FIC PDA-2000 PCI SYSTEM BOARD BENCHMARKING REPORT

June 24, 1997

Revision 2.1

Update Month: BENCHMARKING-1

1.0 Introduction

To evaluate the PDA-2000 performance and to ensure its compatibility with a complete range of the most popular operating systems and software applications, FIC's Motherboard R&D Team conducted a comprehensive suite of benchmark tests on the board in a variety of hardware configurations, including a full selection of Intel Pentium®, IBM/Cyrix 6x86™, AMD-K5™, Intel P55C and Pentium OverDrive processors as well as Fast Page Mode, EDO and Synchronous DRAM types. The performance of the board running some of the most popular VGA adapter cards was also tested.

In order to demonstrate realistic business application performance, Winstone 97 under Windows 95 was chosen as the primary benchmarking tool for FIC's tests. Winstone 97 Version 1.0 was developed by the Ziff-Davis Publishing Company to provide a tool for accurate and realistic measurement of system performance of personal computers running popular business-oriented applications in the Microsoft Windows 95 operating system environment. To demonstrate the performance of the PDA-2000 in the Windows NT operating system environment, tests were also run using the BAPCo SYSmark for Windows NT benchmarking tool.

System Tests Configuration :

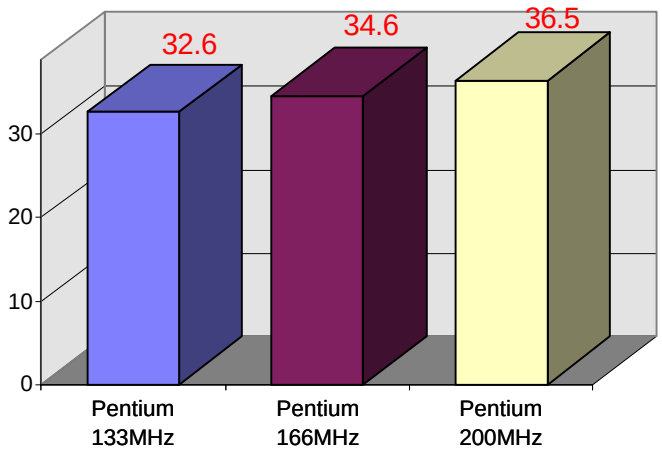
Main Board	FIC PDA-2000
System Core Logic	VIA 82C590VP2
System BIOS	Award BIOS Version 6.59M997
VGA	Onboard S3 Virge 2MB WRAM 256K
VGA Driver	Onboard S3 Virge Windows 95 Driver Version 2.30
IDE Driver	Windows 95 PCI Master Driver
IDE HDD	Quantum Fireball 1280 PIO Mode 4 or DMA mode 2 (FB-1280A)
CD-ROM	Toshiba ATAPI 10X CD-ROM XM-2402B
Operating System	Microsoft Windows 95

2.0 Processor Benchmarks Performance Summary

a) Intel Pentium Processor Performance

The chart below illustrates the Winstone 97 under Windows 95 performance processor benchmark with the PDA-2000 using different speed Intel Pentium processors. The following is a sample of the results using 256KB Pipeline Burst SRAM, 16MB EDO RAM X 2 , with a Onboard S3 Virge, 2MB WRAM 256KB PCI VGA card in 1024 x 768 x 256 colors, resolution refresh rate of 75Hz , small font.

PDA-2000 Winstone 97 Pentium Performance Comparison Chart



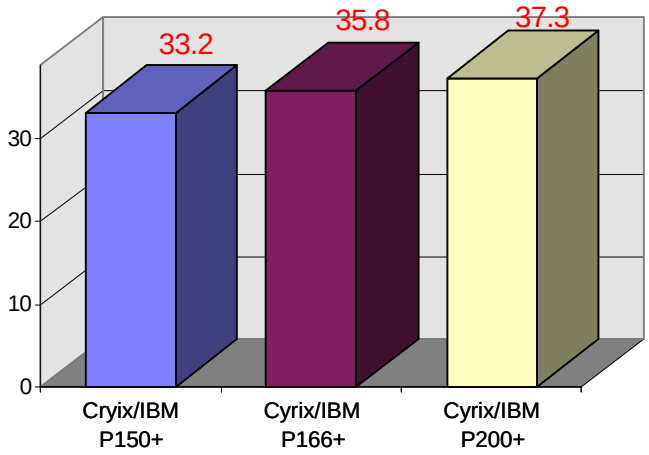
The table below provides more detailed benchmark testing data about the PDA-2000 using different speed Intel Pentium processors. The board was configured with 256KB Pipeline Burst SRAM and 16MB EDO RAM X 2.

Benchmarks	Weighted Suite	Pentium 133MHz	Pentium 166MHz	Pentium 200MHz
Winstone 97	Business Winstone 97	32.6	34.6	36.5
	High End Winstone 97	13.7	14.9	15.9
Winbench 97	Business Disk WinMark 97	795	796	803
	CD-ROM WinMark 97	825	815	831
	High End Disk Winmark 97	2420	2460	2520
	CD-ROM Playback 97	825	815	831
	CPUmark 16	277	306	343
	CPUmark 32	278	305	336
	Business Graphics WinMark 97	41.8	44.2	49.5
	High End Graphics WinMark 97	19.6	21	23.3

b) Cyrix 6x86 Processor Performance

The chart below illustrates the Winstone 97 under Windows 95 performance processor benchmark with the PDA-2000 using different speed Cyrix/IBM processors. The board was configured with 256KB Pipeline Burst SRAM and 16MB EDO RAM X 2.

PDA-2000 Winstone 97 IBM/Cyrix Performance Comparison Chart



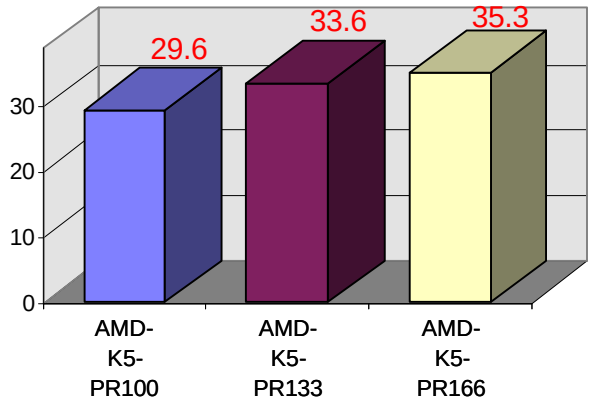
This table provides a detailed summary of PDA-2000 benchmark performance using different speed Cyrix/IBM 6x86 processors. The board was configured with 256KB Pipeline Burst SRAM and 16MB EDO RAM X 2.

Benchmarks	**Weighted Suite**	**P150$^+$**	**P166$^+$**	**P200$^+$**
Winstone 97	Business Winstone 97	33.2	35.8	37.3
	High End Winstone 97	13.2	14.3	15.4
Winbench 97	Business Disk WinMark 97	791	817	832
	CD-ROM WinMark 97	727	735	764
	High End Disk Winmark 97	2390	2520	2590
	CD-ROM Playback 97	727	735	764
	CPUmark 16	262	293	326
	CPUmark 32	263	295	320
	Business Graphics WinMark 97	43.5	47.9	51.8
	High End Graphics WinMark 97	20.7	22.8	24.9

c) AMD-K5 Processor Performance

The chart below illustrates the Winstone 97 under Windows 95 performance processor benchmark with the PDA-2000 using different speed AMD-K5 processors. The board was configured with 256KB Pipeline Burst SRAM and 16MB EDO RAM X 2.

PDA-2000 Winstone 97 AMD-K5 Performance Comparison Chart



This table summarizes the processor benchmark performance of the PDA-2000 using different speed AMD-K5 processors. The board was configured with 256KB Pipeline Burst SRAM and 16MB EDO RAM X 2.

Benchmarks	**Weighted Suite**	**K5-PR100**	**K5-PR133**	**K5-PR166**
Winstone 97	Business Winstone 97	29.6	33.6	35.3
	High End Winstone 97	12.6	14.1	15.3
Winbench 97	Business Disk WinMark 97	779	808	834
	CD-ROM WinMark 97	703	732	711
	High End Disk Winmark 97	2240	2480	2470
	CD-ROM Playback 97	703	732	711
	CPUmark 16	185	240	271
	CPUmark 32	205	264	293
	Business Graphics WinMark 97	41.2	47.3	51.9
	High End Graphics WinMark 97	19.3	22.3	24.1

d) Intel Pentium with MMX (P55C) Processor Performance

The following table summarizes the Processor Benchmark Performance with the PDA-2000 using different speed Pentium with MMX (P55C) processors. The tests were conducted on a board featuring 256KB Pipeline Burst SRAM and 16MB EDO RAM X 2 Memory.

Benchmarks	**Weighted Suite**	**P55C-166MHz**	**P55C-200MHz**
Winstone 97	Business Winstone 97	38.2	40.3
	High End Winstone 97	16.5	17.9
Winbench 97	Business Disk WinMark 97	831	834
	CD-ROM WinMark 97	809	824
	High End Disk Winmark 97	2580	2610
	CD-ROM Playback 97	809	824
	CPUmark 16	343	390
	CPUmark 32	331	369
	Business Graphics WinMark 97	55.3	61.5
	High End Graphics WinMark 97	25.2	28

e) Pentium OverDrive Processor Performance

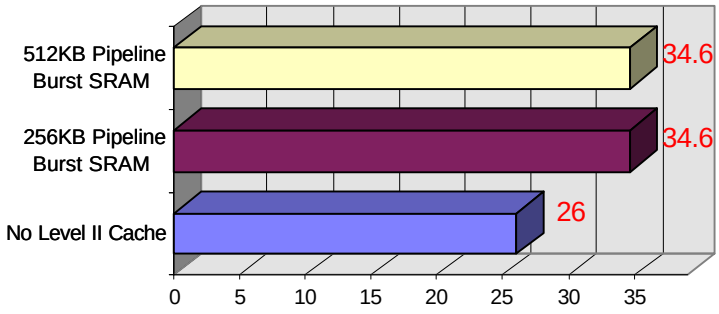
This table summarizes the processor benchmark performance of the PDA-2000 using different speed Pentium OverDrive processors. The board was configured with 256KB Pipeline Burst SRAM and 16MB EDO RAM X 2.

Benchmarks	**Weighted Suite**	**Pentium OverDrive-150MHz**	**Pentium OverDrive 166MHz**
Winstone 97	Business Winstone 97	35.8	38.3
	High End Winstone 97	15.2	16.6
Winbench 97	Business Disk WinMark 97	827	846
	CD-ROM WinMark 97	732	775
	High End Disk Winmark 97	2480	2580
	CD-ROM Playback 97	732	775
	CPUmark 16	315	351
	CPUmark 32	299	336
	Business Graphics WinMark 97	51.2	56.1
	High End Graphics WinMark 97	23	25.4

2.1 Cache Configurations

The PDA-2000 supports a direct-mapped cache system with date size ranging form 0 to 512KB. Ultra-fast Burst Pipeline Synchronous Data SRAMs are supported to deliver an added boost to performance The chart below shows the comparative Winstone 97 performance for the PDA-2000 using different Cache sizes: 512KB/256KB Pipeline Burst SRAM and no L2 Cache. The following table is based on a board featuring an Intel Pentium 166MHz processor with 16MB EDO RAM X 2.

PDA-2000 Winstone 97 Cache Performance Comparison Chart



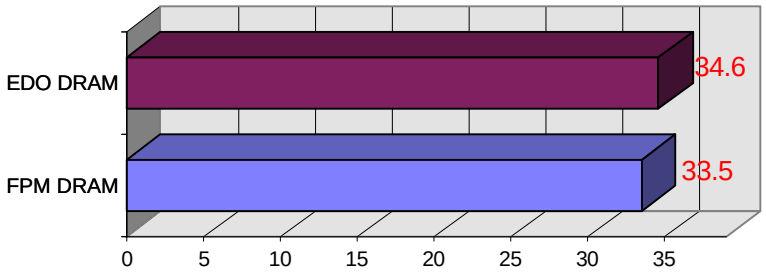
The table below provides more detailed information about the performance of the PDA-2000 using different cache sizes. The tests were conducted on a board featuring an Intel 166MHz Pentium processor with 16MB EDO RAM X 2.

Benchmarks	Weighted Suite	No L2	256KB	512KB
Winstone 97	Business Winstone 97	26	34.6	34.6
	High End Winstone 97	11.5	14.9	15
Winbench 97	Business Disk WinMark 97	712	796	805
	CD-ROM WinMark 97	745	815	734
	High End Disk Winmark 97	2080	2460	2240
	CD-ROM Playback 97	745	815	734
	CPUmark 16	238	306	321
	CPUmark 32	228	305	318
	Business Graphics WinMark 97	30.6	44.2	45.4
	High End Graphics WinMark 97	15	21	21.3

2.2 Memory Configurations

With its support for a complete range of FPM, EDO, the PDA-2000 provides system assemblers with multiple options for configuring their PCs to meet a full range of price/performance points. The chart below provides a comparison of the board's overall Winstone 97 performance using 32MB Main Memory. The tests were conducted on a board featuring an Intel 166MHz Pentium processor plus 256KB Pipeline Burst Cache.

PDA-2000 Winstone 97 Memory Performance Comparison Chart



The table below provides more detailed measurements of the performance of the PDA-2000 using the following different memory types: EDO, Fast Page Mode DRAM. The tests were conducted on a board featuring an Intel 166MHz Pentium processor, 32MB Main Memory, and 256KB Pipeline Burst Cache.

Benchmarks	Weighted Suite	Fast Page	EDO
Winstone 97	Business Winstone 97	33.5	34.6
	High End Winstone 97	14.4	14.9
Winbench 97	Business Disk WinMark 97	799	796
	CD-ROM WinMark 97	754	815
	High End Disk Winmark 97	2450	2460
	CD-ROM Playback 97	754	815
	CPUmark 16	301	306
	CPUmark 32	288	305
	Business Graphics WinMark 97	43.6	44.2
	High End Graphics WinMark 97	20.3	21

This table measures the performance of the PDA-2000 using different memory sizes of 32MB, 64MB. The tests were done on a board featuring an Intel 166MHz Pentium processor, 256KB Pipeline Burst Cache and EDO DRAM.

Benchmarks	**Weighted Suite**	**32MB**	**64MB**
Winstone 97	Business Winstone 97	34.6	34.7
	High End Winstone 97	14.9	16
Winbench 97	Business Disk WinMark 97	796	837
	CD-ROM WinMark 97	815	736
	High End Disk Winmark 97	2460	2670
	CD-ROM Playback 97	815	736
	CPUmark 16	306	314
	CPUmark 32	305	308
	Business Graphics WinMark 97	44.2	46.1
	High End Graphics WinMark 97	21	21.5