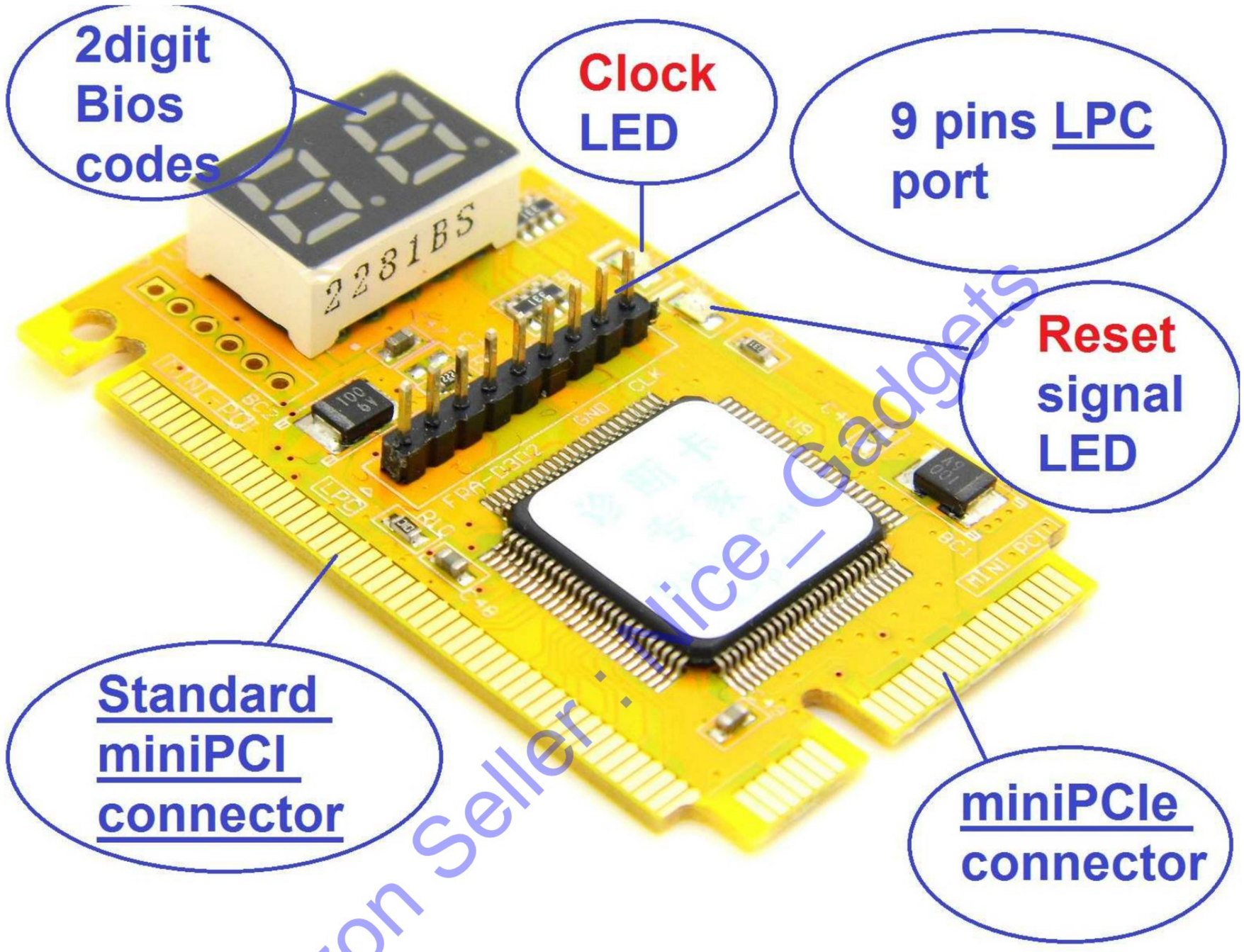
Laptop Computer Standard miniPCI / miniPCIe / LPC

Diagnostic POST Analyzer Card

User Guide with Codes Descriptions



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This laptop diagnostic card works on the laptop standard WIFI miniPCI / miniPCIe / LPC connectors.

This standard full size WIFI miniPCI and miniPCIe connectors mostly can be found on the earlier laptops.

Please kindly take note that when using the LPC diagnosis, we need to have the optional 9 pins LPC bundle wire welded to the laptop motherboard chipset pins and the other end of the LPC cable will be plugged to the 9pins LPC port on this diagnostic card. Since this is LPC method needs professional skills and only recommended for the known faulty laptops, we have to make the LPC bundle cables optional and Not included.

After connecting this diagnostic test card to the laptop computer appropriate corresponding connector as stated above, we need to power on the laptop as usual, and then watch for the digital and LED codes on the diagnostic card. Next is looking up the code tables as followings for

the diagnostic codes descriptions.

Please take note that when installing this test kit on the working fine laptops, the diagnostic codes are just the Process Codes that we may ignore.

When testing the known faulty laptops such as no POST, no display, no boot issues, the codes on the diagnostic card will be the error codes that we should look up the following Bios codes descriptions to see which part(s) on the motherboard is faulty.

The following tables are the LED codes with the different Bios POST digital and audio beep codes descriptions. These Bios codes apply to all diagnostic POST analyzer cards.

Please check what Bios is running on the computer before we perform the diagnosis. Here are a couple suggested methods of the Bios info lookup: 1. from the laptop Bios menu or the manufacturer's web sites search using the laptop model number 2. From the first screen which we just powering on the computer…etc. (mostly at the top left of the screen display)

Please be advised to check the computer manufacturers' web sites for the new latest Bios update if available.

The LED codes (CLK and RST)

There are 2 LEDs on this laptop diagnostic card, the **CLK** and **RST** LEDs.
CLK is for indicating the motherboard Clock signal.
RST is for indicating the motherboard Reset activity signal.

When we are powering on a working laptop computer, the **RST** LED should flash once or twice very quickly. The **CLK** LED is depend on if there is motherboard clock signal activities, this LED may remain ON for a little while after powering on the laptop.

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Bios POST Code Table and Descriptions

Phoenix BIOS code descriptions:

02	Verify real mode
03	Disable non-maskable interrupt (NMI)
04	Get CPU type
06	Initialize system hardware
07	Disable shadow and execute code from the ROM
08	Initialize chipset with initial POST values
09	Set IN POST flag
0A	Initialize CPU registers
0B	Enable CPU cache
0C	Initialize caches to initial POST values

0E	Initialize I/O component
0F	Initialize the local bus IDE
10	Initialize power management
11	Load alternate registers with initial POST values
12	Restore CPU control word during warm boot
13	Initialize PCI bus mastering devices
14	Initialize keyboard controller
16	BIOS ROM checksum
17	Initialize cache before memory autosize
18	8254 programmable interrupt timer initialization
1A	8237 DMA controller initialization
1C	Reset programmable interrupt controller
20	Test DRAM refresh
22	Test 8742 keyboard controller
24	Set ES segment register to 4GB
26	Enable gate A20 line
28	Autosize DRAM
29	Initialize POST memory manager
2A	Clear 512KB base RAM
2C	RAM failure on address line *xxxx*
2E	RAM failure on data bits *xxxx* of low byte of memory bus
2F	Enable cache before system BIOS shadow
30	RAM failure on data bits *xxxx* of high byte of memory bus
32	Test CPU bus clock frequency
33	Initialize Phoenix Dispatch Manager
36	Warm start shut down
38	Shadow system BIOS ROM
3A	Autosize cache
3C	Advanced configuration of chipset registers
3D	Load alternate registers with CMOS values
41	Initialize extended memory for RomPilot
42	Initialize interrupt vectors
45	POST device initialization
46	Check ROM copyright notice
47	Initialize I20 support
48	Check video configuration against CMOS
49	Initialize PCI bus and devices
4A	Initialize all video adapters in system
4B	QuietBoot start (optional)
4C	Shadow video BIOS ROM

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4E	Display BIOS copyright notice
4F	Initialize MultiBoot
50	Display CPU type and speed
51	Initialize EISA board
52	Test keyboard
54	Set key click if enabled
55	Enable USB devices
58	Test for unexpected interrupts
59	Initialize POST display service
5A	Display prompt "Press F2 to enter SETUP"
5B	Disable CPU cache
5C	Test RAM between 512KB and 640KB
60	Test extended memory
62	Test extended memory address lines
64	Jump to UserPatch1
66	Configure advanced cache registers
67	Initialize Multi Processor APIC
68	Enable external and CPU caches
69	Setup system management mode (SMM) area
6A	Display external L2 cache size
6B	Load custom defaults (optional)
6C	Display shadow area message
6E	Display possible high address for UMB recovery
70	Display error messages
72	Check for configuration errors
76	Check for keyboard errors
7C	Set up hardware interrupt vectors
7D	Initialize Intelligent System Monitoring
7E	Initialize coprocessor if present
80	Disable onboard super I/O ports and IRQ's
81	Late POST device initialization
82	Detect and install external RS232 ports
83	Configure non-MCD IDE controllers
84	Detect and install external parallel ports
85	Initialize PC compatible PnP ISA devices
86	Reinitialize onboard I/O ports
87	Configure motherboard configurable devices (optional)
88	Initialize BIOS data area
89	Enable non-maskable interrupts (NMI's)
8A	Initialize extended BIOS data area

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8B	Test and initialize PS/2 mouse
8C	Initialize floppy controller
8F	Determine number of ATA drives (optional)
90	Initialize hard disk controllers
91	Initialize local bus hard disk controllers
92	Jump to UserPatch2
93	Build MPTABLE for multi processor boards
95	Install CD ROM for boot
96	Clear huge ES segment register
97	Fixup multi processor table
98	Search for option ROM's
99	Check for SMART drive (optional)
9A	Shadow option ROM's
9C	Set up power management
9D	Initialize security engine (optional)
9E	Enable hardware interrupts
9F	Determine number of ATA and SCSI drives
A0	Set time of day
A2	Check key lock
A4	Initialize typematic rate
A8	Erase F2 prompt
AA	Scan for F2 key stroke
AC	Enter setup
AE	Clear boot flag
B0	Check for errors
B1	Inform RomPilot about the end of POST
B2	POST done - prepare to boot operating system
B4	One short beep
B5	Terminate QuietBoot (optional)
B6	Check password
B7	Initialize ACPI BIOS
B9	Prepare boot
BA	Initialize DMI parameters
BB	Initialize PnP option ROM's
BC	Clear parity checkers
BD	Display multiboot menu
BE	Clear screen
BF	Check virus and backup reminders
C0	Try to boot with interrupt 19
C1	Initialize POST Error Manager (PEM)

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C2	Initialize error logging
C3	Initialize error display function
C4	Initialize system error handler
C5	PnP dual CMOS (optional)
C6	Initialize notebook docking (optional)
C7	Initialize notebook docking late
C8	Force check (optional)
C9	Extended checksum (optional)
CA	Redirect Int 15h to enable remote keyboard
CB	Redirect Int 13 to Memory Technologies Devices such as ROM, RAM, PCMCIA, and serial disk
CC	Redirect Int 10h to enable remote serial video
CD	Re-map I/O and memory for PCMCIA
CE	Initialize digitizer and display message
D2	Unknown interrupt
	The following are for boot block in Flash ROM
E0	Initialize the chipset
E1	Initialize the bridge
E2	Initialize the CPU
E3	Initialize the system timer
E4	Initialize system I/O
E5	Check force recovery boot
E6	Checksum BIOS ROM
E7	Go to BIOS
E8	Set Huge Segment
E9	Initialize Multi Processor
EA	Initialize OEM special code
EB	initialize PIC and DMA
EC	Initialize Memory type
ED	Initialize Memory size
EE	Shadow Boot Block
EF	System memory test
F0	Initialize interrupt vectors
F1	Initialize Run Time Clock
F2	Initialize video
F3	Initialize System Management Manager
F4	Output one beep
F5	Clear Huge Segement
F6	Boot to mini DOS
F7	Boot to Full DOS

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Award BIOS code descriptions: (PLEASE IGNORE the code last digit LETTER 'h')

CFh	Test CMOS read/write functionality
C0h	Early chipset initialization: Disable shadow RAM, L2 cache (socket 7 and below), program basic chipset registers
C1h	Detect memory: Auto detection of DRAM size, type and ECC, auto detection of L2 cache (socket 7 and below)
C3h	Expand compressed BIOS code to DRAM
C5h	Call chipset hook to copy BIOS back to E000 & F000 shadow RAM
01h	Expand the Xgroup codes located in physical memory address 1000:0
02h	Reserved
03h	Initial Superio_Early_Init switch
04h	Reserved
05h	Blank out screen; Clear CMOS error flag
06h	Reserved
07h	Clear 8042 interface; Initialize 8042 self test
08h	Test special keyboard controller for Winbond 977 series Super I/O chips; Enable keyboard interface
09h	Reserved
0Ah	Disable PS/2 mouse interface (optional); Auto detect ports for keyboard & mouse followed by a port & interface swap (optional); Reset keyboard for Winbond 977 series Super I/O chips
0Bh	Reserved
0Ch	Reserved
0Dh	Reserved
0Eh	Test F000h segment shadow to see whether it is read/write capable or not. If test fails, keep beeping the speaker
0Fh	Reserved
10h	Auto detect flash type to load appropriate flash read/write codes into the run time area in F000 for ESCD & DMI support
11h	Reserved
12h	Use walking 1's algorithm to check out interface in CMOS circuitry. Also set real time clock power status and then check for overrride
13h	Reserved
14h	Program chipset default values into chipset. Chipset default values are MODBINable by OEM customers
15h	Reserved
16h	Initial Early_Init_Onboard_Generator switch
17h	Reserved
18h	Detect CPU information including brand, SMI type (Cyrix or Intel) and CPU level (586 or 686)
19h	Reserved
1Ah	Reserved
1Bh	Initial interrupts vector table. If no special specified, all H/W interrupts are directed to SPURIOUS_INT_HDLR & S/W interrupts to SPURIOUS_soft_HDLR

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1Ch	Reserved
1Dh	Initial EARLY_PM_INIT switch
1Eh	Reserved
1Fh	Load keyboard matrix (notebook platform)
20h	Reserved
21h	HPM initialization (notebook platform)
22h	Reserved
23h	Check validity of RTC value; Load CMOS settings into BIOS stack. If CMOS checksum fails, use default value instead; Prepare BIOS resource map for PCI & PnP use. If ESCD is valid, take into consideration of the ESCD's legacy information; Onboard clock generator initialization. Disable respective clock resource to empty PCI & DIMM slots; Early PCI initialization - Enumerate PCI bus number, assign memory & I/O resource, search for a valid VGA device & VGA BIOS, and put it into C000:0
24h	Reserved
25h	Reserved
26h	Reserved
27h	Initialize INT 09 buffer
28h	Reserved
29h	Program CPU internal MTRR (P6 & PII) for 0-640K memory address; Initialize the APIC for Pentium class CPU; Program early chipset according to CMOS setup; Measure CPU speed; Invoke video BIOS
2Ah	Reserved
2Bh	Reserved
2Ch	Reserved
2Dh	Initialize multilanguage; Put information on screen display, including Award title, CPU type, CPU speed, etc...
2Eh	Reserved
2Fh	Reserved
30h	Reserved
31h	Reserved
32h	Reserved
33h	Reset keyboard except Winbond 977 series Super I/O chips
34h	Reserved
35h	Reserved
36h	Reserved
37h	Reserved
38h	Reserved
39h	Reserved
3Ah	Reserved
3Bh	Reserved
3Ch	Test 8254
3Dh	Reserved
3Eh	Test 8259 interrupt mask bits for channel 1

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3Fh	Reserved
40h	Test 9259 interrupt mask bits for channel 2
41h	Reserved
42h	Reserved
43h	Test 8259 functionality
44h	Reserved
45h	Reserved
46h	Reserved
47h	Initialize EISA slot
48h	Reserved
49h	Calculate total memory by testing the last double last word of each 64K page; Program writes allocation for AMD K5 CPU
4Ah	Reserved
4Bh	Reserved
4Ch	Reserved
4Dh	Reserved
4Eh	Program MTRR of M1 CPU; initialize L2 cache for P6 class CPU & program cacheable range; Initialize the APIC for P6 class CPU; On MP platform, adjust the cacheable range to smaller one in case the cacheable ranges between each CPU are not identical
4Fh	reserved
50h	Initialize USB
51h	Reserved
52h	Test all memory (clear all extended memory to 0)
53h	Reserved
54h	Reserved
55h	Display number of processors (multi-processor platform)
56h	Reserved
57h	Display PnP logo; Early ISA PnP initialization and assign CSN to every ISA PnP device
58h	Reserved
59h	Initialize the combined Trend Anti-Virus code
5Ah	Reserved
5Bh	Show message for entering AWDFLASH.EXE from FDD (optional feature)
5Ch	Reserved
5Dh	Initialize Init_Onboard_Super_IO switch; Initialize Init_Onboard_AUDIO switch
5Eh	Reserved
5Fh	Reserved
60h	Okay to enter Setup utility
61h	Reserved
62h	Reserved
63h	Reserved

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64h	Reserved
65h	Initialize PS/2 mouse
66h	Reserved
67h	Prepare memory size information for function call: INT 15h ax=E820h
68h	Reserved
69h	Turn on L2 cache
6Ah	Reserved
6Bh	Program chipset registers according to items described in Setup & Auto-Configuration table
6Ch	Reserved
6Dh	Assign resources to all ISA PnP devices; Auto assign ports to onboard COM ports if the corresponding item in Setup is set to "AUTO"
6Eh	Reserved
6Fh	Initialize floppy controller; Setup floppy related fields in 40:hardware
70h	Reserved
71h	Reserved
72h	Reserved
73h	Enter AWDFLASH.EXE if: AWDFLASH.EXE is found in floppy dive and ALT+F2 is pressed
74h	Reserved
75h	Detect and install all IDE devices: HDD, LS120, ZIP, CDROM...
76h	Reserved
77h	Detect serial ports and parallel ports
78h	Reserved
79h	Reserved
7Ah	Detect and install coprocessor
7Bh	Reserved
7Ch	Reserved
7Dh	Reserved
7Eh	Reserved
7Fh	Switch back to text mode if full screen logo is supported: if errors occur, report errors & wait for keys, if no errors occur or F1 key is pressed continue - Clear EPA or customization logo
80h	Reserved
81h	Reserved
82H	Call chipset power management hook: Recover the text fond used by EPA logo (not for full screen logo), If password is set, ask for password
83H	Save all data in stack back to CMOS
84h	Initialize ISA PnP boot devices
85h	Final USB initialization; NET PC: Build SYSID structure; Switch screen back to text mode; Set up ACPI table at top of memory; Invoke ISA adapter ROM's; Assign IRQ's to PCI devices; Initialize APM; Clear noise of IRQ's
86h	Reserved
87h	Reserved

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88h	Reserved
89h	Reserved
90h	Reserved
91h	Reserved
92h	Reserved
93h	Read HDD boot sector information for Trend Anti-Virus code
94h	Enable L2 cache; Program boot up speed; Chipset final initialization; Power management final initialization; Clear screen and display summary table; Program K^ write allocation; Program P6 class write combining
95h	Program daylight saving; Update keyboard LED and typematic rate
96h	Build MP table; Build and update ESCD; Set CMOS century to 20h or 19h; Load CMOS time into DOS timer tick; Build MSIRQ routing table
FFh	Boot attempt (INT 19h)

AMI BIOS code Description:

01	NMI disabled; Start CPU flag test
02	Power on delay
03	Initialize system chipset
04	Check keyboard for soft/hard reset
05	Enable ROM
06	ROM BIOS checksum tested
07	8042 keyboard controller tested
08	8042 keyboard controller tested
09	8042 keyboard controller tested
0A	8042 keyboard controller tested
0B	8042 protected mode tested
0C	8042 keyboard controller tested
0D	CMOS RAM shutdown register tested
0E	CMOS checksum tested
0F	CMOS initialization
10	CMOS/RTC status OK
11	Disable DMA and PIC
12	Video display disabled
13	Chipset and memory initialized
14	8254 PIT tested
15	PIT channel 2 tested
16	PIT channel 1 tested
17	PIT channel 0 tested
18	PIT memory refresh tested
19	PIT memory refresh tested

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1A	Check 15 microsecond refresh (PIT)
1B	Base 64K memory tested
20	Address lines tested
21	Base 64K parity memory tested
22	Memory Read/Write tested
23	Perform setup's prior to initialization of the vector table
24	Initialize BIOS vector table in lower 1KB of system RAM
25	8042 keyboard controller tested
26	Global for keyboard controller tested
27	Perform setups for vector table initialization
28	Monochrome video mode tested
29	Video (CGA) color mode tested
2A	Parity enable tested
2B	Check for optional ROM's
2C	Check for video ROM
2D	Determine if EGA/VGA is installed
2E	Video memory is tested if non EGA/VGA
2F	Video memory tested
30	Video adapter tested
31	Alternate video memory tested
32	Alternate video adapter tested
33	Video mode tested
34	Video mode tested
35	BIOS ROM data area initialized
36	Power on display cursor set
37	Power on message displayed
38	Cursor position read
39	Display cursor reference
3A	Display Setup message
40	Protected mode tested
41	Build descriptor tables
42	CPU enters protected mode
43	Protected mode interrupt enabled
44	Descriptor tables checked
45	Memory size checked
46	Memory read/Write tested
47	Base 640K memory tested
48	Memory below 1MB checked for
49	Memory above 1MB checked for
4A	ROM BIOS data area checked

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4B	Memory below 1MB cleared for soft reset
4C	Memory above 1MB cleared for soft reset
4D	Update CMOS memory size
4E	Display base 64K memory test
4F	Memory test on base 640K performed
50	RAM size updated for shadow operation
51	Extended memory test performed
52	System is prepared for real mode
53	CPU is returned to real mode
54	CPU registers are returned to real mode
55	A20 gate disabled
56	BIOS data area rechecked
57	BIOS data area check complete
58	Setup message displayed
59	DMA register page tested
60	Display memory verified
61	DMA #1 tested
62	DMA #2 tested
63	Perform BIOS data area check
64	BIOS data area checked
65	DMA initialized
66	8259 PIC initialized
67	Keyboard tested
80	Keyboard reset
81	Check for stuck key and batch test
82	8042 keyboard controller tested
83	Lock key checked
84	Memory size compared to CMOS
85	Password and soft error checked
86	CMOS equipment checked performed
87	CMOS setup performed if selected
88	Main chipset reinitialized after CMOS setup
89	Power on message displayed
8A	Mouse check and wait message displayed
8B	Any ROM's attempted to be shadowed
8C	System initialized through CMOS settings
8D	Hard drives and floppy drives reset
8E	Floppy disk setup compared to CMOS settings
8F	Floppy controller initialized
90	Hard disks setup compared to CMOS settings

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91	Hard disk controller initialized
92	BIOS data table checked
93	BIOS data table check complete
94	Memory size set
95	Display memory verified
96	All Interrupts cleared
97	Optional ROM's checked for
98	All Interrupts cleared
99	Timer data setup
9A	Serial ports checked for
9B	All Interrupts cleared
9C	Math coprocessor checked
9D	All Interrupts cleared
9E	Extended keyboard checked
9F	NumLock set on keyboard
A0	Keyboard reset
A1	Cache memory size tested
A2	Display any soft errors
A3	Typematic rate set
A4	Memory wait states set
A5	Display is cleared
A6	Parity and NMI enabled
A7	All Interrupts cleared
A8	System control is turned over to ROM at E0000
A9	All Interrupts cleared
AA	Displayed configuration
00	Call to Interrupt 19 for boot loader

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AMI BIOS Beep Codes

Beeps	Error Message	Description
1 short	DRAM refresh failure	The programmable interrupt timer or programmable interrupt controller has probably failed
2 short	Memory parity error	A memory parity error has occurred in the first 64K of RAM. The RAM IC is probably bad
3 short	Base 64K memory failure	A memory failure has occurred in the first 64K of RAM. The RAM IC is probably bad
4 short	System timer failure	The system clock/timer IC has failed or there is a memory error in the first bank of memory
5 short	Processor error	The system CPU has failed
6 short	Gate A20 failure	The keyboard controller IC has failed, which is not allowing Gate A20 to switch the processor to protected mode. Replace the

		keyboard controller
7 short	Virtual mode processor exception error	The CPU has generated an exception error because of a fault in the CPU or motherboard circuitry
8 short	Display memory read/write error	The system video adapter is missing or defective
9 short	ROM checksum error	The contents of the system BIOS ROM do not match the expected checksum value. The BIOS ROM is probably defective and should be replaced
10 short	CMOS shutdown register read/write error	The shutdown for the CMOS has failed
11 short	Cache error	The L2 cache is faulty
1 long, 2 short	Failure in video system	An error was encountered in the video BIOS ROM, or a horizontal retrace failure has been encountered
1 long, 3 short	Memory test failure	A fault has been detected in memory above 64KB
1 long, 8 short	Display test failure	The video adapter is either missing or defective
2 short	POST Failure	One of the hardware tests have failed
1 long	POST has passed all tests	

AWARD BIOS error beep codes

There are 2 main beep codes for the Award BIOS:

- one long beep and two short beeps - Video error (reseat or replace video card)
- two short beeps - Non-Fatal Error (reseat RAM, check other components)

IBM BIOS beep codes

Beep Code	Description
No Beeps	No Power, Loose Card, or Short.
1 Short Beep	Normal POST, computer is ok.
2 Short Beep	POST error, review screen for error code.
Continuous Beep	No Power, Loose Card, or Short.
Repeating Short Beep	No Power, Loose Card, or Short.
One Long and one Short Beep	Motherboard issue.
One Long and Two Short Beeps	Video (Mono/CGA Display Circuitry) issue.
One Long and Three Short Beeps.	Video (EGA) Display Circuitry.
Three Long Beeps	Keyboard or Keyboard card error.

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One Beep, Blank or Incorrect Display	Video Display Circuitry.

Macintosh startup tones

Tones	Error
Error Tone. (two sets of different tones)	Problem with logic board or SCSI bus.
Startup tone, drive spins, no video	Problem with video controller.
Powers on, no tone.	Logic board problem.
High Tone, four higher tones.	Problem with SIMM.

Phoenix BIOS beep codes

Phoenix BIOS beep codes are a series of beeps separated by a pause, for example: **beep** --- **beep beep** --- **beep** --- **beep beep** would be **1-2-1-2**

Beep Code	Description and what to check
1-1-1-3	Verify Real Mode.
1-1-2-1	Get CPU Type.
1-1-2-3	Initialize system hardware.
1-1-3-1	Initialize chipset registers with initial POST values.
1-1-3-2	Set in POST flag.
1-1-3-3	Initialize CPU registers.
1-1-4-1	Initialize cache to initial POST values.
1-1-4-3	Initialize I/O.
1-2-1-1	Initialize Power Management.
1-2-1-2	Load alternate registers with initial POST values.
1-2-1-3	Jump to UserPatch0.
1-2-2-1	Initialize keyboard controller.
1-2-2-3	BIOS ROM checksum.
1-2-3-1	8254 timer initialization.
1-2-3-3	8237 DMA controller initialization.
1-2-4-1	Reset Programmable Interrupt Controller.
1-3-1-1	Test DRAM refresh.
1-3-1-3	Test 8742 Keyboard Controller.
1-3-2-1	Set ES segment to register to 4 GB.

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1-3-3-1	28 Autosize DRAM.
1-3-3-3	Clear 512K base RAM.
1-3-4-1	Test 512 base address lines.
1-3-4-3	Test 512K base memory.
1-4-1-3	Test CPU bus-clock frequency.
1-4-2-4	Reinitialize the chipset.
1-4-3-1	Shadow system BIOS ROM.
1-4-3-2	Reinitialize the cache.
1-4-3-3	Autosize cache.
1-4-4-1	Configure advanced chipset registers.
1-4-4-2	Load alternate registers with CMOS values.
2-1-1-1	Set Initial CPU speed.
2-1-1-3	Initialize interrupt vectors.
2-1-2-1	Initialize BIOS interrupts.
2-1-2-3	Check ROM copyright notice.
2-1-2-4	Initialize manager for PCI Options ROMs.
2-1-3-1	Check video configuration against CMOS.
2-1-3-2	Initialize PCI bus and devices.
2-1-3-3	Initialize all video adapters in system.
2-1-4-1	Shadow video BIOS ROM.
2-1-4-3	Display copyright notice.
2-2-1-1	Display CPU Type and speed.
2-2-1-3	Test keyboard.
2-2-2-1	Set key click if enabled.
2-2-2-3	56 Enable keyboard.
2-2-3-1	Test for unexpected interrupts.
2-2-3-3	Display prompt **Press F2 to enter SETUP**.
2-2-4-1	Test RAM between 512 and 640k.
2-3-1-1	Test expanded memory.
2-3-1-3	Test extended memory address lines.
2-3-2-1	Jump to UserPatch1.
2-3-2-3	Configure advanced cache registers.
2-3-3-1	Enable external and CPU caches.
2-3-3-3	Display external cache size.
2-3-4-1	Display shadow message.

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2-3-4-3	Display non-disposable segments.
2-4-1-1	Display error messages.
2-4-1-3	Check for configuration errors.
2-4-2-1	Test real-time clock.
2-4-2-3	Check for keyboard errors
2-4-4-1	Set up hardware interrupts vectors.
2-4-4-3	Test coprocessor if present.
3-1-1-1	Disable onboard I/O ports.
3-1-1-3	Detect and install external RS232 ports.
3-1-2-1	Detect and install external parallel ports.
3-1-2-3	Re-initialize onboard I/O ports.
3-1-3-1	Initialize BIOS Data Area.
3-1-3-3	Initialize Extended BIOS Data Area.
3-1-4-1	Initialize floppy controller.
3-2-1-1	Initialize hard disk controller.
3-2-1-2	Initialize local bus hard disk controller.
3-2-1-3	Jump to UserPatch2.
3-2-2-1	Disable A20 address line.
3-2-2-3	Clear huge ES segment register.
3-2-3-1	Search for option ROMs.
3-2-3-3	Shadow option ROMs.
3-2-4-1	Set up Power Management.
3-2-4-3	Enable hardware interrupts.
3-3-1-1	Set time of day.
3-3-1-3	Check key lock.
3-3-3-1	Erase F2 prompt.
3-3-3-3	Scan for F2 key stroke.
3-3-4-1	Enter SETUP.
3-3-4-3	Clear in POST flag.
3-4-1-1	Check for errors
3-4-1-3	POST done - prepare to boot operating system.
3-4-2-1	One beep.
3-4-2-3	Check password (optional).
3-4-3-1	Clear global descriptor table.
3-4-4-1	Clear parity checkers.

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3-4-4-3	Clear screen (optional).
3-4-4-4	Check virus and backup reminders.
4-1-1-1	Try to boot with INT 19.
4-2-1-1	Interrupt handler error.
4-2-1-3	Unknown interrupt error.
4-2-2-1	Pending interrupt error.
4-2-2-3	Initialize option ROM error.
4-2-3-1	Shutdown error.
4-2-3-3	Extended Block Move.
4-2-4-1	Shutdown 10 error.
4-3-1-3	Initialize the chipset.
4-3-1-4	Initialize refresh counter.
4-3-2-1	Check for Forced Flash.
4-3-2-2	Check HW status of ROM.
4-3-2-3	BIOS ROM is OK.
4-3-2-4	Do a complete RAM test.
4-3-3-1	Do OEM initialization.
4-3-3-2	Initialize interrupt controller.
4-3-3-3	Read in bootstrap code.
4-3-3-4	Initialize all vectors.
4-3-4-1	Boot the Flash program.
4-3-4-2	Initialize the boot device.
4-3-4-3	Boot code was read OK.

For the latest updates on BIOS codes, please kindly see the computers manufacturers' websites.

If need more helps, please contact me anytime.
Free life time support, my friend.

Thanks,
William

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