MARKET ANALYSIS AND FORECASTS - OFFICE PRODUCTS

INPUT

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Offices

NORTH AMERICA

Headquarters
1943 Landings Drive
Mountain View, CA
94043
(415) 960-3990
Telex 171407

Detroit
220 East Huron
Suite 209
Ann Arbor, MI 48104
(313) 971-0667

New York
Park 80 Plaza West-1
Saddle Brook, NJ 07662
(201) 368-9471
Telex 134630

Washington, D.C.
11820 Parklawn Drive
Suite 201
Rockville, MD 20852
(301) 231-7350

EUROPE

United Kingdom
INPUT, Ltd.
Airwork House
35 Piccadilly
London, W1V 9PB
England
01-439-8985
Telex 23116

France
La Nacelle
Procedure d'abonnement 1-74
2, rue Campagne Premiere
75014 Paris
France
322.56.46
Telex 220064 X5533

Italy
PGP Sistema SRL
20127 Milano
Via Soperga 36
Italy
Milan 284-2850
Telex 310352

Sweden
Athena Konsult AB
Box 22232
S-104 22 Stockholm
Sweden
08-542025
Telex 17041

ASIA/AUSTRALIA

Japan
ODS Corporation
Shugetsu Building
No. 12-7 Kita Aoyama
3-Chome Minato-ku
Tokyo, 107
Japan
(03) 400-7090
Telex 26487

K.K. Ashisuto
Daini-Suzumaru Bldg., 6th Floor
8-1, Nishi Shimbashi
3-Chome Minato-ku
Tokyo, 105, Japan
(03) 437-0654
Telex 781 26196

Singapore
Cyberware Consultants (PTE) Ltd.
2902 Pangkor
Ardmore Park
Singapore 1025
734-8142

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Planning Services For Management

SERVICE MARKET ANALYSIS AND FORECASTS
OFFICE PRODUCTS

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SERVICE MARKET ANALYSIS AND FORECASTS
OFFICE PRODUCTS

EXHIBITS

1 INTRODUCTION

I INTRODUCTION

- This report, Service Market Analysis and Forecasts: Office Products, is the final in a series of four reports provided by INPUT on the service and support of office products. The purpose of this report is to identify and highlight the major trends in the rapidly evolving office product service market, to illustrate how these trends will affect future service operation, and to provide recommendations on how to best prepare and take advantage of these changes in the office product service market.

- The report is broken down into five main sections:

  - An executive summary designed to quickly summarize key points presented in the report.

  - A detailed analysis and forecast of the office product marketplace, broken down by product type.

  - An analysis of product changes and their effect on the service market.

  - An analysis of the developments in office product service, including revenue sources, profitability, and pricing.

  - A presentation of short-term objectives and long-term goals that will aid the office product service vendor meet the challenges ahead.

- The information found in this report is derived from primary research, including both user and vendor surveys conducted by telephone and in-house. The questionnaires used throughout the year can be found in Appendices A, B, and C of this report.

II EXECUTIVE SUMMARY

II EXECUTIVE SUMMARY

- This executive summary is designed in presentation format in order to provide key research findings and observations in a quick and orderly format. The exhibits are placed on the left-hand pages with the corresponding text on the facing pages.

- The office product service market demonstrates both the chaos and growth that one expects in any immature but rapidly growing environment. The goal of this study is to explore the changes in customer services as influenced by user demand and by increased technological development.

A. GROWTH IN THE OFFICE PRODUCT SERVICE MARKET, 1984-1989

- With the introduction and eventual acceptance of the personal computer in corporate America, the role of the office products vendor changed in order to satisfy a growing need for inexpensive, integrated office function. Although the existence of true office automation may be argued, the popularity of the personal computer and the desire to integrate with other office products (word processor, PBX, etc.) has sparked a dramatic growth market.

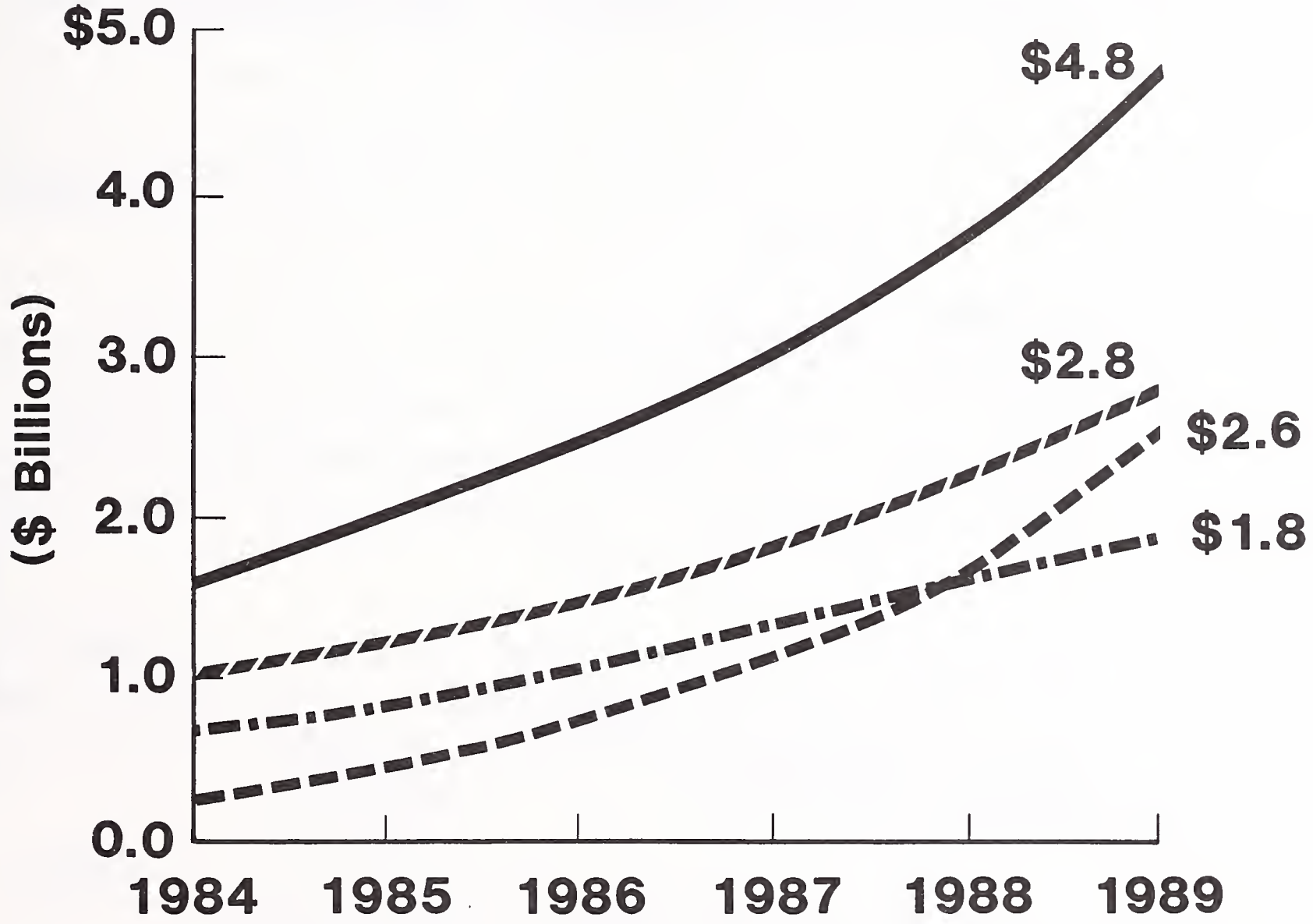
- The trend toward integrating is but one factor in the growth of office products that can be expected between 1984 to 1989. As shown in Exhibit II-1, the fastest service growth can be expected in multiuser workstations, which have evolved to encompass multiuser personal computers like the IBM PC AT.

- Word processor service should benefit from the industry trend toward linking personal computers and word processors and the movement away from single-user, single-function word processors to mutlifunction, multitasking office systems. Word processing vendors must continue to market the quality of their postsale support in order to continue this growth.

- Obvious benefactors in the drive for office automation are the end-user markets of terminals and printers. Technological advances in product design, such as increased modularization, should further encourage service profitability by increasing reliability and reducing service costs.

EXHIBIT II-1

GROWTH IN THE OFFICE PRODUCT SERVICE MARKET, 1984-1989



	Service 1984-1989 AAGR
——— - Printer/Terminals	24%
- - - - - Word Processors	22
-·-·- Personal Computer	24
— — — Workstations	57

B. MANUFACTURERS GAINING CONTROL OF PERSONAL COMPUTER SERVICE

- In the past, it was often necessary for office product vendors to rely on dealers, distributors, and third-party maintenance organizations to provide product service and support to end users. Part of the reason for this was the tremendous costs involved in providing adequate service to a rapidly expanding and uncontrolled product base. Even IBM, with its massive service structure, relied on others to support its personal computers until mid-1983.

- Eventually, as the product base became more controlled, and spurred by increased user pressure for more direct and improved service, office product vendors took a more affirmative stance toward providing direct service and support to their users. Still, TPM and dealer/distributors controlled the majority of personal computer service and support in 1984, as shown in Exhibit II-2.

- By 1989, manufacturer-supplied service should grow at a much faster rate (35% AAGR) than TPM and dealer/distributor-supplied service, and should become the dominant source of personal computer service. Major factors causing this change include:

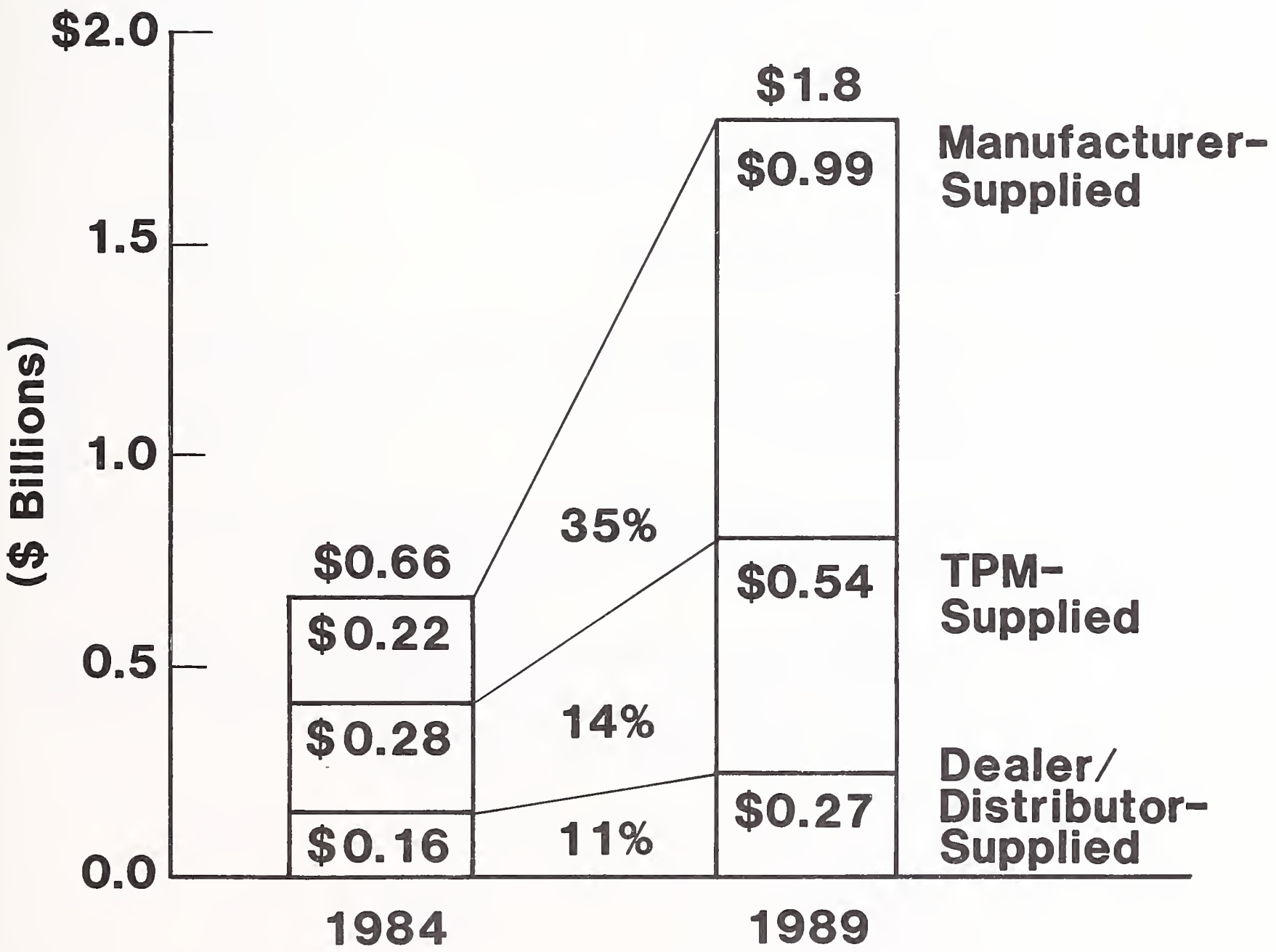
  - A more dominant role by IBM in the support of its products, especially the more sophisticated multiuser business PCs.

  - Increased user demand for service as their products become more integrated into existing data processing equipment.

  - Increased profitability of service, due to reduced costs resulting from improved reliability and more segmented and defined user base.

EXHIBIT II-2

MANUFACTURERS GAINING CONTROL OF PERSONAL COMPUTER SERVICE



Total PC Service 24% AAGR

C. INCREASED DEMAND FOR ON-SITE SERVICE

- In the past, office product service, particularly personal computer service, was delivered to the user through depot-like services, most often carry-in or ship-in, to a centralized or regionalized service location.

- Between 1983 and 1984, increased manufacturer participation in the servicing of office products provided the impetus to the rise in on-site service. Exhibit II-3 demonstrates that on-site service for personal computers should grow significantly between 1984 and 1989, becoming the predominant service delivery method for hardware maintenance.

- Key factors in this growth will be:

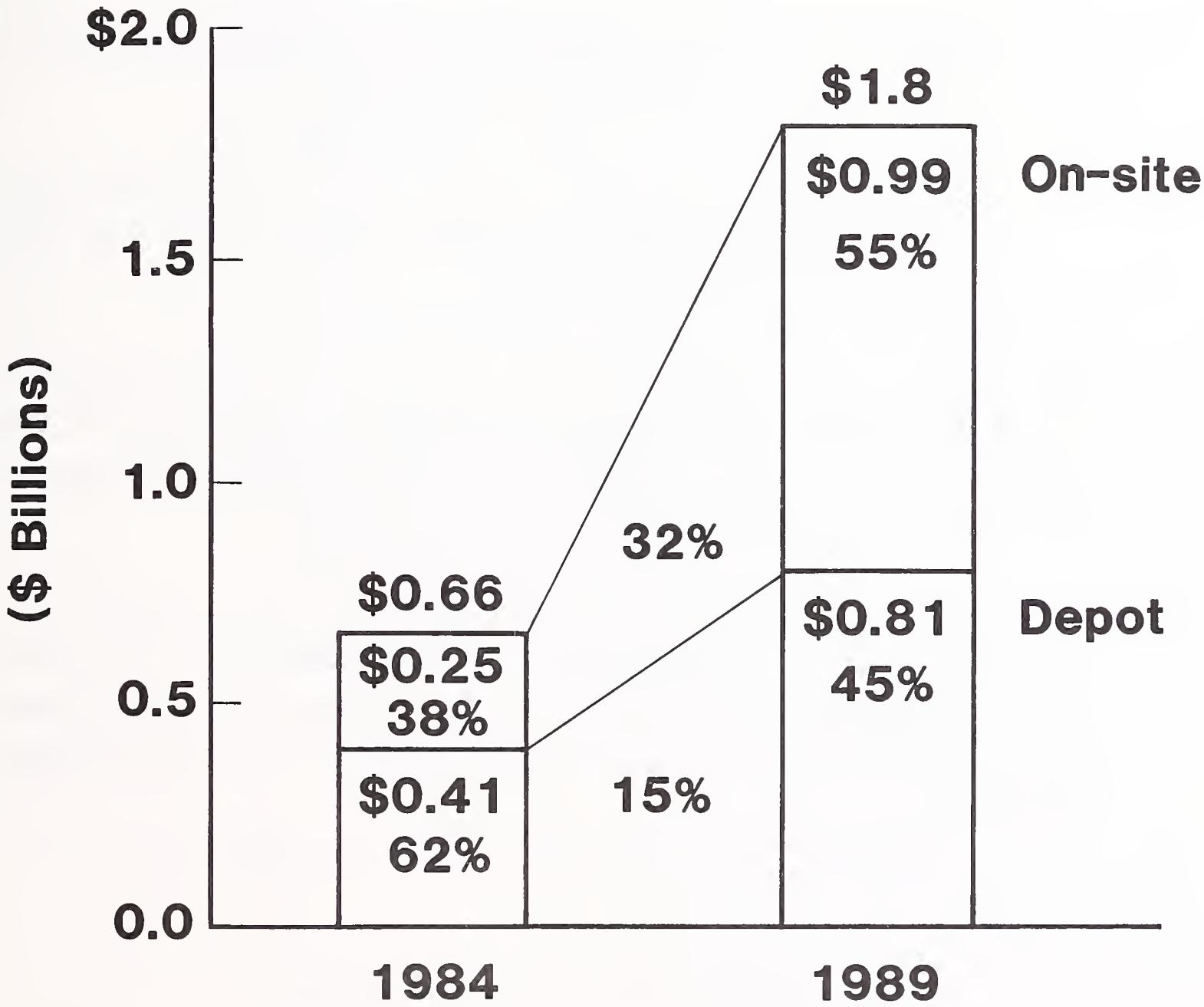
  - Increased sophistication of both hardware configurations and software applications, including networked systems and micro-mainframe connections.

  - Increased user demand for on-site service, as depot service will become both inconvenient and (in network systems) impossible.

  - Increased product density will lower the costs of providing on-site service to users, providing vendors with an upgraded service offering to users who will be willing to pay for it.

EXHIBIT II-3

INCREASED DEMAND FOR ON-SITE SERVICE



Total PC Service AAGR 24%

D. FUTURE TRENDS IN OFFICE PRODUCT SERVICE

- In the past, office product vendors considered service "unmentionable" or a "necessary evil". Now, however, office product service will contribute more profit to the company's bottom line. A number of factors will influence this movement:

  - Increased user demand for service as a result of increasingly sophisticated and integrated office automation systems.

  - Decreased product dispersion will aid vendors in segmenting their service market, encouraging the development of full service menus and assisting in the marketing of service.

- Office product service vendors will need to address the increased demand for service requirements by developing and implementing a full-service menu that satisfies the increased user requirement for on-site service, software support, consulting, documentation, training, and network support.

- To implement such a plan successfully vendors will need to take a more "proactive" approach to marketing of services, by increasing their understanding of both present and future user needs. With this increased knowledge, vendors will be able to present service offerings to a less price-sensitive user market.

EXHIBIT II-4

FUTURE TRENDS IN OFFICE PRODUCT SERVICE

- Office Products Moving Toward Integrated Systems
  - Multiuser Personal Computer
  - Micro-Mainframe Connections
  - Multifunction Word Processors
- Users Demanding Expanded and Improved Service
  - On-Site Service
  - Software Support
  - Complete Network Support
- Successful Service Strategy
  - Increase Marketing of Service
  - Single-Source of Service
  - Full-Service Menu

III OFFICE PRODUCT CUSTOMER SERVICE MARKET AND FORECAST

III OFFICE PRODUCT CUSTOMER SERVICE MARKET AND FORECAST

A. TOTAL CUSTOMER SERVICE MARKET, 1984-1989

- Encouraged by an improved economy and by improved product releases, the overall computer market showed a healthy increase over 1983, with a total growth of over 15% in equipment shipments. For the most part, this growth can be attributed to the tremendous growth in the office products and telecommunications markets. Indeed, all equipment categories exhibited shipment increases from 1983 to 1984.

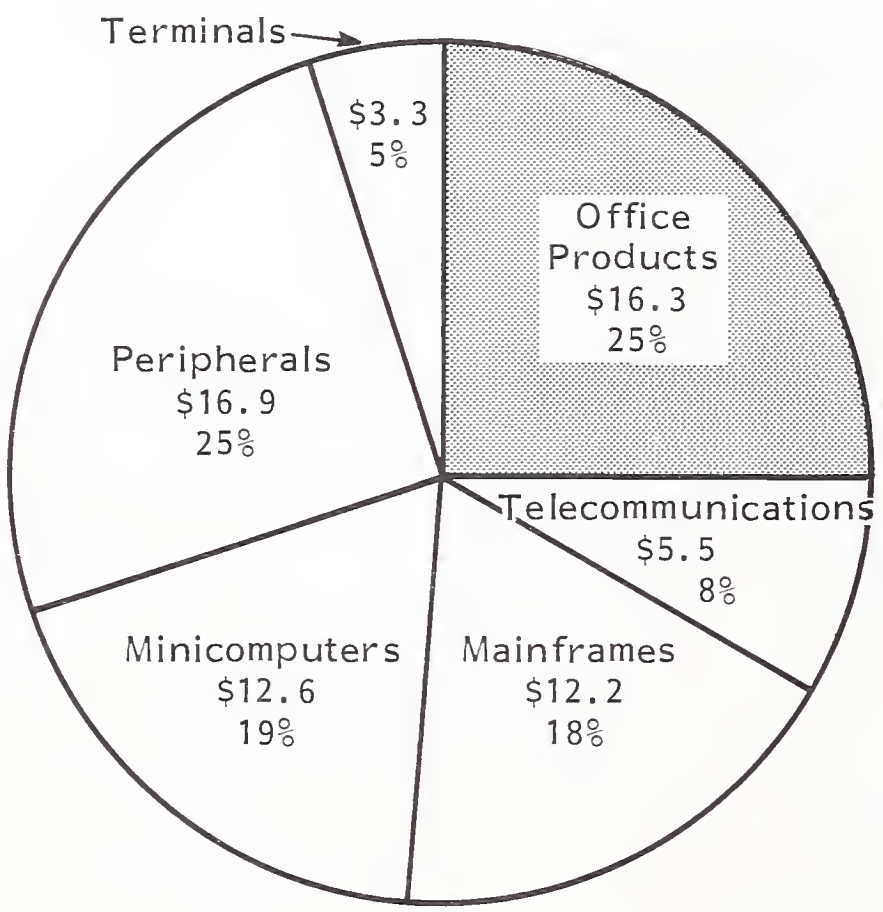
- Exhibit III-1 provides a view of the current data processing equipment market in 1984. Total DP equipment shipments will hit $66.8 billion in 1984, an increase of 15% over 1983. What can be seen from this exhibit is the increased importance of the office product market, which has captured one-fourth of the total DP market.

- Exhibit III-2 presents the customer services market by product market, which totaled $11.6 billion in 1984. The large service market shares held by mainframes and peripheral products reflect the importance of service traditionally associated with these groups, which require the greatest amount of service, both in respect to user needs and in labor intensity.

- Office products already hold a significant share of the service market in 1984, with $2.4 billion (or 21% of the total market) spent on customer service. The

EXHIBIT III-1

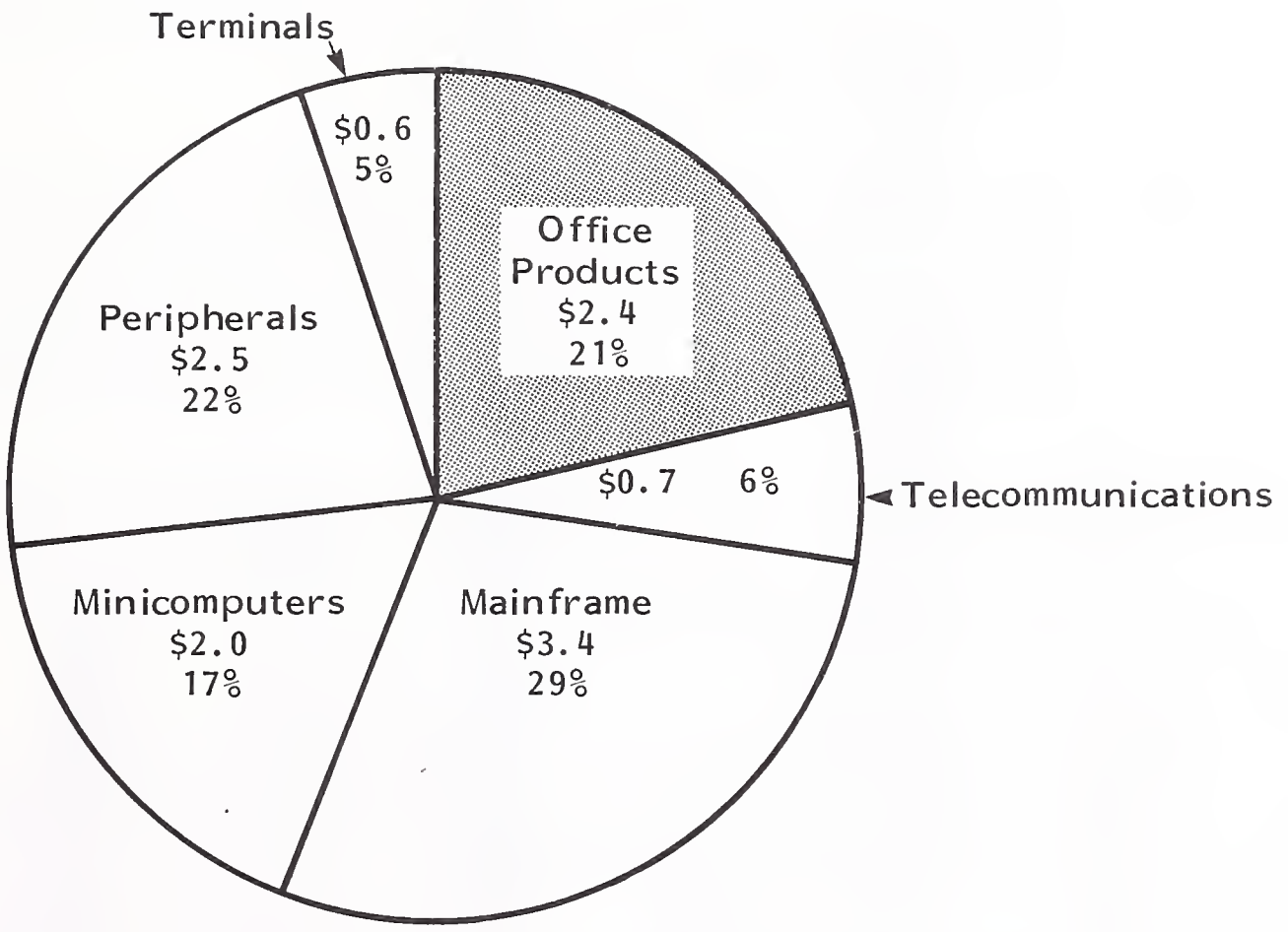
1984 DATA PROCESSING EQUIPMENT SHIPMENTS
($ Billions)



Total Shipments in 1984 = $66.8 Billion

EXHIBIT III-2

1984 CUSTOMER SERVICE REVENUES BY MARKET
($ Billions)



Total Service Revenue in 1984 = $11.6 Billion

dramatic growth of the personal computer, along with the more established service markets for word processors and copiers has contributed greatly to the size of the office products service market.

- Exhibit III-3 demonstrates the tremendous opportunities presented by the growth in office products and telecommunications markets, with average annual growth rates of 16% and 31% respectively. Contributing heavily to this growth is the increasing move toward office automation in the medium-to-large corporations in the U.S.

- The minicomputer will demonstrate continually slower growth rates as the personal computer market, through rapid technological advances in design and capabilities, begins to eat into the lower end of the market, just as the minicomputer market ate into the mainframe market during the sixties.

- The peripherals market, which in the past has been a high growth area, will begin to slow as the increased use of networking will bring about shared storage and output devices.

- The terminals market, on the other hand, will continue to show steady increases--the only threat to it will be the potential use of personal computers as terminals, i.e., the IBM 3270/PC.

- Exhibit III-4 provides a glimpse of the 1989 DP equipment shipments forecast, reflecting the growth in the office products and telecommunications market segments, which will grow to $33.8 billion (a 25% share of the total shipments market) and $21.2 billion (a 15.7% share of the market), respectively. Consequently, mainframes and minicomputers will continue to lose shares of the market, shrinking from a combined 37% of the total market in 1984 to 28% of the total market in 1989.

- The fastest growing segment of the customer service market is telecommunications, which will grow from $0.7 billion in 1984 to $2.7 billion in 1989,

EXHIBIT III-3

DATA PROCESSING EQUIPMENT SHIPMENT FORECAST
1984-1989

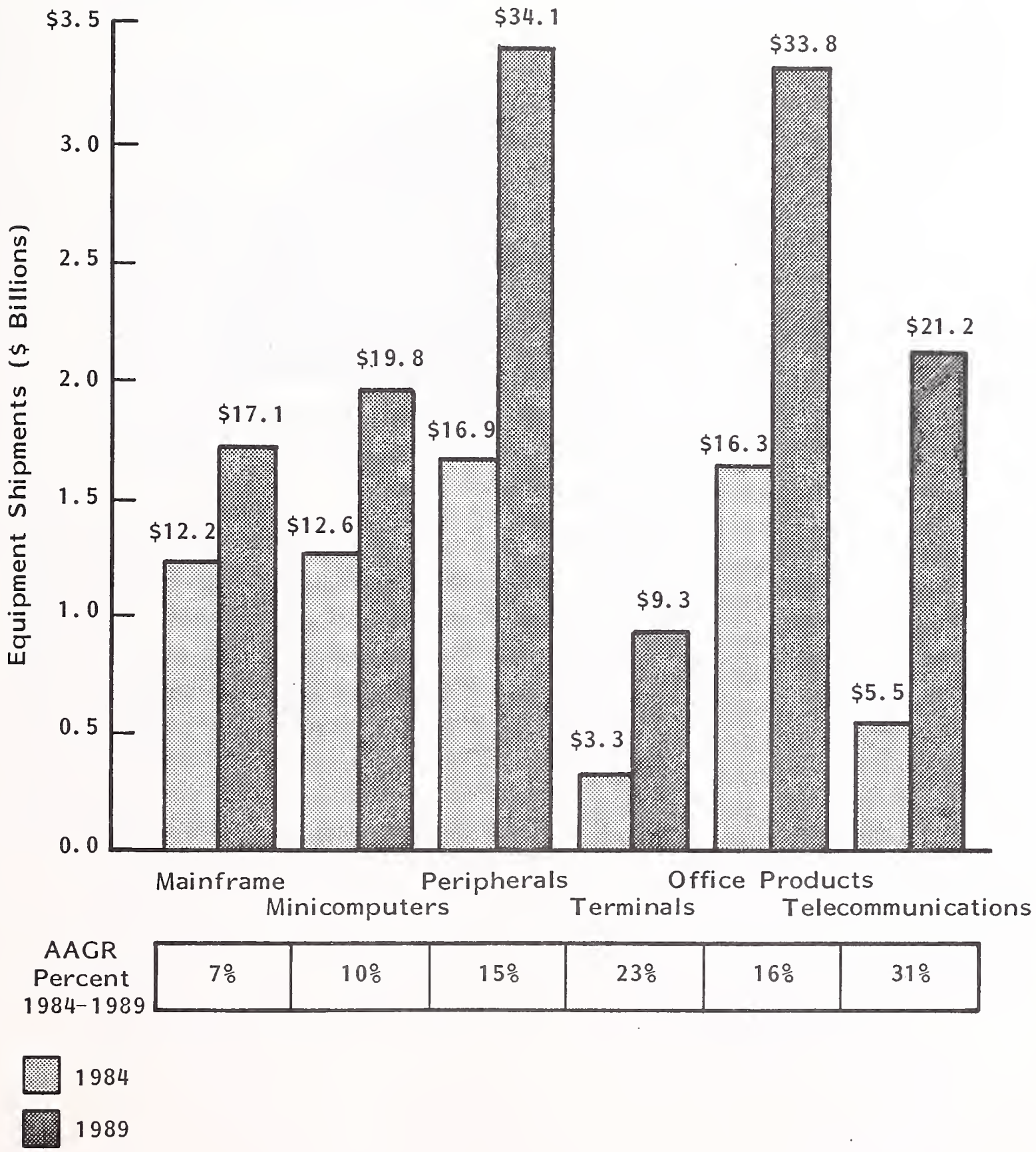
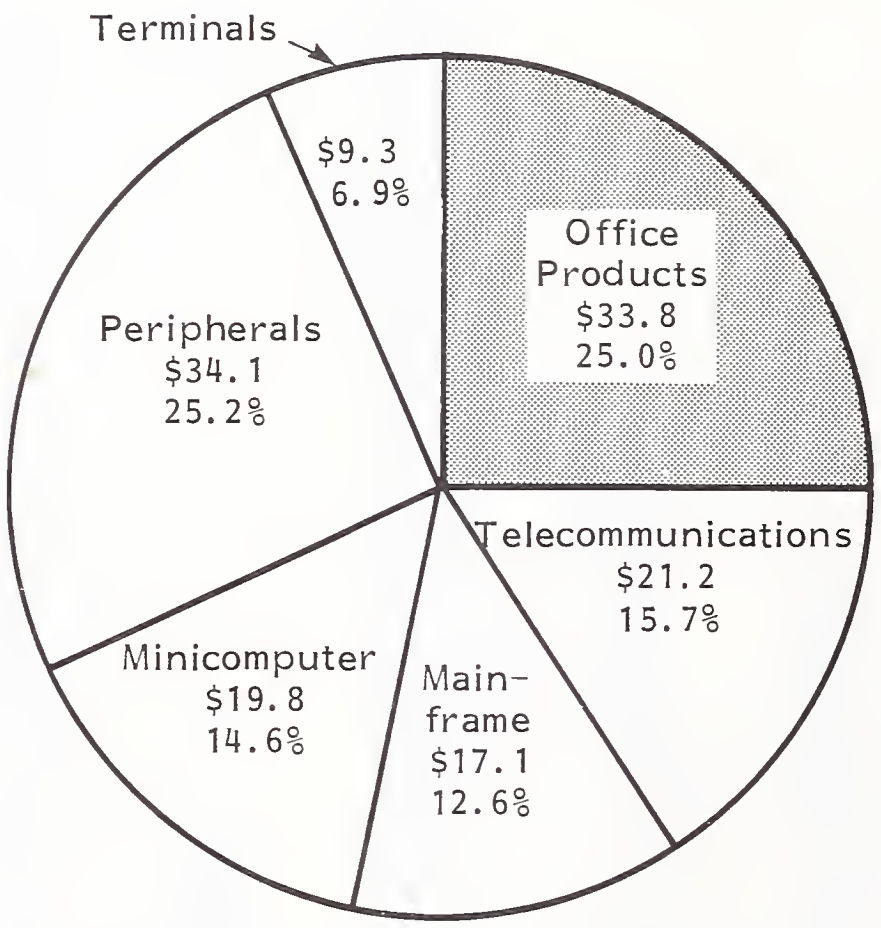


EXHIBIT III-4

1989 DATA PROCESSING EQUIPMENT SHIPMENTS (Forecast)
($ Billions)



Total 1989 Equipment Shipments Forecast = $135.3 Billion

1984-1989 AAGR = 15.2%

representing a 31% average annual growth rate, as shown in Exhibit III-5. The rapid integration of data processing and data communications functions within the corporation has uncovered almost unlimited potential for the support and service of telecommunications equipment. Since the integrity of the information transferred is wholly dependent upon the functionality of the data communications equipment, user requirements for telecommunication service and support will always be high.

- The customer services market will grow at a rate of 17.5% per year, faster than the equipment shipments increases, as shown by Exhibit III-6.

- The tremendous growth of the personal computer industry, spurred by increasingly functional machines, has contributed to dramatic growth in the office product customer service segment, which will grow from $2.4 billion in 1984 to $6.5 billion in 1989, representing a 22% average annual growth rate. Increased use of networks, micro-mainframe applications, and the stabilization of the personal computer product base will contribute to the growing acknowledgement of the importance of service to personal computer users.

- This swing toward office product and telecommunications service will cause a dramatically changed customer service market in 1989, as shown in Exhibit III-6. Mainframe and minicomputer service, while still a sizeable part of the service market, will continue to lose market share, while office products and telecommunications service will assume a larger portion of the customer service market.

- This movement in the service market points out areas of opportunity for service growth, both for manufacturers of equipment servicing their own equipment, and for service organizations desiring to pick up additional service customers by providing third-party maintenance and support for competitive products. Exhibit III-7 demonstrates the product types with the greatest service growth potential by showing the incremental service revenue.

EXHIBIT III-5

DATA PROCESSING EQUIPMENT CUSTOMER SERVICE FORECAST
1984-1989

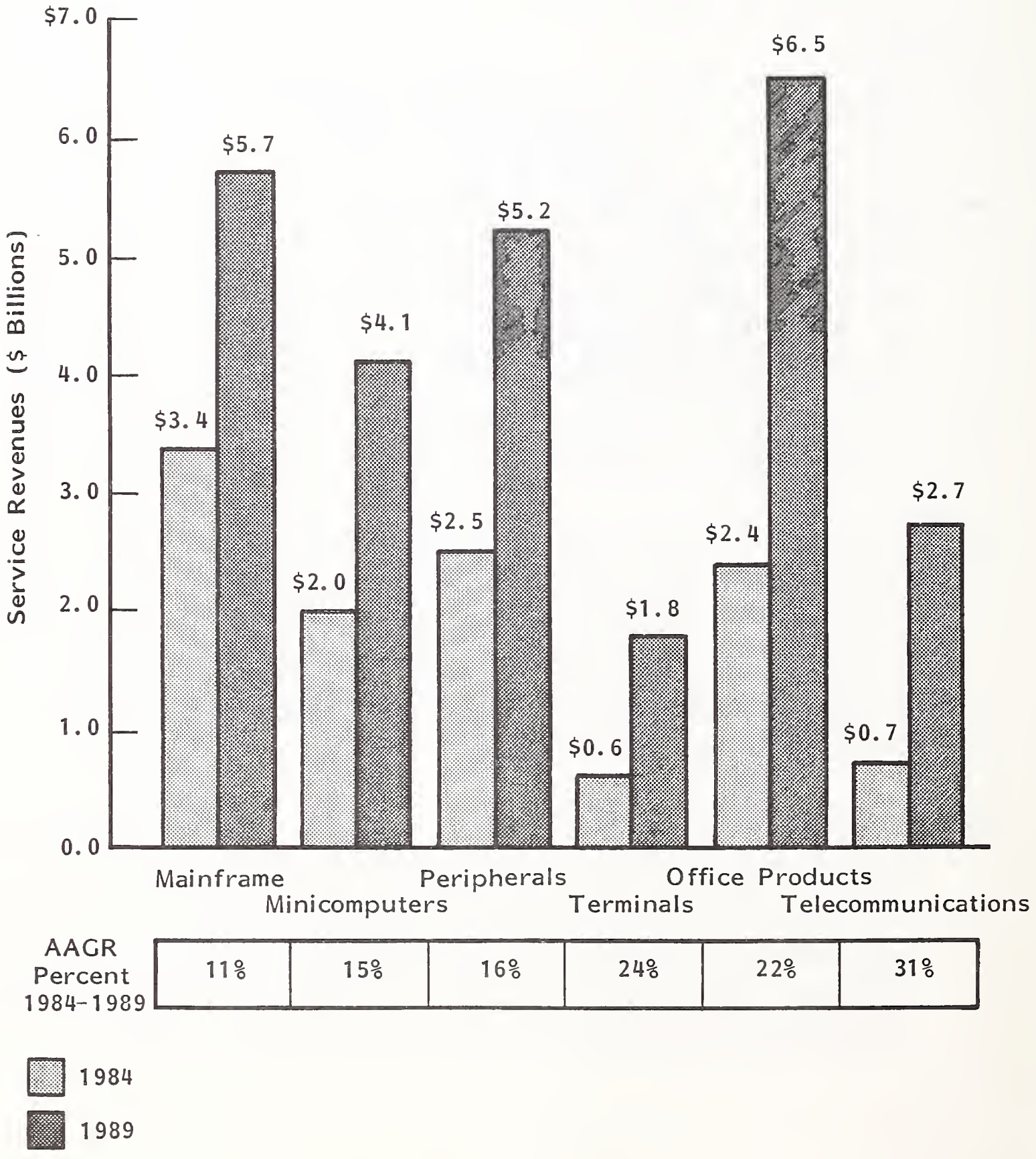
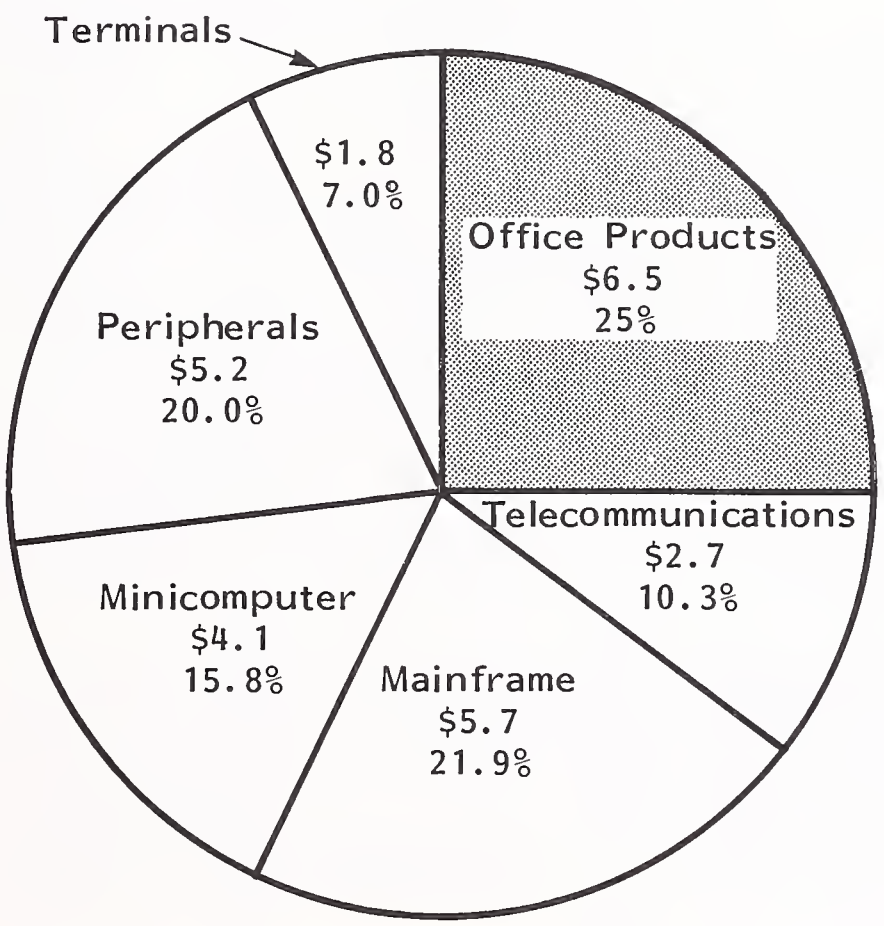


EXHIBIT III-6

1989 CUSTOMER SERVICES REVENUES BY MARKET (Forecast)
($ Billions)

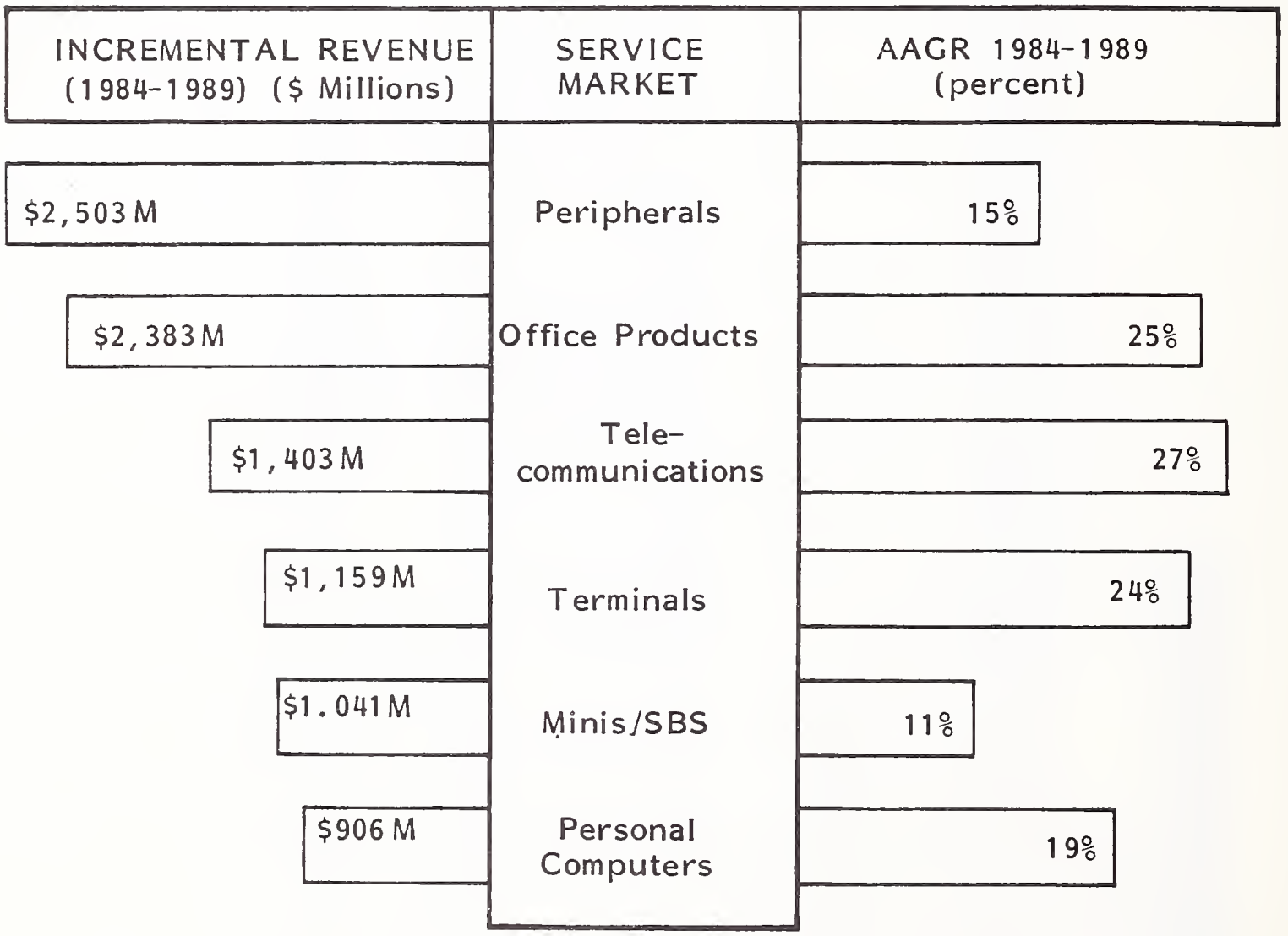


Total Service Revenue Forecast in 1989 = $26.0 Billion

1984-1989 Total Service AAGR = 17.5%

EXHIBIT III-7

LEADING SOURCES OF NEW SERVICE REVENUE
BY SERVICE MARKET



- The growth of service is further illustrated by Exhibit III-8, which shows that for all markets (excluding teminals) service is growing as a percentage of total shipments, even in high sales growth markets like office products. The dropin service as a percentage of the terminal market is a result of the increased use of modular and component exchange as a service technique in maintaining terminals.

B. OFFICE PRODUCT SERVICE MARKET, 1984-1989

- As previously indicated, the office product market, both for equipment sales and for service, is growing at a very rapid rate. The desire for increased office automation is a key driving force behind this growth, as corporate America finds products that can do office activities in easier, faster, and better ways. Continued growth is then spurred by the desire to improve upon the products--to make them even easier to use, more reliable, and faster than the existing products.

- Office automation is driven by the desire to integrate all these products in order to better coordinate the functions of the office place. The eventual goal of office automation is the coordination and integration of the five basic activities of the automated office:

  - Data processing.
  - Word (or text) processing.
  - Voice processing.
  - Image processing.
  - Human interaction.

EXHIBIT III-8

SERVICE REVENUE IN RELATION TO EQUIPMENT SHIPMENTS
($ Billions)

MARKET SEGMENT	1984			1989			1984-1989 % △
	Equipment Shipments	Service	Service as a Percent of Shipments	Equipment Shipments	Service	Service as a Percent of Shipments	
Mainframe	$12.2	$ 3.4	27.9%	$ 17.1	$ 5.7	33.3%	19.4%
Minicomputer	12.6	2.0	15.9	19.8	4.0	20.2	27.0
Peripherals	16.9	2.5	14.8	34.1	5.3	15.5	4.7
Terminals	3.3	0.6	18.2	9.3	1.2	12.9	(29.1)
Office Products	16.3	2.4	14.7	33.8	6.5	19.2	30.6
Telecommunications	5.5	0.7	12.7	21.2	2.7	12.7	8.0
Total	$66.8	$11.6	17.4%	$135.3	$25.4	18.8%	8.0%

- The single-user personal computer has been a cornerstone in the office automation movement, for it represented an inexpensive vehicle that addressed a number of office automation needs, including data processing, word processing, and telecommunications. However, the rapid technological advances that have contributed to this growth will actually slow the growth of single-user personal computers over the next five years. Starting in 1985, single-user personal computers may go the way of single-user, single-function word processors in large corporations, if the expected move toward multiuser personal computers, such as the IBM PC AT and the AT&T PC 6300, comes true.

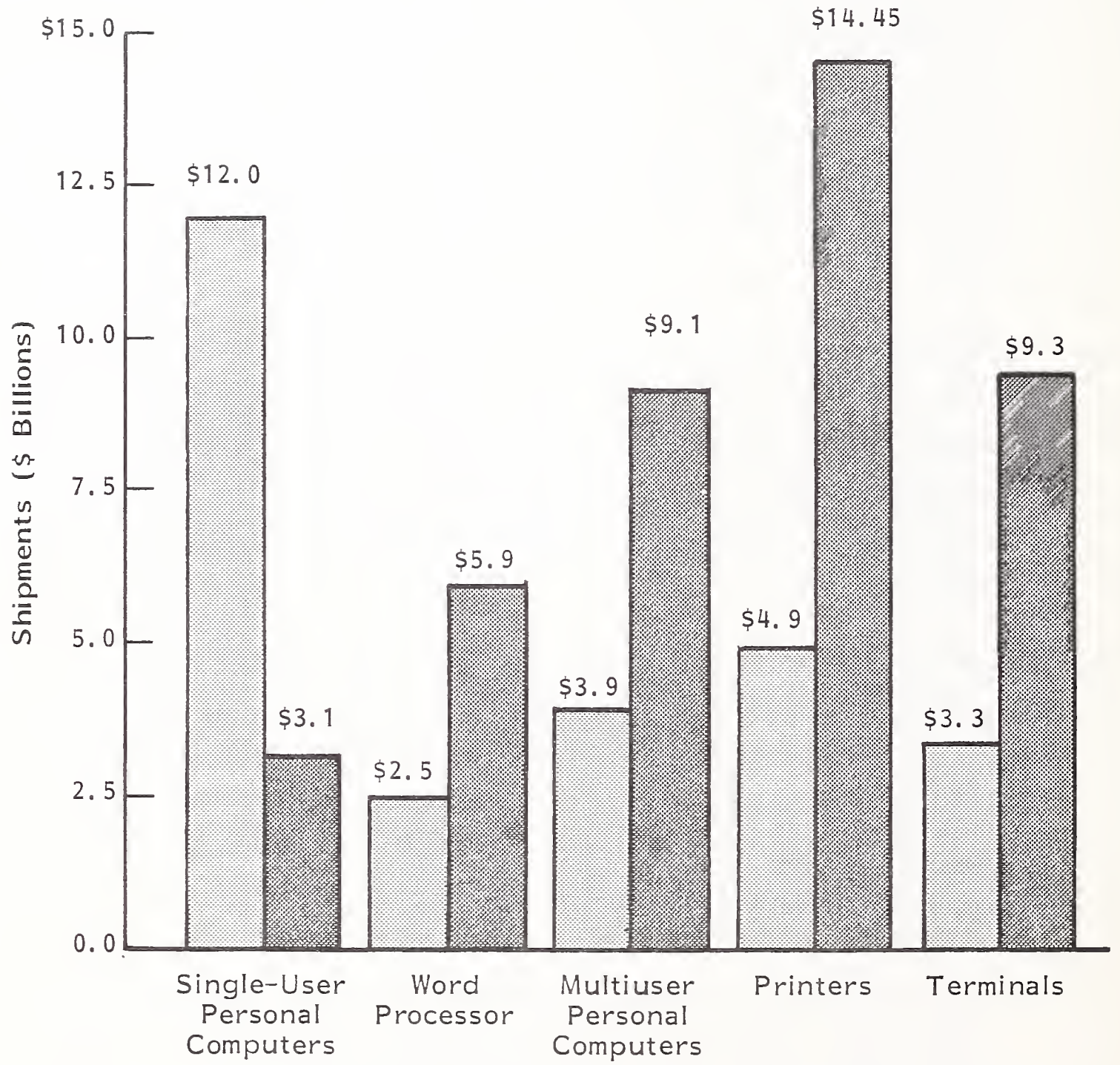
- Exhibit III-9 forecasts the growth of multiuser personal computers, along with other office product shipment sales. All product types, with the exception of single-user personal computers, will exhibit significant growth rates during the forecast period. Even the word processing market demonstrates strong growth potential despite the impact of personal computers on word processor equipment sales.

- The service forecasts presented in Exhibit III-10 indicate an even greater growth potential. As in the equipment sales forecast, the greatest increase can be expected in the printer market, with a 25% AAGR, personal computer markets, both single-user (with an expected growth of 24%) and multiuser (with a 57% AAGR.) The tremendous growth in the personal computer market is being fueled by a number of factors.

- First, selection and purchasing authority is becoming centralized within the corporation. Decision makers are more familiar with the importance of service, since they often were responsible for large data processing decisions. This is especially true if the corporation incorporates their personal computers into the large information systems of the company, whether through a networked system, or as intelligent terminals within a micro-mainframe-linked system.

EXHIBIT III-9

OFFICE PRODUCT SHIPMENT FORECAST -
BY PRODUCT TYPE, 1984-1989



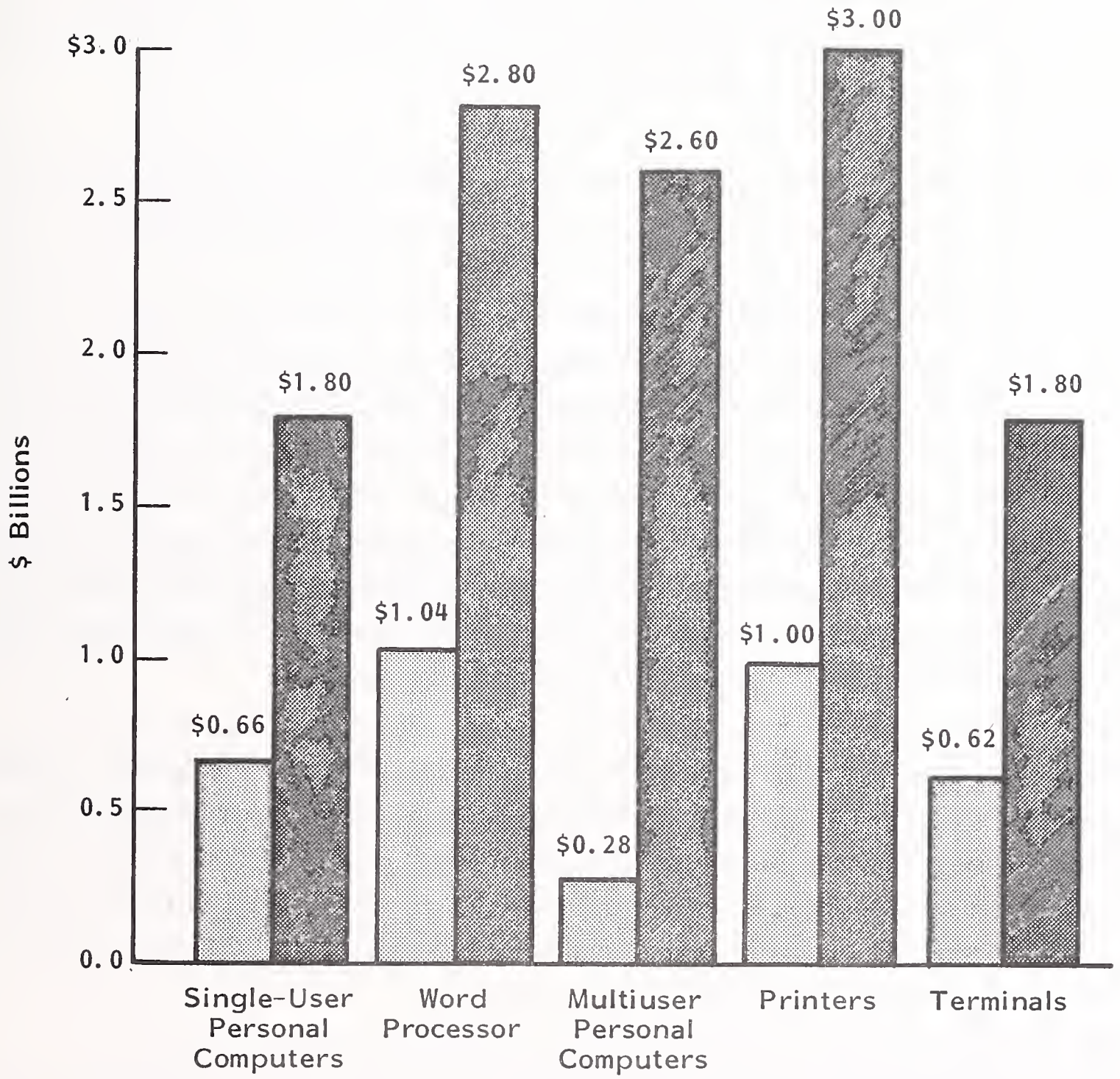
AAGR Percent 1984-1989	(19%)	19%	29%	25%	24%

1984

1989

EXHIBIT III-10

OFFICE PRODUCT SERVICE REVENUE BY PRODUCT TYPE,
1984-1989 (Forecast)



AAGR Percent 1984-1989					
	24%	22%	57%	25%	21%

- A by-product of this increased centralization of personal computer purchasing power is the increased availability of quantity discounts for both equipment purchase and for service. DEC, for example, offers negotiated quantity discounts for multiple service contacts. This is also an indication of how product density has made service less expensive, decreasing service pricing to levels where more users can purchase service.

- Finally, service for personal computers will grow as a result of increased user demand for service. With the rapid increases in sophistication of both user, equipment, and software, the value of processing has risen dramatically, especially in networked systems, whether on a local area network or on a micro-host basis. Users will increasingly demand more on-site service and support. Many vendors, such as DEC and HP, have already recognized and addressed this need, and as IBM further increases its activity in the service of its personal computer user base, the rest of the personal computer industry will have to follow. Personal computers, especially the newer multiusers' systems (i.e., IBM's PC AT and AT&T's PC 6300), are being considered for applications that used to be served by minicomputer vendors, who have traditionally provided more service and support to the users.

- Another traditional service and support-oriented market that personal computers are entering is that of word processing applications--word processor vendors usually ofter more and better service and support to their users, especially in the areas of software support and training. Therefore, personal computer vendors will have to increase the amount of service in order to successfully compete in this area.

- Exhibit III-10 also shows that service for word processors is expected to grow significantly, from just over $1 billion in service revenues in 1984 to $2.8 billion in 1989, expecting a 22% average annual growth rate.

- The principal factors affecting the growth in word processing service will be the need for increasingly coordinated software support and training as word processing vendors integrate more functionality, such as spreadsheet analysis and communications, into their systems. Also, as word processor vendors evolve into office systems vendors, with integrated data/word/voice processing capabilities, the need for service will become increasingly important. Users will expect more and better service, with the understanding that they will have to pay for it. Vendors will find that training and documentation, beyond the support given at time of purchase, will be an additional growth area in word processor service.

- Printer and terminal service can also expect significant revenue growth during the forecast period. Printer service revenues can expect to grow from $1 billion in 1984 to $3 billion in 1989, representing a 25% average annual growth rate.

- Terminal service revenues can expect to increase almost as quickly (but from a smaller base) at a 22% growth rate, from $620 million in 1984 to $1.8 billion in 1989.

- The service revenue growth demonstrated by both product types reflects the tremendous growth in equipment sales that has resulted from the increased desire for automation in the office place. Also, both product types demonstrate similar service cost reductions due to the increased use of components in the design of the products, which greatly reduces the time required to service the equipment.

- Printers, by their very design, require a significant amount of hardware maintenance, both remedial and preventive in nature. However, the printer market is moving away from older designs that utilize a great number of moving parts. For example, NEC has introduced printers that rely on servo, stepper, and DC motors that require less moving parts than gear- and pulley-driven printers.

- Also, printhead design and production has reduced the costs and improved the reliability of the printer component that requires the most service. Newer nonimpact printers, such as laser printers, will benefit from this.

- Printer vendors' service organizations can increase revenues in the sales of supplies and add-on equipment. Larger service organizations, such as DEC and Wang, have already successfully integrated these sales functions into their service organization by offering users catalogs and toll-free telephone order numbers. Printer users, who require constant sales support in the supplies area (i.e., printer ribbons, print heads, and paper), will find this an attractive service.

- Terminal service will also benefit from increased modularization in design, which reduces repair time, and, in the long run, service costs. And although dumb terminals require little, if any, service from the vendor, the increased use of intelligent terminals within networked systems will increase user requirements for terminal service. It is in the intelligent terminal market, unlike the dumb terminal market, that the availability of upgrade service options will become saleable.

C. THIRD-PARTY MAINTENANCE IMPACT ON THE CUSTOMER SERVICES MARKET

- Even though user acceptance of, and satisfaction with, third-party maintenance is rising, TPM's revenue growth in most service areas is slowing, lessening its impact on the overall customer service market. Exhibit III-11 demonstrates that TPM's total market penetration will drop from 9.8% of the total service market in 1984 to 9.5% in 1989.

EXHIBIT III-11

THIRD-PARTY MAINTENANCE REVENUE AND MARKET PENETRATION BY PRODUCT SECTOR

MARKET SECTOR	1984			1989		
	Service Revenue	TPM Revenue	Percent TPM Penetration	Total Service Revenue	TPM Revenue	Percent TPM Penetration
Mainframe	$ 3.4	$0.16	4.7%	$ 5.7	$0.19	3.3%
Minicomputer	2.0	0.17	8.5	4.0	0.35	8.8
Peripherals	2.5	0.23	9.2	5.3	0.36	6.8
Terminals	0.6	0.11	18.3	1.8	0.31	17.2
Office Products	2.4	0.37	15.4	6.5	0.90	13.8
Telecommunications	0.7	0.10	14.3	2.7	0.39	14.4
Total	$11.6	$1.14	9.8%	$26.0	$2.5	9.5%

- Contributing heavily to the swing away from TPM are the following factors:

  - Very slow growth in the mainframe service market, where users traditionally have stayed with the manufacturer-supplied service. TPM penetration into the mainframe service market sector will drop from 4.7% in 1984 to 3.3% in 1989.

  - Slow growth in the peripherals market, once an important TPM market target. The entrance of computer equipment manufacturers into the third-party market (i.e., DEC) in order to provide single-source maintenance on foreign peripherals within the system has reduced the impact of TPM in this category. This will also account for a drop in TPM penetration into the terminal market, which will fall from 18.3% to 17.2%.

  - Slower growth in the office products market, at least compared to the faster growth of the total office products service market. It may seem odd to categorize the growth of TPM service of office products as slow, since TPM service growth averages 19% per year between 1984 and 1989, but since the total service growth for office products will grow at 22% per year for the same period, the actual TPM market penetration into the office products service market will decrease by almost two percent. Certain to contribute to this decline is the expanded participation by personal computer vendors in the service market, as shown in Exhibit II-2.

- Areas in which the TPM market can expect to grow between 1984 and 1989 include minicomputers, where TPM penetration should grow from 8.5% in 1984 to 8.8% in 1989, and telecommunications where TPM penetration will grow from 14.3% to 14.4%.

- Exhibit III-12 examines the declining TPM market penetration into the office products market. Personal computer services, both for single-user and multi-

EXHIBIT III-12

TPM MARKET PENETRATION INTO
OFFICE PRODUCT SERVICE MARKET

PRODUCT TYPE	PERCENT MARKET SHARE 1984	SERVICE MARKET SIZE ($ Billions) 1984	PERCENT MARKET SHARE 1989	SERVICE MARKET SIZE ($ Billions) 1989
Single-User Personal Computer	67%	$0.73	45%	$2.07
Multiuser Personal Computer	75	0.28	30	2.60
Word Processor	2	1.04	2	2.80
Printer	9	1.00	6	3.00
Terminal	18	0.62	17	1.80

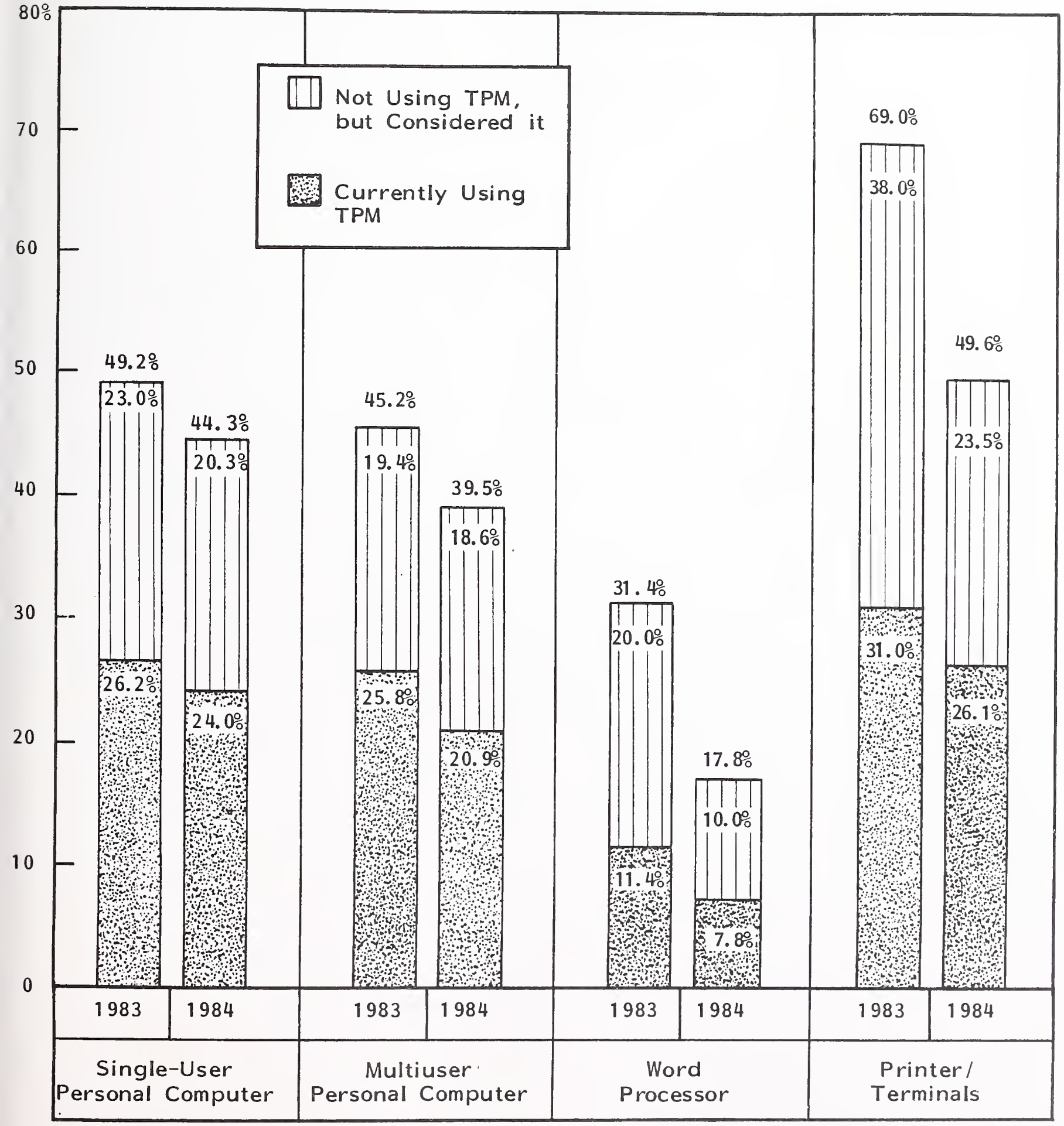
user systems, show the greatest loss of service marketshare, with single-user personal computer TPM penetration dropping from 67% in 1984 to 45% in 1989, and multiuser systems dropping from 75% to 30% over the same forecast period.

- The tremendous drop in TPM penetration into the personal computer market segment will result from key personal computer vendors increasingly providing their own service to users. This will be especially true in the multiuser systems market, where the service revenue potential of supporting multiple systems will encourage increased vendor activity.

- The drop of office product user receptivity to third-party maintenance further supports this trend. Exhibit III-13 demonstrates that, for all product types, user experience with (and consideration of) TPM has declined considerably from 1983 to 1984. This trend should continue as more office product vendors increase their own service offerings.

EXHIBIT III-13

OFFICE PRODUCT USER ATTITUDES
TOWARD USE OF TPM, 1983-1984



IV OFFICE PRODUCTS ANALYSIS

IV OFFICE PRODUCTS ANALYSIS

A. RECENT NEW PRODUCT INTRODUCTIONS

1. PERSONAL COMPUTERS

- 1984 proved to be an important year for the major participants in the personal computer industry. Unlike 1983, which was marked by the introduction of integrated software products, most notably Lotus 1-2-3, during the past year hardware manufacturers, especially AT&T, Apple, and IBM stole the spotlight with important and innovative products.

- Apple started the ball rolling in January of 1984 by introducing their 128 K version of the Macintosh computer. Built around the powerful and fast Motorola MC 68000 (32-bit) microprocessor and LISA-like windowing technology, the Macintosh was targeted to attract business (and home) users who felt that the IBM PC was either too slow, too difficult to use, or both. With the Motorola's chip's 8 MHZ clockspeed, along with applications that utilized windows, menus with easily interpreted icons, and mouse-driven input, the Macintosh proved to be a very popular computer for executives with limited computer experience or keyboard skills.

- In fall of 1984, Apple released the expanded memory (512 K) version of the Macintosh, known as the "Fat Mac". Considering the attraction of integrated software programs, the "Fat Mac" should continue to prove popular with businesses, as it meets a serious need for addressable memory.

- The success of the Macintosh has provided Apple with complete product offering that can be separated into two main groups; the 8-bit machines--Apple IIe, Apple IIc (a semiportable computer targeted to the home and educational user), and its 32-bit machines--the Macintosh and the LISA 2 series.

- The advantage of the Macintosh is that the machine is extremely easy to use, since the user does not have to learn computer systems commands, and the software is designed to take advantage of Apple's screen and mouse technology.

- Apple's use of bit-mapped graphics is also an attractive advantage of the machine, somewhat qualified by the unavailability of color graphics (available as early as 1985), and the print quality of Apple's two current printers.

- A significant disadvantage of the Macintosh to the business user is its incompatibility with MS-DOS software which happened as a result of Apple's attempt to provide a completely separate alternative to IBM (their advertisements refer to the Mac as the computer "for the rest of us"). Apple hopes to provide enough third-party software to counter this criticism.

- Another disadvantage of the Mac is its lack of diskspace, currently limited to a single 3.5 inch that provides 400 K of storage. Apple is expected to provide a double density (800 K) drive by 1985, along with hard disks that should alleviate disk storage problems.

- Perhaps the largest rumble in the personal computer industry occurred in 1984 when AT&T "entered the personal computer game" with its PC 6300, an enhanced version of the Olivetti models M-21 and M-24. The arrival of AT&T brings into the marketplace a competitor larger than IBM, with a strong distribution network of independent retailers and its own AT&T Phone Centers, innovative research and development capabilities, and unquestionable communications expertise.

- The PC 6300 supports MS-DOS, but the operating system that AT&T is preparing for is its own UNIX-based machine, which will create a business standard for micro-, mini-, and mainframe equipment. In fact, AT&T has publicly stated that its corporate strategy is to build a UNIX marketplace and then enter it with the best UNIX hardware.

- UNIX has a number of advantages over current operating systems. It can handle large multiuser loads, address a number of different hardware configurations, and grow with the user. Thus, software compatibility will cease to be a major stumbling block to the corporate user.

- The PC 6300 currently supports Microsoft's MS-DOS version 2.11, however the PC 6300 has a software option known as AT&T's Context Switching, which in effect turns the PC 6300 into a terminal in order to communicate with the UNIX-based 3B minicomputer series. Other AT&T products are available to network PC 6300s around a central AT&T minicomputer.

- The major gamble for AT&T will be the acceptance (or not) of the UNIX operating system encoded on the processor chip, which is already being worked on by a number of chip manufacturers, including AT&T. The inevitability of this is demonstrated by the large number of independent software vendors (ISVs) already translating software packages for use in the UNIX operating environment.

- 1984 was a dramatic year in both the single and multiuser personal computer industry, as many vendors introduced either their first system (i.e., AT&T, Sperry) or significantly improved systems (i.e., Apple, NCR, Compaq, and Wang). Not surprisingly, the biggest shockwave occurred when Big Blue made its first significant entrance into the multiuser world, with the introduction of the IBM PC AT and its first broadband local area network.

- Throughout 1984, industry experts anticipated the arrival of the AT (given the code name "Popcorn") which was expected to be very powerful, with loads of memory, and a very high price tag. Instead, IBM shook the industry by releasing its first real multiuser machine with a surprisingly low ($3,995 for base model) price tag.

- The actual machine differed from the existing PC products in many ways. The AT utilized an Intel 80286 microprocessor that could initially support up to three users. The base model comes with 256K RAM and 1.2 M-bytes of disk storage. The AT offers six 16-bit expansion slots, which will allow users to add high speed 16-bit expansion RAM cords. Finally the machine is geared up for the soon-to-be available PC Xenix (Microsoft) multiuser, multitasking operating system which should compete with AT&T's UNIX for the multiuser operating system standard.

- The expandability of the AT is impressive, both in terms of sheer memory strength and in it's multiuser capabilities. The AT can be expanded to 3 megabytes of RAM storage and 41.2 megabytes of disk storage. To expand the system beyond three users, IBM introduced its IBM PC network, which will let the AT act as a file series for up to 72 PC AT, PCs, PC XTs, or other members of the PC family (excluding the jr.) Thus IBM has provided an important link between its personal computer products and its small minicomputer systems.

- The PC AT provides stiff competition in two market places: at the high-end single-user business computer market, because of its relatively low price tag, and (more significantly) at the multiuser microcomputer market.

- In the multiuser marketplace, the AT should have an impact on sales of existing multiuser vendors, most notably Altos, AT&T, and Tandy (Model 16B). In fact, the competition in this marketplace will help determine whether the AT's XENIX or the AT&T PC 6300's UNIX will become the dominant multiuser operating system in the next few years.

- The second significant announcement that IBM made during 1984 was the introduction of their own PC network, designed to optimize the power of the AT but able to walk around any hard disk-based PC. Even though it is scheduled for shipment in the first quarter of 1985, IBM's network has had immediate impact on an already unsettled marketplace.

- As stated earlier, the network will allow up to 72 PCs in a 1000 ft. radius using broadband coaxial cable. The number of workstations and the distances covered can be increased significantly if broadband amplifiers are added. An added feature of the network is the fact that no one PC needs to act as a dedicated file server.

- A significant concern to users of IBM's PC network, especially as a maintenance and support issue, will be IBM's policy on servicing non-IBM equipment located on the network, especially in the area of output devices, which is one area where IBM has not dominated.

- Other vendors did provide significant new products during the past 12 months. Radio Shack changed its name to parent company's Tandy and introduced its first IBM-compatible, the Model 2000, in December of 1983. NCR introduced its IBM-compatible personal computer in May of 1984. And Compaq, after entering the PC-compatible marketplace with a portable, added a full line of desktop machines, the Desk Pro Models 1, 2, 3, and 4, which were designed to be, and marketed as, significantly superior machines to the IBM PC.

- Two traditional minicomputer competitors entered the truly portable market in 1984 with innovative lap computers. Hewlett Packard, after receiving mixed reviews (and sales) of its touch screen 150, introduced its 9 lb HP 110, a true 16-bit (National Semiconductor) that utilizes CMOS technology (which is quickly becoming the standard for lap and portable computers) and ROM-based software. Then in September, Data General also entered the lap

computer marketplace with their 9 lb. Data General/One, which also added the advantage of IBM-compatibility. The true test of these machines will be their acceptance by those sections of the business community who, due to constant travel, would be attracted to the machine's compactness yet would be willing to make the trade offs inherent in their designs.

- Several significant trends have been demonstrated by the personal computer vendors during the past year. First, a number of vendors who have traditionally been associated with other markets have entered the personal computer market. This movement, which can be traced back to IBM's entrance in 1981, followed by Digital Equipment Corporation, Hewlett Packard, and NCR, and most recently Data General and Sperry, demonstrates an equipment vendor strategy that could open potential new larger-systems sales through the sale of personal computers. In this respect, the personal computer has become a necessary product to larger-systems vendors, even if the actual sales of the personal computer are not high.

- Second, some vendors have begun to release products with the goal of alerting the marketplace to their presence. In this respect, companies can release products that, while technologically innovative, do not satisfy a particularly pressing business need. Examples of this strategy are the Data General/One, and the Hewlett Packard 110 and 150, which have introduced nice features (compactness, touch screen) but, at least at the introduction price, do not truly address a business user's needs. What these products do provide is a signal to computer users familiar to these vendors that they are coming out with innovative products. This will attract these users to other personal computer products within their product line.

- Third, the issue of standardization has been grudgingly addressed as more vendors release products with some degree of IBM PC-compatibility, with the notable exception of Apple. This is especially true of vendors of personal computers who also manufacture larger systems, as these vendors attempt to curb the flow of IBM PCs into their systems.

2. WORD PROCESSORS

- 1984 proved to be a rebuilding year for many vendors in the word processor market. With much improved word processing software in both the micro- and minicomputer markets, along with the increased desire for total office automation, dedicated word processor sales slowed in 1984. In trying to combat this trend, word processor vendors have begun to emphasize and enhance the integration of data processing capabilities of their systems, while still highlighting the improved word and text processing advantages of their equipment over micro- and minicomputer packages.

- An example of this trend toward multifunction word processors is Wang's OIS 40 (single-user WP) and OIS 50 and 60 (multiuser WPs) which provide the user with spreadsheets, scheduling, and other capabilities not available on their earlier Wang Writer systems. An added feature is compatibility with the recently released Wang Professional (personal) computer.

- NBI, once one of the most successful dedicated word processor vendors, has taken a two-prong approach to the office systems market.

  - First NBI released a microcomputer that not only is IBM-compatible, but can be used with its existing OASys clustered systems.

  - The second step will be the release of its much anticipated product family known as System One, which will include a file server, an Ethernet-based LAN, and workstations known as Integrated Work Stations (IWS) and which will integrate word processing, graphics, data base management, and spreadsheet analysis.

- Lanier followed suit by introducing an IBM-compatible microcomputer and a base band LAN built around its System 5000, which will offer word processing, electronic mail, graphics, and other rudimentary office automation applications.

- Honeywell, who helped pioneer the multicapability, clustered word processing market with its OAS series, is moving away from the word processing end and into office automation by enhancing its equipment's data, voice, and imaging processing capabilities.

- Honeywell appears to be moving toward this goal through two product lines. Its first new product is the 16-bit Office Management System (OMS), based upon its DPS 6 minicomputer. The system, which runs under Honeywell's GCOS 6 operating systems, has expanded memory supplies, OAS software for word processing, a spelling checker program, communications capabilities including electronic mail, and compatibility with IBM's SNA protocol. An expanded version, with twice the memory and more communications and networking capabilities, is also available.

- The second product, due in early 1985, is a UNIX-based workstation that is designed more for the technical environment. Based upon the Motorola 68000 microprocessor, Honeywell's Microsystem NX will include word processing applications.

- The key trends indicated by word processor vendors are a realization of the decline in the "dedicated" word processor market, especially in the standalone segment. Both microcomputer and minicomputer vendors are making strong inroads into the word processing market, with much improved software products and the additional benefits in data processing and communications capabilities inherent in their machines. Thus, users are seriously questioning the cost effectiveness of purchasing machines whose applications can be adequately covered by other equipment (micros and minicomputers) that offer many other capabilities.

- To satisfy the user's desire for integrated word, data, and communications processing, word processor vendors have moved toward becoming office systems vendors, or more precisely office automation companies. In making

this move, vendors either had to integrate already existing data processing and communications products into their word processing offering, as was the case with small-systems vendors, such as Wang and Honeywell, or by introducing new products like microcomputers and LANs, as was the case with traditional word processor vendors, such as NBI and Lanier. In either case, the successful strategy became the introduction of complete office automation solutions. Ironically, the very product that provided the most competition for new word processor sales (the personal computer), has become the product that helped word processor vendors successfully integrate data processing capabilities within a network and move toward office automation.

- It is highly unlikely that today's personal computers will ever completely replace standalone word processor stations. The personal computers are not as physically well laid out for word processing, do not yet approach the functionality of a dedicated word processor, and, perhaps most importantly, do not come with anywhere near the level of training, service, and support that word processor vendors provide. Still, these differences between word processors and personal computers are lessening, thus the need for word processor vendors to move toward incorporating the advantages of the personal computer into their systems.

3. PRINTERS/TERMINALS

- Office product printer vendors have made great strides in bringing out printers that will match the technological improvements that have occurred in the microcomputer market. Daisy wheel printers are now available below the $500 price level, dot matrix printers are becoming faster and of higher resolution, and more exotic forms of print technology, such as ink jet and laser printers, are appearing.

- The printers that arrived amidst most interest were Hewlett Packard's ink jet printer, known as the Think Jet, and their laser printer, known as the Laser Jet. Utilizing nonimpact technology, these printers provide fast, quiet, and affordable printers to the office user.

- The Think Jet, at $495, competes well against the traditional dot matrix printers that dominate that price range. With a 125 character per second print speed, compatibility with most popular personal computers, including IBM and Apple personal computers, and 50 db sound level, the Think Jet printer should challenge market leaders Epson and Okidata for printer sales.

- The revolutionary aspect of the Think Jet is the low cost of the print head, which at $8.00, enables HP to offer the Think Jet at a price considerably lower than other ink jet printers. In addition, HP utilizes disposable ink cartridges that can print 500 pages of copy. The combination of print head and ink cartridge can be installed more easily than changing printer ribbons.

- Another benefit provided by the Think Jet is its compact size (11.5 inches by 8 inches by 3.5 inches high) and its light weight (under six pounds). Its compactness makes it an ideal printer for lap computers, since it comes with a 200-page average battery life.

- A potential problem has been reported with the Think Jet printer print head, which tends to clog after extended periods of nonuse.

- HP's second bombshell was the delivery of its Laser Jet printer in June 1984. Based upon the Canon LBP-CX Laser printer made available to OEMs in 1983, the Laser Jet is very fast (8 pages per minute), very quiet (55 db), and very inexpensive ($3,495). Thus HP has provided the office system user with a printer that has the speed and graphics capabilities of dot matrix printers combined with the print quality capabilities of daisy wheel printers.

- HP's use of the Canon electronic control, which translates the computer's input into laser movement, is the main reason that HP is able to offer the Laser Jet at the $3,495 price, compared to the next least expensive laser printer at four times the price.

- The Laser Jet design also makes it relatively maintenance free. The Laser Jet utilizes disposable ink and tone cartridges (as does the Think Jet) which greatly reduces the amount of cleaning and self maintenance necessary, requiring the brushing of only one exposed printing surface and the changing of cartridges every 3,000 pages.

- At this time, the graphics capabilities of the Laser Jet are rather limited. The only reliable software support for graphics is available for the HP 150 personal computer. This limitation will surely be addressed by software vendors, however.

- Nonimpact printers were not the only ones that saw tremendous price reductions and/or technological advances. The price of daisy wheel printers has dropped considerably as printer vendors attempt to gain ground in the microcomputer marketplace--just two years ago a daisy wheel under $1,000 was news, now they can be purchased for under $500.

- A technological advance that has helped the personal computer reduce systems cost was the introduction of modular interface in the Qume Sprint 11/40 and 11/55, which allows the printer to be compatible with virtually any computer. This allows a user to change or upgrade their computer without requiring a new printer.

- An example of the new,low price daisy wheel is the Juki 6100, introduced in 1983 for $599, but now available for $495. It has a 18 cps, which is adequate for business applications, and it provides an excellent letter quality printer for both the home and business user. For this reason, Kaypro has started to bundle this printer into its transportable computer system, offering an even greater saving to the purchaser.

- A number of other vendors offer daisy wheel printers that range between $500 and $700, including Bytewriter (the Praxis 35 & 40), Dynax, Inc. (DX-15), NEC (15-LQ), Olympia (Compact RO), Sanyo (PR 5000), Smith Corona, (TP-II Plus),

Teletex Communications Corp., (TTX-1014), Televideo Systems Inc. (TP 720), and Transtar (120). All of the above printers print at an acceptable speed (14-16 cps) for most business applications, making them excellent value for money.

- NEC Information Systems manufactures a family of letter-quality printers that do not use a daisy wheel design; instead, NEC printers use interchangeable thimble-shaped elements that can be snapped easily in place. In fact, all NEC Spinwriter printers have user-replaceable ribbons, carriages, and any of seventy NEC print thimbles.

- The NEC printers also incorporate interchangeable slide-in interfaces, which allow dealers to stock the basic printers and install the interfaces to suit particular system needs. NEC is planning to offer the slide-in interface modules to end users in order to allow them to interface their printers to any computer system.

- Another feature of the NEC line is the reliability of all the printers in their Spinwriter line, which average 5,000 hours between failures (or 50 million characters) and a mean time to repair of less than 30 minutes. This is due in part to a reliance on servo, stepper and DC motors, which require less moving parts than gear- and pulley-driven printers, and the fact that repairs can be effected by component exchange after which the defective components can be sent to depot repair locations.

- One reason for the drop in daisy wheel printer prices is the improvements offered in traditional dot matrix printers. The print quality of many dot matrix printers is close approaching correspondence, even "letter" quality. Dot matrix printers have the additional advantages of speed (they range between 50-400 cps while daisy wheel printers rarely exceed 50 cps) and flexibility, since daisy wheel printers cannot do graphics.

- Methods currently being used by dot matrix printer vendors to bridge the gap between dot matrix and daisy wheel printers include multirowed 24-wire print heads, extremely dense dot matrix configurations, double and triple passing, and more. For example, some dot matrix printers can switch between a 7-by-9 dot matrix for faster printing and a denser 18-by-18 dot matrix for slower printing but a higher quality text.

- One vendor, Compac Microelectronics Inc., utilizes square pins in its print head instead of round ones. The stacked block of print creates a more solid figure than those made from a round-pin print head. While not having the print quality of other technologies, the Compac CP. 80, at $329, provides the microcomputer user better than average dot matrix print quality.

- Epson America, the leading manufacturer of dot matrix printers, released their first correspondence quality printer, the LQ-1500, in April of 1984. The LQ-1500, utilizing a 24-pin print head to generate a 9-by-17 in draft and 15-by-17 character in letter quality, can print at 200 cps in draft quality mode while still at 67 cps in correspondence quality mode. The LQ-1500 also offers bit-imaged graphics capabilities. At a $1,395 list price, the LQ-1500 can provide the user with an excellent alternative to separate dot matrix and daisy wheel printers.

- The Epson printers are known for their reliability, and the LQ-1500 is no exception. The LQ-1500 print head has a life expectancy of 200 million characters and a mean time between failures of 6300 hours.

- The terminal's role in the office place is under attack from personal computers, who offer end users all the advantages of "dumb" terminals while adding many additional advantages that the display terminal can't. Nevertheless, it would be highly unlikely that personal computers will completely replace the "dumb" terminals, and, in certain markets, the terminal market can actually be expected to demonstrate high growth rates.

- The terminal market has obviously been affected by the quantum price/performance advancements of the personal computer market. Software programs that provide popular terminal emulation formats (DEC VT-100 or IBM 3270), have helped personal computers replace some terminals in the market.

- An additional assault on the terminal market was signaled in 1983 by IBM, who released two upgraded personal computer products, the IBM 3270/XT and the 3270-PC. These offered not only the connection to the company mainframe, but also the ability to load microcomputer software into seven windows, four of which could be used for mainframe applications.

- Terminal vendors responded to the microcomputer assault by dramatically reducing their prices. In the past, pricing of terminals corresponded fairly closely to the capabilities of the terminals. When personal computers entered the market, the prices of dumb terminals plummeted as users looked at the advantages of personal computers.

- An additional influence on the dramatic drop in terminal pricing has been technological advances in terminal production, such as increased use of standard off-the-shelf LSI functions and replacement of multichip design with CRT-controller chips. Vendors reduced costs by taking advantage of off-shore assembly, where labor rates and overhead are much lower than in the U.S.

B. ANTICIPATED NEW PRODUCTS

- With all of the technological advances that have occurred in the personal computer industry it should come as no surprise that the most eagerly awaited new products are also in this market. The expected arrival of new machines is creating the kind of excitement that stirred the marketplace before the releases of LISA, Macintosh, and PC AT.

- Expected new products from Apple for 1985 include its first laser printer, at an approximate $7,000 list price. In keeping with Apple's reluctance to release "me too" products, this printer is not expected to be IBM-compatible.

- 1985 might also mark the introduction of a color version of the "fast Mac" (512 K Macintosh). The combination of the laser printer and the color Macintosh should make for a powerful graphics computer.

- The most persistent, and perhaps feared, product rumor concerns a new IBM PC with proprietary operating system. This should not cause too much of a problem for IBM PC owners, who can expect some sort of compatibility with the new operating system (or at worst a conversion process), but it might cause significant problems for IBM PC-compatible users, who already find that software compatibility is not always assured. The greatest impact of this potential product will obviously hurt the PC-compatible vendors, who will find it exceedingly difficult to produce new compatibles economically, since IBM will no doubt use more proprietary hardware inside their new personal computer.

- The actual size and price of the new machines is still be debated. Some rumors place the new PC between the old PC and the PC/XT. Others feel the new PC will be priced competitively, creating what could become known as the "great fallout", as many vendors (especially of the current compatibles) will not be able to compete either as PC-compatible vendors or as a less expensive alternative to IBM.

- It is certain that the new PC will be a true 16-bit machine, not like the current 8/16-bit machine. This will provide a 16-bit standard at both ends of the price spectrum (with the AT at the upper end).

- IBM is likely to enter the area of the lap size computer, especially if the HP 110 and Data General One achieve popularity with business users. Considering the failure of the IBM portable, which hasn't achieved popularity due to

compatibility problems, any move by IBM into this market will be a considered one, since IBM does not enter a market until the demand for such a product assures success.

V OFFICE PRODUCT SERVICE DEVELOPMENTS

V OFFICE PRODUCT SERVICE DEVELOPMENTS

A. CHANGES IN OFFICE PRODUCT SERVICE REVENUE SOURCES

- Office product service, not unlike other equipment service in its developmental stages, is predominantly hardware-oriented. There has been very little, if any, software support, due in most part to the fact that the hardware vendors rarely supplied the software to the user, and whatever training or consulting occurred was done pre-sale or bundled into the sale.

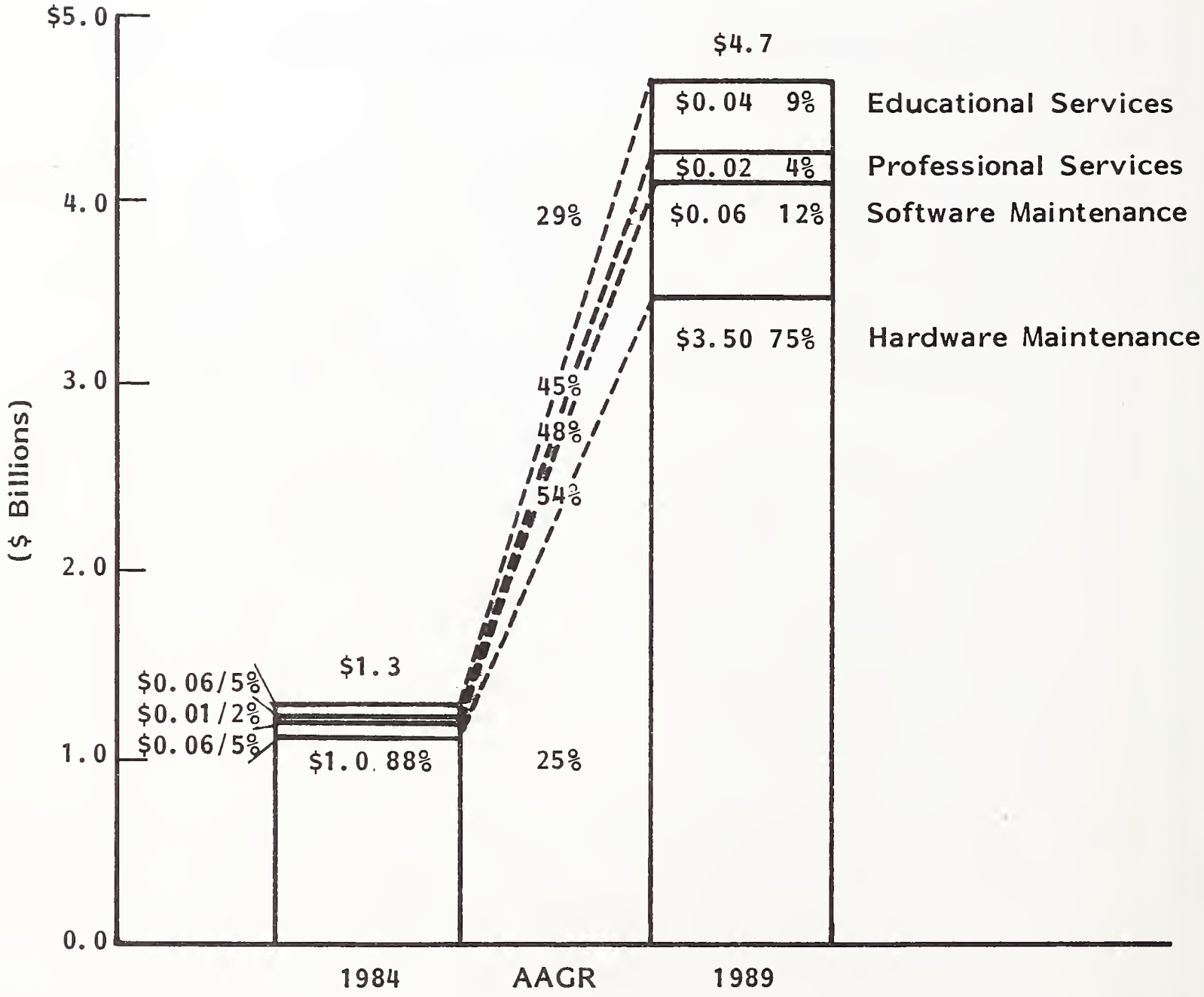
- As the sophistication of the applications increased, the users recognized the importance of aftersales support, thus becoming less price-sensitive. Office product vendors found that users would be willing to purchase additional support, even in the areas of software and training. As larger-service-oriented vendors, such as DEC, HP, and eventually IBM, began introducing a wider range of maintenance and support options, the office product market began to follow.

- Exhibit V-1 presents the office products customer services revenue service mix for 1984 and forecasts into 1989. As shown in the exhibit, office product service is predominantly hardware maintenance, accounting for 88% of all office product service revenue in 1984.

- Software support, including revenues derived from actual fixes, patches, updates, and telephone support, provided only 5% of all service revenues in 1984.

EXHIBIT V-1

OFFICE PRODUCTS CUSTOMER SERVICES REVENUE SOURCE MIX
1984-1989



- Educational services, such as training and documentation services, also provided 5% of the office product customer services. The actual training and education revenues are higher, but this refers only to revenues credited to the service organization.

- Professional services, which consist primarily of planning and consulting services provided by the service organization both pre-sale (environmental and site planning) and post-sale (site audits, programming, relocations), account for only 2% of all office product service revenues.

- Exhibit V-1 also indicates the amount of growth that can be expected in these areas for the next five years. Hardware maintenance can expect to grow, however it is in the other three areas that the greatest growth rates can be expected.

  - Educational services will grow 45% per year to account for 9% of the $4.7 billion office product service market in 1989.

  - Professional services will grow at a 48% annual rate, accounting for 4% of the 1989 service market.

  - Software support will exhibit the fastest growth rate, growing 54% per year to account for 12% of the total office product service market in 1989.

  - Hardware maintenance will grow at 25% annual rate, and will comprise 75% of the total service market in 1989 (down from 88% in 1984).

- These increases in software, educational, and professional services can be attributed to an increased user requirement for these services. Vendors are already offering separate software support plans, usually in the form of telephone support. Some vendors are also increasing the amount of available training outside of the usual instruction that comes with the purchase.

- Even with the extremely high growth rates in software, educational, and professional services, it would be incorrect to ignore the growth in hardware maintenance, which, even at 25% annual growth rate, still accounts for the bulk of service revenues. Exhibit V-2 illustrates the importance of hardware maintenance as a service revenue source. Hardware maintenance will provide $2.4 billion in incremental revenue for the five-year forecast period.

- Exhibit V-3 provides a close-up look at the personal computer service market, which will grow from $660 million in 1984 to $1.8 billion in 1989, a 22% total growth rate.

- In 1984, personal computer customer services consist almost entirely of hardware maintenance, with only 1% of the total service revenues derived from educational services. By 1989, hardware maintenance will still be the largest revenue source, but vendors will also expect to receive revenues from educational services (5% of the total service revenues) professional services (3%) and software maintenance and support (5%).

- The growth in educational, professional and software service will result in part from the increased role hardware vendors will play in the sale and support of their equipment. As personal computers become more powerful, they will compete with smaller minicomputer systems for sales, and vendors will then need to provide not only a machine that can compete with traditional minicomputers, but a competitive sales and support structure as well.

- Also, personal computer vendors will become more involved in the design and sales of their own software. IBM has already announced the availability of their own applications software, and presumably will provide more support on these packages. This trend will continue, as vendors begin to offer software support along with hardware maintenance.

EXHIBIT V-2

OFFICE PRODUCTS SERVICE GROWTH BY SECTOR, 1984-1989

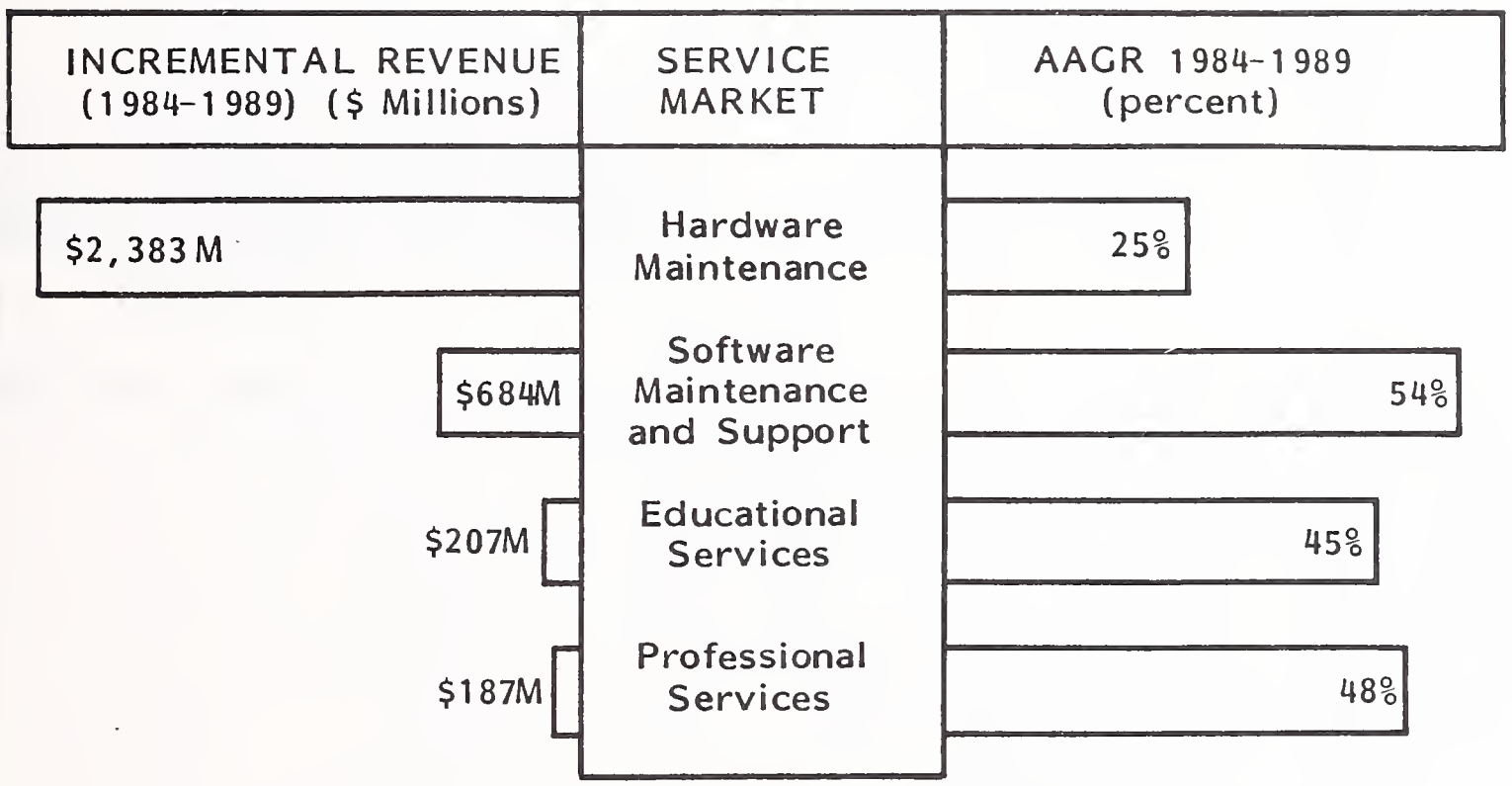
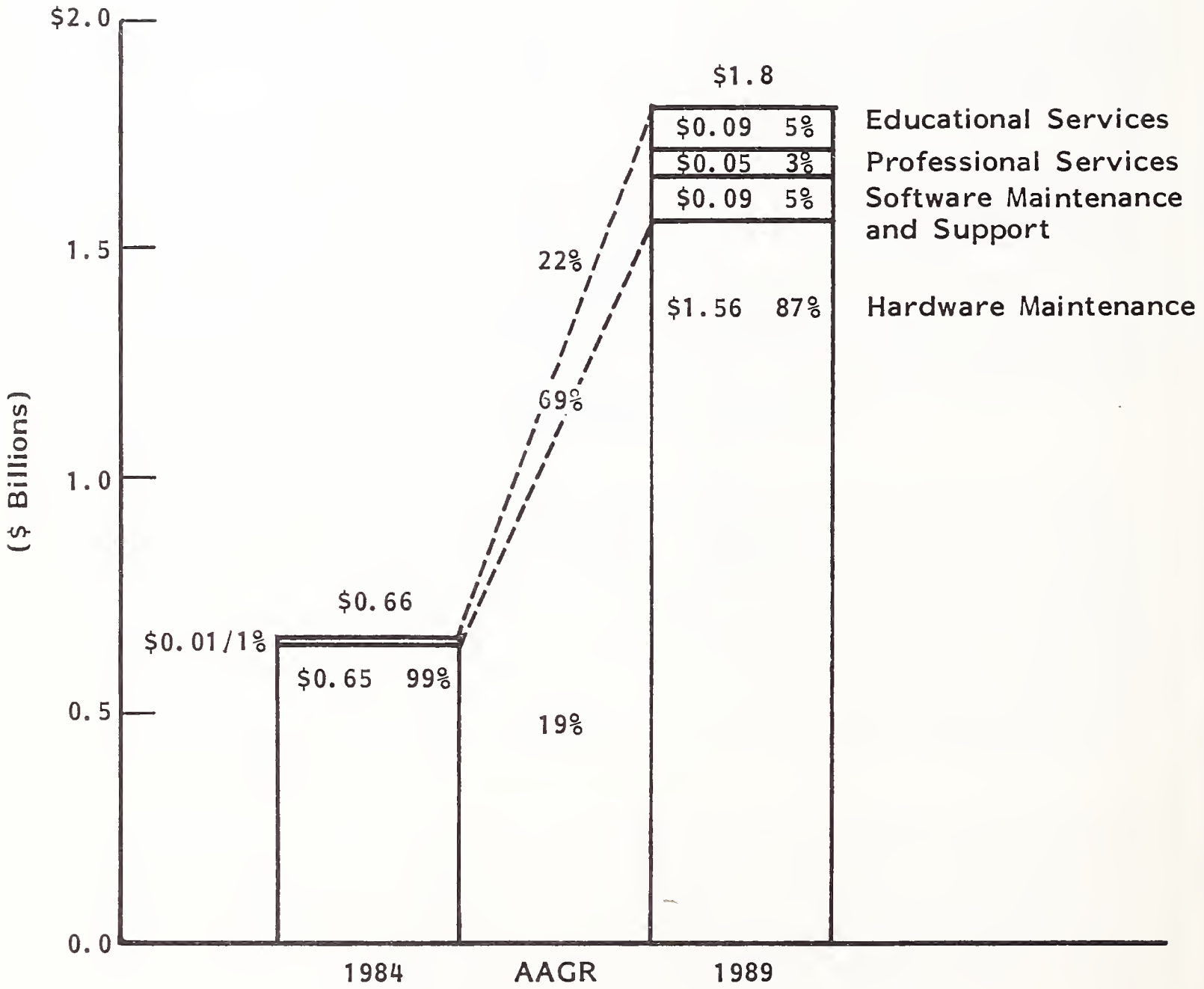


EXHIBIT V-3

PERSONAL COMPUTER SERVICE REVENUE MIX



- Training is another area that will demonstrate growth in the personal computer market, because even though the trend in software design is for user friendly software, software application programs are becoming more sophisticated, requiring more training, and better documentation services. These will be areas of growth within the educational services component of customer services.

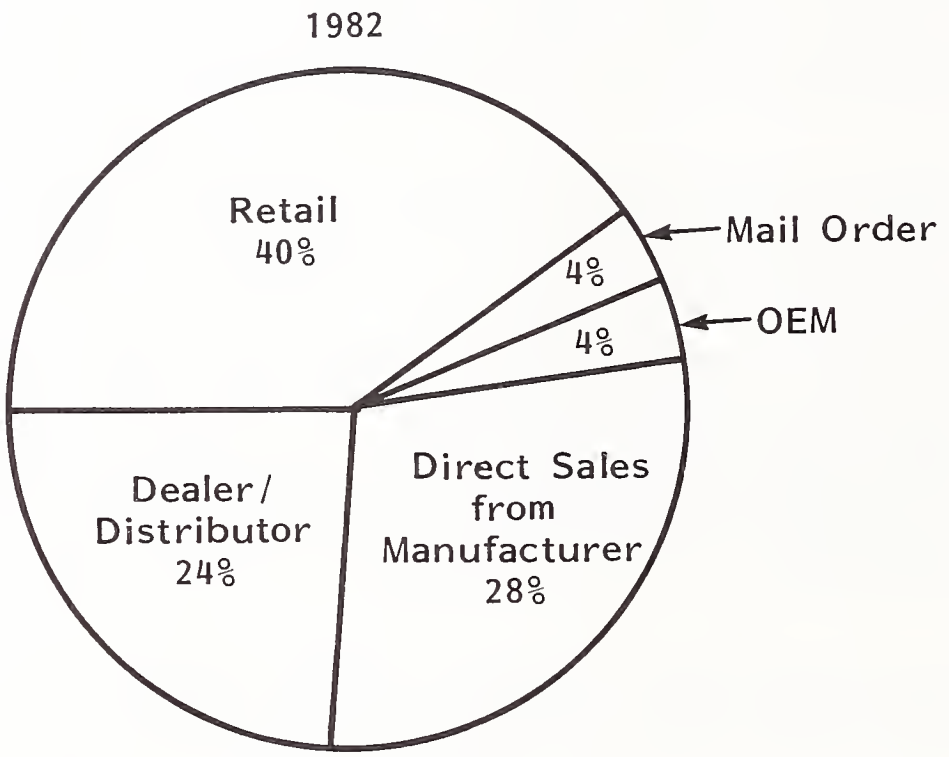
- Another factor that will increase the need for services other than traditional hardware maintenance is the trend toward linking personal computers--both to themselves in Local Area Networks, and to the corporate mainframe in a mainframe-to-microcomputer connection. This trend will require that vendors supply the same quality of software support to the users on their microcomputer equipment as they do on the mainframe and minicomputer equipment.

- Yet another factor affecting the service revenue mix of personal computers will be the distribution avenues available to the users. Exhibit V-4 shows the increased use of the sales force of personal computer vendors as a distribution channel. As equipment vendors become more involved in the sales of their own equipment, they will put more stress on service for their equipment than would a retail computer store. This will increase not only hardware maintenance revenues, but also educational services revenues, as customers who would have received training from the retail distribution service will now take part in the manufacturer's own training program.

- Exhibit V-5 illustrates the changing revenue picture for word processor service between 1984 and 1989. The word processor service market is more established in the sense that support is always a major consideration at the time of purchase, especially in the areas of software support and educational services. As shown in the exhibit, hardware maintenance still dominates word processor service revenue in 1984, with 88% of total revenues--however both educational services and software support already contribute 5% each.

EXHIBIT V-4

CHANGES IN PERSONAL COMPUTER DISTRIBUTION CHANNELS



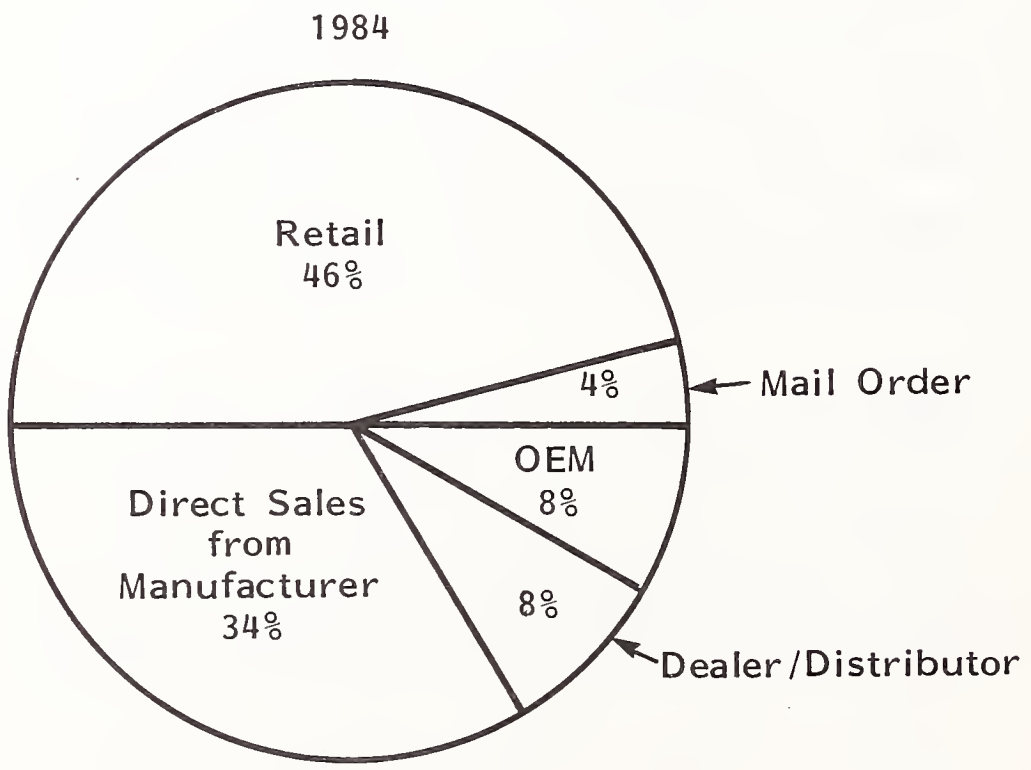
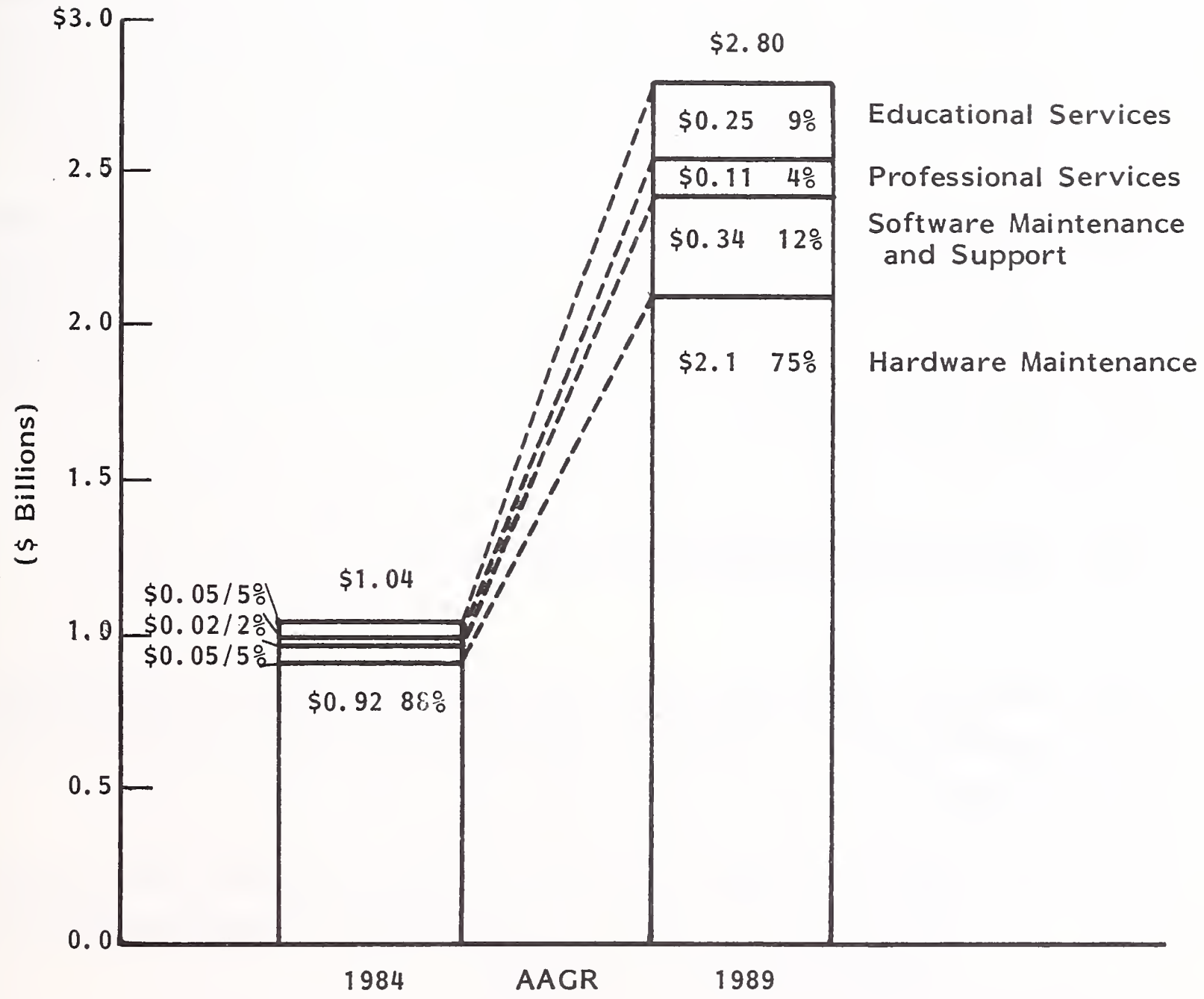


EXHIBIT V-5

WORD PROCESSOR SERVICE REVENUE MIX



- By 1989, software support and educational services should grow significantly. This will be a result of the shift by vendors away from the traditional, stand-alone, single-function word processor to multiuser, multifunction office systems. As these office systems assume more responsibilities, such as spread-sheet and communications applications, the need for educational and software support will grow.

- Further more, these new office automation systems will be competing in a marketplace already contested by traditional minicomputers, small business systems, and supermicrocomputers. A key battleground will be the quantity and quality of support available, especially considering that the end users who will use (and purchase) these systems will be office workers, not MIS people.

- It would be unwise to neglect the importance of professional services in the word processor service market. As the drive toward office automation continues, the need for planning and consulting services will also grow as users will look for assistance in integrating their data, word, voice, and image processing equipment.

B. PRICING OF OFFICE PRODUCT SERVICE

- Equipment service pricing has been traditionally tied into the equipment purchase price. This practice has benefited the sales of equipment for two reasons.

  - First, it connected the value of service to the value of the machine, thus the cost of service could be justified by the cost of replacing the defective unit with a new machine.

  - Second, connecting service prices to the equipment purchase price made it easier for the salesman to relate the cost of service to potential customers as a percent of the purchase price.

- Basing service prices on a percentage of purchase price also benefited service. Buying service prices on a cost-plus-margin basis is often impossible since actual field repair costs are not known, especially at product introduction time. During this period vendors hoped that service revenues would cover costs, and, if not, service prices would later be adjusted when costs could be determined.

- In the personal computer market, service pricing has had a confused history, with service prices that ranged from a low of 7% of the purchase price to a high of 24%. Since there has been a wide range of service provided to end users, it would be easy to blame the lack of consistency in service pricing on the variations in service provided. However, vendors with very complete service offerings, such as Hewlett Packard and DEC, provided service at a lower percentage of purchase price than vendors who provided equal or even less service.

- When IBM entered the personal computer market, its presence was expected to legitimize the market and provide stability (and almost standardization) of service and support policy. When IBM set up its support structure through retail dealers and third-party maintenance organizations, however, the confusion over pricing continued.

- Between 1982 and 1984, equipment prices, sparked by increasing competition for sales and technological advances in design and manufacturing, plummeted on an average of 35%. Service prices, during the same timeframe, dropped at an even faster rate, falling 37% from 1982 to 1984. What held steady, however, was the ratio of service price to purchase price, which dropped only 0.6%, as shown in Exhibit V-6.

- The exhibit also demonstrates that personal computers tie service pricing to purchase prices, even if the vendors haven't agreed on a common percentage to set service prices by.

EXHIBIT V-6

PC PRICE COLLAPSE HIDES
RELATIVE STABILITY IN SERVICE RATIO

VENDOR	PRODUCT	PERCENT CHANGE (1982-1984)		
		($) PRICE	SERVICE*	SERVICE AS PERCENT OF PRICE
IBM	PC	-36%	-34%	+0.6%
Apple	II	-53	-51	+1.1
DEC	Rainbow 100	- 6	-21	-2.4
Tandy	TRS 80	-44	-35	+3.3
	Averages	-35%	-37%	-0.6%

*On-site Service

- As equipment purchase prices and service prices dropped dramatically between 1982 and 1984, the costs involved in servicing the equipment could not possibly be reduced at the same rate. Exhibit V-7 shows how the profitability of service can be expected to be threatened as service pricing approaches the cost level.

- This does not imply that service will not be profitable during this period, since it is unlikely that sufficient numbers of machines would require service to a degree that costs would surpass revenues. In fact, as service prices go down, and as the number of service contracts rise, profitability should begin to rise as a greater number of contracts will be paying for fewer machines requiring service as a result of improved reliability.

C. INCREASED DEMAND FOR ON-SITE SERVICE

- As a direct result of the increased acceptance and reliance of the personal computer in the corporate environment, personal computer service delivery is quickly changing from predominantly depot service to predominantly on-site service. As shown in Exhibits V-8 and V-9, on-site service contributed only 38% of the total personal computer service market in 1984. By 1989, on-site service will grow in acceptance to make up 55% of the total service market.

- Before 1983, personal computer service was almost entirely carry-in and mail-in to the place of purchase. Part of the reason for this was that users of personal computers were predominantly individual users, even within corporations. More significantly, the dominant vendors at the time, Apple and Radio Shack (Tandy) offered little choice in the way of service.

- By 1983, IBM, HP, and DEC had entered the market, with IBM assuming a significant role in the movement of personal computers into corporate

EXHIBIT V-7

PERSONAL COMPUTER SERVICE PRICES

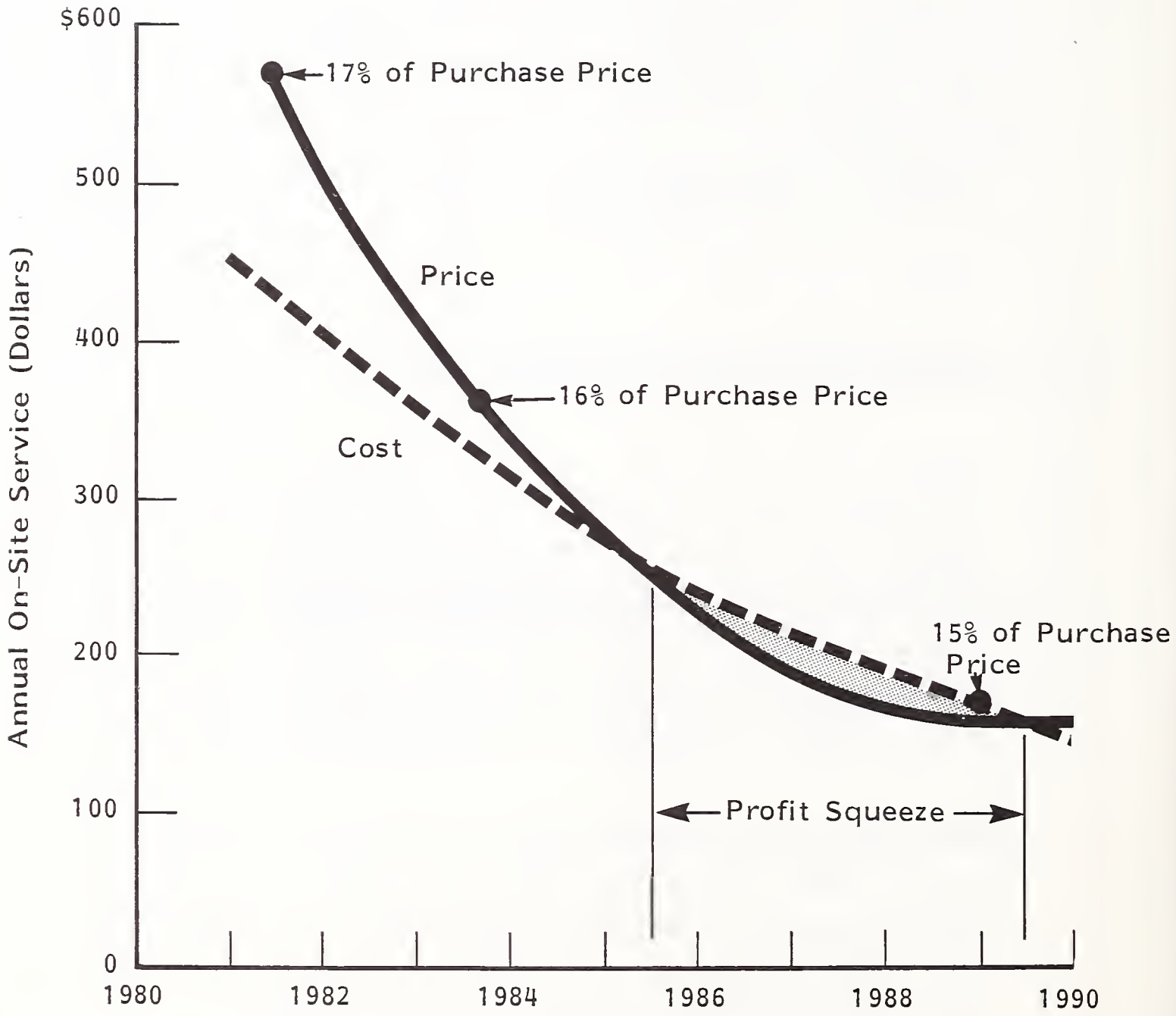
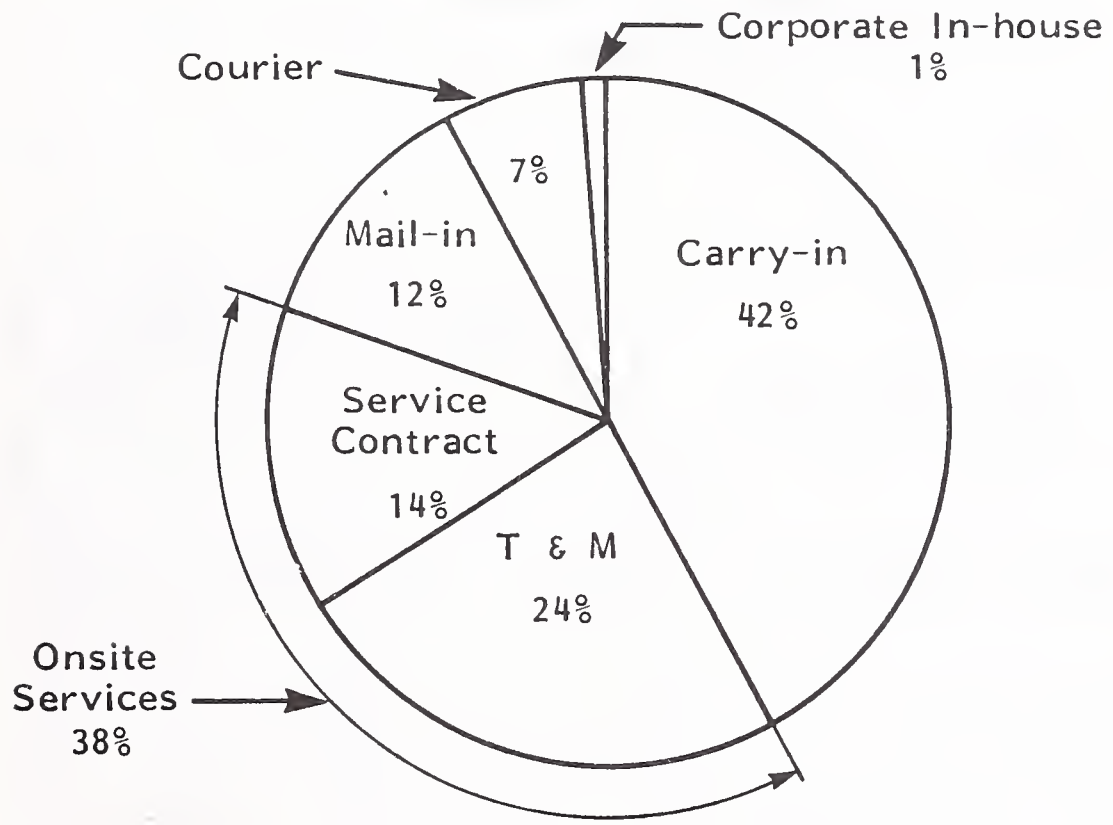
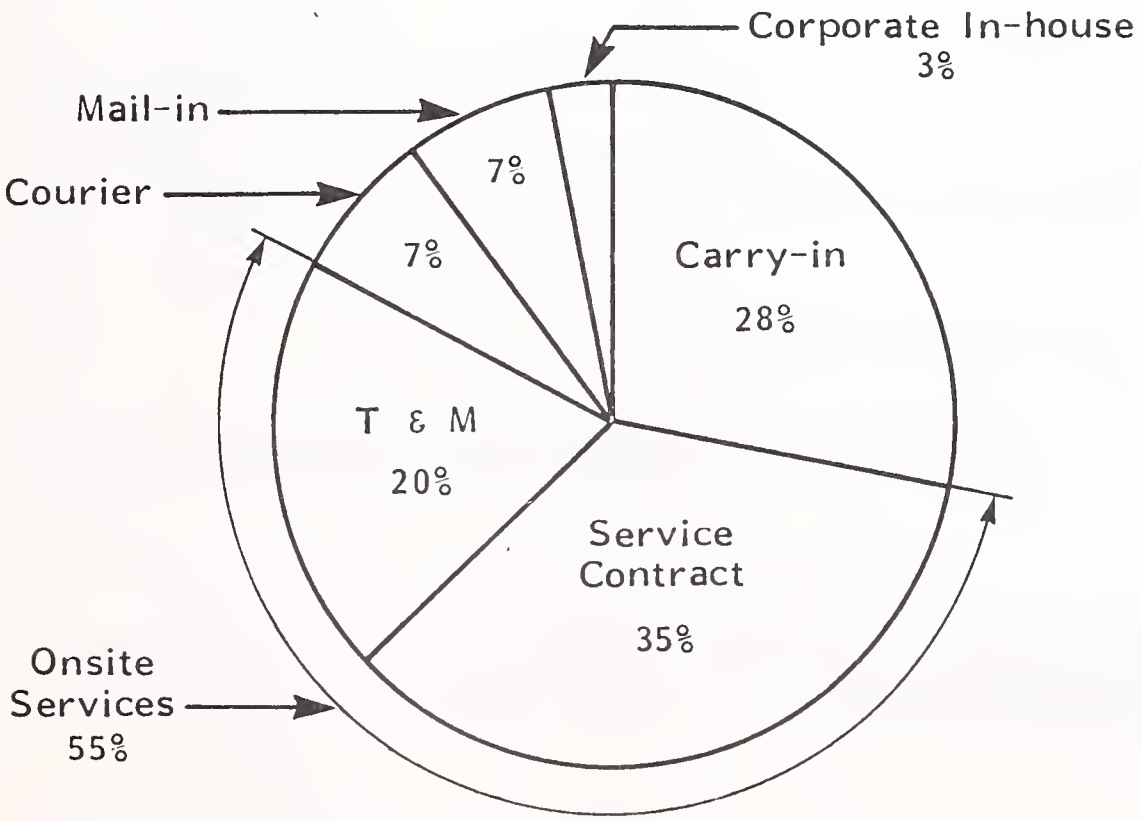


EXHIBIT V-8

PERSONAL COMPUTER SERVICE MARKETS
BY DELIVERY MODE, 1984-1989



1984 Revenue: $660 Million



1989 Revenue: $1,800 Million

EXHIBIT V-9

PERSONAL COMPUTER SERVICE MARKETS BY
DELIVERY MODE, 1984-1989

	DELIVERY MODE	1984 ($ Millions)		1989 ($ Millions)	
		TPM*	DMS†	TPM*	DMS†
ONSITE	Service Contract	$50	$20	$245	$385
ONSITE	T & M	90	55	220	140
OTHER	Courier	20	15	50	75
OTHER	Carry-in	150	30	220	280
OTHER	Mail-in	17	40	45	75
OTHER	Corporate In-house	3	-	25	30
	Total	$330	$160	$805	$985

* Third-Party Maintenance (including dealers, distributors)

† Direct Manufacturer Service

America. The entrance of these business systems vendors (experienced in minicomputer and mainframe markets) oriented the personal computer market toward service and support. At the same time, the increased acceptance of personal computers in corporations increased the need for service.

- Even IBM, a company commonly associated with service, relied heavily on deales, distributors, retailers, and TPM organizations for a large share of their service. When IBM did offer service, they emphasized depot service, realizing that the user base was too dispersed and uncontrolled to service effectively with on-site maintenance. Also, the cost of providing on-site service that would be profitable to IBM would be beyond the reach of many users.

- By 1984, when the personal computer had become firmly entrenched as a business computer, it became increasingly clear that corporate users would become unwilling to carry-in or mail-in their personal computers for service, both because of the length of downtime this would cause and the mere inconvenience of receiving service this way. Personal computer applications were becoming increasingly sophisticated, which increased the value of the processing handled by the personal computer. In addition, personal computers were being networked and linked to corporate mainframes that already received on-site service.

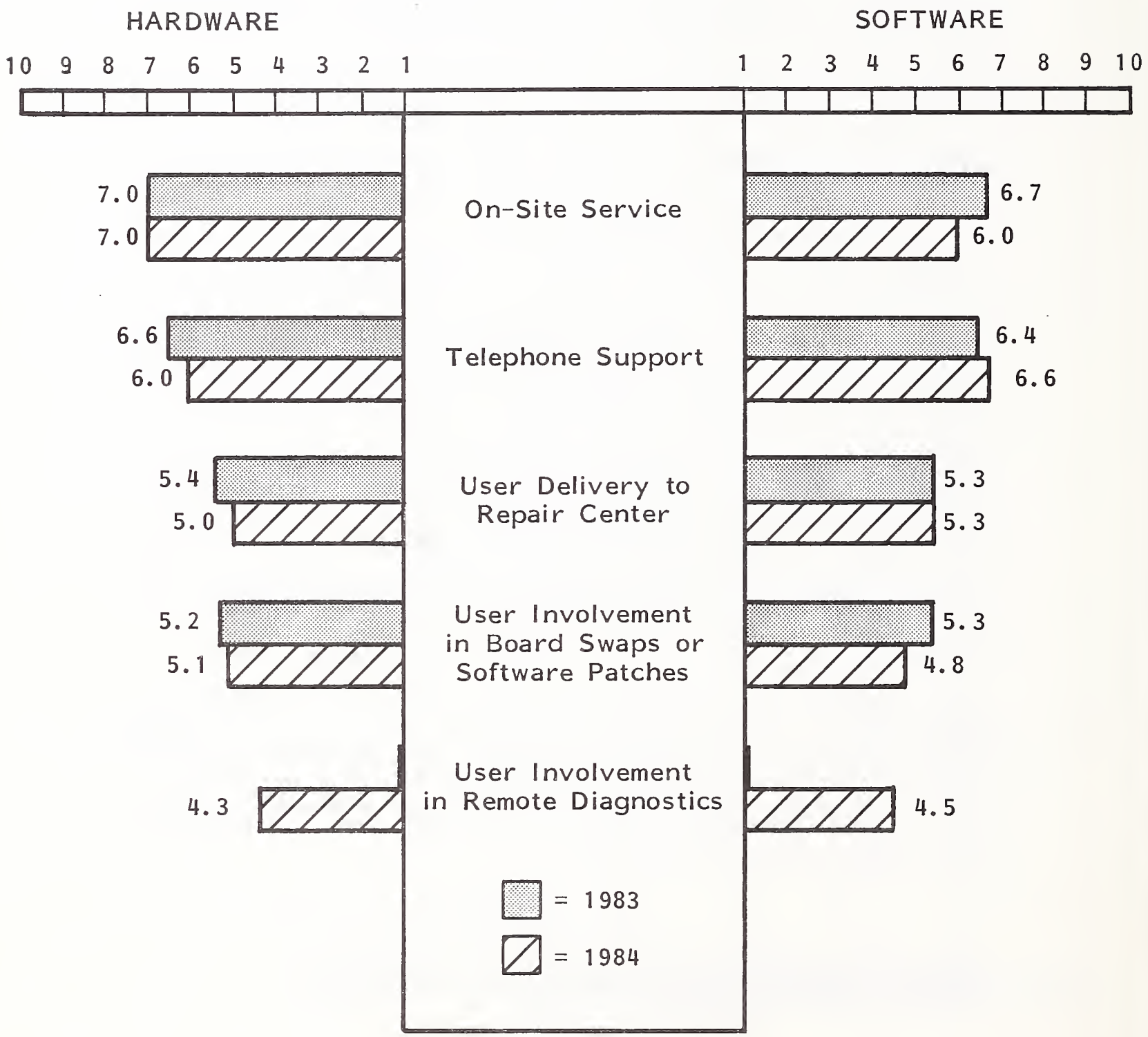
- Office products users, particularly personal computer users, are increasingly attracted to on-site hardware maintenance, as shown by Exhibits V-10 through V-12. At the same time, users report rapidly declining interest in delivering their equipment to repair centers.

D. SERVICE IMPLICATIONS OF NETWORKED SYSTEMS

- A direct result of the tremendous technological advances in hardware design and the increased sophistication of software applications is the growth in

EXHIBIT V-10

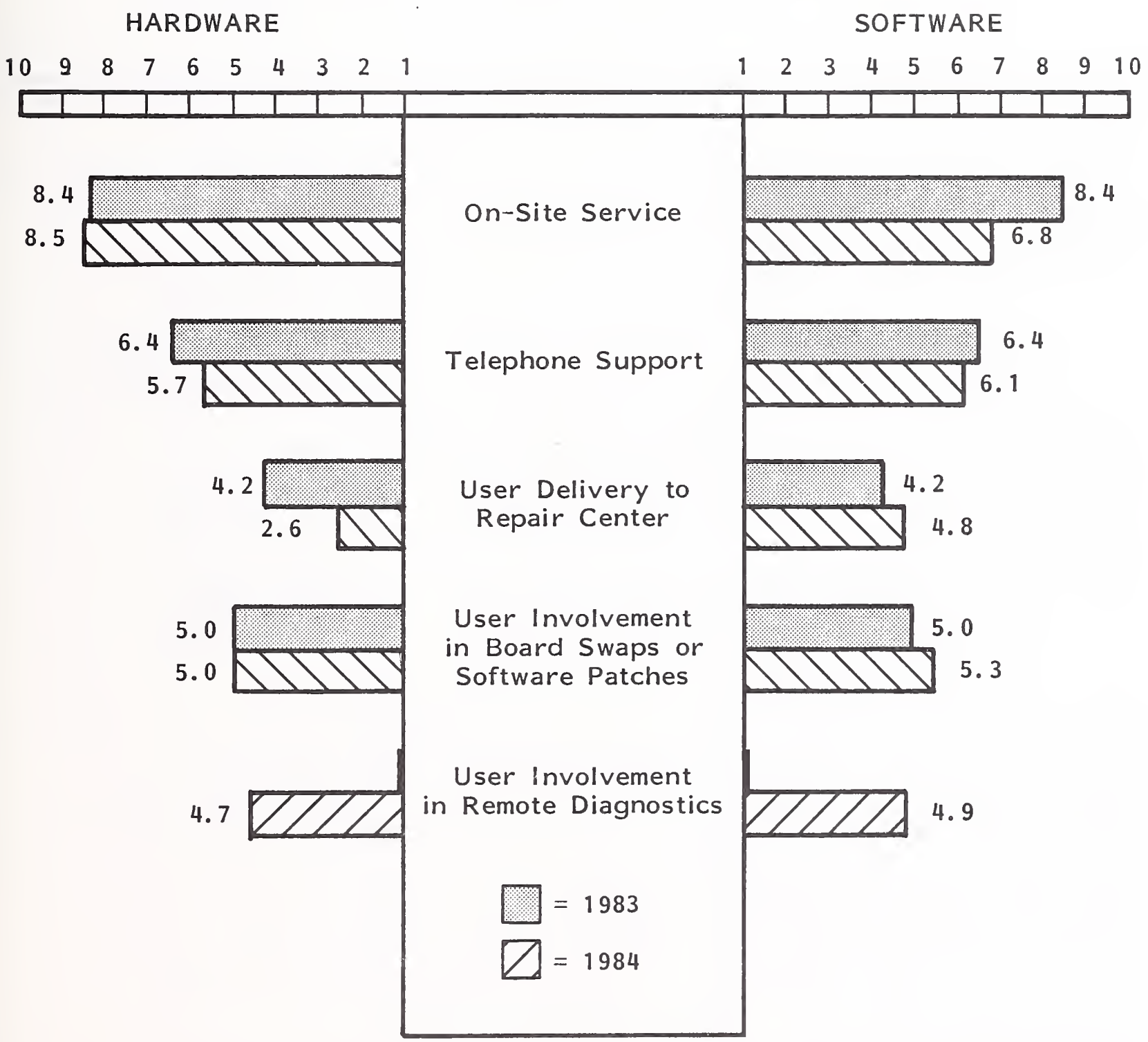
PERSONAL COMPUTER USER ATTITUDES TOWARD
ALTERNATIVE DELIVERY METHODS



* Scale = 1 = Least Important, 10 = Most Important

EXHIBIT V-11

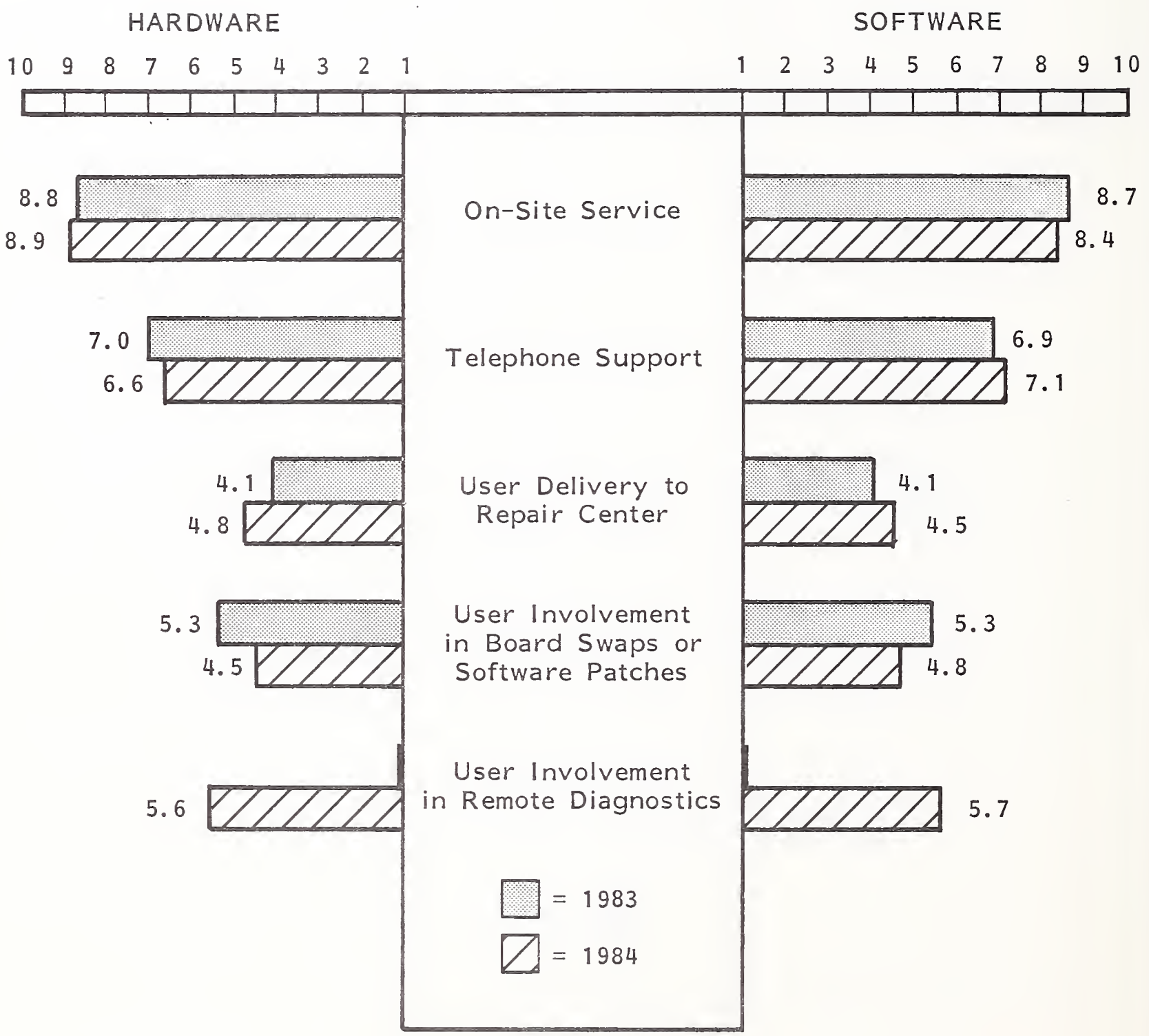
WORKSTATION USER ATTITUDES TOWARD
ALTERNATIVE DELIVERY METHODS



* Scale = 1 = Least Important, 10 = Most Important

EXHIBIT V-12

WORD PROCESSOR USER ATTITUDES TOWARD
ALTERNATIVE DELIVERY METHODS



* Scale = 1 = Least Important, 10 = Most Important

networked systems, both in terms of local area networks of interconnected personal computers, word processors, storage, and out-put devices, and in terms of microcomputer-to-mainframe (or microcomputer-to-minicomputer-to-mainframe). This growth, indicated in Exhibits V-13 through V-15, will have a tremendous impact on user attitudes and need for both hardware and software maintenance and support.

- Office products users report frustration with the lack of coordinated service available on networked systems. Currently, few, if any, vendors have a concrete policy on supporting the entire system, causing many users to look elsewhere for service, including the development of in-house support structures. With the growth of networked systems that is expected, increased user demand for a single source of service will force vendors into developing network support plans.

- Until the present, vendors have avoided providing complete network support due to lack of standardization in communications design. This has prevented the establishment of a diagnostic loop for the entire network, and has forced vendors to either require users to use only their equipment, or to disconnect foreign products from the system before beginning fault determination and repair.

- Until technological advances (perhaps caused by increased user demand for standardization) eliminate this stumbling block, vendors will need to subcontract the service of foreign equipment to third parties until the network vendor can assume complete service control of the user. This type of "strategic partnering" is not foreign to office products vendors, who in the past "subcontracted" service out to their dealers and distributors until the vendors themselves could establish a service structure.

- This type of service management strategy will provide the users with a single point of contact for service, at least contractually. This will give the vendor more control over the user's site, which will in turn improve user satisfaction and prevent other vendors from making inroads into that site.

EXHIBIT V-13

PERSONAL COMPUTER NETWORK CONNECT
1984-1989

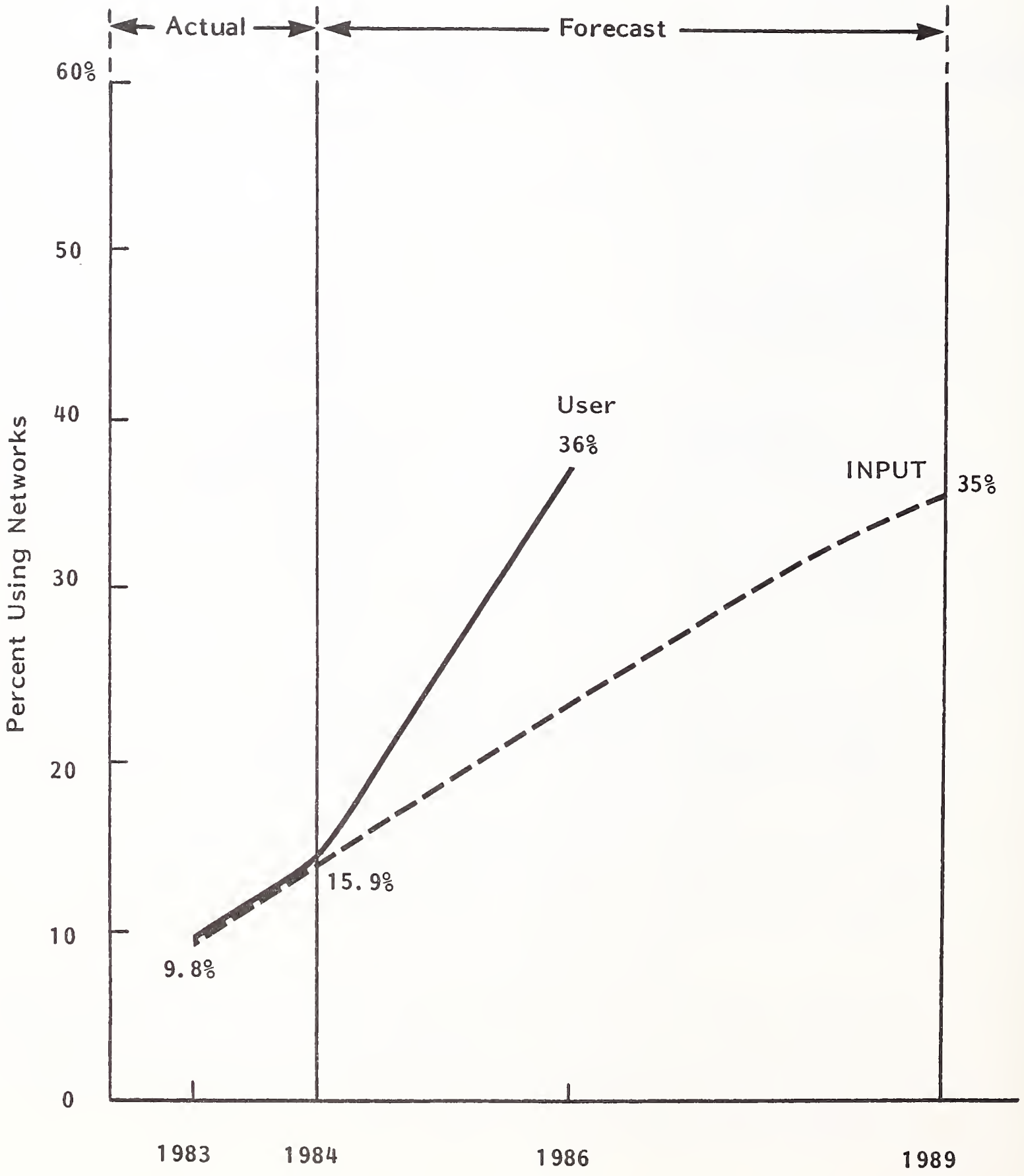


EXHIBIT V-14

WORD PROCESSOR NETWORK CONNECT
1984-1989

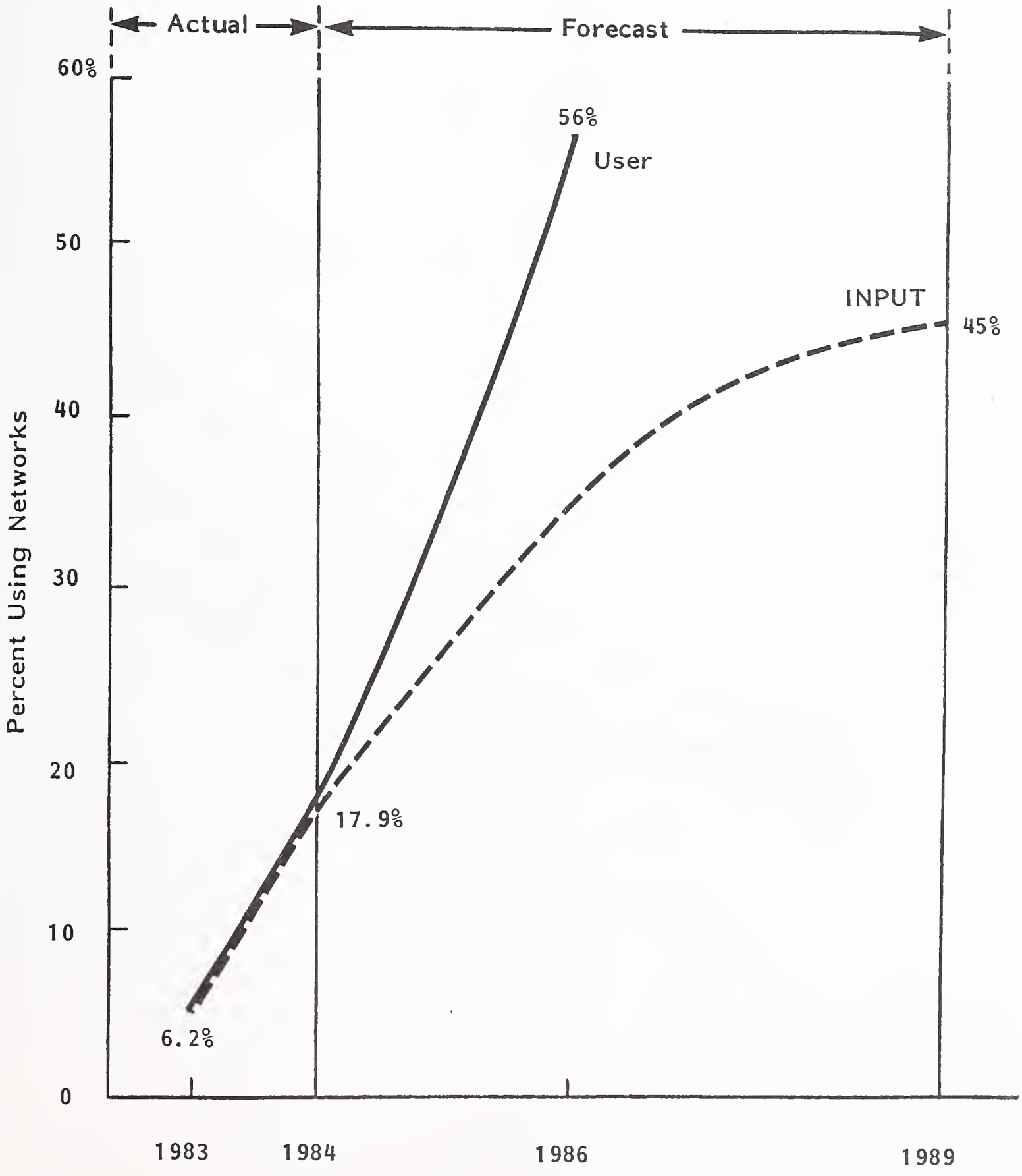
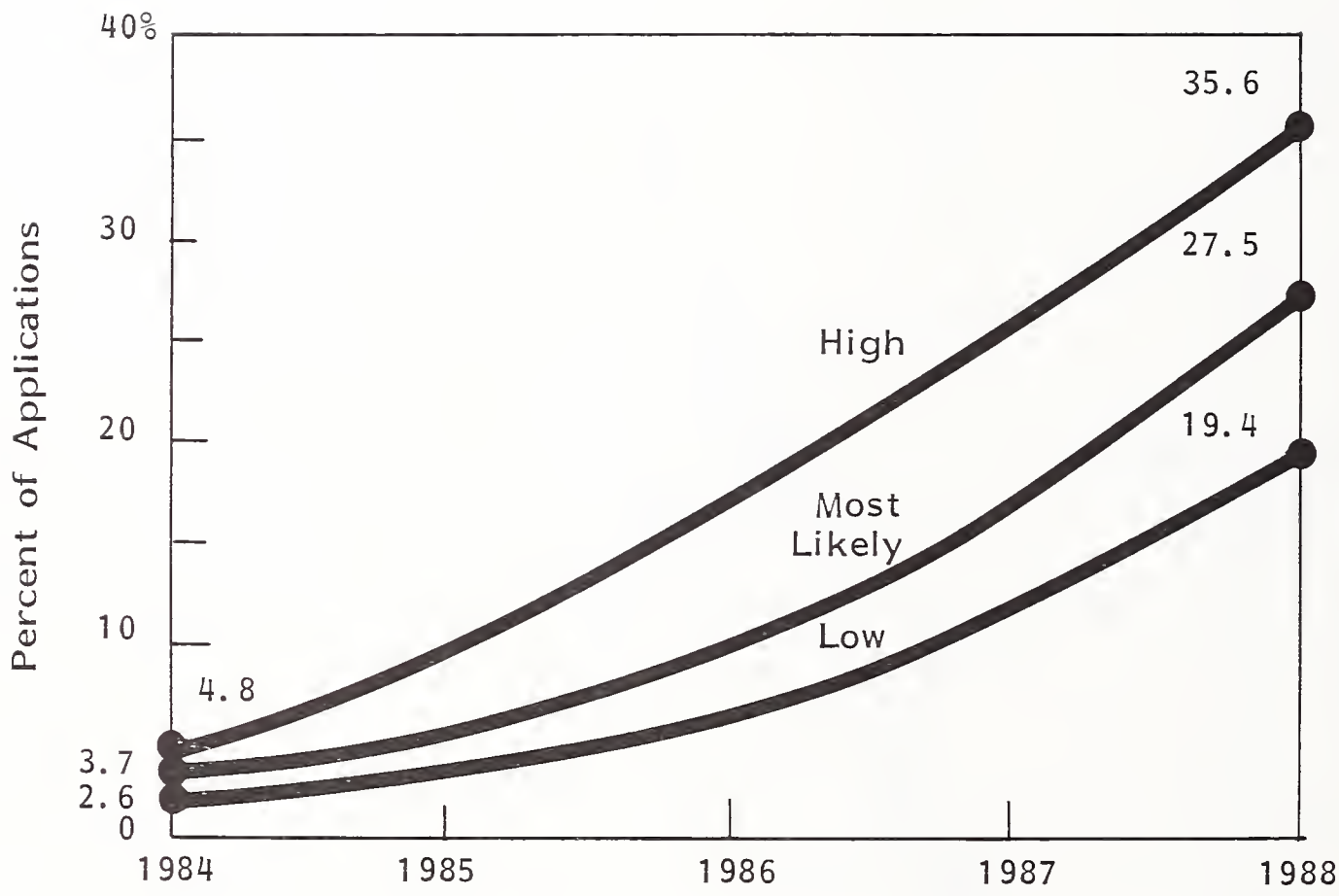


EXHIBIT V-15

MICRO-MAINFRAME APPLICATIONS GROWTH
1984-1988



VI RECOMMENDATIONS AND CONCLUSIONS

VI RECOMMENDATIONS AND CONCLUSIONS

A. CHANGING PICTURE OF OFFICE PRODUCT SERVICE

- In the past, office product vendors considered service "unmentionable" or a "necessary evil". Now, however, service is emerging as both a source of profitability for the vendors and a competitive feature for the users. The goal of office product and service should therefore be an improvement of service operations that leads to increased profitability while still providing users with the quantity and quality of service helpful to them in their purchase decisions.

- To achieve this goal, the office product vendor must develop and follow a service plan, as summarized in Exhibit VI-1:

  - Recognition of changing product market, as office products become office systems and eventually office automation systems

  - Understanding user needs, through both internal and external competitive market research. This will provide the vendor with the necessary information to properly target users, and will aid in the development and implementation of a service plan.

  - Development of a comprehensive service menu, which should encourage more users to purchase service as the offerings resulted from dialogue with vendors.

EXHIBIT VI-1

STRATEGIC RECOMMENDATIONS FOR SERVICE GROWTH

- Recognition of Changing Product Market
- Understanding User Needs
- Development of Comprehensive Service Menu
- Development of Service Marketing Plan
- Pricing that Implies Value yet Remains Competitive

- Development and implementation of a service marketing plan, which will encourage more users to purchase service by increasing the value of service. When service is properly marketed, and its value is perceived, the user becomes less price sensitive.

- Pricing then can be set at a level that reflects the increased value placed upon service by the user. It is important to keep in mind that service pricing will still need to be competitive, since users will be more aware of the service market.

- The implementation of this step-by-step process will bring about increased service profitability, through increased user participation, improved service quality, and the resulting increased user satisfaction.

B. CHANGES IN PRODUCT DESIGN

- A major factor in the growth in office product service will be the continuing sophistication of the equipment sold. As the equipment becomes more sophisticated, and the applications become more integrated, the user will expect better quality service from their vendors.

- Already, the office products market has developed into an office systems market, with products that combine two or more of the fundamental applications of office automation: data processing, word processing, voice processing, image processing, and human interaction. In the personal computer market, application software for word processing is approaching the quality of dedicated word processors. Also, inexpensive modems and electronic mail software are being used to provide telecommunications capabilities to the personal computer user.

- Current word processor systems include improved data processing capabilities, as well as spreadsheet analysis and rudimentary data base management applications. Word processor vendors also have recognized the importance of integrating electronic mail and other telecommunication capabilities into their systems.

- Both the personal computer and the word processor markets should continue toward the integration of their respective applications. Exhibit VI-2 summarizes the direction taken by personal computer and word processor vendors toward the eventual goal of office automation.

- Of greater importance to the customer service operations of office product vendors is the effect of these product changes on service, particularly how the user views services and how these changes will affect the user's service requirements. Obviously, as office products become more sophisticated and integrated, users will assign a greater value to service, and will begin to require more and better service. This has already been demonstrated in the personal computer market as more businesses dominate the market and more on-site service is required.

- Moreover, as individual products evolve into networked systems, whether as a LAN or as a micro-to-mainframe (or minicomputer) connection, users will expect even more service, since any individual problem will impact a much larger system. Users of personal computers or workstations connected to a mainframe will expect the same level of service from their vendor as they receive on their mainframe.

- At the same time, user requirements for such postsale support items as consulting, training, and documentation services will dramatically increase as the sophistication and importance of applications run on office systems grows. These services are already major decision factors for word processor users; in the next five years these services will become a major competitive service factor for all office systems.

EXHIBIT VI-2

OFFICE PRODUCTS BECOMING OFFICE AUTOMATION SYSTEMS

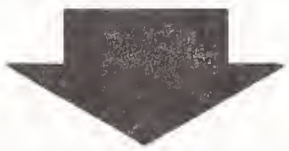
Personal Computer Market

- Increasing in Sophistication
- Expanding Multiuser Capabilities
- Networking, Micro/Mainframe Connections

+

Word Processor Market

- Multifunction, Multitasking
- Networking with Personal Computers



OFFICE AUTOMATION

C. UNDERSTANDING USER NEEDS

- As product enhancements influence user requirements for service and support of their office systems, it will become necessary for the office product service vendor to develop an understanding of user attitudes toward, and requirements for service. As user requirements for service increase, the range of services needed will expand to accomodate users who require greater service coverage and users who, for reasons of reduced need or price sensitivity, require relatively little service. Thus it is the responsibility of the service organization to properly segment their service market by determining the service needs of their users.

- Exhibit VI-3 provides an example of how personal computer users have been segmented by service need. A break down such as this allows you to maximize service business by focusing on the service requirements of your particular user base.

- It is important to recognize that classifications are not static, as demonstrated by the fact that before 1983, the majority of all personal computer service was performed at a level that would satisfy only today's individual purchaser. More and more, the business user, both small business and large corporation, will eventually require on-site service with (at least) four-hour response and eight-hour repair times. Another category will soon emerge with response and repair times approaching those received by today's minicomputer and mainframe users.

- The sources for the information needed to segment the service user base can be found in existing in-house sources. Sales and marketing can provide vital demographic data on who purchases the system, for how much, and from what sources. Often, service and support questions are already included in many existing customer satisfaction surveys performed by the marketing organization.

EXHIBIT VI-3

BUSINESS PERSONAL COMPUTER SERVICE REQUIREMENTS BY CATEGORY OF USER

USER CATEGORY	MAIN SERVICE MODE	ACCEPTABLE RESPONSE TIME	ACCEPTABLE REPAIR TIME	MAIN SERVICE CONCERNS	MAIN DISTRIBUTION CHANNEL
Individual Purchaser	Carry-In/ Ship-In, Some Courier	Next Day	2-3 Days	Local Supplier Low Cost	Retail Store
Small Business	Courier, Some Carry-In/Ship-In	4 Hours to 8 Hours	24 Hours	Response Time, Moderate Cost	VAR, Retail Store
Large Corporation	On-Site, Some Courier	4 Hours	8 Hours	Customized Contract, Response Time, Quality Service	Direct Sales

- Research from external services should always supplement internal research findings as a test of the validity of the original findings, since users are often more open to independent surveys versus their own vendors' questionnaires. Also, external research provides information on competitor's products, which is unavailable through internal reserach sources.

- The eventual goal would be the formation of a market research group within the service organization. This would ensure that the service organization would have control of the type of information gathered while enabling the service group to maintain closer contact with the user. Communication between service management and the user is crucial, not only as a way of heading off potential service problems, but also as a way of determining new service opportunities suggested by the user.

D. DEVELOPMENT OF A FULL SERVICE MENU

- Once an understanding of the user needs has been achieved through proper segmentation of the user base, it is imperative to develop a service plan that will meet the service needs of the greatest number of users possible. By offering service plans designed to affect the largest groups of users centered around specific service requirement levels, the service organization will maximize service contract coverage of their user base. This will become especially important in the office product service market, which clearly demonstrates excellent growth potential for vendors who offer extensive postsales support.

- As office product user service requirements continue to increase, the benefits of a full service will become even more pronounced. Exhibit VI-4 provides a list of presale and postsale components of a full service menu that satisfy the growing need for service as called for by the office product user. With the

EXHIBIT VI-4

COMPONENTS OF A FULL SERVICE MENU

- Presale: Includes Prospect Visits, Proposal Assistance, Environmental Planning, Installation Planning, Etc.

- Postsale: Includes Training, Software Support, Documentation, Contracts Management, Hardware and Software Maintenance, Add-on Sales and Ongoing Analysis of End-User Requirements.

- Order-of-Magnitude Improvements in System Uptime will Encourage Users to Look for Cheaper Sources of Maintenance if that is all System Vendor Provides.

continual sophistication of the office product user, along with the increased integration of products into office systems, these services will grow even more important.

- The introduction, development, and implementation of a full service menu will maintain user respect for a high level of service. This will help counteract any decline in the perceived need for service as products become more reliable. By offering the users a wide range of services from which to choose the vendor increases the value of the products, in this case service, thus changing service from a product to a commodity.

- Exhibit VI-5 highlights the advantages of the transformation of service from a product to a commodity, but the key point of this change is the effect it will have on the users' perception of service and their attitude toward purchasing service. By increasing the value connected with service, the user becomes less price sensitive, and more likely to go with the service offering considered higher in quality. Vendors with high quality service will distance themselves from the "maintenance-only image" associated with third-party maintenance companies.

E. DEVELOPMENT OF A SERVICE MARKETING PLAN

- The next logical step after the development of a comprehensive service offering is the development of an effective service marketing effort. Effective marketing is not just the promotion of a product, rather a systematic planning process that both begins and ends with an analysis of the market to be covered. Exhibit VI-6 details the development of a customer service marketing plan, beginning with an analysis of the market to be served, comparison of the opportunities with the company's goals and objectives, then the positioning of the service product within the market, then the promotion of the service, finally an evaluation of the market's response to the service product.

EXHIBIT VI-5

MAINTENANCE BECOMING A COMMODITY

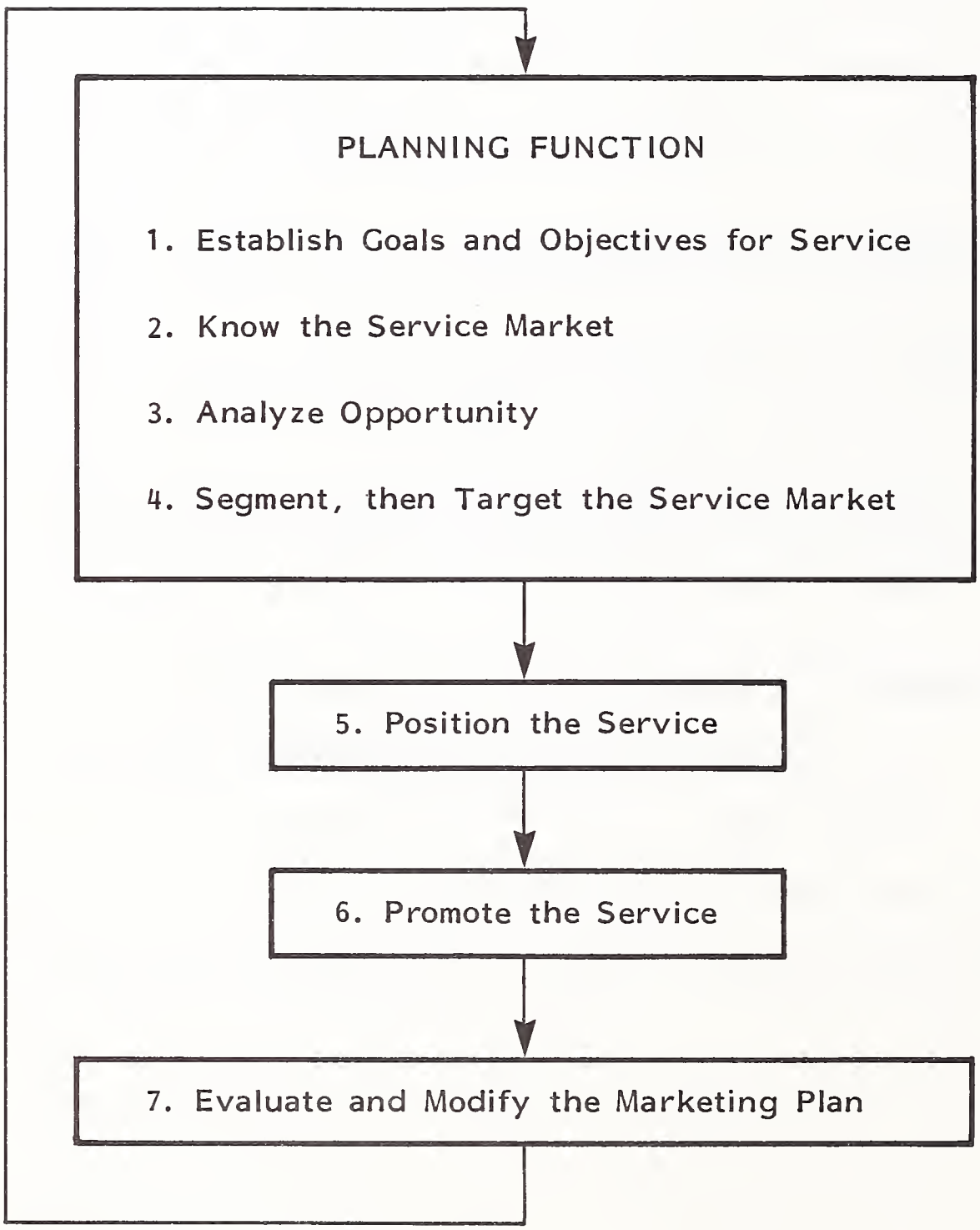
- Sharp Increases in Reliability Encourage Users to Think of Maintenance as Declining Need.

- Service as "Commodity" Means:
  - Brand Name Loyalty Decreases
  - Service Market Opens to Competition which in Turn...
  - Causes Pressure on the Price of Maintenance

- Equipment Manufacturers/Service Vendors Must:
  - Distance Themselves from "Maintenance Only" Image
  - Develop Image of Total Service Company
  - Integrate all Postsale Services

EXHIBIT VI-6

DEVELOP A CUSTOMER SERVICE MARKETING PLAN



- The driving force in effectively marketing customer services is the development of detailed knowledge of the users needs, as shown in Exhibit VI-7. A potential danger is a growth in confusion caused by presenting too many service offerings that do not reflect user needs. Instead, careful analysis of the user market will result in intelligent packaging of needed services. Then, by pricing the service competitively, the office equipment vendor can wield an important advantage over a "maintenance-only" vendor, such as a TPM firm.

- An excellent example of a successful implementation of a service product marketing process was the highly profitable DECdirect add-on and supplies sales program, which prompted a number of other vendors, such as Wang and Texas Instrument, to follow suit. In offering this service, DEC (and the others) were satisfying an existing user need for convenient access to such items as diskettes, ribbons, etc. In return the vendors received increased business.

F. COMPETITIVE PRICING THAT IMPLIED VALUE

- The dramatic decreases in equipment purchase pricing has created the impression that service pricing had to reflect this change, especially since service pricing was often based upon purchase pricing. While service pricing has dropped significantly, the proportion of service price to purchase price has dropped less than 1% between 1982 and 1984.

- IBM will continue to have a great impact on office product service pricing, particularly in the personal computer market. It took only two years for IBM to take control of the personal computer market, which is not surprising since it controls the market in nearly all product categories. The personal computer service market, at first avoided by IBM, will soon be dominated by "Big Blue."

EXHIBIT VI-7

PROACTIVE MARKETING OF CUSTOMER SERVICES

- Detailed Knowledge of User Needs Should Drive User Services. Vendors Should Achieve:
  - Market Segmentation
  - Packaging of Services
  - Positioning of Services in the Environment
  - Competitive Pricing
- Growth in Service Options Can Lead to User Confusion: Good Packaging is Needed
- Increased TPM Thrust Requires Forceful Marketing of Vendors' Own Service Quality, Options, and Advantages.

- As IBM takes greater control over the business personal computer market, combined with reduced service costs due to increased product reliability, the threat of dramatically lower service prices from IBM remains a danger to the personal computer service market. When IBM lowers its prices, competitors will need to determine carefully how far they can drop their prices while still maintaining profitability, since few vendors have as flexible a cost structure as IBM, as shown in Exhibit VI-8.

- To prepare for this, vendors (other than IBM) will need to quickly develop a customer service plan that recognizes and addresses the importance of quality of service. As stated before, as service as a product becomes associated with value, the price sensitivity of the user base lessens. Therefore, it is of paramount importance that office product service vendors actively move toward understanding and satisfying their users' needs.

EXHIBIT VI-8

IBM DRIVING MAINTENANCE PRICE UMBRELLA DOWN

- Target for IBM: Number 1 Competitive Force in Every Market it Participates in. Includes Hardware (Not Total Customer Services Yet)
- Vehicle for Increased Competition is Dramatic Improvement in IBM Product Reliability
- Will Progressively Impact Ability of Other Equipment Companies to Continue to Generate the Same Level of Profits from Hardware Maintenance as Before: Cost Structure for Most is Higher and Less Flexible than IBM's
- In Some Cases will Impact Total Profit Picture Because of High Contribution of Maintenance Profitability

APPENDIX A: OFFICE PRODUCT USER QUESTIONNAIRE

APPENDIX A
OFFICE PRODUCT USER QUESTIONNAIRE

1. On a scale of 1-10, how important are each of the following maintenance factors in computer purchase decision-making: (1 = least important, 10 = most important)

   a. Price (of maintenance) _____

   b. Uptime or system availability _____

   c. Response time _____

   d. Repair time _____

   e. Vendor reputation _____

2. On a scale of 1-10, please rate your maintenance vendor in the following categories:

   a. Hardware service engineers' communication _____

   b. Software service engineers' communication _____

   c. Overall service image of the vendor _____

   d. Dispatching _____

   e. Escalation _____

   f. General responsiveness of the vendor _____

3. a. What is your requirement for hardware response time?_____(hours)

   b. What do you receive?_____(hours)

4. a. What is your requirement for hardware repair time?_____(hours)

   b. What is the average repair time (once the FE is on site)?_____(hours)

5. a. What is your requirement for software response time?_____(hours)

   b. What do you currently receive?_____(hours)

6. a. What is your requirement for software fixes?_____(hours)

   b. What do you currently receive?_____(hours)

7. a. What overall level of system availability do you require?_____%

   b. What level of system availability are you experiencing?_____%

8. a. How many system interruptions do you have each month?_____

   b. What percentage of system interruptions are hardware related?_____%

   c. And software related?_____%

9. Do you have a requirement for any of the following services, and if so, what would you consider a reasonable premium to pay over the basic maintenance charge?

Service	1 = Yes, 2 = No Yes/No	Reasonable Premium (percent)
a. Stand-by coverage during critical periods	_____	_____%
b. Guaranteed uptime	_____	_____%
c. Guaranteed response time	_____	_____%
d. On-site spare parts	_____	_____%
e. Remote diagnostics	_____	_____%
f. Preventive maintenance and field changes during off-prime hours	_____	_____%
g. Occasional shift coverage (versus fixed schedule)	_____	_____%
h. Full-time, on-site service engineer	_____	_____%
i. Guaranteed repair time (hardware)	_____	_____%
j. Guaranteed turnaround on software fixes	_____	_____%

10. a. Please rate, on a scale of 1-10, your requirements for the following vendor goods and services.

    b. Please rate your current level of satisfaction with the services you receive from your maintenance vendor.

Vendor Goods & Services	Requirement (a) 1-10	Current Level (b) 1-10
a. Planning (environmental, physical site installation)		
b. Consulting		
c. Documentation		
d. Training		
e. Sales of supplies		
f. Add-on sales		
g. Site audits		
h. Relocation/deinstallation		
i. Hardware maintenance		
j. Software maintenance		

11. Would you favor or oppose having the field service engineer take orders for: (1 = favor, 2 = oppose, 3 = neutral)

    a. Supplies _____

    b. Add-on equipment _____

    c. New models _____

    d. Upgrades _____

    e. Service contracts _____

    f. Software _____

12. Please rate the importance of receiving your hardware and software support services by the following methods: (scale 1-10)

	(1-10)	
	Hardware	Software
a. Your involvement in telephone diagnosis: working with support center	_____	_____
b. Your involvement with remote diagnostics and software down-line loading	_____	_____
c. Your replacing circuit boards, or patching software	_____	_____
d. Ship in/carry in to repair center	_____	_____
e. Consulting/software customization	[redacted]	_____
f. Traditional, on-site response to trouble calls	_____	_____

13. Do you currently use third-party maintenance on any of your equipment?
_____ (1 = yes, 2 = no) IF YES, GO TO QUESTION 15.

14. Have you considered using third-party maintenance?_____ (1 = yes, 2 = no) IF YES, GO TO QUESTION 20. IF NO GO TO QUESTION 21.

15. a. Which third-party vendor are you currently using? _____

b. And for which product? _____

16. Do you receive third-party maintenance in: (1 = yes, 2 = no)

a. Per call _____ or b. Contract _____

17. If contract:

What is your response time requirement?(1 = yes, 2 = no)

a. 2 hrs._____ b. 4 hrs._____ c. 8 hrs._____

d. Other_____

18. What type of coverage do you receive? (1 = yes, 2 = no)

    a. Mon. - Fri. _____

    b. Saturday _____

    c. Sunday _____

19. On a scale of 1-10, how satisfied are you with the third-party maintenance you are now receiving? _____

20. When considering third-party maintenance, how important are each of the following criteria to you? (1 = not important, 10 = very important)

    a. Price of third party maintenance _____

    b. Improved response time _____

    c. Third-party vendor reputation _____

    d. Hardware support _____

    e. Software support provided by the third-party vendor _____

    f. Overall system uptime (guarantee) _____

    g. Geographic accessibility _____

    h. Other features (spares, diagnostics) _____

21. On a scale of 1-10, how important is a single source of maintenance to you?

    (1 = not important, 10 = very important) _____

    (A single source of maintenance provides a single maintenance contract for all DP products at your site.)

22. Please rate the importance of the following single source maintenance contract features: (1 = not important, 10 = very important)

    a. Improved convenience _____

    b. Improved response time _____

    c. Knowledge of site _____

    d. Reputation of single-source vendor _____

    e. Avoids "finger pointing" _____

23. Do you currently use a Local Area Network in conjunction with your small computer and/or word processor? (1 = yes, 2 = no)

_____

a. If yes, which vendor?_____

1. Star _____

2. Ring _____

3. Bus _____

b. If no, do you plan to in the next two years? _____

24. Who maintains the network? _____

25. What is your most significant LAN maintenance concern? _____

_____

_____

_____

_____

26. In your opinion, what single change should your maintenance vendor make to significantly improve the level of service?

_____

_____

_____

_____

_____

_____

THANK YOU.

APPENDIX B: OFFICE PRODUCT VENDOR QUESTIONNAIRE

APPENDIX B

OFFICE PRODUCT VENDOR QUESTIONNAIRE

1. Many of the large-system service vendors are increasing the number of services offered to customers as a way to increase revenues and to improve user satisfaction. What type of postsales support services does your department now offer or plan to offer in the next 3 years?

	Current	1987	Please Describe
- Planning	___	___	_____
- Consulting	___	___	_____
- Documentation	___	___	_____
- Training	___	___	_____
- Site Audits	___	___	_____
- Software Support	___	___	_____
System	___	___	_____
Application	___	___	_____
- Remote Diagnostics	___	___	_____

2. a. Dispatching technology has advanced very rapidly in the last few years. Do you see these changes in dispatching helping your field services group?

_____

_____

_____

b. Do you offer or plan to offer centralized dispatching?

_____

_____

_____

2. (Cont.)

c. Does your company have local, regional or national dispatching?

d. Please rate your dispatching performance.

e. Has new technology increased performance?

f. Describe the organization structure of your dispatching unit

g. Is parts tracking a function of dispatching?

3. a. Spare parts inventory is usually the second largest budget item for customer service organizations (coming right after personnel expenditures). Controlling these parts inventories is a major goal of most service vendors. Is your capital investment in spares growing?

b. What factors influence your parts investment?

c. Do you have parts depots on a national or regional basis?

3. (Cont.)

   d. How many parts depots does your company have? _____

   _____

   e. Are parts depots at repair depots? _____

   _____

   f. What impact have parts depots had on productivity improvements in your company?

   _____

   _____

4. a. Please describe the remote support services that your company offers:

   _____

   _____

   b. Does the customer receive a discount or a premium for using remote support?

   _____

   _____

   c. What systems or products are covered by RSS? _____

   _____

   d. What was the impact of remote support services on customer support?

   _____

   _____

   e. What trend do you see in remote support? _____

   _____

5. a. We have noticed that in the last 2 or 3 years many of the major service vendors have been building up their depot service networks. Do you think that depot service will significantly impact on-site service?

_____

_____

b. Do you offer T/M or contract rates at depots? _____

_____

c. What products are covered by depot service? _____

_____

d. What channel of distribution do you use? _____

_____

e. How do you market depot service? _____

_____

f. How do you price depot service? _____

_____

6. a. Users have indicated to us that the number of call-backs has been growing, particularly as the number of experienced FE's has decreased. Is your customer services group tracking the problem of call-backs and, if so, how do you plan to reduce call-backs?

_____

_____

b. What percent of completed fault calls are completed in the first call?

_____

6. (Cont.)

c. What percent of call-backs have you experienced? _____

_____

d. Are you achieving goals for MTTRepair? (Y/N) _____

MTTResponse _____

MTBF _____

System Availability _____

7. a. Software support, in the minds of many users, has already become as important as hardware support. How do you see this trend toward increasing software support requirements affecting your customer services department and what is your department doing to meet these requirements?

_____

_____

b. Does your company offer:

	YES/NO	DESCRIBE
- System Software Support	____	_____
- Application Software Support	____	_____
- Training on Software	____	_____
- Support Centers	____	_____
Regional	____	_____
National	____	_____
- Hotlines	____	_____
- On-Site Support	____	_____
- User Involvement	____	_____
- Software Consulting	____	_____

8. a. Single source maintenance and third-party maintenance is becoming increasingly popular among the large service vendors. Honeywell, DEC, and NAS all have just recently announced major expansions in this area. How do you see this effecting your field service options?

_____

_____

b. Will you offer these services? _____ Describe: _____

_____

c. On what products? _____

d. Please describe TPM or Single Source as it relates to:

- Parts _____
- Pricing _____
- Training _____
- Documentation _____
- Software Support _____

9. a. Customer service is becoming more and more competitive with the growth of TPM, single source vendors, and new service vendors such as AT&T. How is this going to effect your pricing policies for field service?

_____

_____

b. When and why do you change service prices? _____

_____

9. (Cont.)

c. Do you offer discounts for any of these features?

	Yes/No	PLEASE DESCRIBE
- User involvement in Maintenance	___	_____
- User delivery of Plug-in Modules	___	_____
- Relaxed Requirements on Response Time	___	_____
- Remote Diagnostics	___	_____
- Volume Discounts	___	_____
- User purchase of Parts Kits	___	_____
- Invoice Prepayment	___	_____

10. Where do you see field service prices going in the next 2-3 years?

_____

11. Service guarantees such as guaranteed availability and guaranteed response time are an attractive option to many users. Where do you see guarantees fitting into the future role of your field service group?

_____

_____

12. a. Personnel costs are the most significant portion of field service expenditures. Improving staff productivity is one method vendors are using to improve their competitive position in service. How do you measure the field engineer's productivity and do you foresee any major changes in overall service staff productivity?

_____

_____

12. (Cont.)

b. Are FE's becoming more productive? _____

_____

c. Do you measure?

	Yes/No	PLEASE DESCRIBE
- Revenue per Engineer	___	_____
- Personnel per Equipment	___	_____
- Expense to Revenue	___	_____
- Down Time	___	_____
- Number Call-Backs	___	_____

13. Please complete the following personnel matrix:

	SOURCE OF NEW EMPLOYEES	TURNOVER 1983 (Percent)	EXPECTED GROWTH	TOTAL NUMBER
Junior FE				
Senior FE				
Software Support				
Line Manager				
Staff				

14. a. Field service revenues are always a touchy subject, but would you say that FS revenue growth has matched your expectations this year?

_____

_____

b. Was FS department profitable? _____ Please Describe: _____

_____

c. What level of growth? _____

_____

d. What are some of the factors affecting FS growth? _____

_____

e. What were FS revenues? _____

_____

f. What were FS expenses? _____

_____

15. Do you think that the field engineer should be involved in any of these sales or sales-support functions:

	Yes/No	DESCRIBE
- Making Goodwill Calls	____	_____
- Software	____	_____
- Maintenance Contracts	____	_____
- Attending Sales Meetings	____	_____

APPENDIX C: SOFTWARE SUPPORT CORPORATE QUESTIONNAIRE

APPENDIX C

SOFTWARE SUPPORT
CORPORATE QUESTIONNAIRE

Introduction:

INPUT is a research and consulting firm. We are conducting a study on issues and trends in packages software support and maintenance from the corporate customer's standpoint. We will make recommendations on how corporations can best deal with these issues in the coming years. We would like your organizstion to take part in this study by describing what you are doing now, what your plans are and what problems you see. This information will be used by IS departments in their planning and will also be used by a wide variety of information service vendors to offer more useful products and services.

None of the information that you provide will be associated with your company. In return for your taking part in this study, we will send you a summary of this study on its completion and will also send you a summary of INPUT's report PC Software Support in Large Corporations.

1. a) Are your responsible for all significant packaged software support matters in your organization?

☐ Yes ☐ No

If No to 1.a)

b) Are you knowledgeable about all significant packaged software support matters in your organization?

☐ Yes ☐ No

If No to 1.b)

Which of the following are you Responsible for or Knowledgeable about: (Note with "R" or "K")

	Operating System(s)	Other Systems Software	Application Software
Mainframe			
Minicomputer Software			
Microcomputer Software			

(NOTE: get names of other people to complete the matrix).

For the rest of this interview I would like to discuss with you your support requirements for _____ software. (If respondent is responsible for one area select that; if responsible/knowledgeable in more than one, follow instructions).

2. Who are the suppliers of your major software packages, categorized by software type (Operating systems, Other Systems Software, and Applications Software) and Applications Software) and Hardware Type? (Use following matrix).

Software Suppliers

Software Type			
	Operating System(s)	Other Systems Software	Application Software
Hardware Type			
Mainframe			
Minicomputer - IBM Sys 38, - Series 1, - 8100			
DEC Minicomputer			
Prime Minicomputer			
Data General Minicomputer			
Other Mini _____			
Office/PC - IBM PC Family - Other			

3. a) Using these same categories, about how much did you spend in 1983 on:

   - Software licenses, fees, lease or rental payments, etc? $_____
   - Software support or maintenance fees either in dollars or as a percent of License fees? $_____

     _____% of license fees.

   b) For what percent of your software is support included in the license fee? _____%

   c) What percent of your software is not supported by the vendor? _____%

   d) Overall, how much do you expect these to change in 1984 and 1985? ($ or percent change)

Changes in:

	Total License Fees	Total Support Fees
1984		
1985		

   e) If any of the changes in 3d were significant (i.e., 10% or more):

   - What is the reason for this? _____

     _____

   Do you expect this amount of change to continue? _____

   _____

4. a) I will read a list of functions or services that are sometimes or usually included as part of standard software support services. Please tell me how important each is to your organization generally and whether there are exceptions, depending on the type of package? Please be specific about the exception (e.g., from a particular vendor, for a particular application, at a particular location, for a particular type of machine). Please rate their importance on a scale of 1 to 5 with 1 being low importance and 5 representing high importance.

SOFTWARE SUPPORT FUNCTIONS

IMPORTANCE

Functions	Generally	Exceptions
Fix Errors		
Improve Features of Functionality		
Add Features or Functionality		
Extend Features or Functionality		
Training		
Consulting		
Other (Describe) _____		

4. b) How well have your software vendors generally met these support requirements? Have certain vendors performed much better or worse? (Note: Specific vendor names are preferred, but generic descriptions are acceptable; Please rate your satisfaction by the same functional areas (on a scale of 1 to 5).

Satisfaction with Software Support

Functions	Generally	Exceptions
Fix Errors		
Improve Features or Functionality		
Add Features or Functionality		
Extend Features or Functionality		
Training		
Consulting		
Other (describe) _____		

5. a) What kinds of services do your software vendors offer in addition to those contained in the standard support contract (e.g., additional training, consulting)? How extensive are they?

_____

_____

5. b) About how much do you spend annually on these additional services?

$ _____

c) What additional services do you expect to purchase from your packaged software vendors?

- When: _____

_____

- Why?: _____

_____

- What would this translate to in dollars? $_____

6. a) Have you experienced situations recently where a software vendor has brought out a new product rather than enhancing or modifying an existing product?

☐ Yes ☐ No

- If Yes:
  - Which product(s) was it? _____
  - Do you feel this was justified? ☐ Yes ☐ No
    Explain: _____

    _____
  - Did licensees of the old product receive a discount on the new product? ☐ Yes ☐ No
    If Yes, how much was it and was it fair in your opinion?

    _____

    _____
  - Overall, do you feel the vendor(s) handled the situation well from your standpoint? ☐ Yes ☐ No
    Why? _____

    _____

6. b) Do you think that bringing out new products in this way will be a more common situation in the future?

☐ Yes ☐ No

Why? _____

_____

If yes, will this be common for:

☐ Mainframe Software
☐ Mini Software
☐ Micro Software

7. a) Does your organization keep logs or other records of major and minor bugs or other problems in packaged software?

☐ Yes ☐ No

- If Yes:
  - How many major and minor problems are reported annually for operating systems software, other systems software and application software packages? How many are resolved? What is the average time to resolve these problems? (Use attached matrix.)

7. a) Problem Reporting or Resolution

	Package Type		
Problems	Operating System(s)	Other Systems Software	Application Software
Major Number Reported			
Number Resolved			
Average Time to Resolve			
Minor Number Reported			
Number Resolved			
Average Time to Resolve			

7. b) Overall, is this problem resolution performance satisfactory?

☐ Yes ☐ No

If No:

How should it be improved? _____

_____

To what extent do you expect it to be improved? _____

_____

7. c) How much do you expect automatic downloading and installation of new releases, remote diagnostics, and remote fixes to improve problem resolution and other services? Are these being done now at your installation? If so, what is your experience?

	Being Done Now (Yes/No)	Expected Improvements	Experience
Automatic Down-loading and Installation of New Releases			
Remote Diagnostics			

8. a) Is there one person in your company who tracks and analyzes software support contractual terms and conditions for all software products?

☐ Yes ☐ No

- If Yes:
  - How long has this been done? _____
  - How many products are covered? _____
  - What benefits has your company received? _____
- If No:
  - Do you plan to? ☐ Yes ☐ No

8. b) Do you feel that current contractual terms and conditions applying to software support and maintenance are satisfactory?

☐ Yes ☐ No

Why: _____

_____

- What sort of changes would you like? _____

_____

_____

- What kind of changes do you believe vendors are planning?

_____

_____

c) Does your firm ever seek to modify standard terms and conditions concerning software support?

☐ Yes ☐ No

Why? _____

_____

If Yes:

- How often is this attempted? _____

_____

- What terms do you try to modify? _____

_____

- What success have you had? _____

_____

9. To what extent do you feel you have little or no choice in the type or amount of software support you will be receiving?

_____

_____

_____

- What can you do about this? _____

_____

- What are you going to do about it? _____

_____

10. a) How much and what kind of self-support of packaged software is your organization currently doing?

_____

_____

Why? _____

_____

10. b) Do you usually, sometimes or never perform the following types of self-support? What are your future plans? (fill in matrix below)

Type of Self-Support	Current			Future		
	Usu.	Some	Never	Usu.	Some	Never
Install Initial Release						
Install Subsequent Releases						
Modify Packages						
Fix Errors						
Set up a Single Point in your Organi-zation to Funnel Questions to a Vendor						

c) Do you expect to do more in the future? ☐ Yes ☐ No

Why? _____

_____

_____

If yes:

What kind of self-support? _____

_____

d) What kind of incentives do software vendors now give you to perform self-support functions?

_____

_____

_____

10. e) What additional incentives would you find attractive? _____

_____

_____

11. What other software support issues are important to you or your organization?

_____

_____

12. Overall, what changes do you see occurring in the way in which packaged software support is delivered?

_____

_____

_____