Pentium® Processor with MMX™ Technology at 233MHz Performance Brief

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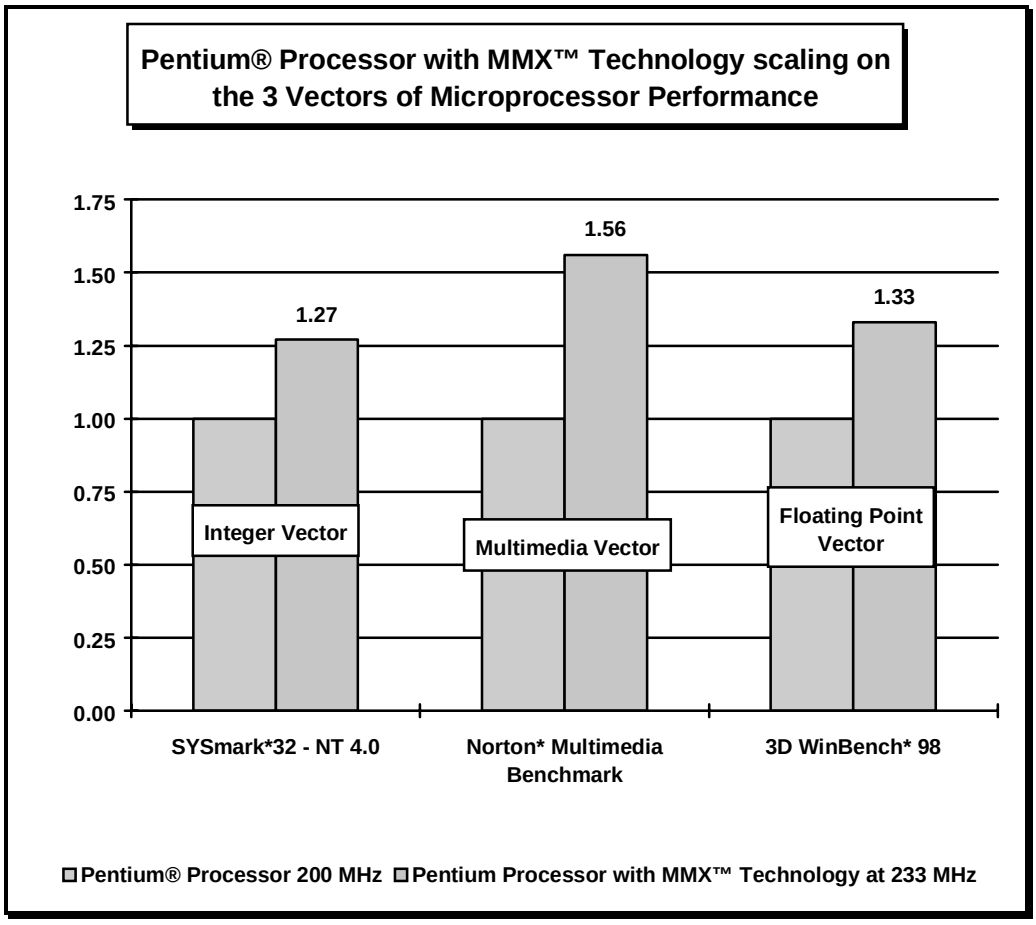
EXECUTIVE SUMMARY - INTEL PENTIUM® PROCESSOR WITH MMX™ TECHNOLOGY

The Intel Pentium® processor delivers excellent performance for all PC software. It is fully compatible with the huge base of PC software. Additionally, the Pentium processor with MMX™ technology enables new levels of multimedia and communications performance, delivering more realistic graphics and the ability to run full-screen, full-motion video.

Note that the microprocessor and the PC of today are designed to run a broad range of powerful software applications. Integer, multimedia (such as video and sound usage) and floating-point (such as 3D geometry calculations) performance comprise three vectors of performance that should be considered when evaluating systems. Specifically, benchmarks designed for evaluating these vectors should be used to look at the complete performance of the processor or the system.

The graph below highlights Pentium processor with MMX technology at 233MHz performance, compared to the Pentium processor at 200MHz, on popular and industry standard benchmarks that demonstrate the three vectors of performance mentioned above.



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INTRODUCTION

The Intel Pentium® processor family provides excellent performance for all PC software. The Pentium processor with MMX™ technology enables new levels of multimedia and communications performance and is the highest performing Pentium processor. The Pentium processor desktop family consists of the following products:

- Pentium® processor with MMX™ technology at 233 MHz
- Pentium processor with MMX technology at 200MHz
- Pentium processor with MMX technology at 166 MHz
- Pentium processor at 200 MHz
- Pentium processor at 166 MHz
- Pentium processor at 150 MHz
- Pentium processor at 133 MHz
- Pentium processor at 120 MHz
- Pentium processor at 100 MHz
- Pentium processor at 90 MHz
- Pentium processor at 75 MHz
- Pentium processor at 66 MHz
- Pentium processor at 60 MHz

When evaluating the performance of a microprocessor, it is important to get a complete picture of how it executes various tasks. The increasing use of 3D and multimedia content in software today is placing new demands on the microprocessor. Typical productivity applications, such as word processing, presentation applications or personal finance programs, require the processor to have good integer performance. Applications such as video playback, 3D games and PC imaging stress the multimedia and floating-point capabilities of the processor and the system. For the best all round computation, a system should deliver high performance in all three of these areas: integer, multimedia, and floating point.

This report provides benchmarks results covering these three vectors of performance on Intel Pentium processor with MMX technology systems. Details of the system configurations used in all the benchmarks throughout this brief are described in Appendix A.

Modern industry standard benchmarks were chosen to accurately demonstrate the excellent performance of the Intel Pentium processor with MMX technology for all three vectors of performance. Integer performance is covered by compute-intensive benchmarks such as SPECint*95 and several 32-bit Windows*95 benchmarks as well as more system oriented benchmarks like BAPCo's SYSmark*32 test. Multimedia performance can be compared with the Norton* Multimedia Benchmark. Floating-point prowess can be seen with the compute intensive SPECfp*95 or the newest 3D benchmark from Ziff-Davis*, the 3D Winbench*98. Intel is committed to using the most robust and relevant benchmarks in characterizing its products' performance and, over time, Intel will adapt this mix as newer benchmarks appear.

Robust benchmark programs should be derived from how actual applications will execute. However, performance is often the result of combined characteristics of a given computer architecture and many other tightly coupled system software/hardware constituents in addition to the microprocessor. Operating system, compilers, libraries, memory design and I/O subsystem characteristics may significantly impact the results and make comparisons difficult. This report is intended to show Intel Pentium processor performance on a consistent set of benchmarks.

THE INTEL PENTIUM® PROCESSOR WITH MMX™ TECHNOLOGY

The Intel Pentium processor delivers excellent performance for all PC software. It is fully compatible with the huge base of PC software. Additionally, the Pentium processor with MMX technology enables new levels of multimedia and communications. High speed Pentium processors have immediate responsiveness for the latest, most demanding software with powerful realistic graphics and the ability to run full-screen, full-motion video.

The Pentium processor with MMX technology may contain design defects or errors known as errata. Current characterized errata are available upon request.

PENTIUM® PROCESSOR WITH MMX™ TECHNOLOGY PRODUCT FEATURE HIGHLIGHTS

The Pentium processor with MMX technology is fully compatible with an entire library of PC software based on operating systems such as MS-DOS*, Windows* 3.1, Windows* for Workgroups 3.11, Windows* 95, OS/2*, UnixWare*, SCO UNIX*, Windows* NT, OPENSTEP*, and Sun Solaris*. Architectural features of the Pentium processor with MMX technology include:

- High Performance Intel MMX™ Media Enhancement Technology:
    - Intel's MMX™ technology is a major enhancement to the Intel Architecture which makes PCs richer multimedia and communications platforms. This technology introduces 57 instructions oriented to highly parallel operations with multimedia and communications data types. These instructions use a technique known as SIMD (Single Instruction, Multiple Data) to deliver better performance for multimedia and communications computation. Intel processors that provide MMX technology support are fully compatible with previous generations of the Intel Architecture and the installed base of software.
    - To further improve performance, the Pentium® processor with MMX™ Technology can execute 2 Intel MMX instructions at a time.
- 32 KB Level One Cache
- Pin Compatible with previous Pentium® processors except for the processor core being supplied at a lower voltage than other Pentium processors.
- Improved Branch Prediction
- Superscalar Architecture
- Improved instruction decoder
- Floating-Point Unit
- 64-bit Data Bus
- Separate Code and Data Caches with MESI Protocol
- Performance Monitoring and Execution Tracing

iCOMP® INDEX 2.0

The iCOMP® index provides a simple relative measure of microprocessor performance. It is not a benchmark, but a collection of benchmarks used to calculate an index of relative processor performance intended to help end users decide which Intel microprocessor best meets their computing needs. iCOMP Index 2.0 comprehends:

1. The accelerating transistion to 32-bit operating systems and applications on the desktop.
2. The proliferation of multimedia, communications, and 3D applications.
3. Updated industry-standard benchmarks appropriate for emerging popular application profiles.

The iCOMP Index 2.0 ratings cannot be compared with the earlier version of iCOMP because a different base processor and different benchmarks were used for calculation of the rating.

The iCOMP Index 2.0 rating is based on the technical categories that encompass three separate aspects of 32-bit CPU performance: integer, floating-point, and multimedia. The multimedia portion is further divided into four sub-components: Audio, Imaging, Video, and 3-D. The higher the iCOMP rating, the higher the relative performance of the microprocessor.

Figure 1 illustrates the iCOMP Index 2.0 ratings for several Intel microprocessors. System configurations used in iCOMP Index 2.0 measurements are listed in Appendix B.

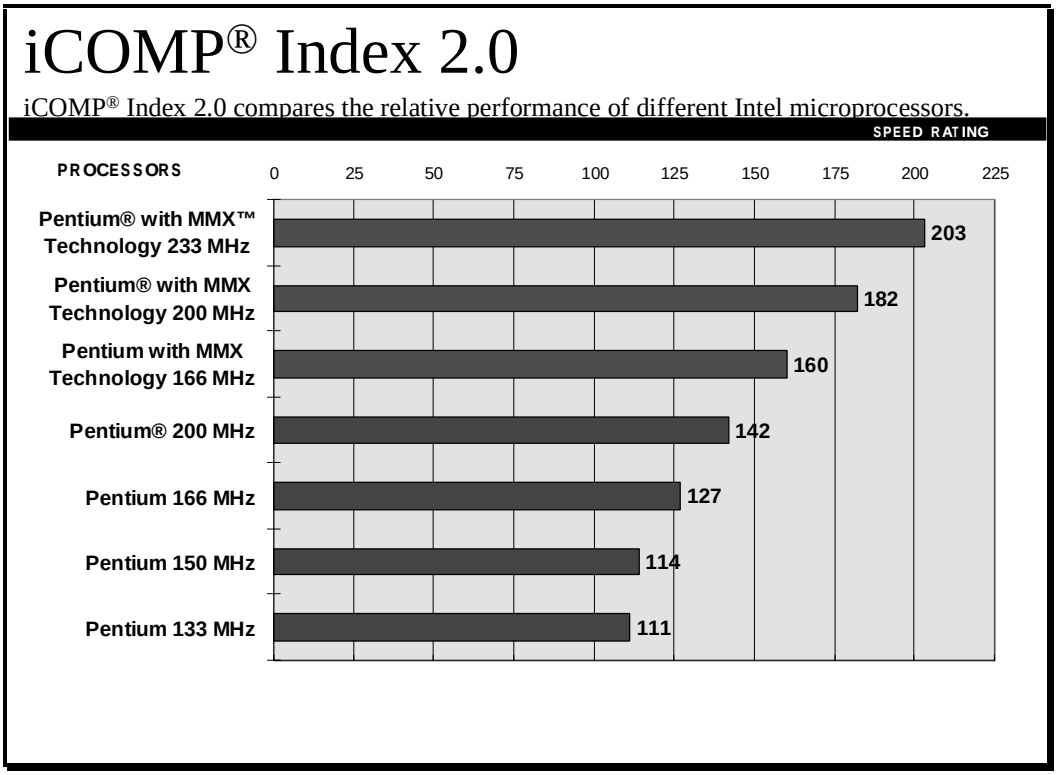

Figure 1. iCOMP® Index 2.0 Ratings for Intel Processors (System configuration for iCOMP Index 2.0 components is given in Appendix B).

iCOMP® Index 2.0 reflects 32-bit applications and benchmarks. It combines 5 benchmarks: CPUmark*32, Norton* SI-32, SPECint_base*95, SPECfp_base*95, and Intel Media Benchmark. Each processor's rating is calculated on a desktop system at the time the processor is introduced. Performance on mobile systems will vary, and other differences in hardware and software configuration, including MMX technology enabled software, will also affect actual performance. Ratings for processors introduced before iCOMP Index 2.0, were calculated upon version 2.0's release. For more information about iCOMP Index 2.0, including a description of the systems used to calculate ratings, contact Intel at 1-800-628-8686 or visit http://www.intel.com

3 VECTORS OF MICROPROCESSOR PERFORMANCE

The microprocessor and the PC of today are designed to run a broad range of powerful software applications. Not every processor is equally capable of the same performance for each type of application. Benchmarks specifically designed for evaluating the performance of processors and systems running integer-, multimedia-, and floating-point-intensive applications should be used to look at the complete performance of the processor or the system.

Integer Benchmarks

Typical productivity applications such as word processing, spreadsheets, presentation applications, and personal finance programs, to name a few, depend on integer performance. Popular, industry integer benchmarks include:

Processor Level Benchmarks:

- SPECint*95
- CPUmark*32
- Norton SI*32

System Level Benchmarks:

- SYSmark*32
- SYSmark*NT

Multimedia Benchmarks

Traditional benchmark tools were not designed to measure the performance of systems running today's applications rich in graphics, audio and video attributes. Multimedia benchmarks are designed specifically to simulate the activities of end users utilizing video, such as MPEG1* and MPEG2*, Dolby* Digital Sound, AVI, PC Imaging or Video Conferencing, and other similar media-rich applications. Some of the benchmarks that fall under this category are:

- Intel Media Benchmark
- Norton* Multimedia Benchmark from Norton Utilities for Windows*95 Version 3.0

Floating-Point Benchmarks

Applications which use three-dimensional visualization techniques, such as games, are increasingly employing floating-point performance to support richer textures and enhanced lighting effects. Floating-point performance is also a critical factor for workstation applications such as Computer Aided Design (CAD). Benchmarks that measure floating point performance include:

- SPECfp*95
- 3D graphics portion of the Norton* Multimedia Benchmark
- 3D Winbench* 98

MICROPROCESSOR PERFORMANCE SUMMARY

Integer Benchmarks

Processor Level Benchmarks

SPEC CPU*95 - SPECint*95

SPEC CPU*95 is a software benchmark product which can be run on Windows NT and many varieties of UNIX. SPEC CPU95 is produced by the Standard Performance Evaluation Corp. (SPEC), a non-profit group of computer vendors, system integrators, universities, research organizations, publishers, and consultants throughout the world. It was designed to provide measures of performance for comparing compute-intensive workloads on different computer systems. SPEC CPU95 consists of two suites of benchmarks: CINT*95 for measuring and comparing compute-intensive integer performance, and CFP*95 for measuring and comparing compute-intensive floating-point performance. The two suites provide component-level benchmarks that measure the performance of the computer's processor, memory architecture and compiler. SPEC benchmarks are selected from existing application and benchmark source code running across multiple platforms.

More information on SPEC CPU95 can be found at the website http://www.specbench.org. The CINT95 suite, written in the C programming language, contains eight CPU-intensive integer benchmarks. It is used to measure and calculate the following metrics:

- SPECint*95 -- The geometric mean of eight normalized ratios (one for each integer benchmark) when compiled with aggressive optimization for each benchmark.
- SPECint_base*95 -- The geometric mean of eight normalized ratios when compiled with the conservative optimization for each benchmark.

For information on SPECfp*95, please refer to the Floating-Point Benchmark section of this document.

Figure 2 shows the SPECint*95 performance on UNIX*. See Appendix A for configuration details.

Figure 3 shows the SPECint*95 performance on Windows* NT 4.0. See Appendix A for configuration details.

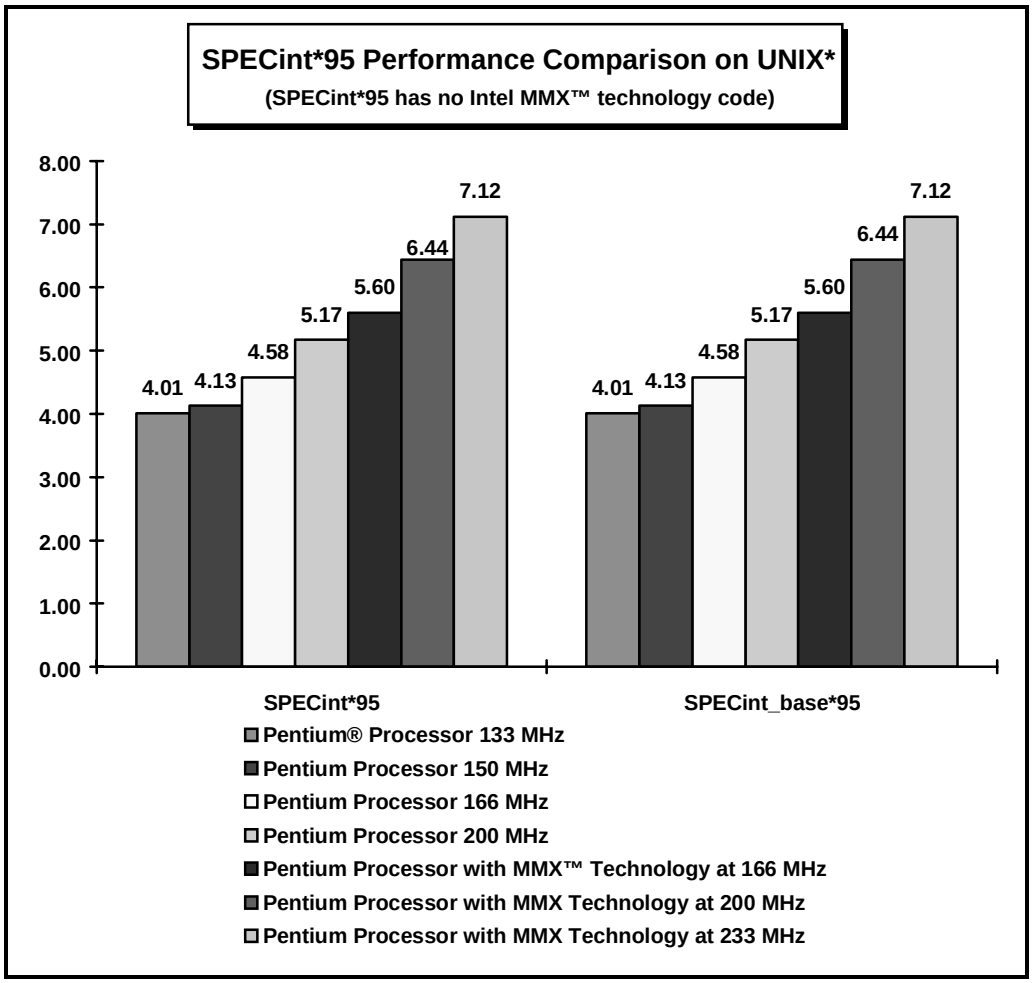

Figure 2. Intel Pentium® Processor Performance for the SPECint* 95 Benchmark on UNIX*.

The SPECint*95 benchmark test reflects the performance of the microprocessor, memory architecture and compiler of a computer system on compute-intensive, 32-bit applications. SPEC benchmark tests results for Intel microprocessors are determined using particular, well-configured systems. These results may or may not reflect the relative performance of Intel microprocessor in systems with different hardware or software designs or configurations (including compilers). Buyers should consult other sources of information, including system benchmarks, to evaluate the performance of systems they are considering purchasing. For more information about SPEC95, including a description of the systems used to obtain these test result, and other information about microprocessor and system performance and benchmarks, visit Intel's World Wide Web site at www.intel.com or call 1-800-628-8686.

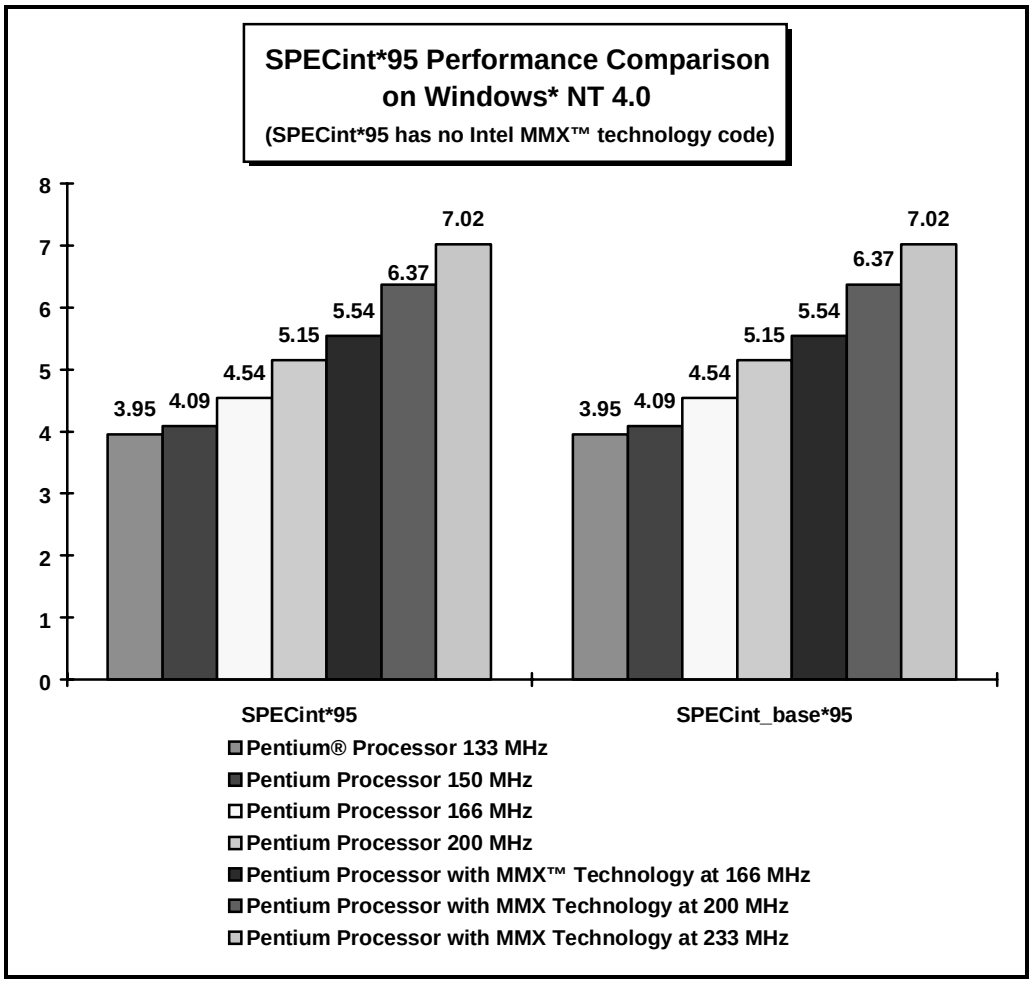

Figure 3. Intel Pentium® Processor Performance for the SPECint*95 Benchmark on Windows NT* 4.0.

The SPECint*95 benchmark test reflects the performance of the microprocessor, memory architecture, and compiler of a computer system on compute-intensive, 32-bit applications. SPEC benchmark tests results for Intel microprocessors are determined using particular, well-configured systems. These results may or may not reflect the relative performance of Intel microprocessor in systems with different hardware or software designs or configurations (including compilers). Buyers should consult other sources of information, including system benchmarks, to evaluate the performance of systems they are considering purchasing. For more information about SPEC95, including a description of the systems used to obtain these test result, and other information about microprocessor and system performance and benchmarks, visit Intel's World Wide Web site at www.intel.com or call 1-800-628-8686.

CPUmark*32

CPUmark*32 is a 32-bit Windows processor benchmark provided by Ziff-Davis Labs. It is designed to compare the performance potential for running 32-bit applications.

Figure 4 illustrates the Intel Pentium processor performance when executing this popular 32-bit benchmark.

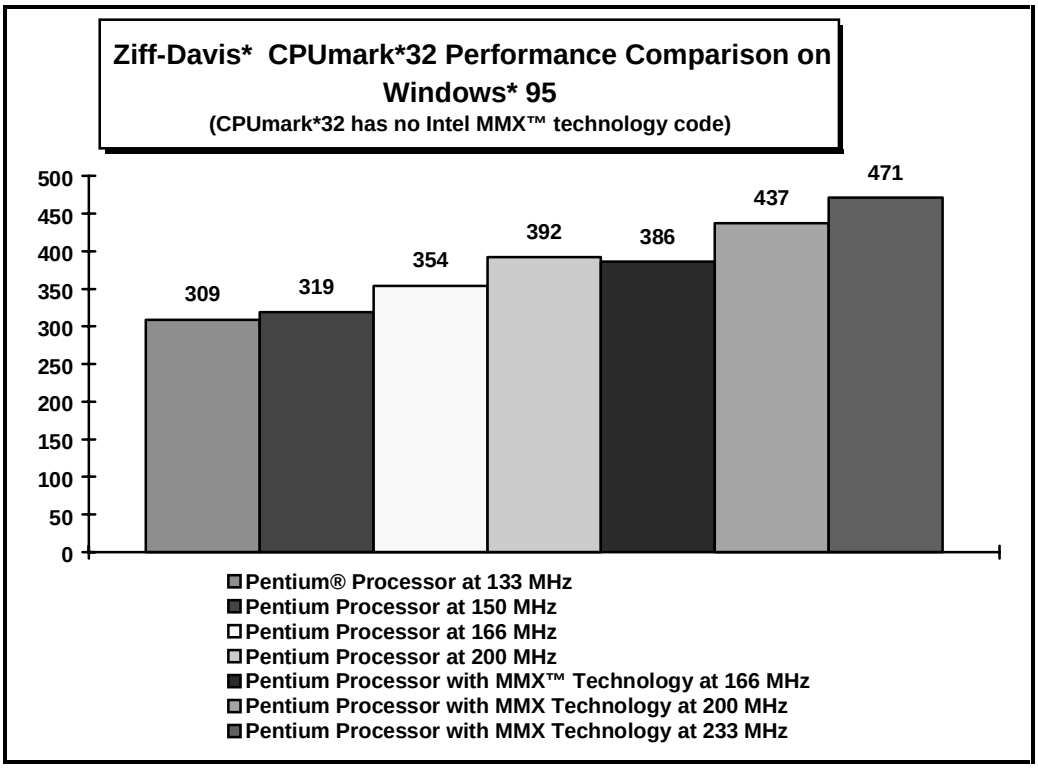

Figure 4. Intel Pentium® Processor Performance for the Ziff-Davis* CPUmark*32 Benchmark

Norton SI*32

Norton SI*32, a part of the System Information module of Norton Utilities* for Windows 95 Version 3.0, is a 32-bit Windows 95 benchmark designed to show the speed of a system (CPU, L2 cache, and memory), compared to the speed of other systems for running common 32-bit applications.

Figure 5 illustrates the Intel Pentium processor performance when executing this popular 32-bit benchmark.

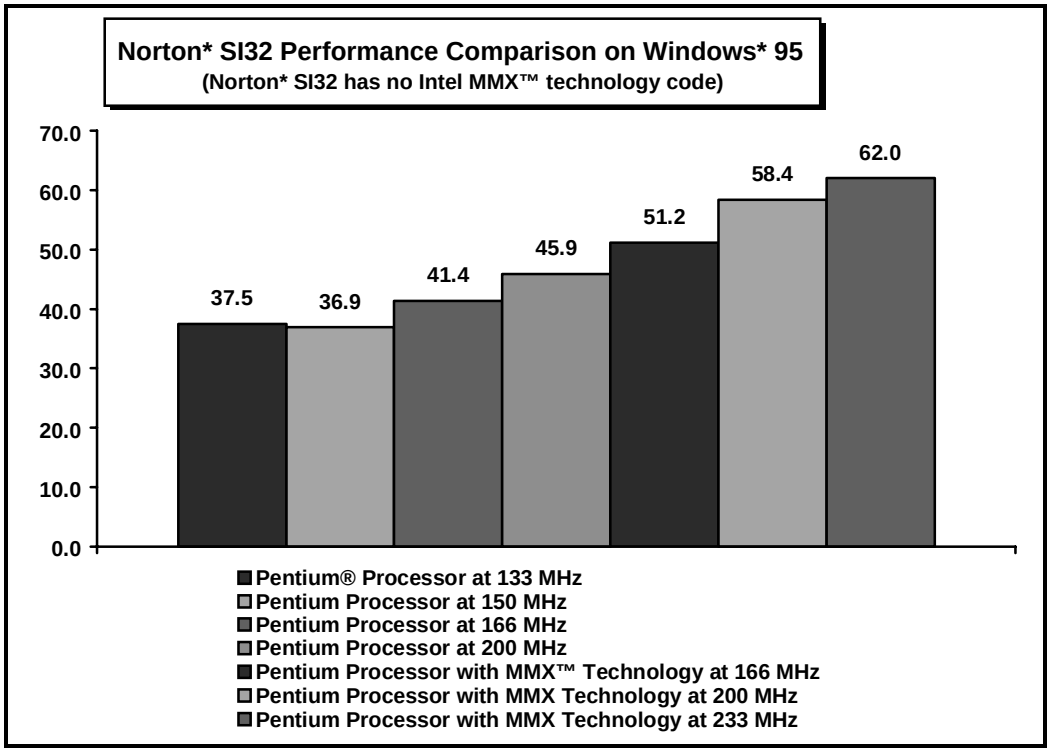

Figure 5. Intel Pentium® Processor Performance for the Norton* SI32 Benchmark

System Level Benchmarks

To measure realistic application performance, SYSmark*32 for Windows* 95, and Windows NT* 4.0 and SYSmark* for Windows NT* 4.0 (32-bit applications), were chosen to gauge the performance of Intel Pentium processor-based systems.

SYSmark*32 For Windows* 95 And Windows NT* 4.0

SYSmark*32 for Windows* 95 and Windows NT* 4.0 is a suite of application software and associated benchmark scripts that have been developed by the Business Applications Performance Corporation (BAPCo), a non-profit consortium of PC OEMs, software vendors, semiconductor manufacturers, and industry publications. SYSmark32 is intended to provide a tool for accurate and realistic measurement of personal computer performance running popular business-oriented applications in the Microsoft Windows operating environment. The scripts are developed to reflect usage patterns of PC users in a business-oriented environment.

SYSmark32 includes 32-bit benchmark scripts for the following applications selected from six categories of application software:

- Word-processing — Microsoft Word* 7.0 and Lotus WordPro* 96.
- Spreadsheet — Microsoft Excel* 7.0.
- Database — Borland Paradox*.
- Desktop Graphics — Corel CorelDraw* 6.0.
- Desktop Presentation — Microsoft PowerPoint* 7.0 and Lotus Freelance* 96.
- Desktop Publishing — Adobe Pagemaker* 6.0.

Figure 6 and 7 illustrate the SYSmark32 ratings under Windows 95 and Windows NT 4.0 respectively for the Intel Pentium processors.

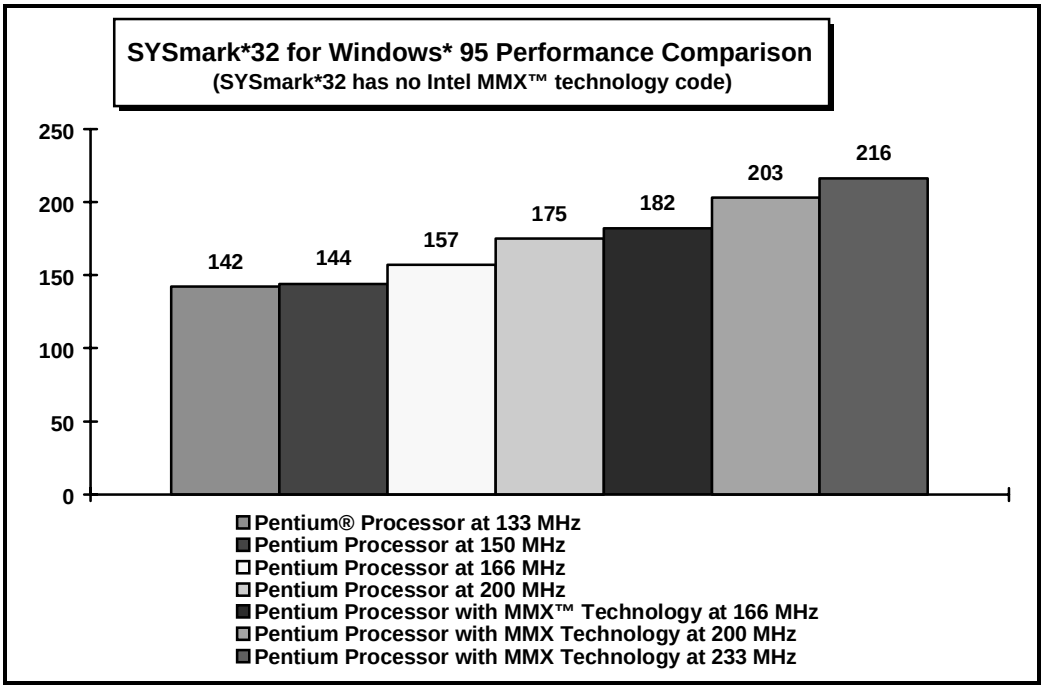

Figure 6. Intel Pentium® Processor Performance for SYSmark*32 on Windows* 95

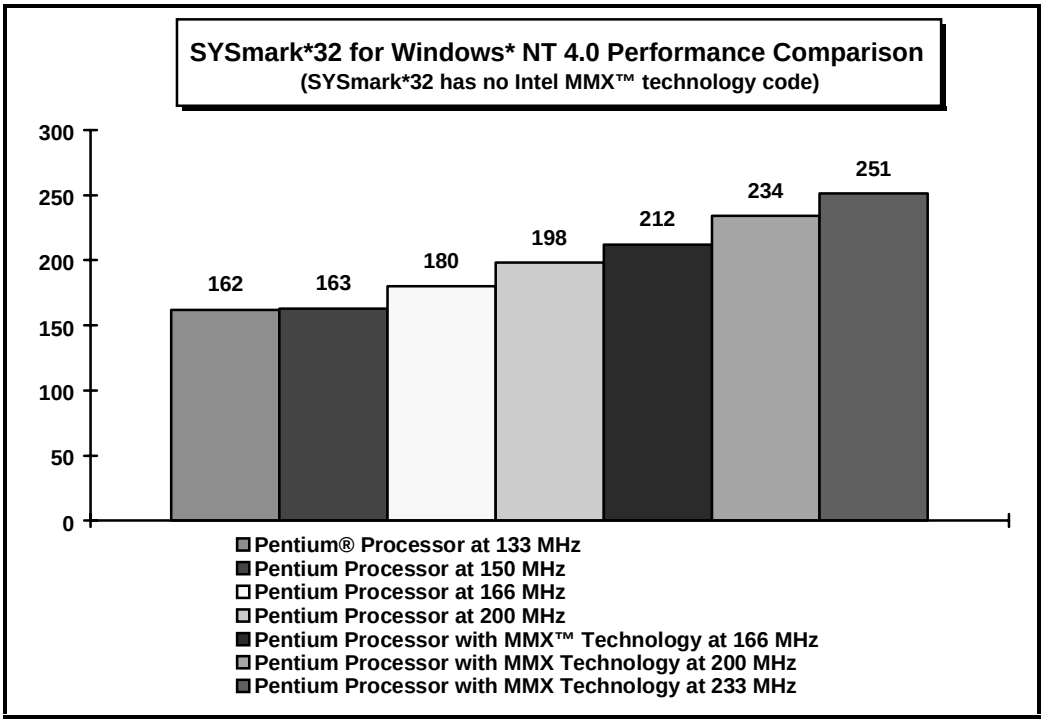

Figure 7. Intel Pentium® Processor Performance for SYSmark*32 on Windows* NT 4.0

SYSmark* For Windows* NT Version 4.0

SYSmark* For Windows NT version 4.0 was developed to provide a benchmark that could be run on all platforms which support Windows NT. Workloads for SYSmark for Windows NT 4.0 were developed based on BAPCo's standardized practice of surveying users to determine how they exercise popular applications in day-to-day work. The following applications are included in SYSmark for Windows NT Version 4.0:

- Word-processing — MS Word* 6.0 (native 32-bit on all architectures)
- Spreadsheet — MS Excel* 5.0 (native 32-bit on all architectures)
- Project Management — Welcom Software Technology Texim Project 2.0e* (native 32-bit on all architectures)
- Computer-Aided Design — Orcad Layout for Windows 7.0* (PCB design tool) (native 32-bit on all architectures)
- Presentation Graphics — MS PowerPoint* 4.0 (16-bit Windows emulation)

Figure 8 includes the SYSmark* NT Version 4.0 rating for Pentium processors.

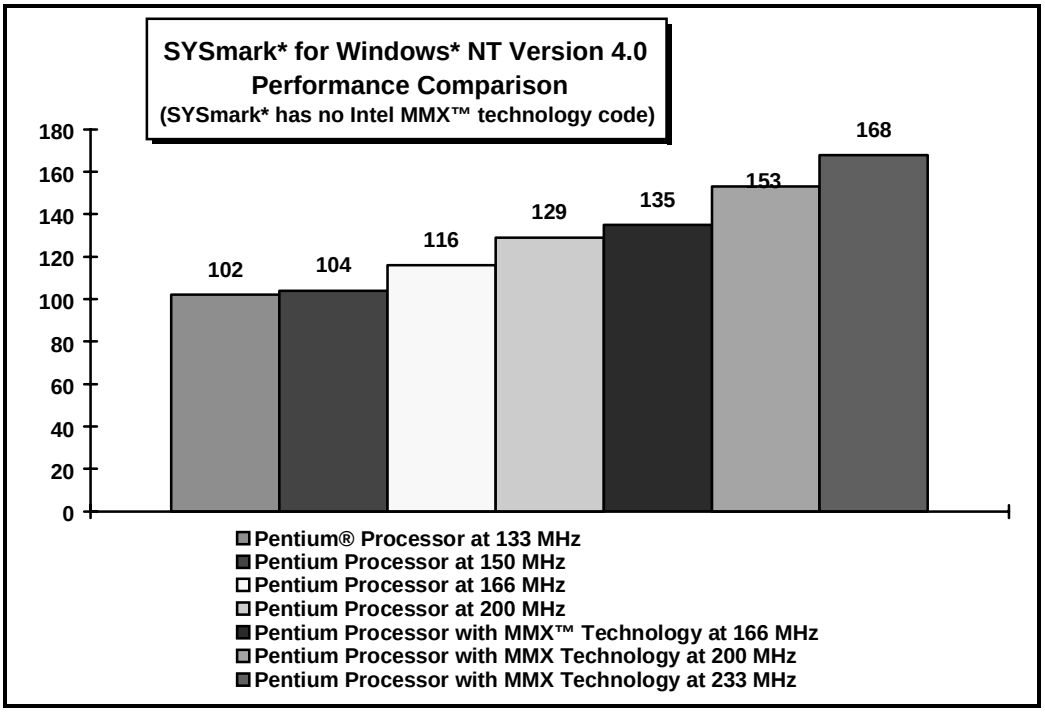

Figure 8. Intel Pentium® Processor Performance for SYSmark* for Windows* NT 4.0

MultiMedia Benchmarks

Intel Media Benchmark

Multimedia applications are proliferating rapidly. The Intel Media Benchmark measures the performance of processors running algorithms found in multimedia uses. It incorporates audio and video playback, image processing, wave sample rate conversion, and 3D geometry.

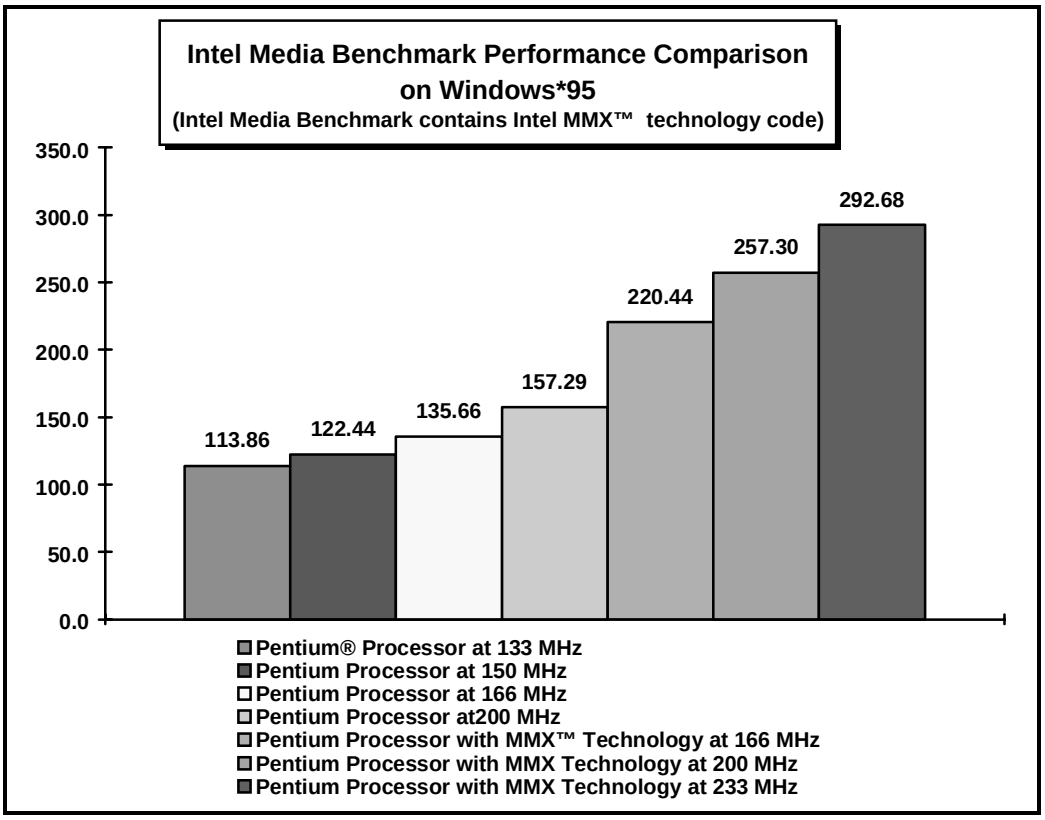

Figure 9. Intel Pentium® Processor Performance for the Intel Media Benchmark

Norton Multimedia Benchmark

The Norton Multimedia Benchmark, a part of the System Information module of Norton* Utilities for Windows* 95 Version 3.0, tests a system's multimedia capabilities and compares the performance to that of a system conforming to the basic Multimedia PC (MPC) Level 2 specification. The benchmark reports performance in five multimedia areas:

- Video - benchmarks video performance. It measures MPEG video decompression and AVI video frame rates.
- 3D - tests rendering capabilities.
- Audio - measures audio mixing and MPEG audio performance.
- CD-ROM - measures the CD-ROM drive's maximum seek and transfer rates.
- Imaging - tests image processing manipulations.

The Norton* Multimedia Benchmark overall score shows a system's overall multimedia performance rating compared to a standard MPC2* system.

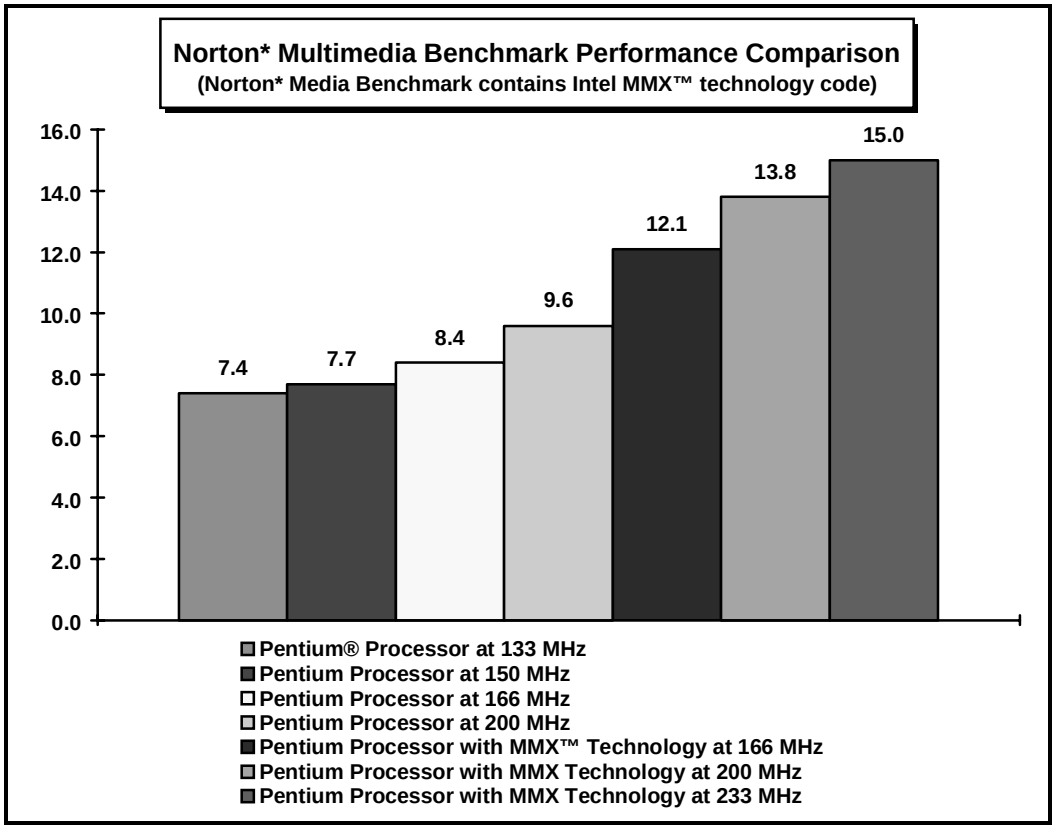

Figure 10. Intel Pentium® Processor Performance for the Norton* Multimedia Benchmark (See Table 3 for individual component scores from the benchmark)

Floating-Point Benchmarks

SPEC CPU*95 - SPECfp*95

SPEC CPU*95 is a software benchmark product which can be run on Windows NT and many varieties of UNIX*. SPEC CPU95 is produced by the Standard Performance Evaluation Corp. (SPEC), a non-profit group of computer vendors, system integrators, universities, research organizations, publishers and consultants throughout the world. It was designed to provide measures of performance for comparing compute-intensive workloads on different computer systems.

The CFP*95 suite, written in the FORTRAN* programming language, contains ten CPU-intensive floating-point benchmarks. It is used to measure and calculate the following metrics:

- SPECfp*95 -- The geometric mean of 10 normalized ratios (one for each floating-point benchmark) when compiled with aggressive optimization for each benchmark.
- SPECfp_base*95 -- The geometric mean of 10 normalized ratios when compiled with conservative optimization for each benchmark.

For information on SPECint*95, please refer to the Integer Benchmark section of this document.

Figure 11 shows SPECfp*95 performance on UNIX. See Appendix A for configuration details.

Figure 12 shows the SPECfp95 performance on Windows NT 4.0. See Appendix A for configuration details.

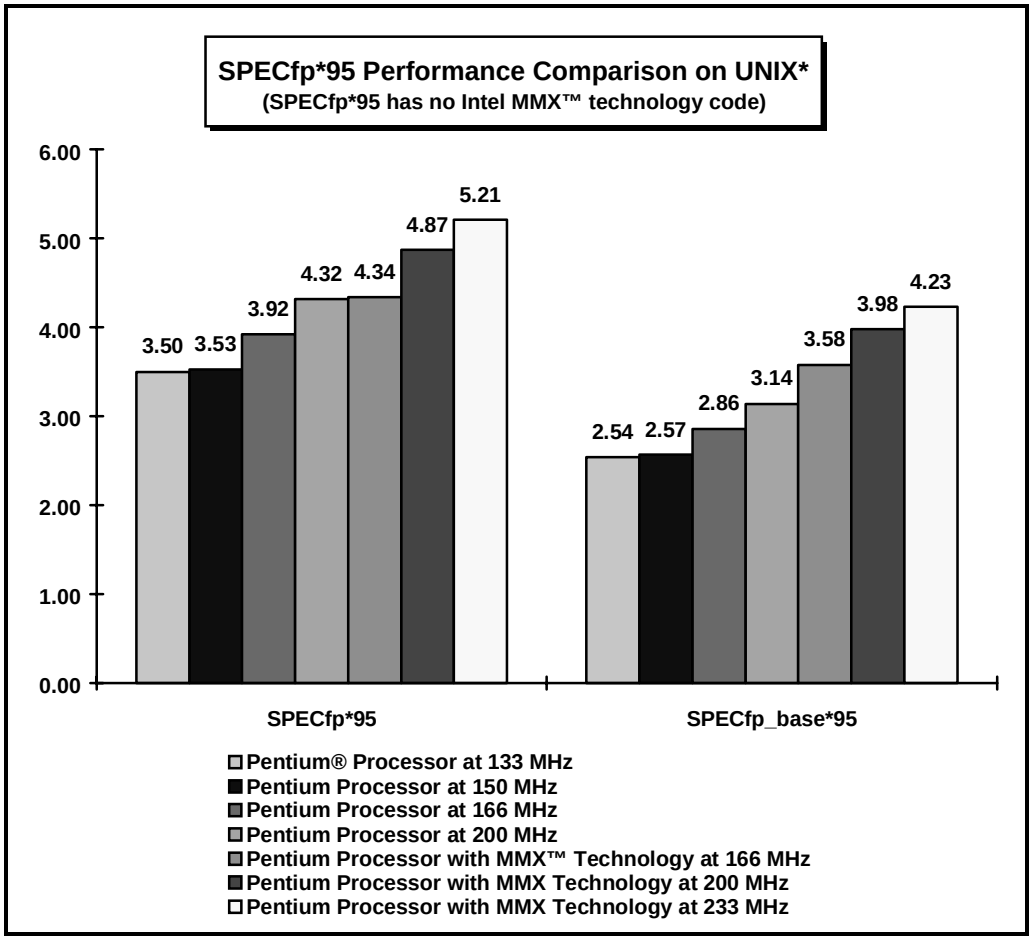

Figure 11. Intel Pentium® Processor Performance for the SPECfp*95 Benchmark on UNIX*.

The SPECfp*95 benchmark test reflects the performance of the microprocessor, memory architecture and compiler of a computer system on compute-intensive, 32-bit applications. SPEC benchmark tests results for Intel microprocessors are determined using particular, well-configured systems. These results may or may not reflect the relative performance of Intel microprocessor in systems with different hardware or software designs or configurations (including compilers). Buyers should consult other sources of information, including system benchmarks, to evaluate the performance of systems they are considering purchasing. For more information about SPEC*95, including a description of the systems used to obtain these test result, and other information about microprocessor and system performance and benchmarks, visit Intel's World Wide Web site at www.intel.com or call 1-800-628-8686.

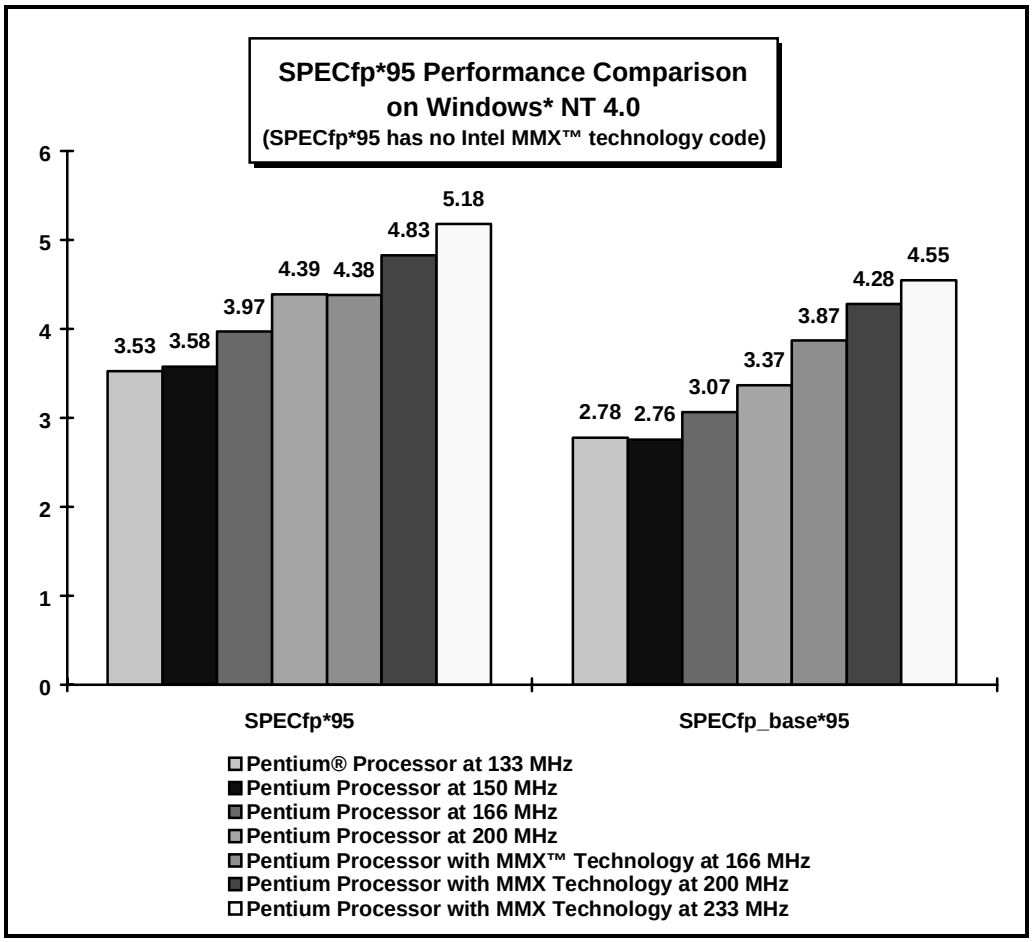

Figure 12. Intel Pentium® Processor Performance for the SPECfp*95 Benchmark on Windows* NT 4.0.

The SPECfp*95 benchmark test reflects the performance of the microprocessor, memory architecture and compiler of a computer system on compute-intensive, 32-bit applications. SPEC benchmark tests results for Intel microprocessors are determined using particular, well-configured systems. These results may or may not reflect the relative performance of Intel microprocessor in systems with different hardware or software designs or configurations (including compilers). Buyers should consult other sources of information, including system benchmarks, to evaluate the performance of systems they are considering purchasing. For more information about SPEC*95, including a description of the systems used to obtain these test result, and other information about microprocessor and system performance and benchmarks, visit Intel's World Wide Web site at www.intel.com or call 1-800-628-8686.

Norton Multimedia Benchmark – 3D Graphics

The Norton* Multimedia Benchmark, a part of the System Information module of Norton Utilities for Windows 95 Version 3.0, tests a system's multimedia capabilities and compares the performance to that of a system conforming to the basic Multimedia PC (MPC) Level 2 specification. The 3D Graphics portion of Norton Multimedia Benchmark uses floating-point operations in its execution.

Figure 13 shows 3D Graphics performance.

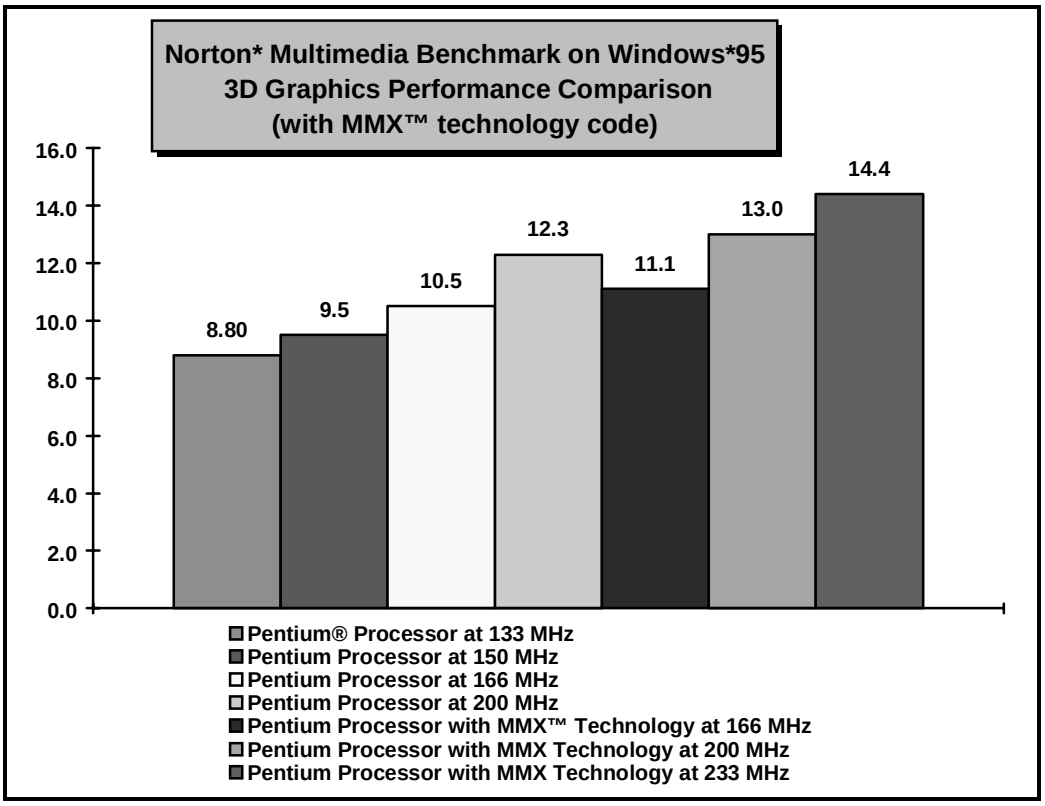

Figure 13. Intel Pentium® Processor Performance for the Norton* Multimedia Benchmark – 3D Graphics.

3D WinBench*98

3D WinBench* 98, from Ziff-Davis*, measures the 3D performance of a computer system (including the microprocessor and the graphics card) using Microsoft's Direct3D* interface under Windows* 95. It includes a series of 19 tests that vary in complexity - the number of triangles they use to form their objects - and the number of quality-enhancing options (such as fog, specular highlights, bilinear filtering and "mip-mapping", antialiasing) they employ and the amount of texture they use. The processing includes 3D geometry calculations, which are floating-point intensive, and rasterization. Each test flies through a scene using a predefined path and measures the rendering speed in frames per second. This suite returns an overall, unitless 3D WinMark* result summarizing the computer's performance on all tests.

Hardware acceleration is used when all quality-enhancing options for the given test are supported by the underlying hardware. Otherwise, software rasterization using MMX technology is employed if Microsoft's Direct3D software rasterizer supports all the options for the test. If neither the graphics card nor the software rasterizer supports all the options, a score zero is granted.

The tests below have been run using the STB Velocity 128 PCI card.

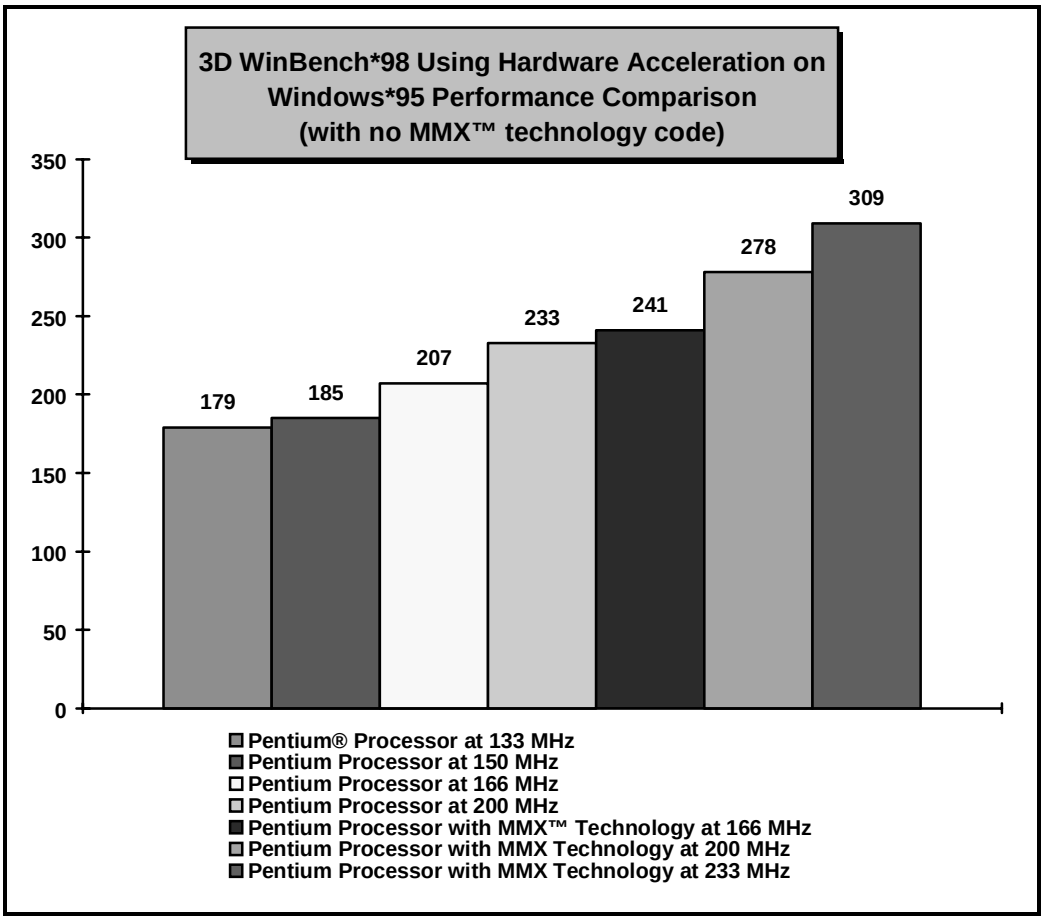

Figure 14. Intel Pentium® Processor Performance for 3D WinBench*98 (using hardware acceleration).

SUMMARY

Table 1 summarizes the iCOMP® Index 2.0 performance of processors representative of the Intel processor families.

Table 1. iCOMP Index 2.0 Results

	Pentium® Processor 133 MHz	Pentium® Processor 150 MHz	Pentium® Processor 166 MHz	Pentium® Processor 200 MHz	Pentium® Processor with MMX™ Technology 166 MHz	Pentium® Processor with MMX™ Technology 200 MHz	Pentium® Processor with MMX™ Technology 233 MHz
iCOMP® Index 2.0 Rating	**111**	**114**	**127**	**142**	**160**	**182**	**203**

Tables 2a and 2b summarize the performance of benchmarks for the Integer Benchmark vector, both processor level and system level, for processors representative of the Intel processor families. (The higher the number, the better the performance).

Table 2a. Three Vectors of Performance Benchmark Results – Integer Benchmarks

Processor Benchmarks	Pentium® Processor 133 MHz	Pentium® Processor 150 MHz	Pentium® Processor 166 MHz	Pentium® Processor 200 MHz	Pentium® Processor with MMX™ Technology 166 MHz	Pentium® Processor with MMX™ Technology 200 MHz	Pentium® Processor with MMX™ Technology 233 MHz
INTEGER BENCHMARKS							
Processor Level Benchmarks							
SPEC CPU95*/UNIX*							
SPECint*95	**4.01**	**4.13**	**4.58**	**5.17**	**5.60**	**6.44**	**7.12**
SPECint_base*95	4.01	4.13	4.58	5.17	5.60	6.44	7.12
SPEC CPU*95 Windows* NT 4.0							
SPECint*95	**3.95**	**4.09**	**4.54**	**5.15**	**5.54**	**6.37**	**7.02**
SPECint_base*95	3.95	4.09	4.54	5.15	5.54	6.37	7.02
Windows* 95							
Ziff-Davis* CPUmark*							
CPUmark*32	**309**	**319**	**354**	**392**	**386**	**437**	**471**
Norton* System Index - Norton Utilities for Windows* 95 Version 3.0							
Norton* SI32	**37.5**	**36.9**	**41.4**	**45.9**	**51.2**	**58.4**	**62.0**

Table 2b. Three Vectors of Performance Benchmark Results – Integer Benchmarks

System Benchmarks	Pentium® Processor 133 MHz	Pentium® Processor 150 MHz	Pentium® Processor 166 MHz	Pentium® Processor 200 MHz	Pentium® Processor with MMX™ Technology 166 MHz	Pentium® Processor with MMX™ Technology 200 MHz	Pentium® Processor with MMX™ Technology 233 MHz
INTEGER BENCHMARKS							
System Level Benchmarks							
SYSmark*32/ Windows* 95	**142**	**144**	**157**	**175**	**182**	**203**	**216**
Publishing	138	142	153	169	177	197	210
Graphics	150	155	166	189	193	219	236
Presentation	143	146	160	180	184	206	222
Word Processing	145	146	160	175	185	204	216
Spreadsheet	134	137	149	167	173	195	209
Database	149	148	162	176	186	206	217
SYSmark*32/ Windows* NT 4.0	**162**	**163**	**180**	**198**	**212**	**234**	**251**
Publishing	193	197	214	235	250	273	290
Graphics	179	181	200	223	234	264	281
Presentation	181	185	205	226	236	265	285
Word Processing	174	173	192	209	233	256	279
Spreadsheet	131	132	145	161	169	187	199
Database	168	167	182	196	212	232	243
SYSmark*/NT/ Windows* NT 4.0	**102**	**104**	**116**	**129**	**135**	**153**	**168**
Spreadsheet	99	99	110	119	130	143	154
Project Management	103	100	114	122	148	167	182
Word Processing	106	107	119	128	137	153	164
Presentation	101	108	120	138	129	149	167
CAD	101	108	119	138	131	153	174

Table 3 summarizes the performance of benchmarks for the Multimedia Benchmark vector for processors representative of the Intel processor families. (The higher the number, the better the performance).

Table 3: Three Vectors of Performance Benchmark Results – Multimedia Benchmarks

	Pentium® Processor 133 MHz	Pentium® Processor 150 MHz	Pentium® Processor 166 MHz	Pentium® Processor 200 MHz	Pentium® Processor with MMX™ Technology 166 MHz	Pentium® Processor with MMX™ Technology 200 MHz	Pentium® Processor with MMX™ Technology 233 MHz
Intel Media Benchmark	**113.86**	**122.44**	**135.66**	**157.29**	**220.44**	**257.30**	**292.68**
Norton* Media Benchmark - Norton Utilities for Windows* 95 Version 3.0	**7.4**	**7.7**	**8.4**	**9.6**	**12.1**	**13.8**	**15.0**
Video	6.7	6.9	7.4	8.3	10.2	11.4	11.9
3D Graphics	8.8	9.5	10.5	12.3	11.1	13.0	14.4
Audio	8.6	8.9	9.9	11.4	19.5	22.6	25.5
CD - ROM	5.7	5.7	5.7	5.7	5.7	5.7	5.3
Imaging	4.1	4.4	4.9	5.8	24.7	28.1	31.2

Table 4 summarizes the performance of benchmarks for the Floating Point Benchmark vector for processors representative of the Intel processor families. (The higher the number, the better the performance).

Table 4: Three Vectors of Performance Benchmark Results – Floating Point Benchmarks

	Pentium® Processor 133 MHz	Pentium® Processor 150 MHz	Pentium® Processor 166 MHz	Pentium® Processor 200 MHz	Pentium® Processor with MMX™ Technology 166 MHz	Pentium® Processor with MMX™ Technology 200 MHz	Pentium® Processor with MMX™ Technology 233 MHz
SPEC CPU*95/UNIX*							
SPECfp*95	**3.50**	**3.53**	**3.92**	**4.32**	**4.34**	**4.87**	**5.21**
SPECfp_base*95	2.54	2.57	2.86	3.14	3.58	3.98	4.23
SPEC CPU*95/ Windows* NT 4.0							
SPECfp*95	**3.53**	**3.58**	**3.97**	**4.39**	**4.38**	**4.83**	**5.18**
SPECfp_base*95	2.78	2.76	3.07	3.37	3.87	4.28	4.55
Norton* Multimedia Benchmark - 3D Graphics - Norton Utilities for Windows* 95 Version 3.0	**8.8**	**9.5**	**10.5**	**12.3**	**11.1**	**13.0**	**14.4**
Ziff-Davis* **3D WinBench*98**							
3D WinBench*98	**179**	**185**	**207**	**233**	**241**	**278**	**309**

APPENDIX A — TEST CONFIGURATIONS

SPEC CPU*95 on UNIX* System Configurations

	Pentium® Processor at 133, 150, 166, 200 MHz Pentium Processor with MMX™ Technology at 166, 200, 233 MHz
System	Intel 82430 TX PCIset-based motherboard
Secondary Cache	512 KB WB Burst
Memory Size	64MB SDRAM
Video Controller/Bus	Matrox Millennium*/ PCI
Hard Disk Controller	E-IDE/integrated PCI
Hard Disk	Quantum UDMA Disk
Operating System	UnixWare* 2.0
C Compiler	Intel C Compiler 2.3
FORTRAN Compiler	Intel FORTRAN Compiler 2.3

Windows* System Configuration

	Pentium® Processor- 133, 150, 166, 200 MHz Pentium Processor with MMX™ Technology - 166, 200, 233 MHz
System	Intel 82430 TX PCIset-based motherboard
FPU	Integrated
Primary Cache	16 KB (8 KB I + 8 KB D) for the Pentium Processor - 133, 150, 166 & 200 MHz. 32 KB (16KB I + 16 KB D) for the Pentium processor with MMX technology - 166, 200 & 233 MHz.
Secondary Cache	512 KB WB Burst
Memory Size/Speed	32 MB SDRAM except for: SYSmark*/NT and SPEC CPU95 under Windows NT 4.0 - 64 MB
Hard Disk Controller/Bus	Adaptec* AHA2940UW SCSI/PCI
Hard Disk	Seagate ST34501W*
Video Controller/Bus	For all benchmarks except 3D WinBench* 98: Diamond Stealth 3D 2000Pro*/ PCI For 3D WinBench 98: STB Velocity 128 PCI based
Video Memory Size/Type	Diamond Stealth 3D 2000 Pro - 2 MB EDO STB Velocity 128 – 4MB SGRAM
Operating System 1	**Windows* NT 4.0**
Video Driver Revision	Diamond V2.10
Graphics	1024x768 Resolution, 256 Colors
	SPEC CPU*95 - Windows* NT 4.0
C* Compiler	Intel C* Compiler 2.4 Plug In
FORTRAN* Compiler	Intel FORTRAN* Compiler 2.4 Plug In
Operating System 2	**For all benchmarks except 3D WinBench* 98 - Windows* 95 - Build 1111 For 3D WinBench 98 - Windows 95 - Build 1212**
File System	FAT32
Video Driver Revision	For all benchmarks except Norton* Multimedia Benchmark and 3DWinBench* 98: Diamond Stealth* 3D 2000 Pro- Diamond 4.03.00.3205 with Microsoft DirectX* 3.0a For Norton* Multimedia Benchmark: Diamond Stealth 3D 2000 Pro- Diamond 4.03.00.3205 with Microsoft DirectX 5.0 For 3D WinBench* 98: STB Velocity 128 – STB 1.21 with Microsoft DirectX 5.0

	Pentium® Processor- 133, 150, 166, 200 MHz Pentium Processor with MMX™ Technology - 166, 200, 233 MHz
Graphics	All benchmarks except Norton* Multimedia and Intel Media Benchmarks, 3DWinBench* 98 – 1024x768 Resolution, 256 Colors Norton* Multimedia and Intel Media Benchmarks - 1024x768 Resolution, 16-bit color 3D WinBench* 98 – 640 x 480 Resolution, 16-bit color
	Audio/Media* Benchmarks
CD ROM Drive	Toshiba* 15X CD-ROM Model XM-3801B
Sound Card	Creative Labs Sound Blaster* 16

NOTE:
Frequency set by replacing the processor and setting system jumpers as described in the system documentation.

APPENDIX B — !COMP® INDEX 2.0 INFORMATION

System Configuration used in iCOMP® Index 2.0 Ratings

CPU	**Pentium® Processor at 133 MHz, 150 MHz, 166 MHz and 200 MHz.**	**Pentium Processor with MMX™ Technology at 166 MHz, 200MHz and 233MHz.**
FPU	Integrated	
System	Intel 82430 FX PCIset-based motherboard	166, 200MHz: Intel 82430 VX PCIset based motherboard 233MHz: Intel 82430 TX PCIset based motherboard
Primary Cache	16 KB (8 KB I + 8 KB D)	32 KB (16 KB I + 16 KB D)
Secondary Cache	512K WB Burst	
Hard Disk	Quantum Fireball* EIDE with Integrated EIDE disk controller except: 233MHz Pentium® processor with MMX™ technology: Quantum UDMA*	
Video	Matrox Millennium* PCI	
Audio	Creative Labs Sound Blaster* 16	
For SPEC*95:		
Memory Size	For Pentium® Processors - 64 MB EDO For Pentium Processor with MMX™ Technology - 64 MB SDRAM	
Operating System	UnixWare* 2.0	
C*Compiler	Intel C* Ref. Compiler 2.3	
FORTRAN* Compiler	Intel FORTRAN* Ref. Compiler 2.3	
For all other benchmarks:		
Memory Size	For Pentium® Processors - 32 MB EDO For Pentium Processor with MMX™ Technology - 32 MB SDRAM	
Operating System	Windows* 95	
Graphics	All benchmarks except Intel Media Benchmark - 1024x768 Resolution, 256 Colors Intel Media Benchmark - 1024x768 Resolution, 16-bit color	

iCOMP® Index 2.0 Component Scores As Measured On Appendix B Configurations

Table 5: iCOMP index 2.0 Component scores on Appendix B Configurations

	Pentium® Processor 133 MHz	Pentium® Processor 150 MHz	Pentium® Processor 166 MHz	Pentium® Processor 200 MHz	Pentium® Processor with MMX™ Technology 166 MHz	Pentium® Processor with MMX™ Technology 200 MHz	Pentium® Processor with MMX™ Technology 233 MHz
iCOMP® Index 2.0 Rating	**111**	**114**	**127**	**142**	**160**	**182**	**203**
CPUmark*32	**300**	**308**	**343**	**382**	**377**	**423**	**472**
Norton* SI32	**36.1**	**35.3**	**39.5**	**43.8**	**50.4**	**56.7**	**61.9**
Intel Media Benchmark/ Windows* 95	**111.53**	**118.92**	**132.50**	**153.06**	**216.71**	**253.08**	**293.27**
Video	111.39	119.11	132.39	153.42	228.02	267.23	324.28
Image Processing	112.14	116.01	130.31	148.50	658.23	742.65	822.94
3D Geometry	111.13	121.44	135.12	157.77	138.20	160.19	184.09
Audio	111.27	120.72	134.07	155.69	274.45	323.81	355.22
SPECint_base*95	**3.96**	**4.05**	**4.52**	**5.00**	**5.59**	**6.41**	**7.12**
SPECfp_base*95	**2.38**	**2.40**	**2.69**	**2.98**	**3.49**	**3.90**	**4.23**

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