITE BUFFER command supported
			X	11 Obsolete
		B	V	10 1 = Host Protected Area has been established (i.e., the maximum LBA is less than the maximum native LBA)
		N	F	9 1 = DEVICE RESET command supported
		B	V	8 1 = SERVICE interrupt enabled
		B	V	7 1 = release interrupt enabled
		B	V	6 1 = look-ahead enabled
		B	V	5 1 = write cache enabled
			F	4 Shall be cleared to zero to indicate that the PACKET feature set is not supported.
		B	F	3 1 = Power Management feature set enabled
		B	F	2 Obsolete
		B	V	1 1 = Security Mode feature set enabled
		B	V	0 1 = SMART feature set enabled
86	M			Command set/feature enabled/supported.
		B		15 1 = Words 120:119 are valid
			F	14 Reserved
		B	F	13 1 = FLUSH CACHE EXT command supported
		B	F	12 1 = FLUSH CACHE command supported
		B	F	11 1 = Device Configuration Overlay supported
		B	F	10 1 = 48-bit Address features set supported
		B	V	9 1 = Automatic Acoustic Management feature set enabled
		B	V	8 1 = SET MAX security extension enabled by SET MAX SET PASSWORD
		B	F	7 Reserved for Address Offset Reserved Area Boot, INCITS TR27:2001
		B	F	6 1 = SET FEATURES subcommand required to spin-up after power-up
		B	V	5 1 = Power-Up In Standby feature set enabled
		B	V	4 Obsolete
		B	V	3 1 = Advanced Power Management feature set enabled
		N	F	2 1 = CFA feature set supported
		B	F	1 1 = READ/WRITE DMA QUEUED command supported
		B	F	0 1 = DOWNLOAD MICROCODE command supported

Table 21 — IDENTIFY DEVICE data (part 6 of 10)

Word	O M	S P	FV	Description
87	M			Command set/feature enabled/supported.
			F	15 Shall be cleared to zero
			F	14 Shall be set to one
		B	F	13 1 = IDLE IMMEDIATE with UNLOAD FEATURE supported
		B	V	12 Reserved for technical report- INCITS TR-37-2004 (TLC)
		B	V	11 Reserved for technical report- INCITS TR-37-2004 (TLC)
		B	F	10:9 1 = Obsolete
		B	F	8 1 = 64 bit World wide name supported
		B	F	7 1 = WRITE DMA QUEUED FUA EXT command supported
		B	F	6 1 = WRITE DMA FUA EXT and WRITE MULTIPLE FUA EXT commands supported
		B	F	5 1 = General Purpose Logging feature set supported
		B	V	4 1 = Obsolete
		N	V	3 1 = Media Card Pass Through Command feature set supported
		B	V	2 1 = Media serial number is valid
		B	F	1 1 = SMART self-test supported
		B	F	0 1 = SMART error logging supported
88	O			Ultra DMA modes
			F	15 Reserved
		P	V	14 1 = Ultra DMA mode 6 is selected
		P		0 = Ultra DMA mode 6 is not selected
		P	V	13 1 = Ultra DMA mode 5 is selected
		P		0 = Ultra DMA mode 5 is not selected
		P	V	12 1 = Ultra DMA mode 4 is selected
		P		0 = Ultra DMA mode 4 is not selected
		P	V	11 1 = Ultra DMA mode 3 is selected
		P		0 = Ultra DMA mode 3 is not selected
		P	V	10 1 = Ultra DMA mode 2 is selected
		P		0 = Ultra DMA mode 2 is not selected
		P	V	9 1 = Ultra DMA mode 1 is selected
		P		0 = Ultra DMA mode 1 is not selected
		P	V	8 1 = Ultra DMA mode 0 is selected
		P		0 = Ultra DMA mode 0 is not selected
		P	F	7 Reserved
		P	F	6 1 = Ultra DMA mode 6 and below are supported
		P	F	5 1 = Ultra DMA mode 5 and below are supported
		P	F	4 1 = Ultra DMA mode 4 and below are supported
		P	F	3 1 = Ultra DMA mode 3 and below are supported
		P	F	2 1 = Ultra DMA mode 2 and below are supported
		P	F	1 1 = Ultra DMA mode 1 and below are supported
		P	F	0 1 = Ultra DMA mode 0 is supported
89	O	B	F	Time required for security erase unit completion
90	O	B	F	Time required for Enhanced security erase completion
91	O	B	V	Current advanced power management value
92	O	B	V	Master Password Identifier

Table 21 — IDENTIFY DEVICE data (part 7 of 10)

Word	O M	S P	FV	Description
93				Hardware reset result. The contents of bits (12:0) of this word shall change only during the execution of a hardware reset. See 7.16.7.41 for more information.
			F	15 Shall be cleared to zero.
			F	14 Shall be set to one.
		P	V	13 1 = device detected CBLID- above V_{iH}.
		P		0 = device detected CBLID- below V_{iL}.
		P		12:8 Device 1 hardware reset result. Device 0 shall clear these bits to zero. Device 1 shall set these bits as follows:
		P	F	12 Reserved.
		P	V	11 0 = Device 1 did not assert PDIAG-.
		P		1 = Device 1 asserted PDIAG-.
		P	V	10:9 These bits indicate how Device 1 determined the device number:
		P		00 = Reserved.
		P		01 = a jumper was used.
		P		10 = the CSEL signal was used.
		P		11 = some other method was used or the method is unknown.
				8 Shall be set to one.
		P		7:0 Device 0 hardware reset result. Device 1 shall clear these bits to zero. Device 0 shall set these bits as follows:
			F	7 Reserved.
		P	F	6 0 = Device 0 does not respond when Device 1 is selected.
		P		1 = Device 0 responds when Device 1 is selected.
		P	V	5 0 = Device 0 did not detect the assertion of DASP-.
		P		1 = Device 0 detected the assertion of DASP-.
		P	V	4 0 = Device 0 did not detect the assertion of PDIAG-.
		P		1 = Device 0 detected the assertion of PDIAG-.
		P	V	3 0 = Device 0 failed diagnostics.
		P		1 = Device 0 passed diagnostics.
		P	V	2:1 These bits indicate how Device 0 determined the device number:
		P		00 = Reserved.
		P		01 = a jumper was used.
		P		10 = the CSEL signal was used.
		P		11 = some other method was used or the method is unknown.
			F	0 Shall be set to one.
94	O	B	F	15:8 Vendor's recommended acoustic management value.
		B	V	7:0 Current automatic acoustic management value.
95	O	B	F	Stream Minimum Request Size
96	O	B	V	Streaming Transfer Time - DMA
97	O	B	V	Streaming Access Latency - DMA and PIO
98-99	O	B	F	Streaming Performance Granularity
100-103	O	B	V	Total Number of User Addressable Sectors for the 48-bit Address feature set.
104	O	B	V	Streaming Transfer Time - PIO
105			F	Reserved

Table 21 — IDENTIFY DEVICE data (part 8 of 10)

Word	O M	S P	FV	Description
106	O			Physical sector size / Logical Sector Size
		B	F	15 Shall be cleared to zero
		B	F	14 Shall be set to one
		B	F	13 1 = Device has multiple logical sectors per physical sector.
		B		12 1= Device Logical Sector Longer than 256 Words
			F	11:4 Reserved
		B	F	3:0 2^X logical sectors per physical sector
107	O	B	F	Inter-seek delay for ISO-7779 acoustic testing in microseconds
108	M	B	F	15:12 NAA (3:0) 11:0 IEEE OUI (23:12)
109	M	B	F	15:4 IEEE OUI (11:0) 3:0 Unique ID (35:32)
110	M	B	F	15:0 Unique ID (31:16)
111	M	B	F	15:0 Unique ID (15:0)
112-115	O		F	Reserved for world wide name extension to 128 bits
116	O	B	V	Reserved for INCITS TR-37-2004
117-118	O	B	F	Words per Logical Sector
119	M			Supported Settings (Continued from words 84:82)
			F	15 Shall be cleared to zero
			F	14 Shall be set to one
			F	13:6 Reserved
				5 Reserved for e06144
		B	F	4 1 = The Segmented feature for DOWNLOAD MICROCODE is supported
		B	F	3 1 = READ and WRITE DMA EXT GPL optional commands are supported
		B	F	2 1 = WRITE UNCORRECTABLE is supported
		B	F	1 1 = Write-Read-Verify feature set is supported
		P	F	0 reserved for DT1825
120	M			Command set/feature enabled/supported. (Continued from words 87:85)
			F	15 Shall be cleared to zero
			F	14 Shall be set to one
			F	13:6 Reserved
				5 Reserved for e06144
		B	F	4 1 = The Segmented feature for DOWNLOAD MICROCODE is supported
		B	F	3 1 = READ and WRITE DMA EXT GPL optional commands are supported
		B	F	2 1 = WRITE UNCORRECTABLE is supported
		B	F	1 1 = Write-Read-Verify feature set is enabled
		P	F	0 Reserved for DT1825
121-126			F	Reserved for expanded supported and enabled settings
127	O			Obsolete

Table 21 — IDENTIFY DEVICE data (part 9 of 10)

Word	OM	SP	FV	Description
128	O			Security status
			F	15:9 Reserved
		B	V	8 Security level 0 = High, 1 = Maximum
			F	7:6 Reserved
		B	F	5 1 = Enhanced security erase supported
		B	V	4 1 = Security count expired
		B	V	3 1 = Security frozen
		B	V	2 1 = Security locked
		B	V	1 1 = Security enabled
		B	F	0 1 = Security supported
129-159			X	Vendor specific
160	O			CFA power mode 1
			F	15 Word 160 supported
			F	14 Reserved
		N	F	13 CFA power mode 1 is required for one or more commands implemented by the device
		N	V	12 CFA power mode 1 disabled
		N	F	11:0 Maximum current in ma
161-175			X	Reserved for assignment by the CompactFlash™ Association
176-205	O	B	V	Current media serial number (60 ASCII characters)
206	O	B		SCT Command Transport
			X	15:12 Vendor Specific
				11:6 Reserved
			F	5 SCT Command Transport Data Tables supported
			F	4 SCT Command Transport Features Control supported
			F	3 SCT Command Transport Error Recovery Control supported
			F	2 SCT Command Transport Write Same supported
			F	1 SCT Command Transport Long Sector Access supported
			F	0 SCT Command Transport supported
207-208			F	Reserved for CE-ATA.
209	O		F	Alignment of logical blocks within a larger physical block
				15 Shall be cleared to zero
				14 Shall be set to one
		B		13:0 ‘Logical sector’ offset within the first physical sector where the first logical sector is placed.
210-211	O	B	V	Write-Read-Verify Sector Count Mode 3 Only
212-213	O	B	F	Verify Sector Count Mode 2 Only
214	O	B		NV Cache Capabilities
			F	15:12 NV Cache feature set version
			F	11:8 NV Cache Power Mode feature set version
				7:5 Reserved
			V	4 1 = NV Cache feature set enabled
				3:1 Reserved
			V	0 1 = NV Cache Power Mode feature set enabled
215	O	B	V	NV Cache Size in Logical Blocks (LSW)
216	O	B	V	NV Cache Size in Logical Blocks (MSW)

Table 21 — IDENTIFY DEVICE data (part 10 of 10)

Word	O/M	S/P	FV	Description
217	O	B	V	NV Cache Read Transfer Speed in MB/s
218	O	B	V	NV Cache Write Transfer Speed in MB/s
219	O	B		NV Cache Options
				15:8 Reserved
			F	7:0 Device Estimated Time to Spin Up in Seconds
220	O	B		15:8 Reserved
			V	7:0 Write-Read-Verify feature set current mode
221				Reserved
222	M		F	Transport Major revision number. 0000h or FFFFh = device does not report version
		B		15:12 Transport Type – 0 = Parallel, 1 = Serial, 2-15 = Reserved
				Parallel **Serial**
		S		11:4 Reserved Reserved
		S		3 Reserved SATA Rev 2.5
		S		2 Reserved SATA II: Extensions
		S		1 Reserved SATA 1.0a
		P		0 ATA8-APT ATA8-AST
223	M	B	F	Transport Minor revision number
224-233			F	Reserved for CE-ATA
234	O	B	F	Minimum number of 512 byte units per DOWNLOAD MICROCODE command mode 3
235	O	B	F	Maximum number of 512 byte units per DOWNLOAD MICROCODE command mode 3
236-254				Reserved
255	M		X	Integrity word
		B		15:8 Checksum
		B		7:0 Signature

Key:

O/M – Mandatory/optional requirement.
- M – Support of the word is mandatory.
- O – Support of the word is optional.

F/V – Fixed/variable content
- F – The content of the field is fixed and does not change. The DCO command may change the value of a fixed field. For removable media devices, these values may change when media is removed or changed.
- V – The contents of the field is variable and may change depending on the state of the device or the commands executed by the device.
- X – The content of the field may be fixed or variable

S/P – Content applies to Serial or Parallel transport
- S – Serial Transport
- P – Parallel Transport
- B – Both Serial and Parallel Transports
- N – Belongs to a transport other than Serial or Parallel

7.16.7.1 Word 0: General configuration

Devices that conform to this standard shall clear bit 15 to zero.

Bits 7:6 are obsolete.

If bit 2 is set to one it indicates that the content of the IDENTIFY DEVICE data is incomplete. This may occur if the device supports the Power-up in Standby feature set and required data is contained on the device media. In this case the content of at least word 0 and word 2 shall be valid.

Devices supporting the CFA feature set shall place the value 848Ah in word 0. In this case, the above definitions for the bits in word 0 are not valid.

7.16.7.2 Word 1: Obsolete

7.16.7.3 Word 2: Specific configuration

Word 2 shall be set as follows:

Value	Description
37C8h	Device requires SET FEATURES subcommand to spin-up after power-up and IDENTIFY DEVICE data is incomplete (see 4.17).
738Ch	Device requires SET FEATURES subcommand to spin-up after power-up and IDENTIFY DEVICE data is complete (see 4.17).
8C73h	Device does not require SET FEATURES subcommand to spin-up after power-up and IDENTIFY DEVICE data is incomplete (see 4.17).
C837h	Device does not require SET FEATURES subcommand to spin-up after power-up and IDENTIFY DEVICE data is complete (see 4.17).
All other values	Reserved.

7.16.7.4 Word 3: Obsolete

7.16.7.5 Words 4-5: Retired

7.16.7.6 Word 6: Obsolete

7.16.7.7 Words 7-8: Reserved for assignment by the CompactFlash™ Association

7.16.7.8 Word 9: Retired

7.16.7.9 Words 10-19: Serial number

This field contains the serial number of the device. The contents of this field is an ASCII character string of twenty bytes. The device shall pad the character string with spaces (20h), if necessary, to ensure that the string is the proper length. The combination of Serial number (words 10-19) and Model number (words 27-46) shall be unique for a given manufacturer (See 0).

7.16.7.10 Words 20-21: Retired

7.16.7.11 Word 22: Obsolete

7.16.7.12 Words 23-26: Firmware revision

This field contains the firmware revision number of the device. The contents of this field is an ASCII character string of eight bytes. The device shall pad the character string with spaces (20h), if necessary, to ensure that the string is the proper length (See 0).

7.16.7.13 Words 27-46: Model number

This field contains the model number of the device. The contents of this field is an ASCII character string of forty bytes. The device shall pad the character string with spaces (20h), if necessary, to ensure that the string is the

proper length. The combination of Serial number (words 10-19) and Model number (words 27-46) shall be unique for a given manufacturer.

7.16.7.14 Word 47: READ/WRITE MULTIPLE support

For PATA devices Bits (7:0) of this word define the maximum number of logical sectors per DRQ data block that the device supports for READ/WRITE MULTIPLE commands.

For SATA devices this field shall be set to 16 or less.

7.16.7.15 Word 48: Trusted Computing feature set options

Bit 0 of word 48 when set to one, indicates that the Trusted Computing feature set is supported.

7.16.7.16 Words 49-50: Capabilities

Bits (15:14) of word 49 are reserved for use in the IDENTIFY PACKET DEVICE data.

Bit 13 of word 49 is used to determine whether a device uses the Standby timer values as defined in this standard. Table 25 specifies the Standby timer values used by the device if bit 13 is set to one. If bit 13 is cleared to zero, the timer values shall be vendor specific.

Bit 12 of word 49 is reserved for use in the IDENTIFY PACKET DEVICE data.

For PATA devices bit 11 of word 49 indicates whether a device supports IORDY. If this bit is set to one, then the device supports IORDY operation. All devices except CFA and PCMCIA devices shall support PIO mode 3 or higher, shall support IORDY, and shall set this bit to one.

For SATA devices bit 11 of word 49 shall be set to one.

For PATA devices bit 10 of word 49 is used to indicate a device's ability to enable or disable the use of IORDY. If this bit is set to one, then the device supports the disabling of IORDY. Disabling and enabling of IORDY is accomplished using the SET FEATURES command.

For SATA devices bit 10 of word 49 shall be set to one.

Bit 9 of word 49 shall be set to one to indicate that an LBA transition is supported.

Bits 8 of word 49 Shall be set to one to indicate that DMA is supported. For devices not implementing the CompactFlash feature set this bit shall be set to one.

Bits (7:0) of word 49 are retired.

Bit 15 of word 50 shall be cleared to zero to indicate that the contents of word 50 are valid.

Bit 14 of word 50 shall be set to one to indicate that the contents of word 50 are valid.

Bits (13:2) of word 50 are reserved.

Bit 1 of word 50 is obsolete.

Bit 0 of word 50 set to one indicates that the device has a minimum Standby timer value that is device specific.

7.16.7.17 Words 51-52: Obsolete

7.16.7.18 Word 53: Field validity

Bit 0 of word 53 is obsolete.

For PATA devices when bit 1 of word 53 is set to one, the values reported in words 64-70 are valid. If this bit is cleared to zero, the values reported in words 64-70 are not valid. All devices except CFA and PCMCIA devices shall support PIO mode 3 or above and shall set bit 1 of word 53 to one and support the fields contained in words 64-70.

For SATA devices bit 1 of word 53 shall be set to one.

For PATA devices if the device supports Ultra DMA and the values reported in word 88 are valid, then bit 2 of word 53 shall be set to one. If the device does not support Ultra DMA and the values reported in word 88 are not valid, then this bit is cleared to zero.

For SATA devices bit 2 of word 53 shall be set to one.

7.16.7.19 Words 54-58: Obsolete

7.16.7.20 Word 59: Multiple sector setting

If bit 8 is set to one, bits (7:0) reflect the number of logical sectors currently set to transfer on a READ/WRITE MULTIPLE command. This field may default to the preferred value for the device (see 7.50).

7.16.7.21 Words 60-61: Total number of user addressable sectors

This field contains a value that is one greater than the maximum user accessible logical block address. The maximum value that shall be placed in this field is 0FFF_FFFFh.

7.16.7.22 Word 62: Obsolete

7.16.7.23 Word 63: Multiword DMA transfer

Word 63 identifies the Multiword DMA transfer modes supported by the device and indicates the mode that is currently selected. Only one DMA mode shall be selected at any given time. If an Ultra DMA mode is enabled, then no Multiword DMA mode shall be enabled. If a Multiword DMA mode is enabled then no Ultra DMA mode shall be enabled.

Bits (15:11) of word 63 are reserved.

If bit 10 of word 63 is set to one, then Multiword DMA mode 2 is selected. If this bit is cleared to zero, then Multiword DMA mode 2 is not selected. If bit 9 is set to one or if bit 8 is set to one, then this bit shall be cleared to zero.

If bit 9 of word 63 is set to one, then Multiword DMA mode 1 is selected. If this bit is cleared to zero then Multiword DMA mode 1 is not selected. If bit 10 is set to one or if bit 8 is set to one, then this bit shall be cleared to zero.

If bit 8 of word 63 is set to one, then Multiword DMA mode 0 is selected. If this bit is cleared to zero then Multiword DMA mode 0 is not selected. If bit 10 is set to one or if bit 9 is set to one, then this bit shall be cleared to zero.

Bits (7:3) of word 63 are reserved.

For PATA devices when bit 2 of word 63 is set to one Multiword DMA modes 2 and below are supported. If this bit is cleared to zero, then Multiword DMA mode 2 is not supported. If Multiword DMA mode 2 is supported, then Multiword DMA modes 1 and 0 shall also be supported. If this bit is set to one, bits (1:0) shall be set to one.

For SATA devices bit 2 of word 63 shall be set to one.

For PATA devices when bit 1 of word 63 is set to one Multiword DMA modes 1 and below are supported. If this bit is cleared to zero, then Multiword DMA mode 1 is not supported. If Multiword DMA mode 1 is supported, then Multiword DMA mode 0 shall also be supported. If this bit is set to one, bit 0 shall be set to one.

For SATA devices bit 1 of word 63shall be set to one.

For PATA devices when bit 0 of word 63 is set to one Multiword DMA mode 0 is supported.

For SATA devices bit 0 of word 63 shall be set to one.

7.16.7.24 Word 64: PIO transfer modes supported

For PATA devices bits (7:0) of word 64 is defined as the PIO data and register transfer supported field. If this field is supported, bit 1 of word 53 shall be set to one. This field is bit significant. Any number of bits may be set to one in this field by the device to indicate the PIO modes the device is capable of supporting.

Of these bits, bits (7:2) are Reserved for future PIO modes. Bit 0, if set to one, indicates that the device supports PIO mode 3. All devices except CFA and PCMCIA devices shall support PIO mode 3 and shall set bit 0 to one. Bit 1, if set to one, indicates that the device supports PIO mode 4. See ATA8-APT for more information.

For SATA devices bits (1:0) shall be set to one.

7.16.7.25 Word 65: Minimum Multiword DMA transfer cycle time per word

For PATA devices word 65 is defined as the minimum Multiword DMA transfer cycle time per word. This field defines, in nanoseconds, the minimum cycle time that the device supports when performing Multiword DMA transfers on a per word basis.

For SATA devices word 65 shall be set to indicate 120ns.

If this field is supported, bit 1 of word 53 shall be set to one. Any device that supports Multiword DMA mode 1 or above shall support this field, and the value in word 65 shall not be less than the minimum cycle time for the fastest DMA mode supported by the device.

If bit 1 of word 53 is set to one because a device supports a field in words 64-70 other than this field and the device does not support this field, the device shall return a value of zero in this field.

7.16.7.26 Word 66: Device recommended Multiword DMA cycle time

For PATA devices word 66 is defined as the device recommended Multiword DMA transfer cycle time. This field defines, in nanoseconds, the minimum cycle time per word during a single logical sector host transfer while performing a multiple logical sector READ DMA or WRITE DMA command for any location on the media under nominal conditions. If a host runs at a faster cycle rate by operating at a cycle time of less than this value, the device may negate DMARQ for flow control. The rate at which DMARQ is negated could result in reduced throughput despite the faster cycle rate. Transfer at this rate does not ensure that flow control is not be used, but implies that higher performance may result. See ATA8-APT for more information.

If this field is supported, bit 1 of word 53 shall be set to one. Any device that supports Multiword DMA mode 1 or above shall support this field, and the value in word 66 shall not be less than the value in word 65.

If bit 1 of word 53 is set to one because a device supports a field in words 64-70 other than this field and the device does not support this field, the device shall return a value of zero in this field.

For SATA devices word 66 shall be set to indicate 120ns.

7.16.7.27 Word 67: Minimum PIO transfer cycle time without IORDY flow control

For PATA devices word 67 is defined as the minimum PIO transfer without IORDY flow control cycle time. This field defines, in nanoseconds, the minimum cycle time that, if used by the host, the device guarantees data integrity during the transfer without utilization of IORDY flow control.

For SATA devices word 67 shall be set to indicate 120ns.

If this field is supported, Bit 1 of word 53 shall be set to one.

Any device that supports PIO mode 3 or above shall support this field, and the value in word 67 shall not be less than the value reported in word 68.

If bit 1 of word 53 is set to one because a device supports a field in words 64-70 other than this field and the device does not support this field, the device shall return a value of zero in this field.

7.16.7.28 Word 68: Minimum PIO transfer cycle time with IORDY flow control

For PATA devices word 68 is defined as the minimum PIO transfer with IORDY flow control cycle time. This field defines, in nanoseconds, the minimum cycle time that the device supports while performing data transfers while utilizing IORDY flow control.

For SATA devices word 68 shall be set to indicate 120ns.

If this field is supported, Bit 1 of word 53 shall be set to one.

All devices except CFA and PCMCIA devices shall support PIO mode 3 and shall support this field, and the value in word 68 shall be the fastest defined PIO mode supported by the device. The maximum value reported in this field shall be 180 to indicate support for PIO mode 3 or above.

If bit 1 of word 53 is set to one because a device supports a field in words 64-70 other than this field and the device does not support this field, the device shall return a value of zero in this field.

7.16.7.29 Words 69-74: Reserved

7.16.7.30 Word 75: Queue depth

Bits (4:0) of word 75 indicate the maximum queue depth supported by the device. The queue depth includes all commands for which command acceptance has occurred and command completion has not occurred. The value in this field equals (maximum queue depth - 1), e.g., a value of zero indicates a queue depth of one, a value of 31 indicates a queue depth of 32. If bit 1 of word 83 is cleared to zero indicating that the device does not support READ/WRITE DMA QUEUED commands, the value in this field shall be zero. Support of this word is mandatory if the TCQ feature set is supported.

7.16.7.31 Words 76-79: Reserved for Serial ATA

7.16.7.32 Word 80: Major revision number

If not 0000h or FFFFh, the device claims compliance with the major version(s) as indicated by bits (6:3) being set to one. Values other than 0000h and FFFFh are bit significant. Since ATA standards maintain downward compatibility, a device may set more than one bit.

7.16.7.33 Word 81: Minor revision number

Table 22 defines the value that shall be reported in word 81 to indicate the revision of the standard that guided the implementation.

Table 22 — Minor revision number (part 1 of 2)

Value	Minor Revision
0000h	Minor revision is not reported
0001h	Obsolete
0002h	Obsolete
0003h	Obsolete
0004h	Obsolete
0005h	Obsolete
0006h	Obsolete
0007h	Obsolete
0008h	Obsolete
0009h	Obsolete
000Ah	Obsolete
000Bh	Obsolete
000Ch	Obsolete
000Dh	ATA/ATAPI-4 X3T13 1153D revision 6
000Eh	ATA/ATAPI-4 T13 1153D revision 13
000Fh	ATA/ATAPI-4 X3T13 1153D revision 7
0010h	ATA/ATAPI-4 T13 1153D revision 18
0011h	ATA/ATAPI-4 T13 1153D revision 15
0012h	ATA/ATAPI-4 published, ANSI INCITS 317-1998
0013h	ATA/ATAPI-5 T13 1321D revision 3
0014h	ATA/ATAPI-4 T13 1153D revision 14
0015h	ATA/ATAPI-5 T13 1321D revision 1
0016h	ATA/ATAPI-5 published, ANSI INCITS 340-2000
0017h	ATA/ATAPI-4 T13 1153D revision 17
0018h	ATA/ATAPI-6 T13 1410D revision 0
0019h	ATA/ATAPI-6 T13 1410D revision 3a

Table 22 — Minor revision number (part 2 of 2)

Value	Minor Revision
001Ah	ATA/ATAPI-7 T13 1532D revision 1
001Bh	ATA/ATAPI-6 T13 1410D revision 2
001Ch	ATA/ATAPI-6 T13 1410D revision 1
001Dh	ATA/ATAPI-7 published ANSI INCITS 397-2005.
001Eh	ATA/ATAPI-7 T13 1532D revision 0
001Fh	Reserved
0020h	Reserved
0021h	ATA/ATAPI-7 T13 1532D revision 4a
0022h	ATA/ATAPI-6 published, ANSI INCITS 361-2002
0023h-0026h	Reserved
0027h	ATA8-ACS revision 3c
0028h-0032h	Reserved
0033h	ATA8-ACS Revision 3e
0034h-0041h	Reserved
0042h	ATA8-ACS Revision 3f
0043h-0051h	Reserved
0052h	ATA8-ACS revision 3b
0053h-0106h	Reserved
0107h	ATA8-ACS revision 2d
0108h-FFFEh	Reserved
FFFFh	Minor revision is not reported

7.16.7.34 Words 82-84: Features/command sets supported

Words 82-84 and 119 shall indicate features/command sets supported. If a defined bit is cleared to zero, the indicated features/command set is not supported. If bit 14 of word 83 is set to one and bit 15 of word 83 is cleared to zero, the contents of words 82-83 contain valid support information. If not, support information is not valid in these words. If bit 14 of word 84 is set to one and bit 15 of word 84 is cleared to zero, the contents of word 84 contains valid support information. If not, support information is not valid in this word. If bit 14 of word 119 is set to one and bit 15 of word 119 is cleared to zero, the contents of word 119 contains valid support information. If not, support information is not valid in this word.

If bit 0 of word 82 is set to one, the SMART feature set is supported.

If bit 1 of word 82 is set to one, the Security feature set is supported.

bit 2 of word 82 is obsolete.

If bit 3 of word 82 is set to one, the Power Management feature set is supported.

If bit 4 of word 82 is set to one, the PACKET feature set is supported.

If bit 5 of word 82 is set to one, write cache is supported.

If bit 6 of word 82 is set to one, read look-ahead is supported.

If bit 7 of word 82 is set to one, release interrupt is supported.

If bit 8 of word 82 is set to one, SERVICE interrupt is supported.

If bit 9 of word 82 is set to one, the DEVICE RESET command is supported.

If bit 10 of word 82 is set to one, the Host Protected Area feature set is supported.

Bit 11 of word 82 is obsolete.

If bit 12 of word 82 is set to one, the device supports the WRITE BUFFER command.

If bit 13 of word 82 is set to one, the device supports the READ BUFFER command.

If bit 14 of word 82 is set to one, the device supports the NOP command.

Bit 15 of word 82 is obsolete.

If bit 0 of word 83 is set to one, the device supports the DOWNLOAD MICROCODE command.

If bit 1 of word 83 is set to one, the device supports the READ DMA QUEUED and WRITE DMA QUEUED commands.

If bit 2 of word 83 is set to one, the device supports the CFA feature set.

If bit 3 of word 83 is set to one, the device supports the Advanced Power Management feature set.

bit 4 of word 83 is obsolete.

If bit 5 of word 83 is set to one, the device supports the Power-Up In Standby feature set.

If bit 6 of word 83 is set to one, the device requires the SET FEATURES subcommand to spin-up after power-up if the Power-Up In Standby feature set is enabled (see 7.47.8).

Bit 7 is defined in Address Offset Reserved Area Boot, INCITS TR27:2001.

If bit 8 of word 83 is set to one, the device supports the SET MAX security extension.

If bit 9 of word 83 is set to one, the device supports the Automatic Acoustic Management feature set.

If bit 10 of word 83 is set to one, the 48-bit Address feature set is supported.

If bit 11 of word 83 is set to one, the device supports the Device Configuration Overlay feature set.

Bit 12 of word 83 shall be set to one indicating the device supports the mandatory FLUSH CACHE command.

If bit 13 of word 83 is set to one, the device supports the FLUSH CACHE EXT command.

If bit 0 of word 84 is set to one, the device supports SMART error logging.

If bit 1 of word 84 is set to one, the device supports SMART self-test.

If bit 2 of word 84 is set to one, the device supports the media serial number field words 176-205.

If bit 3 of word 84 is set to one, the device supports the Media Card Pass Through Command feature set.

If bit 4 of word 84 is set to one, the device supports the Streaming feature set.

If bit 5 of word 84 is set to one, the device supports the General Purpose Logging feature set.

If bit 6 of word 84 is set to one, the device supports the WRITE DMA FUA EXT and WRITE MULTIPLE FUA EXT commands.

If bit 7 of word 84 is set to one, the device supports the WRITE DMA QUEUED FUA EXT command.

If bit 8 of word 84 is set to one, the device supports a world wide name.

Bit 11 of word 84 is reserved for INCITS TR-37-2004 (TLC) Bit 12 of word 84 is reserved for INCITS TR-37-2004 (TLC)

If bit 13 of word 84 is set to one, the device supports IDLE IMMEDIATE with UNLOAD FEATURE.

Bit 0 of word 119 is reserved for technical report DT1825.

If bit 1 of word 119 is set to one, the device supports the Write-Read-Verify feature set

If bit 2 of word 119 is set to one, the device supports the WRITE UNCORRECTAB LE command

If bit 3 of word 119 is set to one, READ and WRITE DMA EXT GPL optional commands are supported

if bit 4 of word 119 is set to one, the Segmented feature for DOWNLOAD MICROCODE is supported

7.16.7.35 Words 85-87: Features/command sets enabled

Words 85-87 and 120 shall indicate features/command sets enabled. If a defined bit is cleared to zero, the indicated features/command set is not enabled. If a supported features/command set is supported and cannot

be disabled, it is defined as supported and the bit shall be set to one. If bit 14 of word 87 is set to one and bit 15 of word 87 is cleared to zero, the contents of words 85-87 contain valid information. If bit 14 of word 120 is set to one and bit 15 of word 120 is cleared to zero, the contents of word 120 contain valid information. If not, information is not valid in these words.

If bit 0 of word 85 is set to one, the SMART feature set has been enabled via the SMART ENABLE OPERATIONS command. If bit 0 of word 85 is cleared to zero, the SMART feature set has been disabled via the SMART DISABLE OPERATIONS command.

If bit 1 of word 85 is set to one, then Security has been enabled by setting a User password via the SECURITY SET PASSWORD command. If bit 1 of word 85 is cleared to zero, there is no valid User password. If the Security feature set is not supported, this bit shall be cleared to zero.

bit 2 of word 85 is obsolete.

Bit 3 of word 85 shall be set to one indicating the mandatory Power Management feature set is supported.

Bit 4 of word 85 shall be cleared to zero to indicate that the PACKET feature set is not supported.

If bit 5 of word 85 is set to one, write cache has been enabled via the SET FEATURES command (see 7.47.4). If bit 5 of word 85 is cleared to zero, write cache has been disabled via the SET FEATURES command.

If bit 6 of word 85 is set to one, read look-ahead has been enabled via the SET FEATURES command (see 7.47.13). If bit 6 of word 85 is cleared to zero, look-ahead has been disabled via the SET FEATURES command.

If bit 7 of word 85 is set to one, release interrupt has been enabled via the SET FEATURES command (see 7.47.14). If bit 7 of word 85 is cleared to zero, release interrupt has been disabled via the SET FEATURES command.

If bit 8 of word 85 is set to one, SERVICE interrupt has been enabled via the SET FEATURES command (see 7.47.15). If bit 8 of word 85 is cleared to zero, SERVICE interrupt has been disabled via the SET FEATURES command.

If bit 9 of word 85 is set to one, the DEVICE RESET command is supported.

If the device is not indicating its full size as defined by READ NATIVE MAX or READ NATIVE MAX EXT command because a SET MAX ADDESS or SET MAX ADDRESS EXT command has been issued to resize the device, then bit 10 of word 85 shall be set to one indicating that a Host Protected Area has been established (i.e., HPA enabled). If the device is indicating its full size as defined by READ NATIVE MAX or READ NATIVE MAX EXT command then bit 10 of word 85 shall be cleared to zero indicating that a Host Protected Area has not been established (i.e., HPA disabled).

Bit 11 of word 85 is obsolete.

If bit 12 of word 85 is set to one, the device supports the WRITE BUFFER command.

If bit 13 of word 85 is set to one, the device supports the READ BUFFER command.

If bit 14 of word 85 is set to one, the device supports the NOP command.

Bit 15 of word 85 is obsolete.

If bit 0 of word 86 is set to one, the device supports the DOWNLOAD MICROCODE command.

If bit 1 of word 86 is set to one, the device supports the READ DMA QUEUED and WRITE DMA QUEUED commands.

If bit 2 of word 86 is set to one, the device supports the CFA feature set.

If bit 3 of word 86 is set to one, the Advanced Power Management feature set has been enabled via the SET FEATURES command. If bit 3 of word 86 is cleared to zero, the Advanced Power Management feature set has been disabled via the SET FEATURES command.

If bit 4 of word 86 is obsolete.

If bit 5 of word 86 is set to one, the Power-Up In Standby feature set has been enabled via the SET FEATURES command (see 7.47.7). If bit 5 of word 86 is cleared to zero, the Power-Up In Standby feature set has been disabled via the SET FEATURES command

If bit 6 of word 86 is set to one, the device requires the SET FEATURES subcommand to spin-up after power-up (see 7.47.8).

Bit 7 of word 86 is defined in Address Offset Reserved Area Boot, INCITS TR27:2001.

If bit 8 of word 86 is set to one, the device has had the SET MAX security extension enabled via a SET MAX SET PASSWORD command.

If bit 9 of word 86 is set to one, the device has had the Automatic Acoustic Management feature set enabled via a SET FEATURES command and the value in word 94 is valid.

If bit 10 of word 86 is set to one, the 48-bit Address feature set is supported.

If bit 11 of word 86 is set to one, the device supports the Device Configuration Overlay feature set.

Bit 12 of word 86 shall be set to one indicating the device supports the mandatory FLUSH CACHE command.

If bit 13 of word 86 is set to one, the device supports the FLUSH CACHE EXT command.

If bit 0 of word 87 is set to one, the device supports SMART error logging.

If bit 1 of word 87 is set to one, the device supports SMART self-test.

If bit 2 of word 87 is set to one, the media serial number field in words 176-205 is valid. This bit shall be cleared to zero if the media does not contain a valid serial number or if no media is present.

If bit 3 of word 87 is set to one, the Media Card Pass Through feature set has been enabled.

If bit 5 of word 87 is set to one, the device supports the General Purpose Logging feature set.

If bit 6 of word 87 is set to one, the device supports the WRITE DMA FUA EXT and WRITE MULTIPLE FUA EXT commands.

If bit 7 of word 87 is set to one, the device supports the WRITE DMA QUEUED FUA EXT command.

If bit 8 of word 87 is set to one, the device supports a world wide name.

Bit 11 of word 87 is reserved for technical report.

Bit 12 of word 87 is reserved for technical report.

If bit 13 of word 87 is set to one, the device supports IDLE IMMEDIATE with UNLOAD FEATURE.

Bit 0 of word 120 is reserved for technical report

If bit 1 of word 120 is set to one then the Write-Read-Verify feature set is enabled

If bit 2 of word 120 is set to one then the WRITE UNCORRECTABLE command is supported

If bit 3 of word 120 is set to one, READ and WRITE DMA EXT GPL optional commands are supported

if bit 4 of word 120 is set to one, the Segmented feature for DOWNLOAD MICROCODE is supported

7.16.7.36 Word 88: Ultra DMA modes

Word 88 identifies the Ultra DMA transfer modes supported by the device and indicates the mode that is currently selected. Only one DMA mode shall be selected at any given time. If an Ultra DMA mode is selected, then no Multiword DMA mode shall be selected. If a Multiword DMA mode is selected, then no Ultra DMA mode shall be selected. Support of this word is mandatory if Ultra DMA is supported.

Bit (15) of word 88 is reserved.

If bit 14 of word 88 is set to one, then Ultra DMA mode 6 is selected. If this bit is cleared to zero, then Ultra DMA mode 6 is not selected. If bit 13 or bit 12 or bit 11 or bit 10 or bit 9 or bit 8 is set to one, then this bit shall be cleared to zero.

If bit 13 of word 88 is set to one, then Ultra DMA mode 5 is selected. If this bit is cleared to zero, then Ultra DMA mode 5 is not selected. If bit 12 or bit 11 or bit 10 or bit 9 or bit 8 is set to one, then this bit shall be cleared to zero.

If bit 12 of word 88 is set to one, then Ultra DMA mode 4 is selected. If this bit is cleared to zero, then Ultra DMA mode 4 is not selected. If bit 13 or 11 or bit 10 or bit 9 or bit 8 is set to one, then this bit shall be cleared to zero.

If bit 11 of word 88 is set to one, then Ultra DMA mode 3 is selected. If this bit is cleared to zero, then Ultra DMA mode 3 is not selected. If bit 13 or 12 or bit 10 or bit 9 or bit 8 is set to one, then this bit shall be cleared to zero.

If bit 10 of word 88 is set to one, then Ultra DMA mode 2 is selected. If this bit is cleared to zero, then Ultra DMA mode 2 is not selected. If bit 13 or 12 or bit 11 or bit 9 or bit 8 is set to one, then this bit shall be cleared to zero.

If bit 9 of word 88 is set to one, then Ultra DMA mode 1 is selected. If this bit is cleared to zero then Ultra DMA mode 1 is not selected. If bit 13 or 12 or bit 11 or bit 10 or bit 8 is set to one, then this bit shall be cleared to zero.

If bit 8 of word 88 is set to one, then Ultra DMA mode 0 is selected. If this bit is cleared to zero then Ultra DMA mode 0 is not selected. If bit 13 or 12 or bit 11 or bit 10 or bit 9 is set to one, then this bit shall be cleared to zero.

Bit (7) of word 88 are reserved.

For PATA devices when bit 6 of word 88 is set to one Ultra DMA modes 6 and below are supported. If this bit is cleared to zero, then Ultra DMA mode 6 is not supported. If Ultra DMA mode 6 is supported, then Ultra DMA modes 5, 4, 3, 2, 1 and 0 shall also be supported. If this bit is set to one, then bits (5:0) shall be set to one.

For SATA devices bit 6 of word 88 shall be set to one.

For PATA devices when bit 5 of word 88 is set to one Ultra DMA modes 5 and below are supported. If this bit is cleared to zero, then Ultra DMA mode 5 is not supported. If Ultra DMA mode 5 is supported, then Ultra DMA modes 4, 3, 2, 1 and 0 shall also be supported. If this bit is set to one, then bits (4:0) shall be set to one.

For SATA devices bit 5 of word 88 shall be set to one.

For PATA devices when bit 4 of word 88 is set to one Ultra DMA modes 4 and below are supported. If this bit is cleared to zero, then Ultra DMA mode 4 is not supported. If Ultra DMA mode 4 is supported, then Ultra DMA modes 3, 2, 1 and 0 shall also be supported. If this bit is set to one, then bits (3:0) shall be set to one.

For SATA devices bit 4 of word 88 shall be set to one.

For PATA devices when bit 3 of word 88 is set to one Ultra DMA modes 3 and below are supported. If this bit is cleared to zero, then Ultra DMA mode 3 is not supported. If Ultra DMA mode 3 is supported, then Ultra DMA modes 2, 1 and 0 shall also be supported. If this bit is set to one, then bits (2:0) shall be set to one.

For SATA devices bit 3 of word 88 shall be set to one.

For PATA devices when bit 2 of word 88 is set to one Ultra DMA modes 2 and below are supported. If this bit is cleared to zero, then Ultra DMA mode 2 is not supported. If Ultra DMA mode 2 is supported, then Ultra DMA modes 1 and 0 shall also be supported. If this bit is set to one, bits (1:0) shall be set to one.

For SATA devices bit 2 of word 88 shall be set to one.

For PATA devices when bit 1 of word 88 is set to one Ultra DMA modes 1 and below are supported. If this bit is cleared to zero, then Ultra DMA mode 1 is not supported. If Ultra DMA mode 1 is supported, then Ultra DMA mode 0 shall also be supported. If this bit is set to one, bit 0 shall be set to one.

For SATA devices bit 1 of word 88 shall be set to one.

For PATA devices when bit 0 of word 88 is set to one Ultra DMA mode 0 is supported. If this bit is cleared to zero, then Ultra DMA is not supported.

For SATA devices bit 0 of word 88 shall be set to one.

7.16.7.37 Word 89: Time required for Security erase unit completion

Word 89 specifies the estimated time required for the SECURITY ERASE UNIT command to complete its normal mode erasure. Support of this word is mandatory if the Security feature set is supported. If the Security feature set is not supported, this word shall be cleared to zero.

Value	Time
0	Value not specified
1-254	(Value*2) minutes
255	>508 minutes

7.16.7.38 Word 90: Time required for Enhanced security erase unit completion

Word 90 specifies the estimated time required for the SECURITY ERASE UNIT command to complete its enhanced mode erasure. Support of this word is mandatory if support of the Security feature set is supported. If the Security feature set is not supported, this word shall be cleared to zero.

Value	Time
0	Value not specified
1-254	(Value*2) minutes
255	>508 minutes

7.16.7.39 Word 91: Advanced power management level value

Bits (7:0) of word 91 contain the current Advanced Power Management level setting. Support of this word is mandatory if advanced power management is supported.

7.16.7.40 Word 92: Master Password Identifier

If either the Security feature set or the Master Password Identifier feature are not supported, word 92 shall contain the value 0000h or FFFFh.

If the Security feature set and the Master Password Identifier feature are supported, word 92 contains the value of the Master Password Identifier set when the Master Password was last changed.

7.16.7.41 Word 93: Hardware configuration test results

For PATA devices when bit 14 of word 93 is set to one and bit 15 of word 93 is cleared to zero the content of word 93 contains valid information. During processing of a hardware reset, Device 0 shall set bits (12:8) of this word to zero and and shall set bits (7:0) of this word as indicated to show the result of the hardware reset. During processing of a hardware reset, Device 1 shall clear bits (7:0) of this word to zero and and shall set bits (12:8) of the word as indicated to show the result of the hardware reset. Support of bits (15:13) is mandatory. Support of bits (12:0) is optional.

Bit 13 shall be set or cleared by the selected device to indicate whether the device detected CBLID- above V_{IH} or below V_{IL} at any time during execution of each IDENTIFY DEVICE command after receiving the command from the host but before returning data to the host. This test may be repeated as desired by the device during command execution (See ATA8-APT).

For SATA devices word 93 shall be set to the value 0000h.

7.16.7.42 Word 94: Current automatic acoustic management value

Bits (15:8) contain the device vendor's recommended acoustic management level (see table 37 for an enumeration of all of the possible acoustic management levels). If the host desires the drive to perform with highest performance, it should set the automatic acoustic management level to FEh. If the OEM host desires the vendor's recommended acoustic management level as defined by the device's vendor, the host should set the automatic acoustic management level to the value returned to the host in these 8 bits. The use of this setting may not provide the lowest acoustics, or the best trade-off of acoustics and performance, in all configurations. Support of this word is mandatory if the Acoustic Management feature set is supported.

Bits (7:0) contain the current automatic acoustic management level. If the Automatic Acoustic Management feature set is supported by the device, but the level has not been set by the host, this byte shall contain the

drive's default setting. If the Automatic Acoustic Management feature set is not supported by the device, the value of this byte shall be zero.

7.16.7.43 Word 95: Stream Minimum Request Size

Number of logical sectors that provides optimum performance in a streaming environment. This number shall be a power of two, with a minimum of eight logical sectors (4096 bytes). The starting LBA value for each streaming command should be evenly divisible by this request size.

7.16.7.44 Word 96: Streaming Transfer Time - DMA

Word 96 defines the Streaming Transfer Time for DMA mode. The worst-case sustainable transfer time per logical sector for the device is calculated as follows:

Streaming Transfer Time = (word 96) * (Streaming Performance Granularity / 65536)

The content of word 96 may be affected by the host issuing a SET FEATURES subcommand 43h (Typical Host Interface Sector Time for DMA mode). Because of this effect, an IDENTIFY DEVICE command shall be issued after a SET FEATURES command that may affect these words. If the Streaming feature set is not supported by the device, the content of word 96 shall be zero.

7.16.7.45 Word 97: Streaming Access Latency - DMA and PIO

Word 97 defines the Streaming Access Latency for DMA and PIO mode. The worst-case access latency of the device for a streaming command is calculated as follows:

Access Latency = (word 97) * (Streaming Performance Granularity / 256)

The content of word 97 may be affected by the host issuing a SET FEATURES subcommand 42h or C2h (Automatic Acoustic Management). Because of this effect, an IDENTIFY DEVICE command shall be issued after a SET FEATURES command that may affect these words. If the Streaming feature set is not supported by the device, the content of word 97 shall be zero.

7.16.7.46 Words 98-99: Streaming Performance Granularity

These words define the fixed unit of time that is used in IDENTIFY DEVICE data words 96-97 and 104, and SET FEATURES subcommand 43h, and in the Streaming Performance Parameters log, which is accessed by use of the READ LOG EXT command, and in the Command Completion Time Limit that is passed in streaming commands. The unit of time for this parameter shall be in microseconds, e.g., a value of 10000 indicates 10 milliseconds. If yy was returned by the drive for this parameter, then

a) the Command Completion Time Limit in the Feature field for a streaming command shall be yy microseconds.
b) the Streaming Transfer Time shall be ((word 96) * (yy/65536)) microseconds,
   ((word 104) * (yy / 5536)) microseconds, or
   ((a Sector Time array entry in the Streaming Performance Parameters log) * (yy/65536)) microseconds.
c) The Streaming Access Latency shall be ((word 97) * (yy/256)) microseconds, or
   ((an Access Time array entries in the Streaming Performance Parameters log) * (yy / 256)) microsecon ds.
d) taking these units into account, the host may calculate the estimated time for a streaming command of size S logical sectors as ((word 96 * S / 65536) + (word 97 / 256)) * yy microseconds for DMA mode.
e) taking these units into account, the host may calculate the estimated time for a streaming command of size S logical sectors as ((word 104 * S / 65536) + (word 97 / 256)) * yy microseconds for PIO mode.

The value of the Streaming Performance Granularity is vendor specific and fixed for a device.

7.16.7.47 Words 100-103: Total Number of User Addressable Sectors for the 48-bit Address feature set

Words 100-103 contain a value that is one greater than the maximum LBA in user accessible space when the 48-bit Addressing feature set is supported. The maximum value that shall be placed in this field is 0000_FFFF_FFFF_FFFFh. Support of these words is mandatory if the 48-bit Address feature set is supported.

7.16.7.48 Word 104: Streaming Transfer Time - PIO

Word 104 defines the Streaming Transfer Time for PIO mode. The worst-case sustainable transfer time per logical sector for the device is calculated as follows:

Streaming Transfer Time = (word 104) * (Streaming Performance Granularity / 65536)

The content of word 104 may be affected by the host issuing a SET FEATURES subcommand 43h (Typical Host Interface Sector Time for PIO mode). Because of this effect, an IDENTIFY DEVICE command shall be issued after a SET FEATURES command that may affect these words. If the Streaming feature set is not supported by the device, the content of word 104 shall be zero.

7.16.7.49 Word 106: Physical sector size / Logical Sector Size

If bit 14 of word 106 is set to one and bit 15 of word 106 is cleared to zero, the contents of word 106 contain valid information. If not, information is not valid in this word.

Bit 13 of word 106 shall be set to one to indicate that the device has more than one logical sector per physical sector.

Bit 12 of word 106 shall be set to 1 to indicate that the device has been formatted with a logical sector size larger than 256 words. Bit 12 of word 106 shall be cleared to 0 to indicate that words 117-118 are invalid and that the logical sector size is 256 words.

Bits (11:4) of word 106 are reserved.

Bits (3:0) of word 106 indicate the size of the device physical sectors in power of two logical sectors.

Examples:

Bits (3:0): 0 = 2^0 = 1 logical sector per physical sector
Bits (3:0): 1 = 2^1 = 2 logical sector per physical sector
Bits (3:0): 2 = 2^2 = 4 logical sector per physical sector
Bits (3:0): 3 = 2^3 = 8 logical sector per physical sector

7.16.7.50 Word 107: Inter-seek delay for ISO 7779 standard acoustic testing

Word 107 is defined as the manufacturer's recommended time delay between seeks during ISO-7779 standard acoustic testing in microseconds (ISO 7779 value t_D. See ISO 7779:1999 (E), subclause C.9 Equipment Category: Disk units and storage subsystems).

7.16.7.51 Words 108-111: World wide name

Words 111-108 shall contain the mandatory value of the world wide name (WWN) for the device.

Word 108 bits 15-12 shall contain 5h, indicating that the naming authority is IEEE. All other values are reserved.

Words 108 bits 11-0 and word 109 bits (15:4) shall contain the Organization Unique Identifier (OUI) for the device manufacturer. The OUI shall be assigned by the IEEE/RAC as specified by ISO/IEC 13213:1994.

The identifier may be obtained from:

Institute of Electrical and Electronic Engineers, Inc.
Registration Authority Committee
445 Hoes Lane
Piscataway, NJ 08855-1331

Word 109 bits (3:0), word 110, and word 111 shall contain a value assigned by the vendor that is unique for the device in the OUI domain.

7.16.7.52 Words 112-115: Reserved for a 128-bit world wide name

7.16.7.53 Word 116: Reserved for TLC technical report

This field is described in Time-Limited Commands (TLC) INCITS TR-37-2004

7.16.7.54 Words 117-118: Logical Sector Size

Words 117,118 indicate the size of device logical sectors in words. The value of words 117,118 shall be equal to or greater than 256. The value in words 117,118 shall be valid when word 106 bit 12 is set to 1. All logical sectors on a device shall be 117,118 words long.

7.16.7.55 Words 121-126: Reserved

7.16.7.56 Word 127: Obsolete

7.16.7.57 Word 128: Security status

Support of this word is mandatory if the Security feature set is supported. If the Security feature set is not supported, this word shall be cleared to zero.

Bit 8 of word 128 indicates the Master Password Capability. If security is enabled and the Master Password Capability is high, bit 8 shall be cleared to zero. If security is enabled and the Master Password Capability is maximum, bit 8 shall be set to one. When security is disabled, bit 8 shall be cleared to zero.

Bit 5 of word 128 set to one indicates that the enhanced mode of the SECURITY ERASE UNIT command is supported.

Bit 4 of word 128 set to one indicates that the password attempt counter has decremented to zero. This is also known as the "Password Attempt Counter Exceeded" bit.

Bit 3 of word 128 set to one indicates that security is frozen.

Bit 2 of word 128 set to one indicates that security is locked.

Bit 1 of word 128 set to one indicates that security is enabled. This is a copy of word 85, bit 1.

Bit 0 of word 128 set to one indicates that the Security feature set is supported. This is a copy of word 82, bit 1.

7.16.7.58 Words 129-159: Vendor specific

7.16.7.59 Word 160: CFA power mode

Word 160 indicates the presence and status of a CFA feature set device that supports CFA Power Mode 1. Support of this word is mandatory if CFA Power Mode 1 is supported.

If bit 13 of word 160 is set to one then the device shall be in CFA Power Mode 1 to perform one or more commands implemented by the device.

If bit 12 of word 160 is set to one the device is in CFA Power Mode 0 (see 7.47.9).

Bits (11:0) indicate the maximum average RMS current in Milliamperes required during 3.3V or 5V device operation in CFA Power Mode 1.

7.16.7.60 Words 161-175: Reserved for assignment by the CompactFlash™ Association

7.16.7.61 Words 176-205: Current media serial number

Words (205:176) contain the current media serial number. Serial numbers shall consist of 60 bytes. The first 40 bytes shall indicate the media serial number and the remaining 20 bytes shall indicate the media manufacturer.

For removable ATA devices (e.g., flash media with native ATA interfaces) that do not support removable media, the first 20 words of this field shall be the same as words IDENTIFY DEVICE data words (46:27) and the next ten words shall be the same as words IDENTIFY DEVICE data words (19:10).

7.16.7.62 Word 206: SCT Command Transport

Bits 15:12 indicate support for vendor specific action codes.

Bits 11:6 of word 206 are reserved

If bit 5 of word 206 is set to one the device supports SCT Data Tables (see 8.3.6).

If bit 4 of word 206 is set to one the device supports SCT Features Control (see 8.3.5).

If bit 3 of word 206 is set to one the device supports SCT Error Recovery Control (see 8.3.4).

If bit 2 of word 206 is set to one the device supports SCT Write Same (see 8.3.3).

If bit 1 of word 206 is set to one the device supports SCT Long Sector Access (see 8.3.2).

If bit 0 of word 206 is set to one the device supports the SCT Command Transport including SCT Read Status (see clause 8).

7.16.7.63 Word 209: Alignment of logical blocks within a physical block

Word 209 shall report the location of LBA0 within the first physical sector of the media. See Annex C for more information.

7.16.7.64 Words 210-211: Write-Read-Verify Sector Count Mode 3 Only

Words 210-211 shall indicate the number of logical sectors to be verified after every spin-up, as set by the SET FEATURES command for the Enable Write-Read-Verify subcommand. This count only applies to mode 3.

7.16.7.65 Words 212-213: Verify Sector Count Mode 2 Only

Words 212-213 shall indicate the number of logical sectors to be verified after every spin-up, as set by the SET FEATURES command for the Enable Write-Read-Verify subcommand. This count only applies to mode 2.

7.16.7.66 Word 214: NV Cache Capabilities

Both the NV Cache Power Mode feature set version (word 214 bits 8-11) and the NV Cache feature set version (word 214 bits 12-15) shall be set to 0.

If bit 0 of word 214 is set to 1, the device supports the power modes of the NV Cache feature set. Bits 8 to 11 specify the version of the NV Cache Modes supported.

If bit 4 of word 214 is set to 1, the device supports the commands of the NV Cache feature set. Bits 12 to 15 specify the version of the NV Cache Commands supported.

7.16.7.67 Words 215-216: NV Cache Size in Logical Blocks (MSW)

Words 215 and 216 specify the maximum number of logical sectors that the device's NV Cache Set can contain for the host to pin.

7.16.7.68 Word 217: NV Cache Read Transfer Speed in MB/s

Word 217 specifies the maximum sustained transfer speed of the device's NV Cache during a read operation in megabytes per second.

7.16.7.69 Word 218: NV Cache Write Transfer Speed in MB/s

Word 218 specifies the maximum sustained transfer speed of the device's NV Cache during a Write in megabytes per second.

7.16.7.70 Word 219: NV Cache Options

Word 219 bits 0-7 specify a value which is the device's estimate of the amount of time it takes to be able to satisfy a read or write request from its rotational media when the read or write request is received while the rotational media is not spinning.

7.16.7.71 Word 220: Write-Read-Verify Mode

Word 220 contains the current mode of the Write-Read-Verify feature set, as set by the SET FEATURES Enable/Disable Write-Read-Verify subcommand. See 7.47.10 for more information on setting Write-Read-Verify mode.

Bits 15:8 reserved

Bits 7:0 current mode of the Write-Read-Verify feature set

7.16.7.72 Word 221: Reserved

7.16.7.73 Word 222: Transport major revision number

If not FFFFh, the device claims compliance with the Transport Standard major version(s) as indicated by bits (6:3) being set to one. Values other than 0000h and FFFFh are bit significant. Since ATA standards maintain downward compatibility, a device may set more than one bit.

7.16.7.74 Word 223: Transport minor revision number

Table 23 defines the value that shall be reported in word 223 to indicate the revision of the standard that guided the implementation.

Table 23 — Transport minor version number

Value	Minor Revision
0000h	Minor revision not reported
0001h-0020h	Reserved
0021h	ATA8-AST T13 Project D1697 Revision 0b
0022h-FFFEh	Reserved
FFFFh	Minor version not reported

7.16.7.75 Words 213-254: Reserved

7.16.7.76 Word 255: Integrity word

The use of this word is optional. If bits (7:0) of this word contain the signature A5h, bits (15:8) contain the data structure checksum. The data structure checksum is the two's complement of the sum of all bytes in words 0-254 and the byte consisting of bits (7:0) in word 255. Each byte shall be added with unsigned arithmetic, and overflow shall be ignored. The sum of all 512 bytes is zero when the checksum is correct.