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INTEROFFICE MEMORANDUM

TO: Distribution

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NODE: VAXINE/EMS

SUB: MicroVAX BUSINESS PLAN

Attached for your information is a copy of the MicroVAX Business Plan. The MicroVAX chip and the MicroVAX family of products came about as a response to a perceived change in the competitive environment for low end computing products. The MicroVAX Business Plan describes the changing low end environment and outlines the rationale and intended results of the MicroVAX Program.

This program-level plan is intended to be a supplement to the specific (and more detailed) product business plans. The MicroVAX Program Office will update this plan as required and will measure program results against the objectives stated here. Your comments are welcome.

Distribution

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MicroVAX Program Office Team
MicroVAX Program Office Group
MicroVAX Interest List
OEM Staff
LEE Staff
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SBAM
Burlington Manufacturing
AMC/GIA 32-bit Forecasters

MicroVAX BUSINESS PLAN
December 14, 1983

MICRO VAX 32

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EXECUTIVE SUMMARY

SCOPE

This business plan summarizes the external environment, the market opportunity and DEC's product and marketing response to the emerging market for 32-bit supermicrocomputers. The MicroVAX Program is a cross-functional effort to develop and implement a product and marketing strategy for a family of products based on the MicroVAX chip. This business plan addresses the family strategy. Individual business plans for each MicroVAX product will address the specific product plans.

ENVIRONMENT

A high growth market for low end 32-bit supermicrocomputers will emerge in FY84/85 because of advances in technology and changes in patterns of computer usage. Key advances in technology include the availability of single chip 32-bit microprocessors, low cost 256K bit RAM's, and inexpensive, compact hard disk storage. Changes in patterns of computer usage include major growth in single user systems, increased demand for transportable software and development of multiple network solutions.

The total low end market, computer products from $1K to $40K, will increase 2.5x in size from $14B in FY84 to $35B in FY88. The highest growth segments will be 32-bit single and multi-user systems selling in the technical and office markets. The 32-bit market will grow from 10% of the low end in FY84 to 50% in FY88. The low end 32-bit market will account for a significant proportion of the growth in the total computer industry.

Competition in the low end will come from relatively small application-oriented systems integrators (Apollo, Fortune, Sun Microsystems) and from large vertically integrated companies (IBM, HP and Data General). Low end 32-bit microcomputers will have broad application in vertical and general purpose markets.

MicroVAX RESPONSE

Analysis of the environment suggests that: 1) trends in the low end will greatly influence the overall development of computing, 2) achieving a strategic position in the low end is critically important to DEC, and 3) the nature of competition in the low end is changing and competition will be extremely challenging.

The MicroVAX marketing plan calls for DEC to: 1) Place highest priority on the 32-bit supermicro segment, 2) Develop time-to-market systems, components and workstations and 3) target the technical and office market primarily through the direct and OEM channels.

Analysis of DEC's strengths and weaknesses suggests that a family of MicroVAX products can achieve a 10% share of revenue in the total low end market by FY87 or about $3B in potential revenue.

Program risks include: 1) time-to-market for the chip and/or products, 2) acceptance of VAX/VMS in new applications, 3) ability to manufacture competitive low cost, high volume products, 4) commitment to focus on VAX and to deemphasize other products, 5) implementation of programs to market and sell low end products, and, 6) availability of application software for Digital products.

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ANALYSIS OF LOW END COMPUTER ENVIRONMENT

1.0 MARKET ANALYSIS

1.1 EVOLUTION OF CUSTOMER NEEDS

Since the end of the 1970's, industry, particularly in the U.S and Western Europe, has been forced to rethink it's strategic goals. Inflation, competitive threats from new directions, and explosive demands for information have created a need for greatly improved productivity to remain competitive. The process of re-allocating resources to achieve greater performance has just begun. Inflation has focused industry on the need to protect their investments, and to increase their returns from existing assets.

As the demand for productivity of people and machines increases, businesses are turning to computing technology for answers. There is a growing need for information that can be obtained, processed and communicated quickly and inexpensively. Effective decision-making requires timely information. This need is paramount in the service businesses and physical science industries. The rise of decentralized decision-making is also creating a new need for efficient intergroup communication.

Computer solutions to these needs have been prevalent, but the need, today, is to expand their employment in industry to new uses. The end user is demanding effortless computing and minimal cost of ownership. Increasing computer literacy, from grade schools thru chief executives, is also driving the need for easy to use, easy to maintain, inexpensive computers.

This evolution of needs will cause an expansion of the market for cost effective, low end computers. Those computer vendors who provide the best hardware and software solutions to these needs will be successful in the 1980's.

1.2 LOW END COMPUTER MARKET SIZE

The market for low end computer solutions represents a major growth opportunity for computer vendors. The available market for computer equipment priced between $1K and $40K will increase 2.5X in size by FY88, to $35 Billion in revenue. (Appendix 1). For comparison, the total market for computers of all types will be $70 Billion. The low end market will increase from 25% to 50% of the total computer industry revenue in the next five years. Demand exists for computer products at all levels of integration. Component, multi-user and single-user computers will provide solutions to different needs in office, technical, and education markets.

1.3 APPLICATIONS FOR SUPER MICROCOMPUTERS

The demand for efficient and effective computer solutions is prevalent in a variety of industries. The limited supply of skilled professionals will result in increased use of high performance computers to improve

their productivity. Business people will need increasing amounts of computing power to manipulate databases and perform analyses. Engineers and scientists require high performance machines to do simulations and graphics. Large organizations demand efficient solutions for processing and communicating information, both inter-organization and external to the organization. Industries that are performance-driven with a high demand for increasing function and a near-constant price, will require 32-bit processors. These processors are needed to increase direct addressing and processor speed, and for their powerful instruction sets and expanded data types. Image processing, graphic workstations, industrial control, telecommunications, economic, weather, and nuclear information processing are a few examples.

2.0 TECHNOLOGY ANALYSIS

More and more of the system design complexity is moving from hardware to software. The cost of a line of debugged software is increasing from year to year with the general inflation rate. As the cost of hardware drops, it becomes cost effective to use increased CPU power, disk storage and main memory to increase human productivity. Thus, if it is vastly easier to develop software for 32-bit computers than for 16-bit computers, people will want the higher productivity environment.

There are several significant technical trends which have an impact on the growth of the high performance, low end market.

o VLSI Technology

The semiconductor industry is moving from producing "building blocks" to producing "solutions". In 1973, a single chip performed a single simple logic function. Today, a single chip performs a major "box-level" function (CPU, Disk Controller, Memory controller). The "system on a chip" will begin to replace the "computer on a chip". The implementation of these technical advancements changes the economics of the computer industry. The cost of a system is dramatically decreased. High performance solutions are affordable to new users for new applications. The future of the computing industry will be determined by companies with the best VLSI technology. Companies who can not architect silicon solutions will be forced to buy standard components and create uniqueness through marketing and software.

o Main Memory

MOS RAMS have increased in density by a factor of sixteen over the last five years (16K in 1978 to 256K today). We can expect a similar increase over the next five or six years (4 megabit RAMs by 1990). Each generation of RAM technology has followed a similar learning curve resulting in plummeting cost per bit. This implies that software will be less and less constrained by memory. There will also be a steady increase in demand for a large address space to take advantage of the increasing memory size.

o Disk

Disks are also increasing in density. Two trends result. First, disks are getting physically smaller for a given capacity. For example, 25 Megabytes of PDP-1 disk would weigh 55 thousand pounds, consume 30,403 cubic feet and 45 Kilowatts at a cost of 4.3 million 1964 dollars. In 1984 the same disk capacity will weigh less than 10 pounds, consume less than one cubic foot and will cost less than $1000. This means that applications which used to require a machine room full of disk can soon fit on a desktop.

o Software

Software is becoming more complex, more expensive, and more important to overall productivity. As computers reach a wider and wider audience, software will be expected to provide a total solution instead of a tool kit. Customers will ask for a computer with a good solution (mathmatical models, business management) instead of good FORTRAN or COBOL. This is most dramatic in the low-end/new- user area where customers are looking for very specific applications. For example, an auto parts dealer will want a good automobile parts distributer package instead of a retailing package (and they have no interest in learning COBOL). As more productive tools are required, software will become the key factor in purchase decisions.

The right tools (as well as the right marketing) will help generate the required application base. The base hardware and software must make the application look good.

o Communications

Long distance communications costs are not dropping nearly as fast as computer hardware costs. This means that large central computers and timesharing are often more expensive than a dispersed system of desktop or team computers. This is expanding demand for low-end machines. As the low-end machines proliferate, there is a need to share data. This in turn is generating demand for local area networks and new methods of long distance communications.

The trend is away from sharing the computer (timesharing systems, remote job entry, dumb terminals) to sharing data (DECnet, distributed processing). We will see a explosion in "stand-alone" computers with the ability to access remote computers and data.

o Merging of Different Industries

As the prohibitive cost barriers of using computer technology are stripped away, different industries will be competing in the same markets. For example, copier, computer, telecommunications and facsimile technologies will merge into families of overlapping products.

3.0 COMPETITIVE ANALYSIS

Competition is changing and getting tougher. The traditional micro/mini/mainframe distinctions of the 70s are gone. There is a brand new style of competition based on easy to use commodity VLSI chips. We are now seeing startup companies like SUN and APOLLO able to go from startup to product in a very short time. The 68020 chip has about the same CPU power as a DECsystem-10. In this new competitive environment, particularily in the low end, DEC needs product and marketing uniqueness, with emphasis on time to market, to win.

The table below highlights the key strengths and weaknesses of the competition in the low end computer market.

	STRENGTHS	WEAKNESSES
Vertically Integrated Companies (IBM, Intel etc.)	o Total product integration	o Heavy capital investment
	o Non-duplicable features	o Technology obsolescence
	o Time to market (technology)	o Business focus issues
	o Economies of scale	
	o Architectural control	
Application-Oriented System Integrators (Apollo, Wang etc.)	o Superior point product capability	o Dependence on industry standard products
	o Low capital investment	o Weak product differentiation
	o Time to market (applications)	o Exposure to price competition
	o Flexibility	o Architectural management

Appendix 2 analyzes the specific competition for the MicroVAX product family.

4.0 CONCLUSIONS AND IMPLICATIONS FOR DIGITAL

From the previous environmental analysis, there are three generic conclusions that may be drawn.

o Relationship of Low End and High End

The overall concept of standalone, single user (or single application) systems is flawed as a long term view of a computing environment. Self contained computing systems are no more valid than isolated people. At some point and time, people must deal with others. In computing, the need for systems to communicate with other systems is as real and necessary as the need for people to communicate. Computing systems are tools which make the communications task easier and more productive.

Small systems will need to communicate with large systems. Conversely, large systems will "delegate" work to distributed, smaller, less expensive systems. This relationship is synergistic. Therefore, achieving high growth rates for small and large systems applications will be leveraged by the availability of both. Failure to produce both is a major risk.

The first conclusion is that success in the high end and low end are not decoupled. To retain a strong market position in the mid and high end computing systems market, Digital must expand market presence in the low end.

o Low End As A Business

A substantial market will exist for medium and large computing systems. This need will continue to grow as more small systems are installed. But low end systems growth will be disproportionately higher. The available markets and applications for inexpensive high performance small systems will develop in new areas versus replacement or upgrading of equipment in established traditional areas.

The low end represents an emerging, high growth segment that is mostly incremental to the existing computing market. Achievement of market share in the low end will increase the probability of retaining a strong, medium and high end systems position.

The second conclusion is that Digital must be successful in the low end to continue to achieve growth rates consistent with the overall computer industry.

o Competitive Position

The competitive environment for low end products is different in the mid 80's than in the 70's. The ability to design and manufacture computing systems is no longer isolated to a few companies with a high degree of vertical skills in hardware and computer architecture.

The emergence of many systems integration companies, all seeking a clear market advantage or product uniqueness, will create confusion and fragmentation - as typical of technology driven emerging markets.

But Digital's advantages must be clear, understood by, and having value to the customer.

The third conclusion is that Digital can no longer compete simply with a leadership CPU architecture. Digital must establish a clear competitive advantage with networks, clusters, software and a homogeneous computing environment as well as cost competitive CPU, storage, interconnect and utilities.

5.0 DIGITAL'S STRENGTHS AND WEAKNESSES

Digital's success in the high performance, low end computer market depends on our ability to exploit our strengths, understand and minimize our weaknesses. The key strengths and weaknesses that will impact Digital's success in this market are summarized below.

Key Strengths

- o System Architecture

  Because Digital produces such a wide range of computer products (chips, modules, boxes, systems, operating software, application tools and applications), Digital is able to evaluate each component in terms of the total solution, offering a broad range of compatible systems.

- o Quality Engineering

  Because Digital manufactures and services products in high volume, quality must be designed in.

- o Hudson LSI Group

  Hudson is one of the best overall design and fabrication groups in the industry.

- o Software

  Digital has a very large application base and is recognized for quality, productive software tools.

- o Customer Experience

  There is a large number of customers and potentials with Digital hardware or software experience.

- o Service

  Digital has a worldwide service organization to provide support for all products.

- Human resources

  Digital has talented people who can accomplish almost anything.

- VAX Recognition

  VAX systems are perceived as the standard to which the competition must be compared.

Key Weaknesses

- Lack of Innovative Focus

  Resources have been directed at re-engineering products and designing unnecessary perfection rather than new ideas.

- Costs

  High fixed costs and overhead allocations have resulted in product prices that are perceived as uncompetitive.

- Terms and Conditions

  Perceived by the market as being inflexible and confusing.

- Distribution

  No clear strategy on low end distribution.

- Time to Market

  New product introductions are often too late, missing the window for timely technical innovations. Once announced delivery commitments are not met.

- Software

  Although Digital has a large base of installed software, it is thought of as being overpriced, cumbersome and ever changing.

6.0 THE MICROVAX PROGRAM

The MicroVAX strategy was developed as a response to the market, technical and competitive trends. To gain a jump on the competition, and thereby maximize success in the growing Supermicro market, several objectives were established.

- o Develop a 32bit micro-system in 1984 (software and hardware).
- o Focus on time to market with minimal risks.
- o Alter as little as possible in our traditional customer base and internal manufacturing.
- o Leverage existing power, packaging and peripheral products.

The long-term MicroVAX Program goals evolved from these objectives.

6.1 PROGRAM GOALS

- o Establish VAX/VMS as the preferred industry computer architecture for the late 1980's. Utilize technology to extend the VAX/VMS architecutre into the low-cost, high-volume market segment. Leverage market position for Digital's next generation of computer products.
- o Achieve significant market position with profitable systems. Defend systems by selling at all levels of integration.
- o Design, manufacture and market a family of microprocessor-based VAX/VMS products in the $1-40K, 32-bit marketplace.

6.2 PRODUCT STRATEGY

At a very early stage of the Program, the decision was made to develop a range of products using different technical implementations. Initially, two hardware, and one software product, were defined to minimize risks and accelerate time to market. Seahorse, (MicroVAX I), developed by DEC West Engineering, is a time to market system designed to provide a low cost Q-bus VAX system in a short period of time. Basically, a MicroPDP-11 with the -11 replaced by a VAX. Announced October 18, the product has been nominated by a trade journal as one of the Top 10 product announcements in 1983.

Mayflower, (MicroVAX II), the second MicroVAX product, is the first implementation of the VLSI MicroVAX chip designed by Hudson. This reduces the Seahorse CPU and memory from 3 modules to 1 and greatly increases performance. Mayflower is being developed by MSD Engineering, within Low End Engineering. The product is also designed to run in the Q22 LSI bus. Mayflower will be sold at the board, box and multi-user system level. Additionally, Mayflower will be the basis for workstation products.

The software product is MicroVMS, a modular version of full VMS. MicroVMS also provides support for the emulated instructions defined in the MicroVAX architecture. It provides the same native-mode application environment provided by full VMS.

This dual-pronged technical strategy minimizes the risk of missing the time to market threshold. If the MicroVAX chip slips, Seahorse will be available in the market to serve the short term customer needs. The strategy also provided a product early, giving our internal software developers a development system to work with.

This strategy has proven to be successful. The Seahorse development group has been on schedule. They will indeed produce product approximately six months earlier than we currently expect our competitors to offer similar products. This will allow us to get both software and hardware developers well under way before Mayflower is ready to be announced.

The use of existing system bus and packaging means we should have fewer problems with a fast production ramp in manufacturing. The use of the Q-Bus on the VAX also allows us to offer a smoother migration path to our large customer base have existing Q-Bus hardware investments.

In addition to the initial three products, the MicroVAX product strategy includes another multi-user system, a single user MicroVAX, the MicroVAX chip family and two additional software products.

AURORA

The third multi-user system in the MicroVAX family is Aurora. Directed by the Polaris Development Group in the 32-bit Systems organization, Aurora combines the MicroVAX chip with the new Backplane Interconnect (BI) bus. This technical advancement positions Aurora to expand Digital's participation in the Low End market and will introduce the BI bus, the Unibus I/O replacement for future VAX's. The Aurora product strategy includes boards, multi-user systems compatible with an open office environment, and Aurora based VAX stations.

METEOR

Meteor is Digital's first single-user MicroVAX product. Developed within Low End Engineering, the product is positioned as a strong competitor in the low end, technical/scientific and the high end office/business graphics workstations market. Meteor should be an effective follow-on product to the Professional Series and high end VAX/Seahorse workstations. Although not a replacement product per se, Meteor represents a clear migration path for PRO users upward in functionality, and for VAX Workstation applications downward to a lower cost, single user design center.

MICROVAX CHIP FAMILY

Designed to build high performance, low cost VAX solutions. Includes a full line of support chips.

VAXELAN

A Pascal based runtime system for dedicated real-time applications.

ULTRIX

Full Berkeley, UNIX* running on MicroVAX hardware.

For a more detailed analysis of the MicroVAX product family, see Appendix 3.

6.3 MARKETING STRATEGY

The marketing strategy is to position the MicroVAX products to address those customers desiring high performance, low cost, 32-bit microprocessor products. Offer the customers products at all levels of integration to fully satisfy their broad range of computer needs. In addition, the MicroVAX strategy is to extend and enhance sales of existing and future products by developing a clearly competitive low-end product set for the late 1980's. This goal is consistent with Digital's goal to offer the customer a full range of computer solutions. The customers now have a complete array of choices for their needs. Digital offers competitive low end 16-bit products, the MicroPDP-11 family for 16-bit applications, the 11/725 for those customers desiring large disk capacity, and MicroVAX for low end 32-bit applications.

The marketing focus can be summarized in the following chart.

Market Goals	Rationale
o Focus on the 32-bit Supermicro segment	o Leverage VAX/VMS architecture o No established leader o Highest growth segment o Higher lifecycle margins o DEC is on technology curve o Position DEC for development of next generation products o Leverage networking capabilities across homogeneous products
o Develop systems, components and workstations	o Provide a complete solution o Enhance competitive strength in compatability, communications and networking o Creates synergy and flexibility in product development and manufacturing

*Unix is a registered trademark of Bell Labs

o Target the Technical and Office markets through the direct and OEM channels	o Builds on current market strengths o Addresses the largest market segment o Uses familiar channels o Allows the fastest early market penetration o Requires minimum new product development

Specific programs the MicroVAX Program Office has undertaken include the following:

- o Adopt a family-focused pricing strategy.
- o Offer non-disclosure presentations to key customers to keep them abreast of our total product strategy
- o Develop a program level promotion strategy emphasizing the family, in addition to the specific products.
- o Coordinate communication among the product development groups, the Strategic Marketing organizations and recently, the Field.

6.4 MICROVAX PROGRAM RISKS

Inherent in any new strategy are risks. We have documented our concerns and issues with the goal being to focus our future efforts at resolving or minimizing their impact on the MicroVAX program.

RISKS/ISSUES

- o Lack of commercial software strategy for MicroVAX products
- o Need to focus corporate efforts on sales motivation and distribution channels
- o No clear network systems implementation
- o Uncertainty of chip sales strategy; CPU, floating point
- o Need a clear direction of storage products; 5 1/4, tape, cartridge
- o Open issues around single user products; ergonomics, cost, timeliness, product definition, applications, software, performance
- o VIA/VMS efforts need to be focused on low end products
- o Competitive risks of 68000/IBM/Unix* entries
- o Need to invest resources to promote awareness of MicroVAX/VMS benefits to the customer and internally

7.0 MICROVAX PROGRAM RESULTS

The impact the MicroVAX strategy will have on Digital's success in the low end computer market is evidenced by the analysis of our market share goals. The market share goals are based on a market sizing analysis done by the MicroVAX Program Office. The detail information is presented in Appendix 1 and summarized here.

7.1 MARKET SHARE SUMMARY

Methodology

The market share forecast was developed by evaluating the following factors and estimating a reasonable forecast from known past performance.

- The total available market by segment (from the Market Sizing Model)
- Digital product development plans
- Anticipated competitive actions
- Digital market goals
- Digital and competitive strengths, weaknesses and past performance

Conclusions

- Digital will obtain a large, early share in the low end 32-bit OEM systems and components markets. MicroVAX II is expected to become DEC's first $1 Billion per year product.

- Digital will gain a modest share in the 32-bit desktop market. A low share is assumed because product plans and engineering development are proceeding slowly and the environment is expected to be more competitive in the desktop segment.

The market share goals are predicated on a volume forecast that reflects the opportunity Digital has in the Low End market. This opportunity is not guaranteed. It depends on the successful resolution of the program risks previously mentioned.

This business plan therefore includes two forecasts for the MicroVAX products. The first forecast labelled "opportunity" is a consolidation of the Phase 0 product plans for each MicroVAX product. The second forecast, labelled "base case", is a best guess estimate made by the MicroVAX Program Office Team. The base case is lower than the opportunity forecast because of more conservative assumptions regarding the growth of the 32-bit segment and a more realistic view of our ability to deal with the overall risks and issues surrounding the program.

MARKET SHARE BY PRODUCT SEGMENT - OPPORTUNITY

Units (K)

	FY84	FY85	FY86	FY87	FY88
Market					
Multi-user Systems	251	334	444	570	718
Single-user Desktop	2475	3130	3986	4852	5976
Components	160	200	280	360	400
Total	2886	3664	4710	5782	7094
MicroVAX					
Multi-user Systems	2	29	56	100	105
Single-user Desktop	-	6	45	103	65
Components	2	10	31	54	40
Total	2	45	132	257	210
MicroVAX Share					
Multi-user Systems	1%	9%	13%	18%	15%
Single-user Desktop	-	-	1	2	1
Components	-	5	11	15	10
TOTAL MICROVAX SHARE	-%	1%	3%	4%	3%

Revenue $B

Market	$13.5	$17.5	$22.8	$28.6	$35.6
MicroVAX	$ .03	$ .6	$ 1.6	$ 3.1	$ 3.0
MicroVAX Share	-	3%	7%	11%	8%

Components are board and box level products; definition excludes chips.

MARKET SHARE BY PRODUCT SEGMENT - BASE CASE

Units (K)

Market	FY84	FY85	FY86	FY87	FY88
Multi-user Systems	251	334	444	570	718
Single-user Desktop	2475	3130	3986	4852	5976
Components	160	200	280	360	400
Total	2886	3664	4710	5782	7094
MicroVAX					
Multi-user Systems	2	12	28	45	64
Single-user Desktop	-	9	48	109	74
Components	-	3	8	23	36
Total	2	24	84	177	174
MicroVAX Share					
Multi-user Systems	1%	4%	6%	8%	9%
Single-user Desktop	-	-	1	2	1
Components	-	2	3	6	10
TOTAL MICROVAX SHARE	-	1%	2%	3%	2%

Revenue $B

Market	$13.5	$17.5	$22.8	$28.6	$35.6
MicroVAX	$ .03	$ .3	$ 1.1	$ 2.1	$ 2.4
MicroVAX Share	-	2%	5%	7%	7%

MicroVAX Business Plan

UNIT SHIPMENT AND REVENUE FORECAST

- Opportunity -

	FY84	FY85	FY86	FY87	FY88
Units-K					
Seahorse Systems	2K	15	2	-	-
Workstations		(included in systems forecast)			
Mayflower Systems	-	12	40	65	50
Workstations	-	5	10	20	15
Boards	-	7	23	38	23
Boxes	-	3	7	12	7
Aurora Systems	-	2	14	35	55
Workstations	-	(included in systems forecast)			
Boards	-	.1	1	4	10
Meteror	-	.5	35	83	50
Total	2K	44.6	132	257	210
	=	====	===	===	===
Net Equipment Sales-$M					
Seahorse	$27M	$182	$ 24	$ -	$ -
Mayflower	-	343	891	1401	933
Aurora	-	62	407	1025	1630
Meteror	-	4	307	719	436
	$27M	$591	$1629	$3145	$2999
	===	===	====	====	====

MicroVAX Business Plan

UNIT SHIPMENT AND REVENUE FORECAST

- Base Case -

	FY84	FY85	FY86	FY87	FY88
Units-K					
Seahorse Systems	1.6	5	1	-	-
Workstations-QVSS	.4	3	-	-	-
Mayflower Systems	-	6	18	29	36
Workstations-QVSS	-	5	10	20	15
-David	-	.3	2	2	2
Boards	-	2	5	12	15
Boxes	-	.5	2	4	5
Aurora Systems	-	1	9	16	28
Workstations-WS32	-	-	1	4	7
Boards	-	.1	1	7	16
Meteor	-	.5	35	83	50
Total	2.0	23.4	84	177	174
Net Equipment Sales-$M					
Seahorse	$27	$100	$ 12	$ -	$ -
Mayflower	-	213	503	794	834
Aurora	-	29	292	611	1090
Meteor	-	4	307	719	436
Total	$27	$346	$1114	$2124	$2360

7.2 FINANCIAL SUMMARY

Based on Product Management's current forecasts, the MicroVAX family will generate over a billion dollars in gross equipment sales in FY86. The forecast reflects the opportunity Digital has in the Low End marketplace. The first product, MicroVAX I, will generate $29M in operating revenue for FY84, at current forecasted unit sales. Operating profit margin is estimated by MicroVAX Program Office Finance and the Product Manager to be 13%. The high margin is in part due to the relatively low engineering investment for this product.

The simple business models for the MicroVAX products represent the goals of the MicroVAX Program Office and Product Manangement. They are based on the opportunity volume projections detailed on the previous pages.

MICROVAX I
(Seahorse - Phase 2)

- SIMPLE BUSINESS MODEL -
($ M)

	FY84	LIFETIME
Units	2.0K	19.0K
MLP/unit	$20.2K	$18.1K
NOR	$29.4	$262.8
Product Costs	$13.6	$136.0
PRODUCT MARGIN	$15.8	$126.8
PRODUCT MARGIN %	54%	48%
Field Expenses	$ 5.6	$ 47.1
FIELD MARGIN	$10.2	$79.7
FIELD MARGIN %	35%	30%
Engineering	$ 3.1	$ 13.7
Corporate Market/Advt/Admin	1.9	16.1
Other Costs (CMC, O/A)	1.4	13.3
OPERATING PROFIT	$ 3.8	$ 36.6
OPERATING PROFIT %	13%	14%
INTERNAL RATE OF RETURN	23%	
QUARTERS TO PAYBACK	8	

The IRR for the MicroVAX I is lower than corporate average because the product only has a three year life cycle.

MICROVAX II
(Mayflower - Phase 0)

- SIMPLE BUSINESS MODEL -
($M)

	FY85	LIFETIME
Units	27K	457K
MLP/unit	$16.4K	$12.8K
NOR	$363.4	$5801.1
Product Costs	$142.0	$2608.0
PRODUCT MARGIN	$221.4	$3193.1
PRODUCT MARGIN %	61%	55%
Field Expenses	$ 61.9	$ 823.0
FIELD MARGIN	$159.5	$2370.0
FIELD MARGIN %	44%	41%
Engineering	$ 18.4	$ 101.1
Corporate Market/Advt/Admin	$ 24.1	$ 319.2
Other Costs	$ 13.5	$ 245.2
OPERATING PROFIT	$103.5	$1704.6
OPERATING PROFIT %	28%	29%
INTERNAL RATE OF RETURN	75.2%	
QUARTERS TO PAYBACK	11	

The MLP per unit is an average of all the Mayflower configurations, boards, systems and workstations.

AURORA - Phase 0

- SIMPLE BUSINESS MODEL -
($M)

	FY85	LIFETIME
Units-K	2.1	193.3
MLP/unit	$35.6K	$21.1K
NOR	$62.9	$4688.0
Product Costs	$32.0	$1782.5
PRODUCT MARGIN	$30.9	$2905.5
PRODUCT MARGIN %	49%	62%
Field Expenses	$10.9	$ 743.6
FIELD MARGIN	$20.0	$2161.9
FIELD MARGIN %	32%	46%
Engineering	$28.5	$ 119.4
Corporate Market/Advt/Admin	$ 5.2	$ 356.9
Other Costs (CMC)	$ 3.1	$ 119.6
OPERATING PROFIT	($16.8)	$1566.0
OPERATING PROFIT %	-	33%
INTERNAL RATE OF RETURN	61.8%	
QUARTERS TILL PAYBACK	10	

METEOR - Phase 0

- SIMPLE BUSINESS MODEL -
($M)

	FY85	LIFETIME
Units-K	.5	188.5
MLP/unit	$11.7K	$11.5K
NOR	$ 4.4	$1686.7
Product Costs	$ 2.0	$ 773.8
PRODUCT MARGIN	$ 2.4	$ 912.9
PRODUCT MARGIN %	55%	54%
Field Expenses	$ 1.0	$ 312.8
FIELD MARGIN	$ 1.4	$ 600.1
FIELD MARGIN %	32%	36%
Engineering	$18.2	$ 83.7
Corporate Market/Advt/Admin	$ .3	$ 118.4
Other Costs	$ 2.7	$ 132.4
OPERATING PROFIT	($19.8)	$ 265.6
OPERATING PROFIT %	-	16%
INTERNAL RATE OF RETURN	28%	

APPENDIX 1

MARKET SIZING OVERVIEW AND CONCLUSIONS

MARKET SIZING OVERVIEW

GOALS

- Establish a single shipment forecast and revenue plan for all MicroVAX products
- Measure results against this plan over time

PHILOSOPHY

- the market for 32-bit supermicro-computers will develop independently of digital's participation
- Digital's participation is a response to a market opportunity; Digital can only influence the distribution of market share

METHODOLOGY

- Identify an industry accepted market definition, "Computer products priced between $1-40K
- Develop a model to forecast the most likely total available market size
- Segment the available market by price band, application, product type, distribution channel and word length
- Estimate Digital market share, shipment forecast and revenue plan

MARKET SIZING CONCLUSIONS

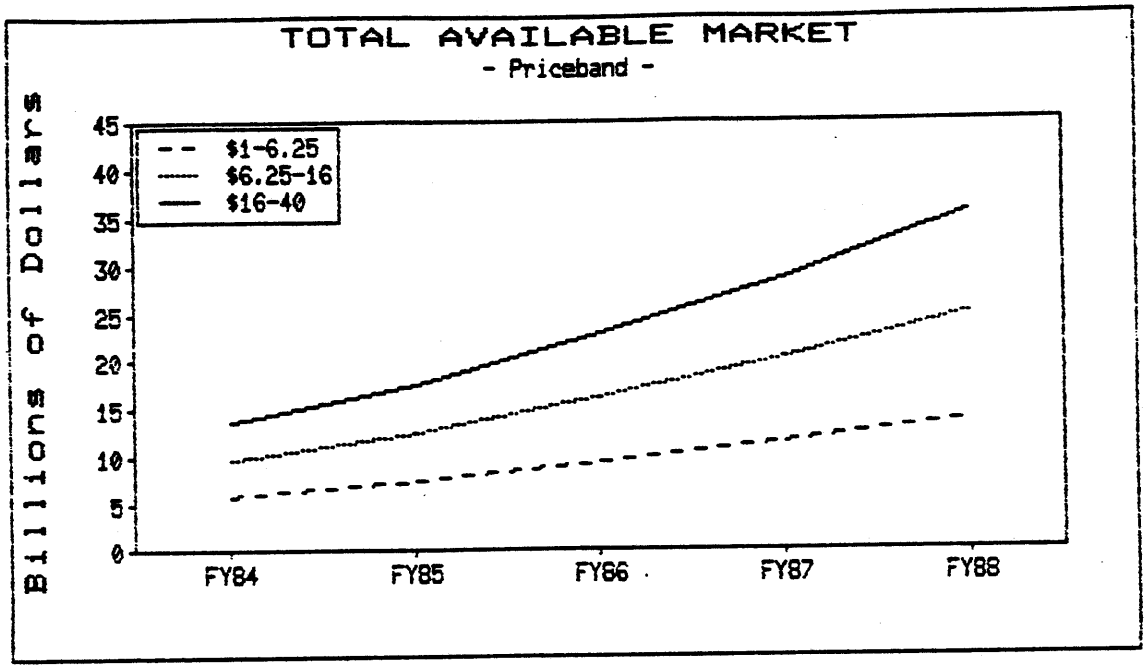
GENERAL

- The available market for computer equipment priced between $1K and $40K will increase 2.5x in size by FY88
- The low end market will increase from 1/4 to about 1/2 of the total computer market by FY88
- Office (Small Business, F1000) and Technical applications account for more than 80% of the $1-40K market
- The 32-bit segment will grow from 10% to about 50% of the low end segment by FY88; the 16-bit segment will continue to grow through FY87
- The highest 32-bit penetration will occur in the $16-40K price band and in the direct and OEM channels
- Single-user, desktop products account for over 60% of the low end revenue opportunity

SPECIFIC

- The target market for MicroVAX products is defined as those customers desiring 32-bit desktop and system products, selling between $6.25 and $40K, with office and technical applications and distributed through the direct and OEM channels. This target market represents 15-20% of the total available low end market.

TOTAL AVAILABLE MARKET
(Revised 12/5/83)



Revenue ($B)

Price Band	CAGR	FY84	FY85	FY86	FY87	FY88
$1-6.25	24%	$ 5.9	$ 7.4	$ 9.4	$11.4	$13.9
6.25-16	32	3.7	5.0	6.9	8.9	11.1
16-40	28	3.9	5.1	6.5	8.3	10.6
	27%	$13.5	$17.5	$22.8	$28.6	$35.6

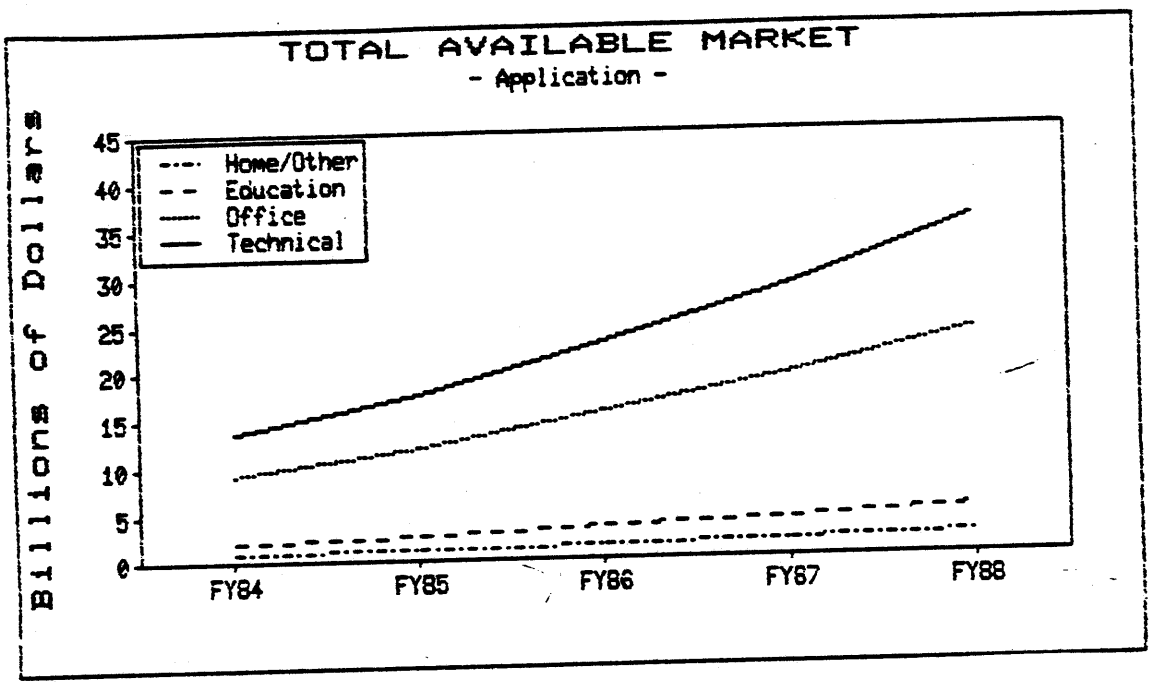
Units (K)

$1-6.25	2360	2960	3760	4560	5560
6.25-16	370	500	690	890	1110
16-40	156	204	260	332	424
	2886	3664	4710	5782	7094

COMMENTS

- The available market for computer equipment priced between $1K and $40K will increase 2.5 x in size by FY88.
- Distribution of revenue by price band is roughly uniform. Distribution of unit shipments by price band is heavily weighted towards the lowest price band.
- Revenue and unit growth is greatest in the $6.25-16K price band.

TOTAL AVAILABLE MARKET
(Revised 12/5)



Revenue ($B)

Application	FY84	FY85	FY86	FY87	FY88
Technical	$ 4.3	$ 5.6	$ 7.3	$ 9.3	$11.7
Office	7.1	9.3	12.1	15.1	18.8
Education	1.1	1.4	1.9	2.3	2.8
Home/Other	1.0	1.2	1.5	1.9	2.3
	$13.5	$17.5	$22.8	$28.6	$35.6

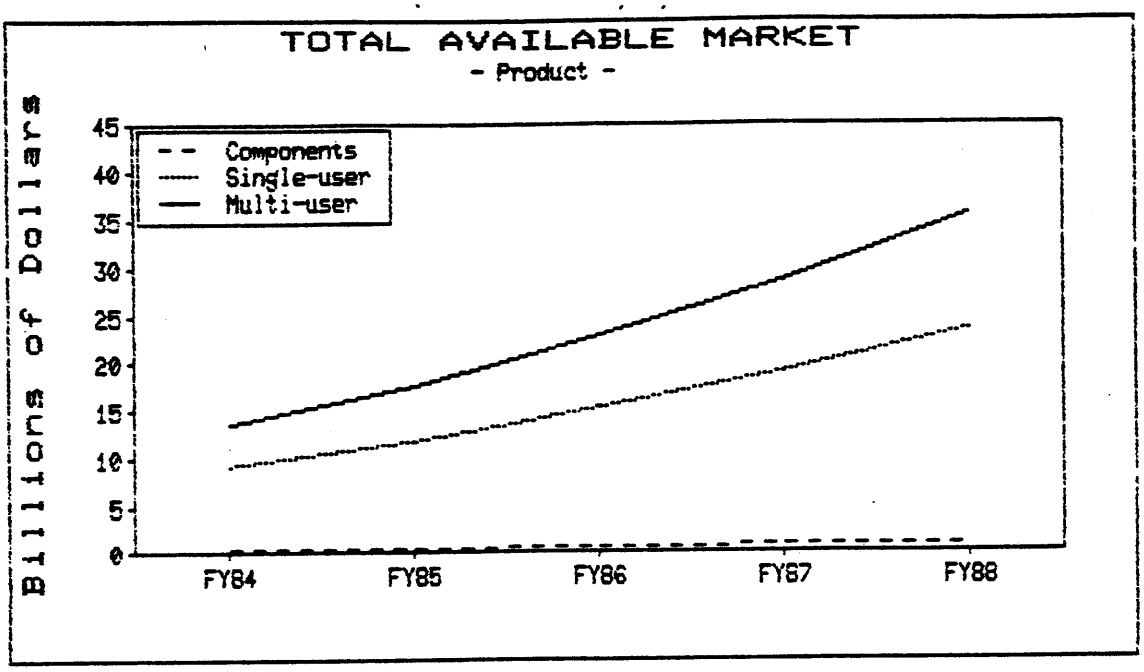
Units (K)

Technical	617	791	1026	1272	1572
Office	1561	1982	2550	3132	3841
Education	349	440	560	682	832
Home/Other	359	451	574	696	849
	2886	3664	4710	5782	7094

COMMENTS

- Office and Technical applications account for more than 80% of the $1-40K market.
- All application segements are growing at approximately the same rate.

TOTAL AVAILABLE MARKET
(Revised 12/5)



Revenue ($B)

Product	FY84	FY85	FY86	FY87	FY88
Multi-user (System)	$ 4.3	$ 5.7	$ 7.5	$ 9.6	$12.1
Single (Desktop)	8.8	11.3	14.6	18.1	22.5
Components	.4	.5	.7	.9	1.0
	$13.5	$17.5	$22.8	$28.6	$35.6

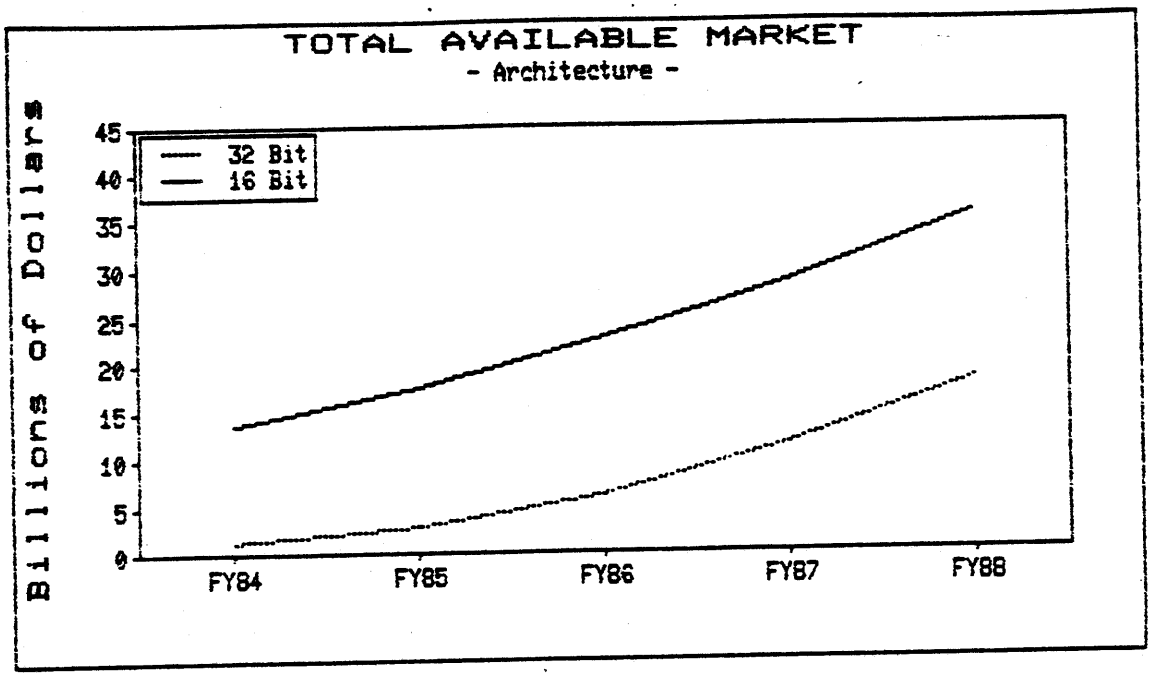
Units (K)

Mulit-user	251	334	444	570	718
Single-user	2475	3130	3986	4852	5976
Components	160	200	280	360	400
	2886	3664	4710	5782	7094

COMMENTS

- Desktop products account for over 60% of the low end market opportunity.
- System and Desktop products grow at approximately the same rate (no clear "winner").
- Components remain relatively insignificant.

TOTAL AVAILABLE MARKET
(Revised 12/5)



Revenue ($B)

Architecture	FY84	FY85	FY86	FY87	FY88
16-Bit	$12.1	$14.6	$16.7	$17.1	$17.5
32-Bit	1.4	2.9	6.1	11.5	18.1
	$13.5	$17.5	$22.8	$28.6	$35.6

Units (K)

16-Bit	2797	3452	4150	4524	4630
32-Bit	89	212	560	1258	2464
	2886	3664	4710	5782	7094

COMMENTS

- The low end 32-bit market will show explosive growth through FY88. However, the 16-bit market will also continue to grow through FY87.
- The highest 32-bit market penetration will occur in the $6.25-40K price bands and in the direct and OEM channel.

APPENDIX 2

MICROVAX COMPETITION

TECHNICAL MARKETPLACE

Functionality	MicroVAX I	SUN Syst.A	SUN Syst.B	Apollo DN300	HP 9020B	HP 9020S	DG Model 30
CPU Implement.	Cust.design MOS	M68000	M68000	M68000	HP9000	HP9000	8086
Address size	32-bit	23-bit	23-bit	23-bit	32-bit	32-bit	20-bit
Memory	1 MB	1 MB	1 MB	1.5 MB	512 KB	1 MB	1 MB
Disk (Formatted)							
- Floppy	800 KB	-	-	1.2 MB	270 KB	270 KB	Yes
- Winchester	25+ MB	8+8 MB	64 MB	34 MB	-	10 MB	15 MB
- Streaming tape	-	-	20 MB	-	-	-	-
Asynch line	1	2	2	2	?	?	4
Terminal	VT125 B/W	17" B/W	19 " Color	17 " B/W	13" B/W	13" Color	DASHER B/W
Comm.	Ethernet	Ethernet	Ethernet	-	-	-	-
Oper. system	MicroVMS MicroVAX ULTRIX	UNIX	UNIX	AEGIS	-	HP-UX	AOS
Claimed Performance (11/780) Not measured by Digital	.3	.6-.9	.6-.9	.3	.3	.3	.3
Price(MLP)	$ 20.8K	$ 19.9K	$ 36K	$ 31.9K	$ 28K	$ 50K	$ 17K

Notes:

Sun: Sys A: The 13" B/W landscape monitor offers 1024x800 pixel resolution.
Sys B: The 19" Color monitor offers 640x480x8 pixel resolution, with the Color Graphic frame buffer option included.

Apollo: The price for additional languages in the DN300 , such as FORTRAN, Pascal is $1,500 each.

HP: HP-UX is a single-user operating system
HP9020B includes no software.
HP9020S includes thermal printer.
Ethernet is an option to both systems and will be priced at $6K.

DG: The price includes a printer.

COMMERCIAL MARKETPLACE

Functionality	MicroVAX I	IBM9000	LINK-DATA	ALTOS ACS 68000-RMC3	IBM Sys.36
CPU Implement.	Cust.design MOS	68000	68000	68000	IBM Proprietary
Address size	32-bit	23-bit	23-bit	23-bit	24-bit
Memory	1 MB	1 MB	256 KB	512 KB	128 KB
Disk (Formatted)					
- Floppy	800 KB	327 KB	5 MB	-	Yes
- Winchester	25+ MB	20 MB	30 MB	64 MB	30 MB
- Streamer tape				Yes	
Asynch line	1	4	4	?	2
Terminal	1	1	2	None	2
Communication	Ethernet	-	-	-	-
Operating system	MicroVMS MicroVAX ULTRIX	UNIX	LINK-DOS	?	System Support Program
Performance (11/780)	.3	.3	.3	.3	?
Price(MLP)	$ 20.8K	$ 18.2K	$ 19.3K	$ 20.5K	$ 34K

Notes:

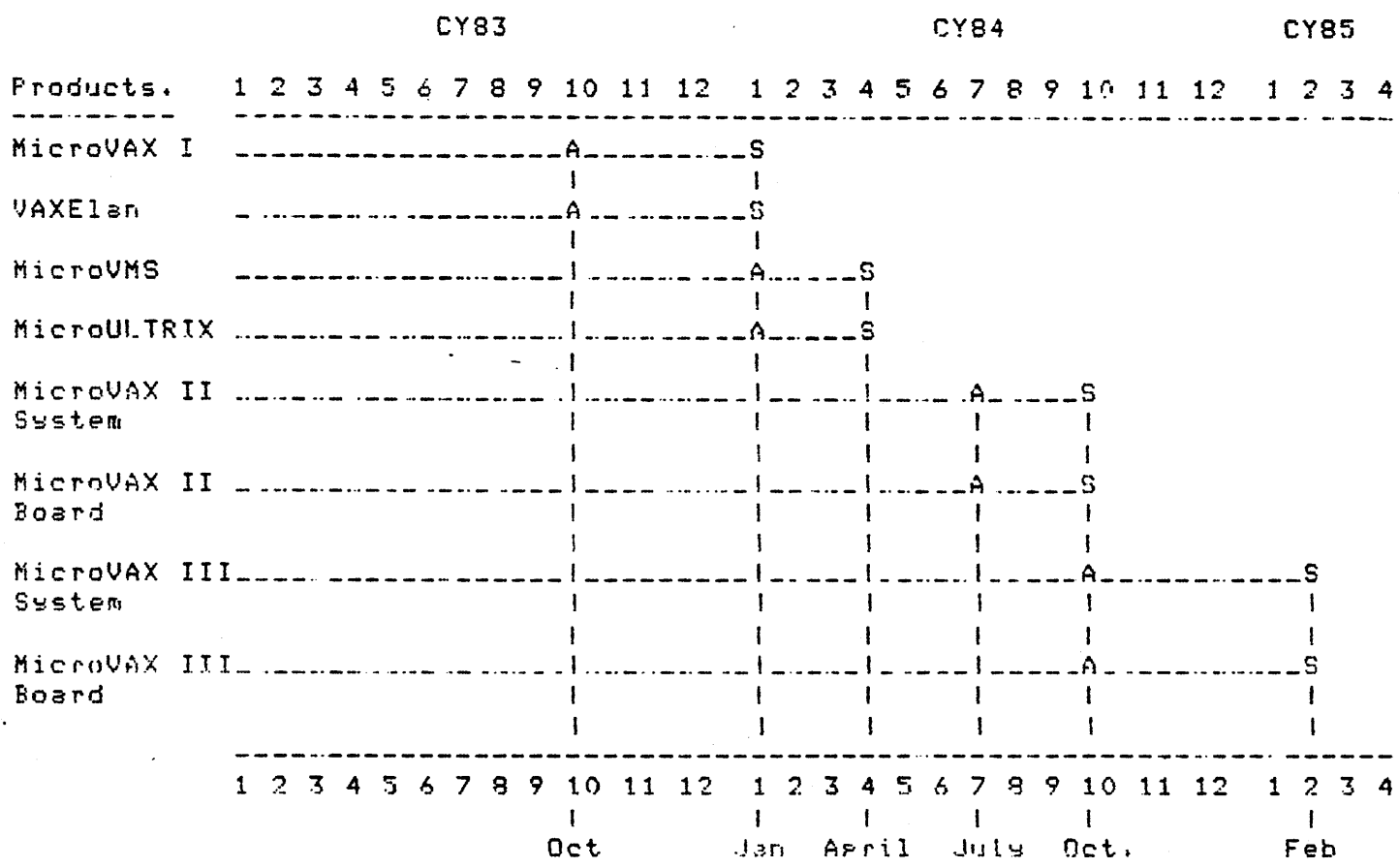
IBM: The IBM9000 includes a 12" raster scan CRT with graphic resolution of 768x480 pixels. The price for System 36 includes a printer.

LINK-DATA: Link-Data system includes the layered software DYBALL (DIBOL) and 2 each VT100 compatible terminals. The Link-Data product is built around the IBM9000 base system, priced at $ 5,695.

APPENDIX 3

MICROVAX PRODUCTS AND SCHEDULE

MicroVAX key Events calendar.



A = Announcement
S = FCS

System Configuration:

Functionality	MicroVAX I	MicroVAX II	MicroVAX III	11/725	Micro/PDP11	Micro/PDP11
CPU Implement.	Cust.design	MicroVAX	MicroVAX	11/730	F-11	J-11
CPU (1)	KD32-AA	KDQ32	KA640	?	KDF-BE	KDJ-BP
-Boards	2	1	1	3	1	1
-Memory	-	1 MB (1)	1 MB (1)	-	-	-
-SLU	1	1	1	1	1	1
-NI	NO	NO	NO	NO	NO	NO
-Cost	$ 1800	$ 1150	$ 800	$ 5206 (2)	$ 389	$ 973
Memory (BUS) (1)	2xMSV11-PL	- (3)	- (4)	1xM9730	2xMSV11-PL	1xMSV11-JB
-Size	1 MB	-	-	1 MB	1 MB	1 MB
-Cost	$ 920	-	-	Incl in $5206 above	$ 920	$ 1192
Asynch. lines	-	-	AIE 8 Lines (5)	-	-	-
-Cost	-	-	$ 500	-	-	-
Disk Controller	RQDX1	RQDX1	AIO (6)	KLESI	RQDX1	RQDX1
-Cost	$ 720	$ 592	$800	Incl in Disk price	$ 720	$ 592
Disk	20 MB	20 MB	50 MB+	2x24 MB	20 MB	20 MB
-Cost	$ 950	$ 700	$ 1000	$ 2972	$ 950	$ 700
Floppy (7)	2x400KB	2x400KB	2x400KB	NO	2x400KB	2x400KD
-Cost	$ 197	$ 187	$ 187	-	$ 197	$ 187
Tape:	-	-	MAYA	TU58	-	-
-Cost	-	-	$ 350	Incl in $5206 above	-	-
Packaging	BA23-A	BA23-A	New	LCN	BA23-A	BA23-A
-Cost	$ 750	$ 572	$ 1210	$ 828 (8)	$ 750	$ 572
Misc.	$ 385	$ 362	-	$ 974	$ 139	$ 253
Bus - type	Q-Bus	Q-bus	BI	Unibus (9)	Q-bus	Q-bus
- Slots (avail)	2 Quad/ 4 Dual	4 Quad/ 12Dual	3xEuro	4 Hex	4 Quad/ 8 Dual	4 Quad/ 8 Dual
Performance:	.35	.8-.9	.8-.9	.3	.15	.6 (15 MHZ)
User supported.	1-4	1-8	1-24 (10)	1-8	1-8	1-8
Transfer cost. -FY84	$ 5.722			$ 9.980	$ 4.065	
-FY85		$ 3.563	$ 4.847			$ 4.419
Price.(MLP) (11)	$ 16.985	$ 13.090	$ 16.964	$ 24.950	$ 12.950	$ 12.708
Option: NI	DEQNA	DEQNA	Incl. in	DEUNA	DEQNA	DEQNA
MLP	$ 1150	$ 1150	AIE	$ 3500	$ 1150	$ 1150

Low-end 16/32-bit system alternatives

Functionality	MicroVAX I	MicroVAX II	MicroVAX III	11/725	Micro/PDP11	Micro/PDP11
CPU Implement.	Cust.design MOS	MicroVAX	MicroVAX	11/730	F-11	J-11
System Bus						
-Type	Q-Bus	Q-Bus	BI	Unibus	Q-Bus	Q-Bus
-Data Width	16-bit	16-bit	32-bit	16-bit	16-bit	16-bit
-Addr Width	22-bit	22-bit (1)	30-bit	18-bit	22-bit	22-bit
-Memory						
- Max Address	4 MB	16 MB	1 GB	1 GB	4 MB	4 MB
- Max system	4 MB	16 MB (2)	11 MB	3 MB	4 MB	4 MB
-Slots (avail)	2 Quad/ 4 Dual	6 Quad/ 12Dual	3 x Euro	4 HEX	4 Quad/ 8 Dual	4 Quad/ 8 Dual
Disk						
- Floppy	800 KB	800 KB	800 KB	-	800 KB	800 KB
- Winchester	20 MB	20 MB	504 MB	2x26 MB	20 MB	20 MB
- TU58				512 KB		
- MAYA			100 MB			
NI (CPU Mod)	NO (opt)	NO (Opt)	AIE	NO (Opt)	NO (Opt)	NO (Opt)
Software						
- VMS	NO	NO	NO	Yes	NO	NO
- Mem. req.	-	-	-	1 MB	-	-
- Disk req.	-	-	-	17MB	-	-
- MicroVMS	Yes	Yes	Yes	NO	NO	NO
- Mem. req.	1 MB	1 MB	1 MB	-	-	-
- Disk req.	5 MB	5 MB	5 MB	-	-	-
- Seaboard	Yes	Yes	Yes	Yes	NO	NO
- Mem. req.	64 KB	64 KB	64 KB	64 KB	-	-
- Disk req.	0 KB	0 KB	0 KB	0 KB	-	-
- RSX-11M+	NO	NO	NO	NO	Yes	Yes
- Mem. req.	-	-	-	-	100 KB	100 KB
- Disk req.	-	-	-	-	5 MB	5 MB
FRS	Q3 FY84	Q2 FY85	Q3 FY85	Q3 FY84	Shipping	Q1 FY85
Perf (11/780=1)	.35	.8-.9	.8-.9	.3	.15	.6 (15 MHZ)
Transfer cost.						
-FY84	$ 5,722			$ 9,980	$ 4,065	
-FY85		$ 3,563	$ 4,847			$ 4,419
Price.(MLP)	$ 16,985	$ 13,090	$ 16,964	$ 24,950	$ 12,950	$ 12,700

(1) 22-bit bus address for DMA! DMA I/O may address more than 4MB of main mem.
(2) With 1 MBit chips (9MB with surface mount 256 Kbit chips)

Low-end 16/32-bit system alternatives

Functionality	Definitions:
CPU Implement!	The Technology used in the CPU
System Bus!	
-Type	The type of Bus used
-Data Width	The width of the physical data bus
-Addr Width	The physical address range of the system bus: The logical adressing for MicroVAX is 30-bits, but the physical implementation (0-22) in MicroVAX I & II is only 22-bits.
-Memory	
- Max Address	The maximum physical memory that can be adressed in the system.
- Max system	The max. physical memory that can be implemented in the system box or cabinet.
- Slots (avail)	The numbers of slots available for the user, after the system components are installed.
Disk!	
- Floppy	Size of the mini floppy used.
- Winchester	28MB = RD52
- Other	2x26MB = AZTEC = RC25
NI! (CPU Mod)	Yes = NI chipset implemented on the CPU module NO = No NI chipset implemented.
Software!	
- XXX	The operating system
- Mem. req.	The amount of memory required by the operating system and the utilities.
- Disk req.	The amount of disk space required by the operating system and the utilities.
Perf!(11/780=1)	The performance given for the Low-end systems is for a multi tasking , 1-4 user environment.
FRS/	The data in these columns is given by!
Transfer cost/	MicroVAX I ! Reid Brown
	MicroVAX II ! Sharon Lise
Price.(MLP)	MicroVAX III ! Jan Tuttle
	11/725 ! Business Plan
	Micro/PDP11 ! Business Plan

Notes to System configuration:

(1) The memory size is based on modules with 64K bit chips; except MicroVAX II and III.

(2) The $ 5204 cost for the CPU box includes:

- 3 Board CPU
- 1 MB of memory
- Power supply
- Two TU58's
- Console assembly
- Cable assembly

(3) The MicroVAX II implements anexpension board concept for additional memory to be added to the CPU module. The memory will have to be installed in slot 2 and 3 of the Q-22 backplane (requires CD interconnect)

(4) The MicroVAX III also have a local memory implementation. The memory module will sit on the BI, but will logisk be connected to a memory interconnect on the KA640 CPU module.

(5) The AIE includes NI port, MAYA interface and 8 asynch lines

(6) The AIO module includes MicroVAX chip, BIIC , memory and disk controller for RX and RD53.

(7) Mava (the new streamer tape) can be used instead of the floppy drive (RX50), for an additional T.C cost of $ 300.

(8) The $ 828 cost for packaging includes:

- 874 Power controller
- H9xx Cab/enclosure, bulkheads, etc.
- Mfg build/test

(9) Exclude slot reserved for memory and FPA unit.

(10) The MicroVAX III is designed to be able to attached 24 terminals to the system cabinet. The average number of users on MicroVAX III will be in the range of 8-12.

(11) The prices includes NO software license, except 11/725 which includes VMS DZ license.

APPENDIX 4

MARKET SIZING METHODOLOGY AND ASSUMPTIONS

MicroVAX Program Office

PRODUCT FORECASTING METHODOLOGY

DECISION TREE MODEL
- SUMMARY -

- o Size and segment the market by number of users/ interfaces, (human and machine)

- o Select a range of alternative scenarios for market evolution. Assign a probability of occurrence to each possible scenario. Structure a probability tree to develop a weighted average forecast.

- o Vary the assumptions to test alternative outcomes.

DECISION TREE MODEL

- o Size and Segment the market by number of users/ interfaces

Actual computer shipments by US manufacturers, and non-US manufacturers serving the US marketplace were provided by Joe Menard, VAX BPM. His database is developed using International Data Corp's, (IDC), census sheets. This information segments the computer market into pricebands from $1K to >$625K. The segmentation is based on the average system value at initial purchase; includes software and peripherals sold with the CPU.

The unit shipments for FY81-FY83 were converted to the number of users or interfaces, based on an average number of users per priceband.

PRICEBAND	AVERAGE NUMBER OF USERS
$1-6.25K	1
6.25-16	2
16-40	4
40-100	8
100-250	16
250-625	32
>625	96

The estimated number of computer users is the basis for the market projections. The rationale for this approach was to analyze the available market as objectively as possible. The number of users/interfaces is a finite number in any given year. The computer solution to these users is varied, but the number of users remains constant.

Ex. 100 users/interfaces could be satisfied with one VAX 11/780 solution or 100 PRO-350's.

- o Structure Probability (Decision) Tree

Using the calculated number of users for FY83 as the starting point, a decision tree approach was utilized to model a weighted average five year forecast for the computer market. The forecast is segmented by priceband, total units and dollars, 32-bit units and dollars, and non-32 bit units and dollars. This analytical tool allows the decision maker to develop alternative outcomes for each decision. Each scenario is weighted by a probability of occurrence, the sum equalling 100%. This technique was used to reflect the wide variety of computer solutions a user can select for its needs.

The model specifically analyzes three alternative solution paths for the user/interface.

Moderate Product Mix Path

Relatively even mix of high end (>$40K) solutions and low end (<$40K)

Ex. 50% of 100 users select one VAX 11/780
25% select 25 PRO-350's
25% select 6 MPDP-11's (avg. #users/system = 4)

Total users = 100
High end units = 1
Low end units = 31

Total units = 32

Low End Multi-user path

Majority of users are satisfied with the cost/performance characteristics of the low end; and desire multi-user solutions.

Ex. 70% of 100 users select a low end product
65% of these are multi-user (MPDP-11)
35% are single users (PRO-350)
the remaining 30% demand a high end product (VAX 11/750)

Total users = 100
High end units = 1
Low end units = 35

Total units = 36

Low End Single-user path

Majority of users select a low end product; and desire more single user solutions.

Ex. 70% of 100 users select a low end product
65% of these are single-user
35% are multi-user
the remaining 30% demand a high end product

Total users = 100
High end units = 1
Low end units = 52

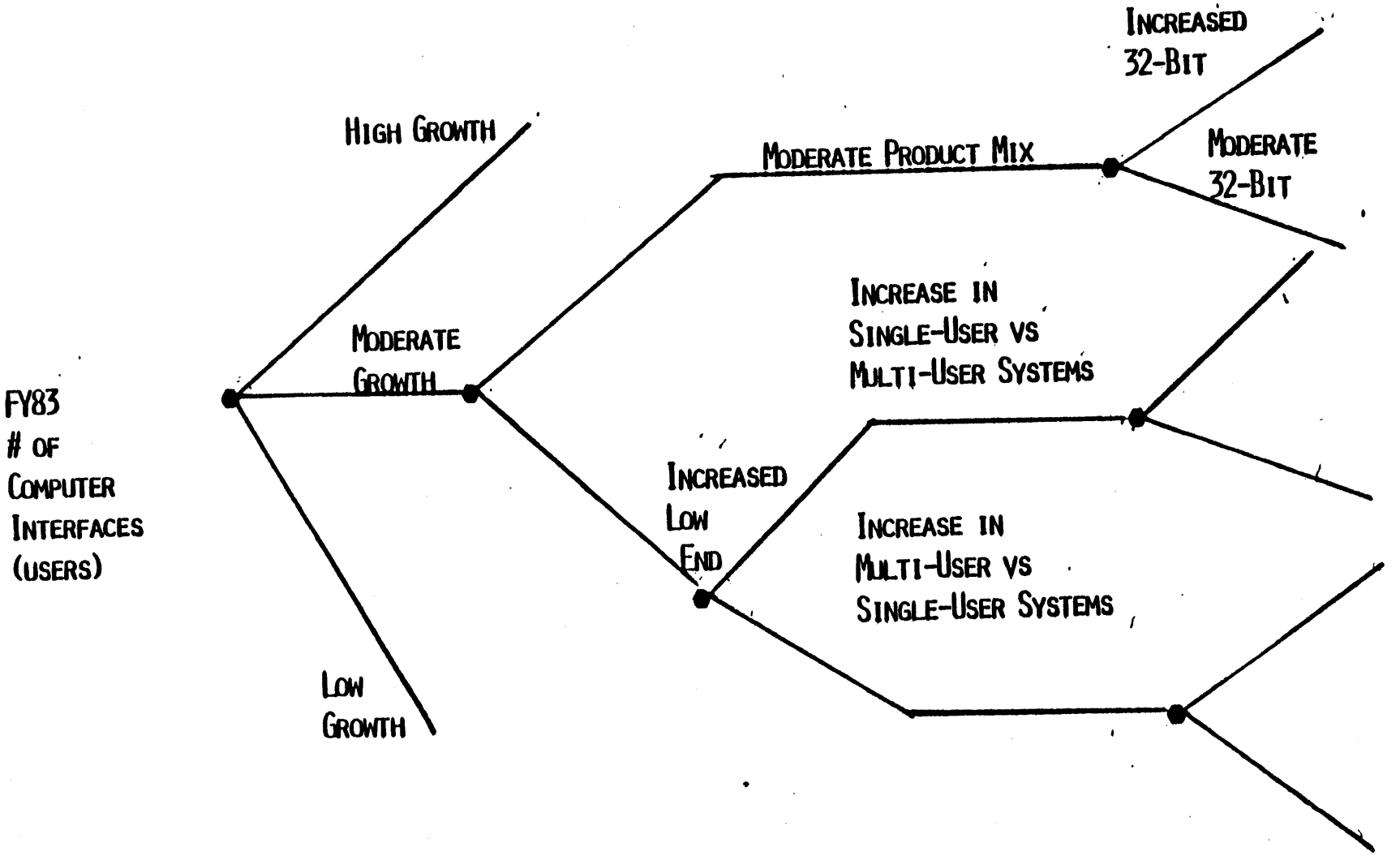
Total units = 53

Once the product mix is determined, the decision concerning 16 vs. 32 bit is modeled. The basis for the split between architecture is an understanding of the mix today and estimates of 32-bit future penetration. Penetration estimates were formulated from inputs from VAX BPM and Product Management. The MicroVAX Program Office has contracted with IDC to specifically analyze the 32-bit low end market. The published data will be incorporated into the model's assumptions.

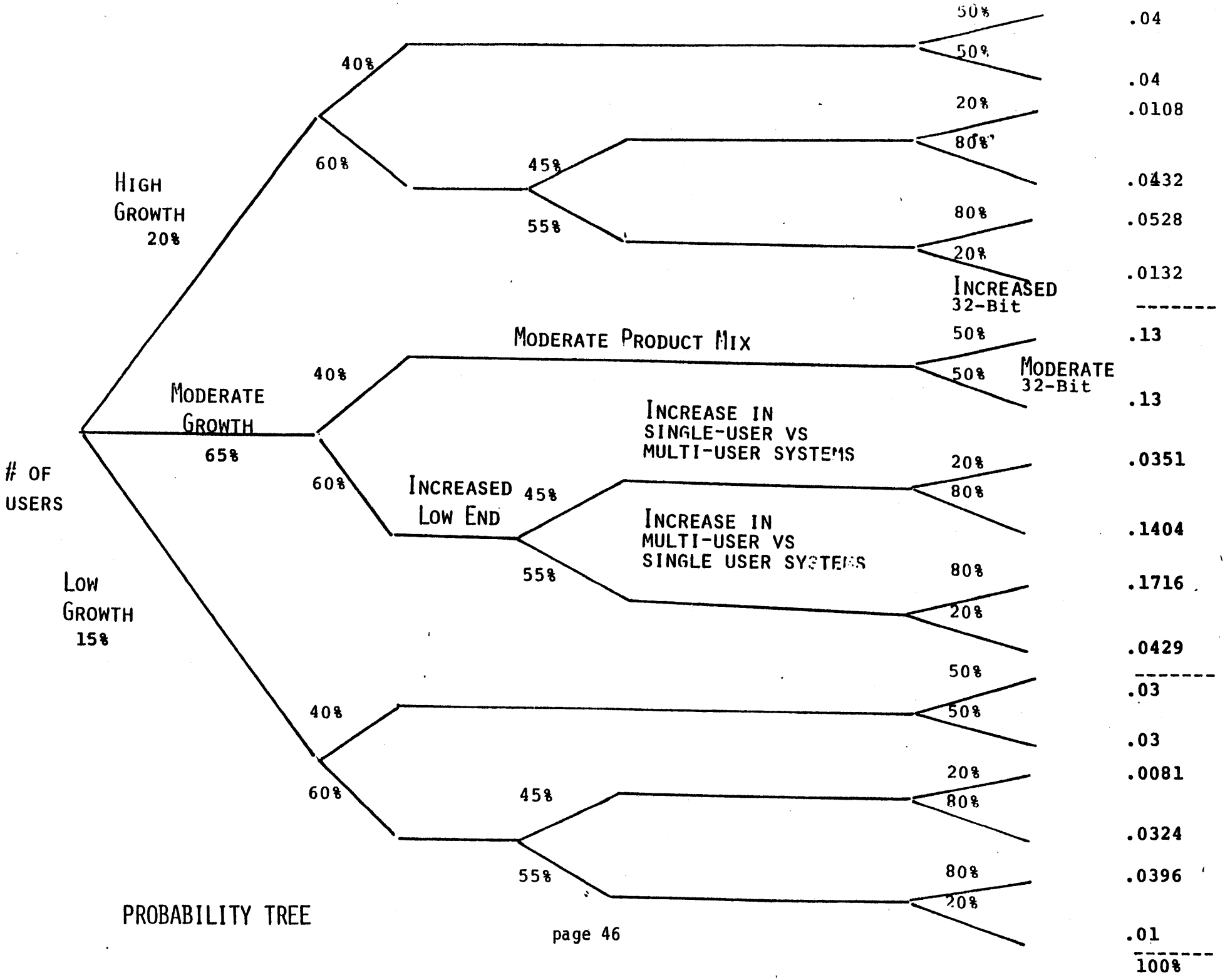
The following chart details the final assumptions used to forecast the low end market. The % fiqures refer to the % of users. For simplicity, only three years are illustrated. The decision model is also shown with the assigned probabilities of each solution path

MICROVAX PROGRAM OFFICE
MARKET SIZING MODEL

PROBABILITY TREE



● DECISION POINTS



PROBABILITY TREE

DECISION POINTS

Decision point	Decision	Assumptions			
1	growth forecast for the number of users	High path :	30% /yr	(FY84-86)	
			25%	(FY87-88)	
		Moderate :	20% /yr	(FY84-86)	
			15%	(FY87-88)	
		Low :	15% /yr	(FY84-86)	
			10%	(FY87-88)	

			FY83	FY85	FY87
2	product mix (% of users demanding low end solutions)	Moderate Path:	55%	62%	70%
		Increased Low:	55%	64%	72%

		Single-user path:	FY83	FY85	FY87
3	single-user vs multi-user low end solution (% of users)	1-6.25K :	62%	66%	67%
		6.25-16 :	19	19	20
		16-40 :	18	15	13
		Multi-user path:			
		1.-6.25 :	62%	52%	44%
		6.25-16 :	20	24	29
		16-40 :	18	21	26

		Moderate Penetration :	FY83	FY85	FY87
4	32-bit penetration (penetration %)	1-6.25 :	-	4%	26%
		6.25-16 :	-	15	45
		16-40 :	10	31	55
		Increased Penetration :			
		1-6.25 :	-	5%	26%
		6.25-16 :	-	20	45
		16-40 :	10	35	55

This methodology results in a forecast of the total available market by priceband. (Appendix 1). The forecast was compared to market research conducted by external firms. Infocorp's forecast of the low end market was used for comparison as they follow a similar priceband segmentation as the model.

TOTAL AVAILABLE MARKET BY PRICEBAND

- UNITS -

		FY84	FY85	FY86	FY87
$1-6.25K	Infocorp	2671	3673	4425	4980
	Model	2360	2960	3760	4560
	%	11%	19%	15%	8%
$6.25-16	Infocorp	421	522	594	657
	Model	370	500	690	890
	%	12%	4%	16%	35%
$16-40	Infocorp	186	222	270	338
	Model	156	204	260	332
	%	16%	8%	4%	2%

The comparison shows the model to be fairly consistent, within 20% of external forecasts.

MARKET SEGMENTATION

The total available market was further segmented by product type, application and architecture. The segmentation analysis creates a multi-dimensional view of the low end computer market. Each dimension can be compared with external market data for reasonableness in addition to providing a method to understand the growth potential of each segment.

Using market information from Dataquest, Infocorp, Digital BPM plans, and VAX BPM, the market was segmented by priceband and application.

TAM BY APPLICATION AND BY PRICEBAND
- Inputs -

$1-6.25	Technical	17%
	Office	54
	Education	14
	Home/Other	15
		100%
$6.25-16	Technical	38%
	Office	58
	Education	3
	Home/Other	1
		100%
$16-40	Technical	48%
	Office	46
	Education	5
	Home/Other	1
		100%

Technical : Industrial, scientific, manufacturing, laboratory applications

Office : Small business, F1350, word processing applications

Education : School systems, Universities, student use

Home/Other: Home use, Small EDP applications

The application by priceband segmentation was further segmented by product type. This information was compared to both internal and external market research.

TOTAL AVAILABLE MARKET BY PRODUCT

- UNITS -

		FY84	FY85	FY86	FY87
Multi-User	IDC	208	318	412	563
	Model	251	334	444	570
	%	21%	5%	8%	1%
Single-user	IDC	2975	4106	5341	6812
	Model	2475	3130	3986	4852
	%	17%	23%	25%	29%
Components	OEM Group	139	185	250	345
	Model	160	200	280	360
	%	15%	8%	12%	4%

Systems : Multi-user computers

Desktop : Single-user personal computers and workstations

Components : Board and box products

TOTAL AVAILABLE MARKET
(Revised 12/5)

- PRODUCT -

	FY84		FY85		FY86		FY87		FY88	
	$	Units	$	Units	$	Units	$	Units	$	Units
Multi-user										
1-6.25	-	-	-	-	-	-	-	-	-	-
6.25-16	$1.3	131	$1.7	176	$2.5	244	$3.2	313	$3.9	389
16-40	3.0	120	4.0	158	5.0	200	6.4	257	8.2	329
Total	$4.3	251	$5.7	334	$7.5	444	$9.6	570	$12.1	718
Single-user										
1-6.25	5.5	2200	6.9	2760	8.7	3480	10.5	4200	12.9	5160
6.25-16	2.4	240	3.3	324	4.5	446	5.7	577	7.2	720
16-40	.9	35	1.1	46	1.4	60	1.9	75	2.4	95
Total	$8.8	2475	11.3	3130	14.6	3986	18.1	4852	22.5	5975
Components										
1-6.25	.4	160	.5	200	.7	280	.9	360	1.0	400
6.25-16	-	-	-	-	-	-	-	-	-	-
16-40	-	-	-	-	-	-	-	-	-	-
Total	$ .4	160	.5	200	.7	280	.9	360	1.0	400