

**TDS5000B Series
Digital Phosphor Oscilloscope
Read This First**

www.tektronix.com



061-4331-03

Tektronix

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For product information, sales, service, and technical support:

- In North America, call 1-800-833-9200.
- Worldwide, visit www.tektronix.com to find contacts in your area.

General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

To avoid potential hazards, use this product only as specified.

To Avoid Fire or Personal Injury

Use Proper Power Cord. Use only the power cord specified for this product and certified for the country of use.

Power Disconnect. The power cord disconnects the product from the power source. Do not block the power cord; it must remain accessible to the user at all times.

Ground the Product. This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Do Not Operate With Suspected Failures. If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Provide Proper Ventilation. Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

Terms in this Manual

These terms may appear in this manual:



WARNING. *Warning statements identify conditions or practices that could result in injury or loss of life.*



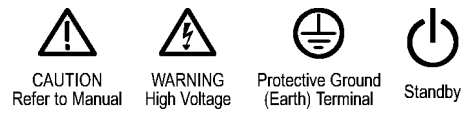
CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Symbols and Terms on the Product

These terms may appear on the product:

- DANGER indicates an injury hazard immediately accessible as you read the marking.
- WARNING indicates an injury hazard not immediately accessible as you read the marking.
- CAUTION indicates a hazard to property including the product.

The following symbol(s) may appear on the product:



Environmental Considerations

This section provides information about the environmental impact of the product.

Product End-of-Life Handling

Observe the following guidelines when recycling an instrument or component:

Equipment Recycling. Production of this equipment required the extraction and use of natural resources. The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. In order to avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle this product in an appropriate system that will ensure that most of the materials are reused or recycled appropriately.



This symbol indicates that this product complies with the European Union's requirements according to Directive 2002/96/EC on waste electrical and electronic equipment (WEEE). For information about recycling options, check the Support/Service section of the Tektronix Web site (www.tektronix.com).

Mercury Notification. This product uses an LCD backlight lamp that contains mercury. Disposal may be regulated due to environmental considerations. Please contact your local authorities or, within the United States, the Electronics Industries Alliance (www.eiae.org) for disposal or recycling information.

Perchlorate Materials. This product contains one or more type CR lithium coin cell batteries. According to the state of California, CR lithium coin cells are classified as perchlorate materials and require special handling. See www.dtsc.ca.gov/hazardouswaste/perchlorate for additional information.

Restriction of Hazardous Substances

This product has been classified as Monitoring and Control equipment, and is outside the scope of the 2002/95/EC RoHS Directive.

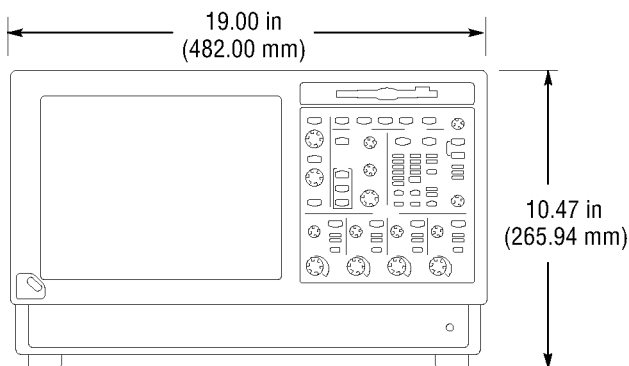
Getting Started

Use the following information to replace or clarify information contained in your instrument documentation.

Operating Requirements

Place the instrument on a cart or bench, observing clearance requirements:

- Top, Rear, Front, and Right Side: 0 in (0 mm)
- Left Side: 3 in (76 mm)
- Bottom: 0.75 in (19 mm) minimum or 0 in (0 mm) standing on feet, flip stand down



CAUTION. To ensure proper cooling, keep the bottom and sides of the instrument clear of obstructions.

Environmental Requirements

Characteristic	Description
Humidity, operating	20% to 80% relative humidity with a maximum wet bulb temperature of +29 °C (+84.2 °F) at or below +45 °C (+113 °F) noncondensing. Upper limit derated to 30% relative humidity at +45 °C (+113 °F)
Altitude, operating	9,842 ft. (3,000 m)
Temperature, ambient operating	+41 °F to +113 °F (+5 °C to +45 °C)

Powering On the Instrument

Power Supply Requirements

Source voltage and frequency

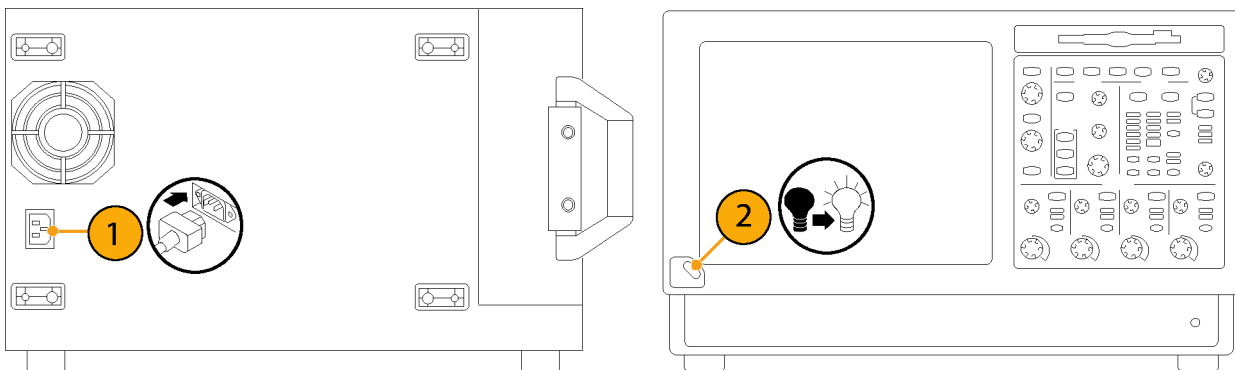
100 -240 $V_{RMS} \pm 10\%$, 47-63 Hz, or
115 $V_{RMS} \pm 10\%$, 360-440 Hz

Power consumption

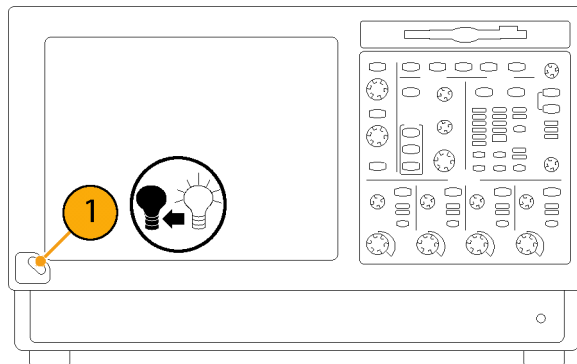
< 220 watts



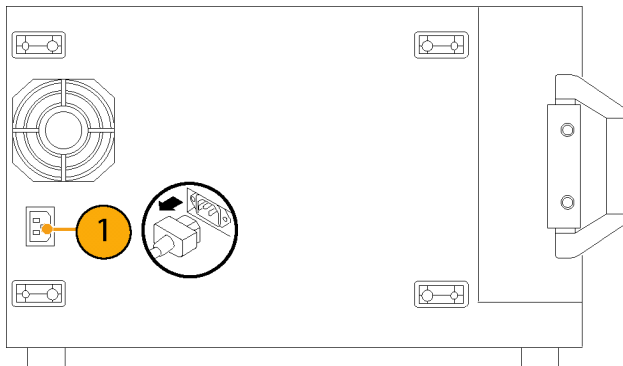
WARNING. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.



Powering Off the Instrument



Removing the Power



Using Your Instrument

Documentation for your instrument is found by selecting **Help > Documentation...**

Before using your instrument, read the following information in the user manual:

- Safety Summary
- Creating an Emergency Startup Disk
- Getting Acquainted with Your Instrument

Standard Accessories

The standard accessories list has been upgraded to include the following discs:

TDS5000B Series Operating System Restore disc (SN B040000 and above) 063-4160-xx.

TDS5000B Series Operating System Restore disc (SN B030000 to B039999) 063-3985-xx.

TDS5000B Series Operating System Restore disc (SN B020000 to SN B029999) 063-3759-xx

TDS5000B Series Operating System Restore disc (SN B010100 to SN B019999) 063-3693-xx

Options

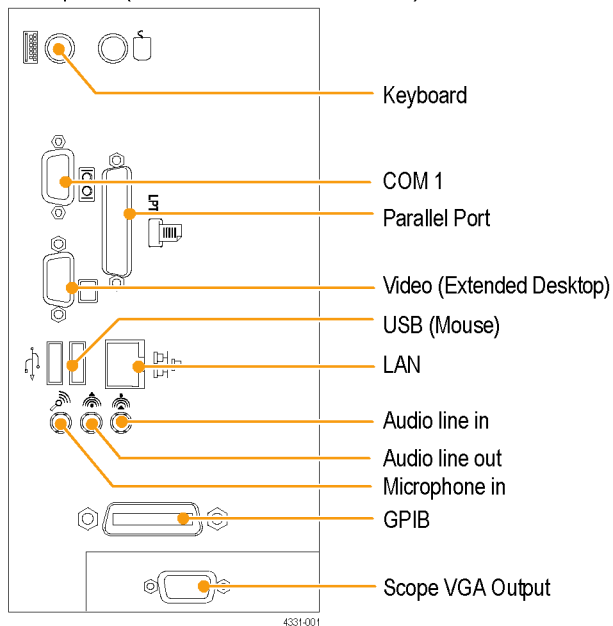
The TDS5054B and TDS5104B have been upgraded to include the following options:

- Option 18, Touch Screen
- Option 3M, 16 M points record length

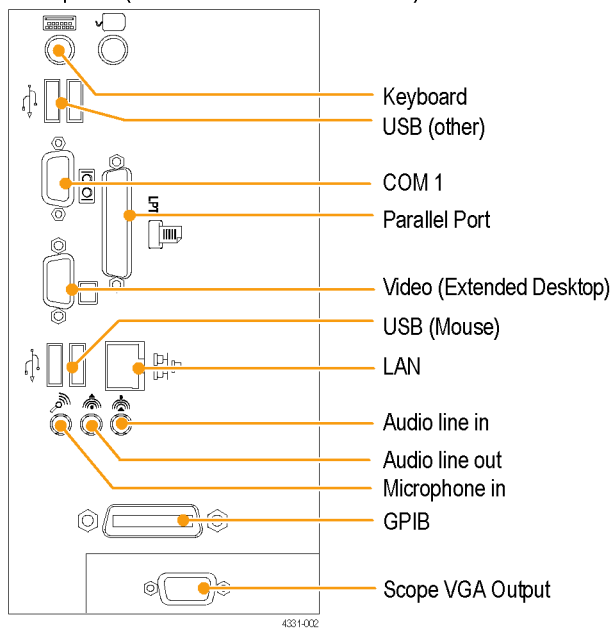
Side and Rear Panels

The following side-panel illustrations have been upgraded to include the latest component locations:

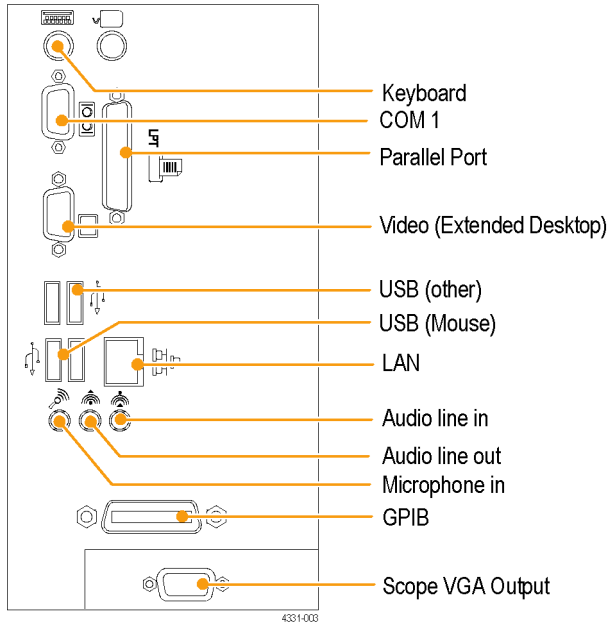
Side panel (SN B010100 to SN B019999)



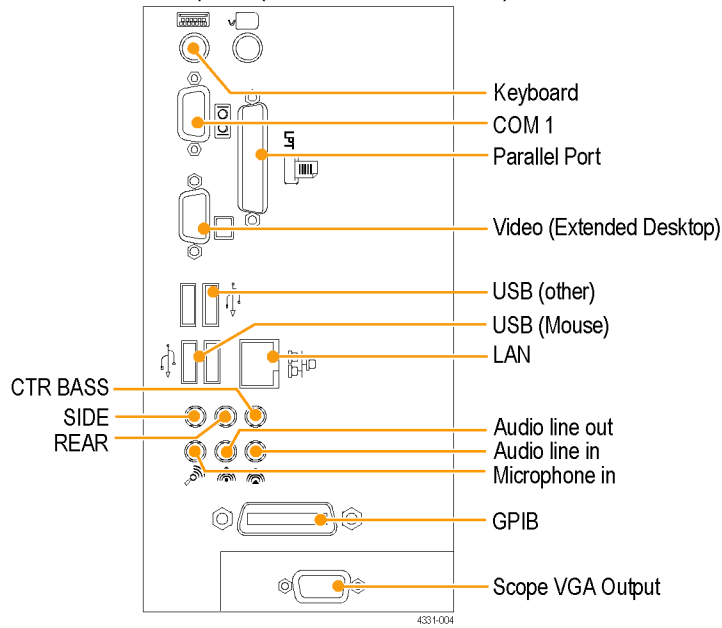
Side panel (SN B020000 to SN B029999)



Side panel (SN B030000 to SN B039999)



Side panel (SN B040000 and Above)



039-0185-xx Service Information

Use the following information when servicing instruments with serial numbers B040000 and above or instruments using the 039-0185-xx computer board. This information is only for qualified service personnel.

Table 1: 039-0185-xx µATX POST codes

Item no.	Module	Displayed POST code	Description
1	Turn Off Chipset and CPU test	C0	<p>OEM Specific-Cache control cache</p> <hr/> <p>Processor Status (1FLAGS) Verification</p> <p>Tests the following processor status flags: Carry, zero, sign, overflow.</p> <p>The BIOS sets each flag and verifies.</p> <p>They are set, then turns each flag off and verifies if it is off.</p> <hr/> <p>Read/Write/Verify all the CPU registers except SS, SP, and BP with data pattern FF and 00.</p> <p>RAM must be periodically refreshed to keep the memory from decaying. This function ensures that the memory refresh function is working properly.</p>
2	Memory Presence	C1	<p>First block memory detect</p> <p>OEM Specific-Test to size on-board memory</p> <p>Early chip set initialization</p> <p>Memory presence test</p> <p>OEM chip set routines</p> <p>Clear low 64K of memory</p> <p>Test first 64K memory</p>
3	Early Memory Initialization	C2	OEM Specific-Board Initialization
4	Extend Memory DRAM select	C3	<p>OEM Specific-Turn on extended memory</p> <hr/> <p>Initialization</p> <p>Cyrix CPU initialization</p> <p>Cache initialization</p>

Table 1: 039-0185-xx µATX POST codes, (cont.)

Item no.	Module	Displayed POST code	Description
5	Special Display Handling	C4	OEM Specific-Display/Video Switch Handling so that the Switch Handling display switch errors never occur
6	Early Shadow	C5	OEM specific-Early shadow enable for fast boot
7	Cache presence test	C6	External cache size detection
8	CMOS Check	CF	CMOS checkup
9	Spurious	B0	If interrupt occurs in protected mode.
10	Unclaimed NMI	B1	If unmasked NMI occurs, display Press F1 to disable NMI, F2 reboot.
11	Program Chip Set	BF	To program chipset from defaults values
12	Setup Pages	E1–EF	E1- Page 1, E2 - Page 2, and so on
	Force load Default to chipset	1	Chipset defaults program
	Reserved	2	
	Early Superio Init	3	Early Initialize of the super IO
	Reserved	4	
	Blank video	5	Reset the Video controller
	Reserved	6	
	Init KBC	7	Keyboard controller init
	KB test	8	Test the keyboard
	Reserved	9	
	Mouse Init	A	Initialize the mouse
	Onboard Audio init	B	Initialize the onboard audio controller if it exists
	Reserved	C	
	Reserved	D	
	Checksum Check	E	Check the integrity of the ROM, BIOS, and message
	Reserved	F	
	Auto detect EEPROM	10	Check the Flash type and copy flash write/erase routines to 0F000h segments
	Reserved	11	
	CMOS Check	12	Check CMOS Circuitry and reset CMOS
	Reserved	13	
	Chipset Default load	14	Program the chipset registers with CMOS values
	Reserved	15	
	Clock Init	16	Init onboard clock generator
	Reserved	17	
	Identify the CPU	18	Check the CPU ID and init L1/L2 cache

Table 1: 039-0185-xx µATX POST codes, (cont.)

Item no.	Module	Displayed POST code	Description
12	Reserved	19	
	Reserved	1A	
	Setup Interrupt Vector Table	1B	Initialize first 120 interrupt vectors with SPURIOUS_INT_HDLR and initialize INT 00h-1Fh according to INT_TBL
	Reserved	1C	
	Early PM Init	1D	First step initialize if single CPU onboard
	Reserved	1E	
	Re-initial KB	1F	Re-init KB
	Reserved	20	
	HPM init	21	If support HPM, HPM get initialized here
	Reserved	22	
	Test CMOS Interface and Battery Status	23	Verifies CMOS is working correctly and detects bad battery. If failed, load CMOS defaults and load into chipset
	Reserved	24	
	Reserved	25	
	Reserved	26	
	KBC final Init	27	Final Initial KBC and setup BIOS data area
	Reserved	28	
	Initialize Video Interface	29	Read CMOS location 14h to find out type of video in use. Detect and Initialize Video Adapter.
	Reserved	2A	
	Reserved	2B	
	Reserved	2C	
	Video memory test	2D	Test video memory, write sign-on message to screen. Setup shadow RAM - Enable shadow according to Setup.
	Reserved	2E	Setup shadow RAM - Enable shadow according to Setup.
	Reserved	2F	
	Reserved	30	
	Reserved	31	
	Reserved	32	
	PS2 Mouse setup	33	Setup PS2 Mouse and reset KB
	Reserved	34	
	Test DMA Controller 0	35	Test DMA channel 0
	Reserved	36	
	Test DMA Controller 1	37	Test DMA channel 1

Table 1: 039-0185-xx μ ATX POST codes, (cont.)

Item no.	Module	Displayed POST code	Description
12	Reserved	38	
	Test DMA Page Registers	39	Test DMA Page Registers.
	Reserved	3A	
	Reserved	3B	
	Test Timer Counter 2	3C	Test 8254 Timer 0 Counter 2.
	Reserved	3D	
	Test 8259-1 Mask Bits	3E	Verify 8259 Channel 1 masked interrupts by alternately turning off and on the interrupt lines.
	Reserved	3F	
	Test 8259-2 Mask Bits	40	Verify 8259 Channel 2 masked interrupts by alternately turning off and on the interrupt lines.
	Reserved	41	
	Reserved	42	
	Test Stuck 8259's Interrupt Bits	43	Turn off interrupts then verify no interrupt mask register is on. Force an interrupt and verify the interrupt occurred.
	Test 8259 Interrupt Functionality		
	Reserved	44	
	Reserved	45	
	Reserved	46	
	Set EISA Mode	47	If EISA non-volatile memory checksum is good, execute EISA initialization. If not, execute ISA tests and clear EISA mode flag.
	Reserved	48	
	Size Base and Extended Memory	49	Size base memory from 256K to 640K and extended memory above 1MB.
	Reserved	4A	
	Reserved	4B	
	Reserved	4C	
	Reserved	4D	
	Test Base and Extended Memory	4E	Test base memory from 256K to 640K and extended memory above 1MB using various patterns. NOTE. This test is skipped in EISA mode and can be skipped with ESC key in ISA mode.
	Reserved	4F	
	USB init	50	Initialize USB controller
	Reserved	51	

Table 1: 039-0185-xx µATX POST codes, (cont.)

Item no.	Module	Displayed POST code	Description
12	Memory Test	52	Test all memory of memory above 1MB using Virtual 8086 mode, page mode, and clear the memory
	Reserved	53	
	Reserved	54	
	CPU display	55	Detect CPU speed and display CPU vendor specific version string and turn on all necessary CPU features
	Reserved	56	
	PnP Init	57	Display PnP logo and PnP early init
	Reserved	58	
	Setup Virus Protect	59	Setup virus protect according to Setup
	Reserved	5A	
	Awdflash Load	5B	If required, will auto load Awdflash.exe in POST
	Reserved	5C	
	Onboard I/O Init	5D	Initializing onboard super IO
	Reserved	5E	
	Reserved	5F	
	Setup enable	60	Display setup message and enable setup functions
	Reserved	61	
	Reserved	62	
	Initialize & Install Mouse	63	Detect if mouse is present initialize mouse install interrupt vectors
	Reserved	64	
	PS2 Mouse special	65	Special treatment to PS2 Mouse port
	Reserved	66	
	ACPI init	67	ACPI sub-system initializing
	Reserved	68	
	Setup Cache Controller	69	Initialize cache controller
	Reserved	6A	
	Setup Entering	6B	Enter setup check and auto-configuration check up
	Reserved	6C	
	Initialize Floppy Drive & Controller	6D	Initialize floppy disk drive controller and any drives.
	Reserved	6E	
	FDD install	6F	Install FDD and setup BIOS data area parameters
	Reserved	70	

Table 1: 039-0185-xx μ ATX POST codes, (cont.)

Item no.	Module	Displayed POST code	Description
12	Reserved	71	
	Reserved	72	
	Initialize Hard Drive & Controller	73	Initialize hard drive controller and any drives.
	Reserved	74	
	Install HDD	75	IDE device detection and install
	Reserved	76	
	Detect & Initialize Serial/Parallel	77	Initialize any serial and parallel ports (also game port)
	Reserved	78	
	Reserved	79	
	Detect & Initialize Math Coprocessor	7A	Initialize math coprocessor
	Reserved	7B	
	HDD Check for Write protection	7C	HDD check out
	Reserved	7D	
	Reserved	7E	
	POST error check	7F	Check POST error and display them and ask for user intervention
	Reserved	80	
	Reserved	81	
	Security Check	82	Ask password security (optional)
	Write CMOS	83	Write all CMOS values back to RAM and clear screen
	Pre-boot Enable	84	Enable parity checker Enable NMI, enable cache before boot.
	Initialize Option ROMs	85	Initialize any option ROMs present from C8000h to EFFFFh. NOTE. When FSCAN option is enabled, ROMs initialize from C8000h to F7FFFh.
	Reserved	86	
	Reserved	87	
	Reserved	88	
	Reserved	89	
	Reserved	8A	
	Reserved	8B	
	Reserved	8C	

Table 1: 039-0185-xx µATX POST codes, (cont.)

Item no.	Module	Displayed POST code	Description
12	Reserved	8D	
	Reserved	8E	
	Reserved	8F	
	Reserved	90	
	Reserved	91	
	Reserved	92	
	Boot Medium detection	93	Read and store boot partition head and
	Final Init	94	Final init for last micro details before boot
	Special KBC patch	95	Set system speed for boot Setup NumLock status according to Setup
	Boot Attempt	96	Set low stack Boot via INT 19h.
Boot	FF		
Quick POST Codes			
13	Init onboard device	65	Early Initialized the super IO Reset Video controller Keyboard controller init Test the Keyboard Initialized the mouse Onboard audio controller initialize if exist Check the integrity of the ROM, BIOS, and message Check Flash type and copy flash write/erase routines to 0F000h segments Check CMOS Circuitry and reset CMOS Program the chipset registers with CMOS values Init onboard clock generator
	Early System setup	66	Check the CPU ID and init L1/L2 cache Initialize first 120 interrupt vectors with SPURIOUS_INT_HDLR and initialize INT 00h-1Fh according to INT_TBL First step initialize if single CPU onboard. Re-init KB If support HPM, HPM get initialized here
	KBC and CMOS Init	67	Verifies CMOS is working correctly detects bad battery If failed, load CMOS defaults and load into chipset Final Initial KBC and setup BIOS data area.
	Video Init	68	Read CMOS location 14h to find out type of video in use. Detect and Initialize Video Adapter. Test video memory, write sign-on message to screen. Setup shadow RAM - Enable shadow according to Setup.
	8259 Init	69	Init 8259 channel 1 and mask IRQ 9

Table 1: 039-0185-xx μ ATX POST codes, (cont.)

Item no.	Module	Displayed POST code	Description
13	Memory test	6A	Quick Memory Test
	CPU Detect and IO init	6B	Detect CPU speed and display CPU vendor specific version string and turn on all necessary CPU features Display PnP logo and PnP early init Setup virus protect according to Setup. If required, will auto load Awdflash.exe in POST Initializing onboard super IO
	Reserved	6C	
	Reserved	6D	
	Reserved	6E	
	Reserved	6F	
	Setup Init	70	Display setup message and enable setup functions Detect if mouse is present, initialize mouse, install interrupt vectors Special treatment to PS2 Mouse port ACPI sub-system initializing
	Setup Cache Controller	71	Initialize cache controller
	Install FDD	72	Enter setup check and auto-configuration check up Initialize floppy disk drive controller and any drives Install FDD and setup BIOS data area parameters
	Install HDD	73	Initialize hard drive controller and any drives IDE device detection and install Initialize any serial and parallel ports (also game port)
	Detect & Initialize Math Coprocessor	74	Initialize math coprocessor
	HDD Check for Write protection	75	HDD check out
	Reserved	76	
	Display POST error	77	Check POST error and display them and ask for user intervention Ask password security (optional)
	CMOS and Option ROM Init	78	Write all CMOS values back to RAM and clear screen Enable parity checker Enable NMI Enable cache before boot.

Table 1: 039-0185-xx µATX POST codes, (cont.)

Item no.	Module	Displayed POST code	Description
13			Initialize any option ROMs present from C8000h to EFFFFh NOTE. When FSCAN option is enabled, ROMs initialize from C8000h to F7FFFh.
	Reserved	79	
	Reserved	7A	
	Reserved	7B	
	Reserved	7C	
	Boot Medium detection	7D	Read and store boot partition head and cylinders values in RAM
	Final Init	7E	Final init for last micro details before boot
	Special KBC patch	7F	Set system speed for boot Setup NumLock status according to Setup
	Boot Attempt	80	Set low stack Boot via INT 19h
	Boot	FF	
S4 POST Codes			
14	Early Chipset Init	5A	Early Initialized the super IO Reset Video controller Keyboard controller init Test the Keyboard Initialized the mouse
	Cmos Check	5B	Check CMOS Circuitry and reset CMOS
	Chipset default Prog	5C	Program the chipset registers with CMOS values. Init onboard clock generator
	Identify the CPU	5D	Check the CPU ID and init L1/L2 cache
	Setup Interrupt Vector Table	5E	Initialize first 120 interrupt vectors with SPURIOUS_INT_HDLR and INT 00h-1Fh according to INT_TBL First step initialize if single CPU Onboard Re-init KB If support HPM, HPM get initialized here.
	Test CMOS Interface and Battery status	5F	Verifies CMOS is working correctly detects bad battery. If failed, load CMOS defaults and load into chipset
	KBC final Init	60	Final Initial KBC and setup BIOS data area
	Initialize Video Interface	61	Read CMOS location 14h to find out type of video in use Detect and Initialize Video Adapter

Table 1: 039-0185-xx μ ATX POST codes, (cont.)

Item no.	Module	Displayed POST code	Description
14	Video memory test	62	Test video memory, write sign-on message to screen Setup shadow RAM - Enable shadow according to Setup
	Setup PS2 mouse and test DMA	63	Setup PS2 Mouse and reset KB Test DMA channel 0
	Test 8259	64	Test 8259 channel 1 and mask IRQ 9
	Init Boot Device	65	Detect if mouse is present, initialize mouse, install interrupt vectors Special treatment to PS2 Mouse port ACPI sub-system initializing Initialize cache controller
	Install Boot Devices	66	Enter setup check and auto-configuration check up Initialize floppy disk drive controller and any drives Install FDD and setup BIOS data area Parameters Initialize hard drive
	Cache Init	67	Cache init and USB init
	PM init	68	PM initialization
	PM final Init and issue SMI	69	Final init Before resume
	Full on	FF	
BootBlock POST Codes			
15	Base memory test	1	Clear base memory area (0000:0000–9000:ffffh)
	KB init	5	Initialized KBC
	Install interrupt vectors	12	Install int. vector (0-77) and initialized 00-1fh to their proper place
	Init Video	0D	Video initializing
	Init FDD	41	Scan floppy and media capacity for onboard super IO
	Boot	FF	Load boot sector

Table 2: 039-0185-xx µATX beep codes

Item no.	Beep code	Error message	Description
1	1 long, 2 short	Video adapter error	Bad video adapter or a bad connection to the video adapter. Ensure that the monitor cable is connected properly.
2	Repeating endless loop	Memory error	Check for improperly seated or missing memory.
3	1 long, 3 short	No video card or bad video RAM	Reseat or replace the video card.
4	High frequency beeps while running	Overheated CPU	Check the CPU fan for proper operation and check the case for proper air flow.
5	Repeating High/Low	CPU	Either the CPU is not seated properly or it is damaged. The problem can also be due to excess heat. Check the CPU fan or BIOS settings for proper fan speed.

Replaceable Parts

The following part numbers have changed:

Table 3: Inner Panels

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discont'd	Qty	Name & description
10-2-10	441-2226-xx	B010100	B019999	1	CHASSIS ASSY;FOR ASHLAND MOTHER BOARD,0.050 AL W/BRACKETS & HARDWARE
	441-2376-xx	B020000	B029999	1	CHASSIS ASSY;FOR LACROSSE MOTHER BOARD,0.050 AL W/BRACKETS & HARDWARE
	441-2491-xx	B030000	B039999	1	CHASSIS ASSY;FOR TAPPEN MOTHER BOARD,0.050 AL W/BRACKETS & HARDWARE
	441-2557-xx	B040000		1	CHASSIS ASSY;FOR ADVANTECH MOTHER BOARD,0.050 AL W/BRACKETS & HARDWARE

Table 4: Modules

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discontinued	Qty	Name & description
10-3-5	039-0154-xx	B010100	B019999	1	MOTHER BOARD ASSY;PENTIUM 4/CELERON BD, UATX,ASHLAND 2.1,W/O PROCESSOR,D845GVAD2L
	039-0159-xx	B020000	B029999	1	MOTHER BOARD ASSY;PENTIUM 4/CELERON BD, UATX,LA CROSSE,W/O PROCESSOR,BLKD865GLCLK INTEL P/N,SAFETY CONTROLLED
	039-0173-xx	B030000	B039999	1	MOTHER BOARD ASSY;PENTIUM 4, UATX,TAPPEN BD,GIG E, PROCESSOR LGA775,DDR2 667MHZ,TOTAL 4 GIG,BLKD945GTPLKR,SAFETY CONTROLLED
	039-0185-xx	B040000		1	MOTHER BOARD ASSY;ADVANTECH MICROATX, LGA 775 CORE 2 DUO, DDR2, PCI-E X1, SINGLE GBE LAN; ADVANTECH AIMB-562VG-00A1E WITH ADD2 DISABLE AND BIOS 562X126N.BIN SAFETY CONTROLLED

Table 5: Accessories

Fig. & index number	Tektronix part number	Serial no. effective	Serial no. discontinued	Qty	Name & description
10-6-	063-3693-xx	B010100	B019999	1	TDS5000B SERIES OPERATING SYSTEM RESTORE CD
	063-3759-xx	B020000	B029999	1	TDS5000B SERIES OPERATING SYSTEM RESTORE CD
	063-3985-xx	B030000	B039999	1	TDS5000B SERIES OPERATING SYSTEM RESTORE CD
	020-2969-xx	B040000		1	TDS5000B SERIES OPERATING SYSTEM RESTORE CD KIT