

January 7, 1987

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Original

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Dear

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:

Enclosed are two additional deliverables of the Analysis of Third-Party Maintenance module of INPUT's 1986 Customer Service Program. The first of these deliverables, Third-Party Maintenance User Service Requirements, should be filed in Section III of the Third-Party Maintenance binder.

Also, additional appendix information, such as a list of definitions used in these reports along with examples of questionnaires used in creating these reports, has been included to be filed in Section VI of the binder.

Shortly, INPUT will be sending the final deliverables in the Third-Party Maintenance module of the Customer Service Program--the Third-Party Maintenance Market Analysis and an Executive Summary which provides a summary of the year's findings in presentation format.

Sincerely,

Rick Brusuelas
Manager, Customer Service Program

RB:ml

Enclosure

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Received of the Treasurer of the State of New York the sum of \$1000.00 for the year 1875.

Witness my hand and the seal of the State at Albany this 1st day of January 1875.

John T. Hoffman, Treasurer of the State of New York.

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ANALYSIS OF THIRD-PARTY MAINTENANCE

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ANALYSIS OF THIRD-PARTY MAINTENANCE

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III THIRD-PARTY MAINTENANCE USER SERVICE REQUIREMENTS

A. INTRODUCTION

I. SCOPE

- This study is part of INPUT's 1986 U.S. Third-Party Maintenance Services Program and covers the results of a recent study conducted by INPUT of the support requirements of third-party maintenance users.
- The objective of this report is to identify and analyze the needs of computer system and peripherals users who opt to receive their maintenance services from third-party support vendors. The analysis and consideration of the needs of this growing market is of importance not only to TPM vendors themselves, but also to equipment manufacturers as TPM continues to erode their service revenue base.
- The report initially discusses basic characteristics of the current TPM market, identifying the types of firms who use TPM for which equipment categories and when and why it is chosen as a support option. The third-party business base is then more specifically analyzed, broken out by contract type, service delivery method, and support coverage. The analysis of such specifics of the current market provides solid input into the design and marketing of new maintenance packages and offerings attractive to potential TPM users.



- User satisfaction with third-party support is also discussed, and maintenance performance and delivery are measured, ranging from traditional criteria (such as mean time to respond and mean time to repair) through the evaluation of extended services relatively new to the maintenance market. Users' levels of requirement are compared to actual vendor performance in support of both systems and peripherals, and the comparison of TPM vendor ratings to those of manufacturer-supplied service are presented where possible. Such rankings of performance as seen through the user's eye gives service vendors a valuable comparative tool, allowing them to see just where they are "making the grade" and recognize the areas in which they could improve their business and revenues as well.
- The report concludes with a discussion of important trends surfacing in the TPM market and how they will affect user satisfaction and demands. The application of these market directions to future service provision is discussed, and alternative and expanded support offerings accommodating the changing market are suggested.

2. DEMOGRAPHICS

- For INPUT's 1986 Third-Party Maintenance User Requirements report, 150 TPM support users were contacted and a variety of support issues were discussed with key DP and operations personnel at each site (see questionnaire in Appendix A). The sample, drawn from a base of over 1,000 interviews performed for INPUT's systems vendor maintenance reports, covered virtually all industry categories, as demonstrated in Exhibit III-1.
- Targeted for interview response was the ranking staff member at each site with knowledge of both the practical and financial aspects of the TPM support their organization receives. At most firms, this individual held the title of Data Processing/MIS Manager or a broader position such as Director of Operations. As shown in Exhibit III-2, the majority of interviews were conducted with this person.



EXHIBIT III-1

SAMPLE BY INDUSTRY SERVED

INDUSTRY	NUMBER OF RESPONSES
Process Manufacturing	47
Services	32
Discrete Manufacturing	16
Government	15
Education	13
Insurance	7
Banking and Finance	4
Medical	4
Transportation	4
Telecommunications	3
Distribution	2
Utilities	1
Other	2
Total	150



EXHIBIT III-2

SAMPLE BY TITLE

TITLE	NUMBER OF RESPONSES
CEO, Vice President, Administrator	16
MIS Director, DP Manager, Systems Manager	69
Operations Manager	29
Service Coordinator	10
Programmer, Systems Analyst	13
Other	13
Total	150



- Exhibit III-3 lists specific TPM vendors used by respondents in the sample. Market leaders are represented in number as well as a wide variety of local and franchised TPM firms, reflecting the diverse and increasing competition felt in the market.

B. THIRD-PARTY MAINTENANCE USER MARKET

I. TPM PRODUCT MARKET

- The use of third-party maintenance (TPM) has grown substantially over the past three years, encompassing all sizes of new and used computer equipment, OEM peripherals and terminals, personal computers, and telecommunications equipment. Once only a complement to equipment manufacturers service, TPM is now a direct competitor challenging the pricing, distribution, performance, and quality of traditional manufacturer services. The 1986 sample, as outlined in Exhibit III-4, roughly parallels product category concentration in the market in general proportion.
 - Large systems comprise the smallest share of the total TPM market as large system users exercise a greater degree of loyalty to their hardware vendor.
 - Peripherals represent a large share of the market since they have become a significant part of mixed vendor environments conducive to third-party support. The greater number of OEM manufacturers in the peripherals area also lends this market to TPM support; many peripherals vendors concentrate resources in operations other than support, preferring to leave these activities to maintenance companies who can cover their widely dispersed installed base.



EXHIBIT III-3

SAMPLE BY TPM VENDOR USED

TPM VENDOR	NUMBER OF MENTIONS	TYPICAL PRODUCT SERVICES
SORBUS	22	IBM System 36, System 38; IBM Peripherals
TRW	14	DEC CAX Systems; Televideo Terminals; Data Products Peripherals
CDC	12	DEC VAX Systems, Peripherals; IBM Peripherals
General Electric	5	IBM PCs; Hewlett-Packard, Data General, Other Peripherals
DataServ	3	IBM System 36, 3890; Data General Peripherals
Honeywell	3	DEC PDP, VAX; Printronix, Xerox Peripherals
Systems Industries	3	DEC, CDC, Fujitsu Disk Drives, Peripherals
Businessland	2	IBM PC Systems
Computer Maintenance Corp.	2	Data General Systems, Peripherals; Printronix Printers
ComputerLand	2	IBM PC Systems
Data Access	2	Xerox Peripherals; Beehive Terminals
Grumman	2	Data General Systems; DEC Peripherals; WYSE Terminals
NCR	2	IBM PC Systems; Okidata Printers
Other	76	
Total	150	



EXHIBIT III-4

SAMPLE BY PRODUCTS SERVED

PRODUCT	NUMBER OF RESPONDENTS	PERCENT OF SAMPLE
Large Systems	12	8%
Small Systems	34	23%
Personal Computers	28	19%
Peripherals:	71	47%
Disk Drives	12	8%
Tape Drives	4	3%
Terminals	24	16%
Printers	31	21%
Other	5	3%
Total	150	100%



- Personal computer users, although proportionally under-represented in this sample, have an equally high propensity toward TPM usage for many of the same reasons. Support for PC units has traditionally been ignored by systems vendors, and the open market has attracted a large number of independent support suppliers.
- Small systems users' responses to TPM, although less dramatic than that of PC or peripheral users, has been significant.
- The concentration of IBM products shown in Exhibit III-5 is also typical of the TPM market as a whole. With the proliferation of IBM products new to the market each year, this is not surprising. A great number of TPM vendors base their business solely on IBM product support, and gradually IBM is responding in defense of its service revenues with increased attention to maintenance offerings. Through the introduction of a number of extended (in some cases up to three years) warranty provisions, IBM's VMA (Volume Maintenance Amendment) available to larger account PC users as well as a limited concession to support of foreign PC peripherals (announced earlier this year) also evidence IBM's stand against the further erosion of maintenance revenue.
- Other products heavily represented in our sample reflect typical product base in the TPM market as a whole. Older, small systems and microcomputers were prevalent among users sampled (e.g., IBM Systems 36 and 38, HP3000, DG Eclipse units), as well as a notable number of various peripheral units, especially terminals, printers, and disk drive units (see Exhibit III-5).
- Exhibit III-6 shows steady growth in TPM use among these small systems, micro, and peripheral users, all reporting near 40% increases in their third-party utilization. The personal computer and peripheral users among this sample in 1986 reported even greater interest in increasing involvement in TPM than did last year's sample, with PC users reporting a 10% increase overall.



EXHIBIT III-5

SAMPLE BY MANUFACTURERS MENTIONED

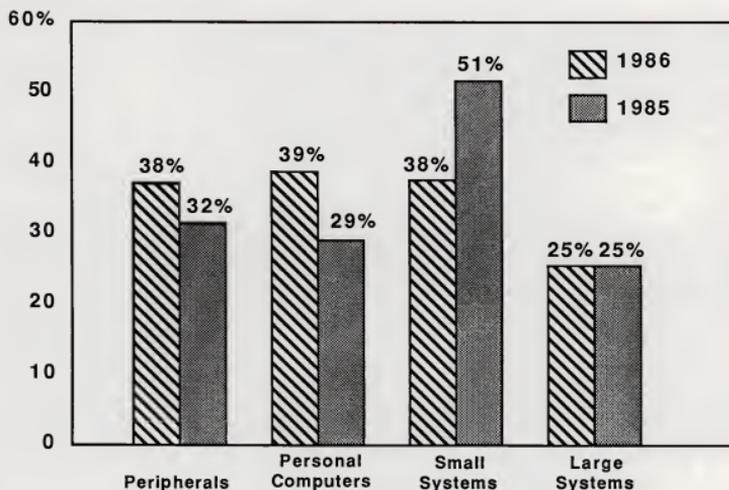
MANUFACTURING	MENTIONS	TYPICAL PRODUCTS
IBM	59	System 36, System 38; PC Systems
DEC	22	PDP, VAX Systems; VT Terminals
DataProducts	6	BP Series, Laser Printers
Burroughs	5	B900 Systems, TD Terminals
Data General	5	Eclipse Systems, Disk Drives
Printronix	5	DP Series, Laser Printers
Televideo	5	900 Series Terminals
Hewlett-Packard	4	3000 Series, HP 150 Systems
Apple	3	PC Systems
Basic Four	3	Small Systems
STC	3	Tape Drives
*	2	

* The following manufacturers received two mentions: CDC, C.ITOH, Lear Siegler, Okidata, and Xerox.



EXHIBIT III-6

CURRENT USERS WHO WILL INCREASE USE OF TPM





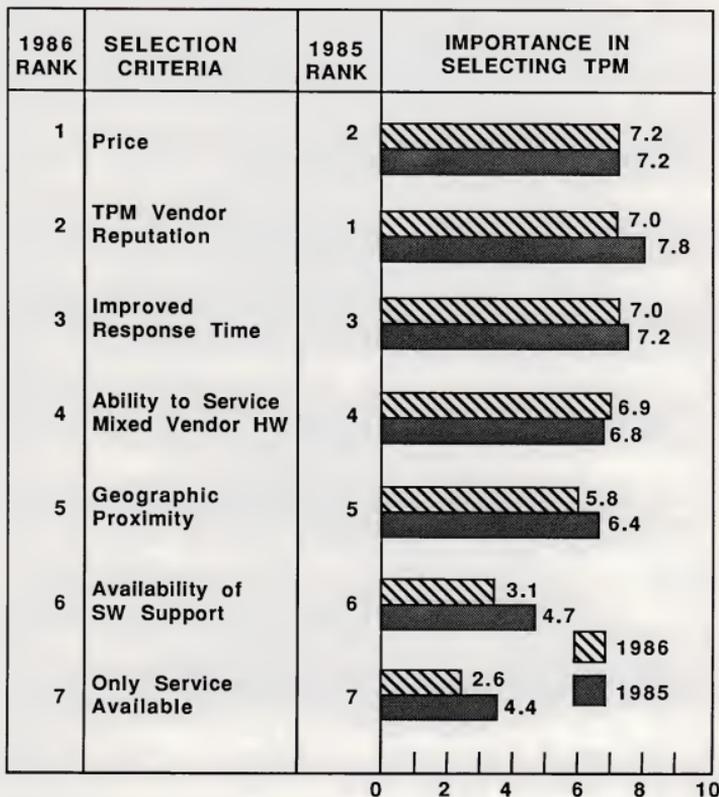
2. TPM SELECTION CRITERIA

- Following an economically trying period for many firms, the response of our 1986 sample regarding the criterion most important in their selection of a support vendor is not surprising (see Exhibit III-7). Previous years had seen more subjective factors weighing in TPM selection, last year's top ranking response being vendor reputation. Although users still regard reputation highly, the practicality of discounted maintenance offered by many TPMs became the deciding factor among users in 1986.
- Improved response times rated equally important in selection of a maintenance vendor and for many local independents remains an important area of differentiation among users. Geographic proximity to the installed product base can provide a tangible advantage over manufacturer-supplied support in terms of quick response to service calls. In addition to alleviating downtime, fast response to a customer's needs is a very visible factor of support, resulting in significant contribution to customer satisfaction.
- TPM vendors' abilities to support a variety of manufacturers' equipment, although rated number one in importance among the 1985 sample, now ranks fourth among the list of selection criteria. With the heavy increase of equipment vendors involvement in support of mixed-vendor systems, the advantage independent TPM suppliers once enjoyed must now be shared with the manufacturers. Now competing even more directly with equipment vendors for support of manufacturers' as well as other vendors' equipment, TPM firms must look beyond multivendor service in search of competitive advantage. A wider variety of services paralleling the full support offered by manufacturers will be required to keep customers satisfied as vendor involvement in the market increases.
- As mentioned above, geographic proximity can provide distinct competitive advantage to a support vendor. As indicated in Exhibit III-7, however, the improved response times are the practical effect of concern to TPM users,



EXHIBIT III-7

TPM USER SELECTION CRITERIA



Rating: 1 = Low Importance, 10 = High Importance



rating geographic proximity of the support facility well below response in importance in TPM selection.

- Availability of software support, considering the low percentage of respondents currently receiving systems software maintenance from their TPM vendor (14%, as shown in Exhibit III-32), was, not surprisingly, rated of relatively low importance in choosing a TPM vendor. As third-party-supplied software support gains greater acceptance with users as more TPM vendors present and succeed in providing such services to the market, however, the provision of software support should increase in importance as a TPM selection criterion. Software support will prove to be a service area with great potential in the market as TPM vendors continue to expand support offerings in efforts to remain competitive with full service manufacturers.
- The low rating received on the final criterion (TPM being the only support available on the unit) continues to lessen in importance as the TPM industry grows. With the growing numbers and expanding coverage offered by TPM vendors nationwide, it would be a rare occasion that a user would not be provided with a number of support vendors from which to choose.
- Exhibit III-8 presents a breakdown of our sample according to product category for a number of significant demographic measures. The higher average ages of both small and large system users sampled reflects the traditional involvement of TPM vendors in the service of older machines as users look for more economic means of support for aging units which manufacturers, encouraging the purchase of newer replacements, tend to maintain at less competitive prices.
- PC units, newer to the market as well as less expensive to replace, tend to be of a younger mean age among the systems. The age of peripherals, which can range from the most expensive of drives to the least expensive printers, averages in between these systems ages at 4.3 years.



EXHIBIT III-8

SAMPLE BY DEMOGRAPHIC BREAKDOWN

	LARGE SYSTEMS	SMALL SYSTEMS	PERSONAL COMPUTERS	PERIPHERALS
Average Age of Product (Years)	4.6 Years	5.6 Years	3.0 Years	4.3 Years
Average Length of Relationship (Years)	3.7 Years	3.4 Years	2.2 Years	3.6 Years
Average Distance From Service Location (Miles)	16.5 Miles	21.1 Miles	16.6 Miles	44.6 Miles



- The length of the support relationship with the TPM vendor logically follows the development of the market, with large systems and peripherals the first area of third-party infiltration and small and micro systems following. The shorter relation between PC users and their service vendor also reflects the shorter life span experienced in the use of these products.

- The distances separating support site and user site also follow logical progression. Critical large systems demanding fastest response to down situations utilize vendors close at hand to facilitate their needs. Small system users tend to have a somewhat longer lead associated with response to service calls and may be less sensitive to their physical distance from the service provider. Micro users, although typically much less concerned with such expedient responses, have the widest variety of TPM vendors from which to choose, allowing them to choose the most proximate servicer for their unit.

- The nature of many peripherals in their less critical application as well as more modular design tends to be supported by TPM vendors more remote to user sites. In many cases, peripheral units can be supported by mail-in depot repair, extending the mean distance from service location considerably. Responses from peripheral users ranged from 1 mile to 265 miles; the mode value at 10 miles.

3. TPM BUSINESS BASE

- Segmentation of the third-party maintenance market by product type reveals distinct patterns in the support coverages which these user groups require. An understanding of user requirements within these distinct segments enables vendors to develop successful offerings properly targeted toward their defined marketplace.



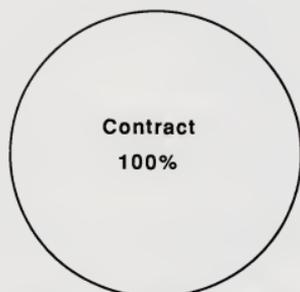
a. Large System Market

- As illustrated in Exhibit III-9, TPM support for the large systems segment of our sample was wholly performed on a contractual basis, providing users with the level of support which matches their more critical need. The potential cost to users of downtime, coupled with the relatively low proportion of system cost which maintenance contracts represent to the functioning of a large system, provides mainframe users with greater incentives for purchasing long-term maintenance contracts.
- Support on large systems was performed on-site in all cases. Part of the large systems maintenance can be expected to be done off-site at the service center on the modular components of the large system processors, yet the support as perceived by the user is still performed "on-site" by the field engineer removing and replacing modules.
- The contract coverage option most consistently chosen by large system users sampled was support available over five days of the week. The vast majority of respondents (91.7%) found working day coverage sufficient for their system. A select group of large systems users relied on their vendor for a full seven-day availability. An option often offered in between the two coverages, providing six-day-per-week availability, was not used by any of our large system respondents.
- Hours of coverage within those days ranged between 8 standard business hours and full 24-hour coverage on the system with the majority of respondents covered daily for 9 hours or under. Coverage for up to 16 hours per day was also relatively popular due to the standard IBM 11-hour provision that TPM vendors offering support on IBM equipment compete with. Near 17% of large systems users required extended coverage up to 24 hours over the 5 or 7 days covered by their contract.

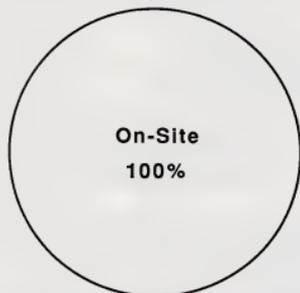


EXHIBIT III-9

TPM BUSINESS BASE - LARGE SYSTEMS



Contract versus TPM



On-Site versus Depot

DAYS COVERED	USE (Percent)
Monday-Friday	91.7%
Monday-Saturday	0.0%
Monday-Sunday	8.3%
HOURS COVERED	USE (Percent)
0 - 9	58.3%
10 - 16	25.0%
17 - 24	16.7%

DEPOT TYPE	USE (Percent)
Carry-In	0.0%
Mail-In	0.0%
Courier	0.0%



b. Small Systems Market

- The support delivery requirements of the small systems respondents contacted this year proved somewhat greater than those of last year's sample. This reflects the increasing sophistication and networking capabilities of these mid-range systems which are increasingly maintaining the levels of critical processing once reserved for large system applications. The entire group contacted required the security of a long-term maintenance contract (see Exhibit III-10) versus the 88% opting for contract maintenance among last year's sample.
- As was found among large systems respondents, 100% of the users received on-site support (compared to 93% last year). As small systems manufacturers continue to offer enhancements and building blocks to users' installed systems, on-site support for this segment of the market has become increasingly important as users require support for the networking aspect of the system as well as for the individual components.
- The most popular contractual option chosen by the users of small systems TPM maintenance was, again, five-day-per-week coverage, elected by 93.3% of users sampled. A small percentage required full seven-day support availability. Seventy percent of small systems users required coverage during normal working hours, while 6.7% desired the availability of extended 24-hour coverage.

c. Personal Computer Market

- The business base of personal computer (PC) TPM users is also experiencing shifts, evidenced as results are compared with the requirements of last year's users. A great jump was seen in the proportion of PCs under contract with TPM vendors, with 75% of this year's respondents holding support agreements on their units (see Exhibit III-11) as compared to only 39% in 1985. In response to the increased efforts of manufacturers to regain their share of

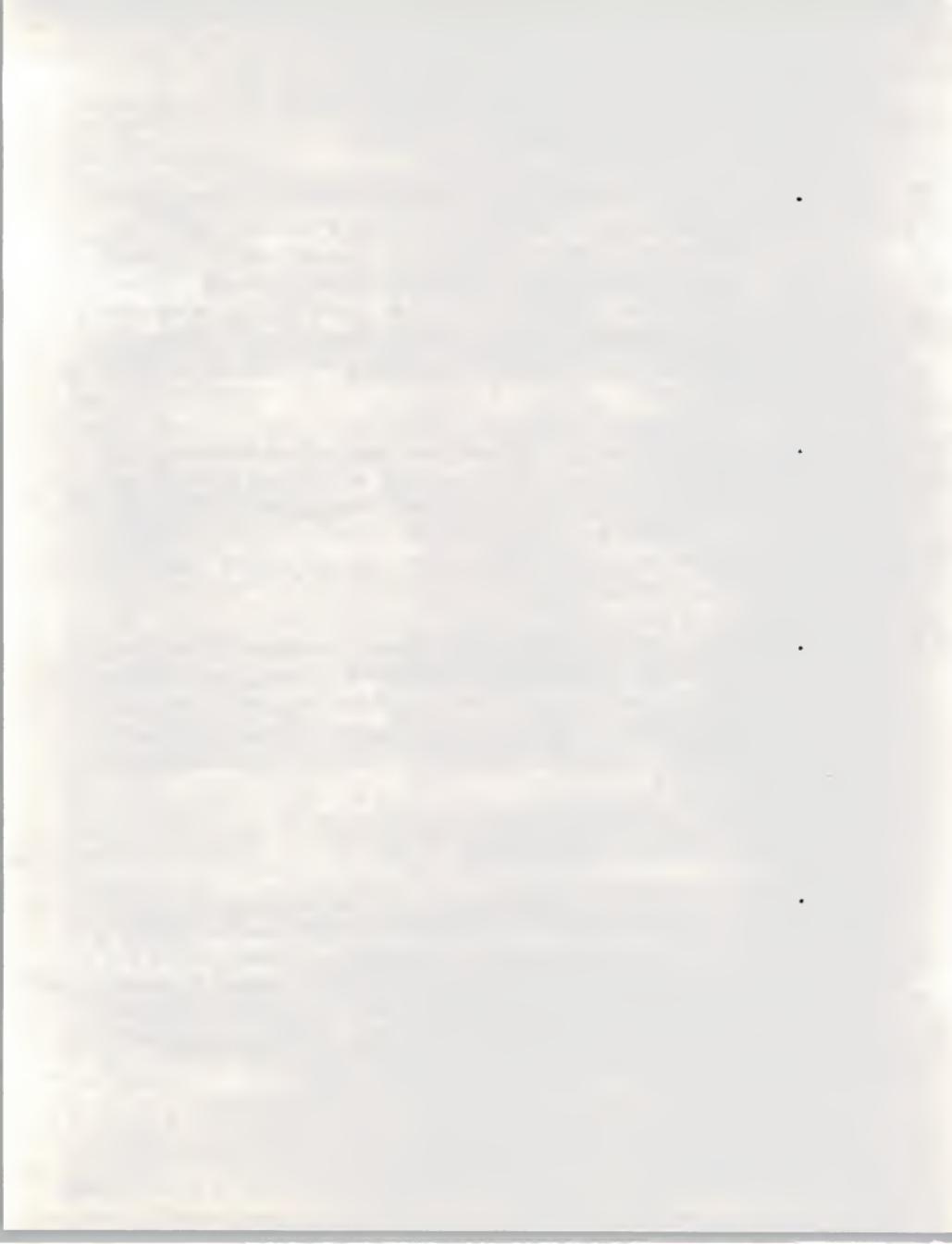
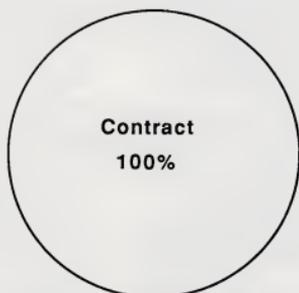
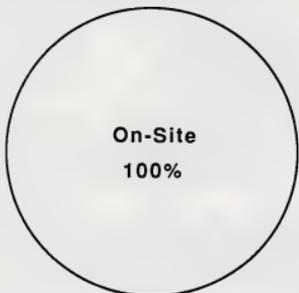


EXHIBIT III-10

TPM BUSINESS BASE - SMALL SYSTEMS



Contract versus TPM



On-Site versus Depot

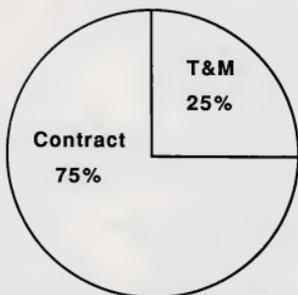
DAYS COVERED	USE (Percent)
Monday-Friday	93.3%
Monday-Saturday	0.0%
Monday-Sunday	6.7%
HOURS COVERED	USE (Percent)
0 - 9	70.0%
10 - 16	23.3%
17 - 24	6.7%

DEPOT TYPE	USE (Percent)
Carry-In	0.0%
Mail-In	0.0%
Courier	0.0%

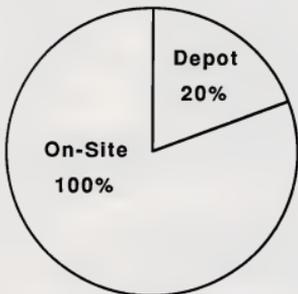


EXHIBIT III-11

TPM BUSINESS BASE - PERSONAL COMPUTERS



Contract versus TPM



On-Site versus Depot

DAYS COVERED	USE (Percent)
Monday-Friday	87.5%
Monday-Saturday	0.0%
Monday-Sunday	12.5%
HOURS COVERED	USE (Percent)
0 - 9	87.5%
10 - 16	0.0%
17 - 24	12.5%

DEPOT TYPE	USE (Percent)
Carry-In	100.0%
Mail-In	0.0%
Courier	0.0%



micro support revenues, the maintenance offerings on the market from vendors and TPM suppliers alike have become more competitive and more attractive to the PC user market.

- Site volume discounting has gained popularity, especially among manufacturers, as a way to hold marketshare in PC support while keeping supporting costs low. Contracts involving user personnel in the initial stages of diagnosis and maintenance also allow maintenance vendors to keep costs and contract prices within more acceptable ranges. As the installed base of PCs continues to grow, the competition for the micro service dollar will follow, providing increasingly affordable user support in its wake.
- Support via main-in depot services remains a popular option among PC users with 20% of the sample participants in this form of maintenance. More importantly, the majority of PC users are opting for support at their site, a number which can be expected to increase as the connectivity of newer PC products enables the units to become integral parts of more powerful systems and their importance in business applications increases.
- The majority of PC users of TPM receive support over five days per week. The percentage of PC users reporting Monday through Sunday coverage appears artificially high (compared to the 8.3% of large system and 6.7% of small system users) due to their greater involvement in depot and time and materials support delivery, which, provided as available, is perceived by users as "perpetual" coverage. Hours over which support is provided to micro users was consistently either 8 or 24 hours per day with 87.5% covered over normal 8 working hours. Again, the response of users of depot and T&M support as 24-hour availability inflates the average to 12.5%.

4. PERIPHERAL MARKET

- The support requirements of peripherals users varies greatly with the application and availability needs placed upon the unit. Ranging from the high



performance demands on peripherals attached to critical systems to the lower requirements for uptime of one in a series of terminals or printers included in a system, support options exercised by peripheral users as a group cover a broad spectrum.

- Ninety percent of our sample of peripherals TPM users opted for contractual support for their units; the remaining 10% relying on time and materials maintenance as needed (see Exhibit III-12). The vast majority of users contacted were covered over five working days in a week. Eight hours of coverage was reported most frequently by peripheral users (the full 81.8% of that category).
- The popularity of depot support among peripherals users was found to be consistent with last year's results with 14% of the sample (in both years) participating in some form of depot service. Most of these users were experienced with mail-in depot service. The market is seeing an increase in the number of refurbishment houses, which take repair down the sub-component and board level and allow for depot repairability even on larger units previously tied to on-site maintenance. As cost-conscious users are becoming more comfortable with certain degrees of self-maintenance, use of these depot refurbishing facilities by end users as well as vendors will be on the rise.

C. THIRD-PARTY MAINTENANCE VENDOR PERFORMANCE

I. INTRODUCTION

- This section of the report examines users' satisfaction with the service and support supplied by their third-party vendor. Where possible, this performance is compared to and judged against that provided by manufacturers in the same service delivery areas.

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Fourth block of faint, illegible text.

Fifth block of faint, illegible text.

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EXHIBIT III-12

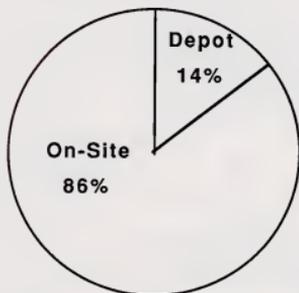
TPM BUSINESS BASE - PERIPHERALS

T&M

10%



Contract versus TPM



On-Site versus Depot

DAYS COVERED	USE (Percent)
Monday-Friday	93.3%
Monday-Saturday	0.0%
Monday-Sunday	6.7%
HOURS COVERED	USE (Percent)
0 - 9	81.8%
10 - 16	11.4%
17 - 24	6.8%

DEPOT TYPE	USE (Percent)
Carry-In	36.4%
Mail-In	45.5%
Courier	18.1%



- Areas of concern include basic service responsiveness (in terms of mean response and repair times experienced by user) as well as specific measures of satisfaction with a range of factors affecting the delivery of support, including engineer skill level, parts availability, and dispatching procedures. Satisfaction with various support components, such as the provision of documentation and other extended services, are also reviewed in context.
- There are a number of factors to take into consideration when analyzing the satisfaction of users of third-party support. The majority of TPM users have defected to third-party source due to dissatisfaction with support provided by the manufacturer of their equipment. Many of these users experienced dissatisfaction because of the high level of service requirements they place upon their support vendor. Those who remain with their TPM supplier view their chosen alternatives as providing them with an appreciably higher quality of service.
- Another group of TPM users to consider, however, are those enlisting TPM support out of necessity whether due to geographic proximity or the lack of manufacturer-supplied support for their product. These users, although representing a smaller percentage of the population, generally have lower requirements of their support vendor and tend to be satisfied with lower levels of performance.
- In consideration of these two facts, reports of high overall satisfaction with third-party support can be expected, especially in comparison with the service performance of manufacturers. Users opting for TPM in the face of poor response from their product vendor will tend to perceive their chosen option as that of superior service; users who have little choice in support will tend to be satisfied with less.
- In reviewing the earlier exhibit outlining the selection criteria user by the respondents (see Exhibit III-7), geographic proximity and "only service



available" were ranked among the lowest in choosing a TPM vendor. The sample upon which our analysis of user satisfaction is based appears to be proportional relative to these two categories of users.

2. TPM USER SATISFACTION WITH SERVICE

- Overall, users of third-party maintenance report relatively high satisfaction with the service they receive from their vendor. Analysis of specific areas of performance, however, reveal a downward slide from the levels of satisfaction reported last year across product lines in many areas of support, excluding that of contract flexibility. Competitive pressures faced by TPM vendors servicing all categories of products have led to increased responsiveness to the individual needs of users in the form of more flexible support offerings. The increases seen in the proportion of users purchasing contracts over the past year can be attributed to the attractiveness of such agreements.

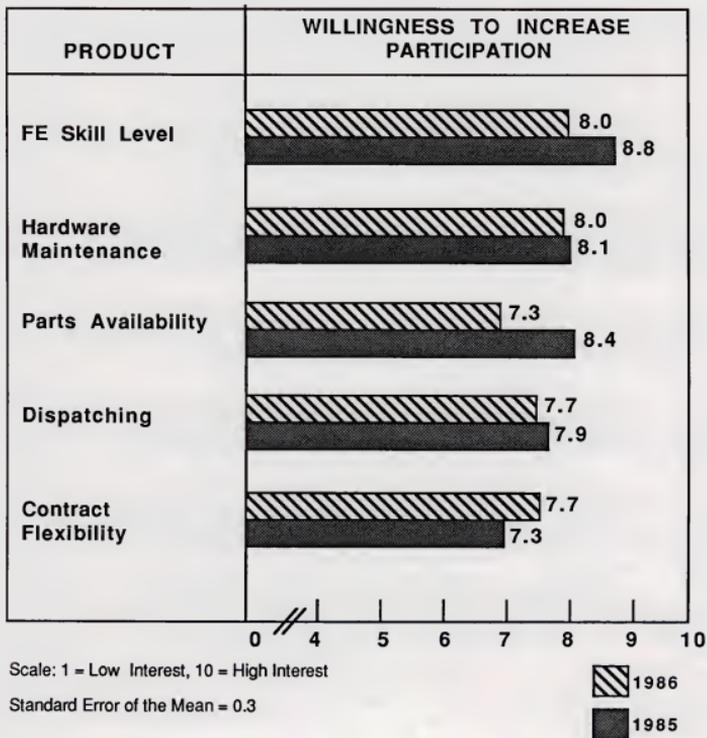
a. Large System User Satisfaction

- The satisfaction levels of large system users remains the highest among the product groups (see Exhibit III-13), even in consideration of the slight downturns reported by this year's sample. Of greatest discrepancy between the years' levels of satisfaction is the availability of parts, an area which often is out of the control of the TPM vendor who, in many cases, must rely upon the mercy of the manufacturer for spares.
- Most manufacturers, so as not to threaten restraint of trade, officially state an open market policy toward the sale of spare parts to third-party maintainers. Actual practices within the spares market, however, are alleged by TPMs to differ markedly from such free market policy as manufacturers are becoming defensive of their maintenance revenue share. A number of TPM companies are taking manufacturers to court over the issue. The outcomes of these disputes will weigh heavily on the future of the TPM market, as well as on certain TPM vendors' individual operations.



EXHIBIT III-13

USER SATISFACTION WITH SERVICE
LARGE SYSTEMS





- The skill level of the TPM field engineer interfacing with the user has also declined over the past year according to our sample, but still remains one of the most highly rated aspects of large systems TPM service. This level of satisfaction may be a reflection of the ability of TPM vendors, although overall much younger organizationally than their manufacturer competitors, to recruit experienced technical personnel (often at the expense of a product vendor) into their organization. A number of successful TPM operations have been the result of a group of manufacturer FEs leaving their corporate positions to startup a service organization of their own.
- As observed earlier, the single area of improvement between 1985 and 1986 performance is in the area of contract flexibility. Large systems users, most sensitive to the operating requirements of their unit, require special attention to the meeting of their individual support needs. Flexibility on the part of the support vendor is necessary to satisfy users of systems in such critical applications.

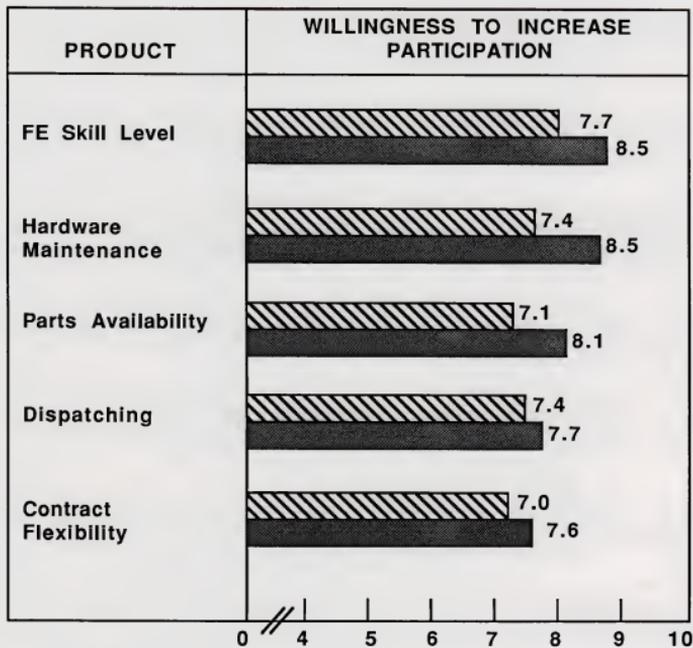
b. Small System User Satisfaction

- The small systems users of TPM maintenance reported the greatest decreases in satisfaction over the past years' service, reflected in the largest drop in their overall satisfaction with hardware maintenance (see Exhibit III-14). Rating their vendors' support lowest in most categories addressed, the increasing applications and performance demands users are placing upon their small systems are the likely cause of this drop in satisfaction as these smaller machines continue to be upgraded and networked in efforts to increase their processing powers.
- The problem with parts availability, as outlined above, is being equally felt within the realm of small systems, affecting these vendors' ratings as well. FE skill level also experienced a drop in users' perceptions, but again, remained well above an average level of satisfaction.



EXHIBIT III-14

USER SATISFACTION WITH SERVICE
SMALL SYSTEMS



Scale: 1 = Low Interest, 10 = High Interest

Standard Error of the Mean = 0.4

 1986
 1985



- The small systems user sample was the only group of respondents among the four categories to report a lower level of satisfaction with contract flexibility in 1986 than in the previous years. This too may be a reflection of the increasing demands of these users as their systems become more critical to their operations. Approaching the levels of needs expressed by users of large systems in such applications, small system users are demanding more responsiveness in service delivery as well as in contractual flexibility.

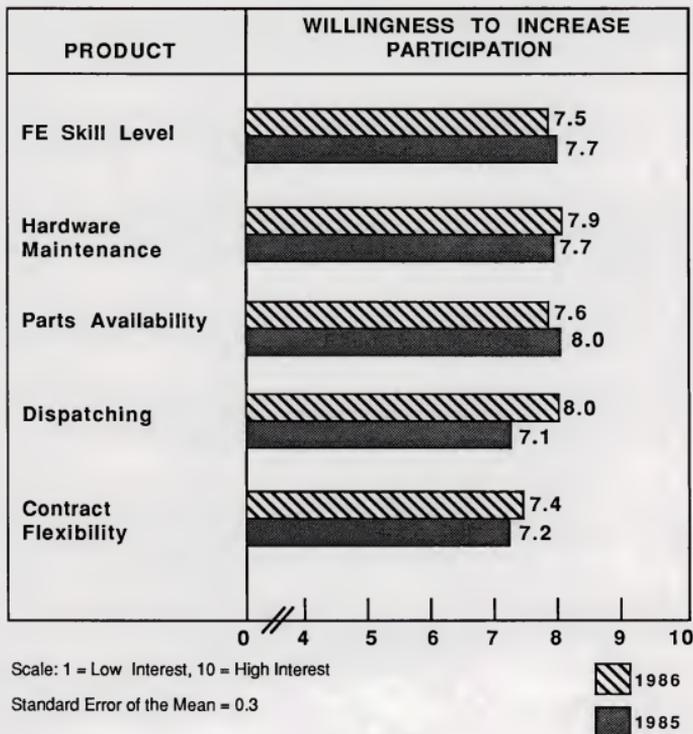
c. Personal Computer User Satisfaction

- As shown in Exhibit III-15, TPM users of personal computers reported satisfaction relatively consistent with that reported in 1985. Overall satisfaction with hardware maintenance increase slightly, and the only areas showing decreases in satisfaction among PC users were of FE skill level and, again, parts availability.
- The drop in skill level rating could be accounted for in part by the increased visibility of the technicians performing the maintenance on users' PCs, as the popularity of on-site support delivery soared over the past year. As discussed previously, the microcomputer TPM market shifted drastically toward on-site support in 1986, up from 41% in 1985 to 80% reporting on-site support among this year's sample. Having a field engineer performing support at the installation allows the user a greater chance to judge the skill level of the supporting technician first hand.
- The area of performance in which users perceived the greatest change was in that of the dispatching capabilities of their TPM vendors. This change in perception is likely a reflection of the drastic shift from time and material service to contract coverage among micro users over the past year (see Exhibit III-10), up from 39% of PC users in 1985 to 75% receiving support contractually in 1986. Experience with maintenance delivered as a T&M customer often varies greatly in terms of response priority from that received



EXHIBIT III-15

USER SATISFACTION WITH SERVICE
PERSONAL COMPUTERS





as a contract customer, and this improved dispatching performance was reflected in users' response.

- Improvements being realized among TPM vendors in reaction to user demands for flexibility were also felt among microcomputer customers as vendors strive to stay competitive in a crowded market. Traditionally, PC service provided by manufacturers tended to be more flexible than offerings provided by third-party servicers. As the manufacturers of microcomputers have begun to take increased interest in this market, their introduction of increased flexibility has spurred competitive counters by third-party vendors, and user satisfaction with contractual responsiveness is on the rise.

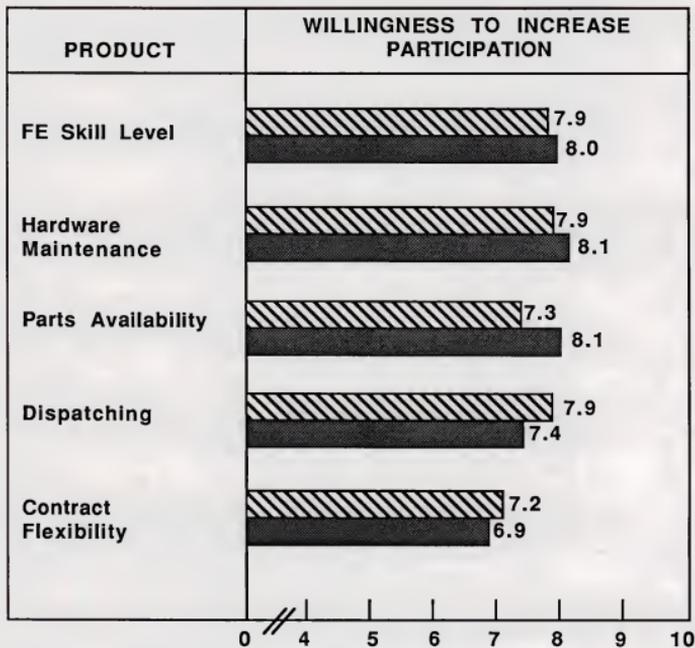
d. Peripherals User Satisfaction

- Support provided to users of peripheral units saw a number of slight downturns over the past year, most notably in the area of parts availability. This, as discussed previously, follows the trends being disputed by TPM vendors of the increasing difficulty being faced by TPM vendors in their efforts to procure spares from manufacturers (see Exhibit III-16). The peripherals support market is populated by a number of smaller third-party companies striving to offer support for a wide variety of manufacturers' products. The impact of parts disputes tends to especially affect the operations of these small organizations with such diverse product lines.
- Increased satisfaction with dispatching expressed by peripherals TPM users parallels that of personal computer users as the peripherals business base also turned more toward contractual support over the past year (up from 76% in 1985 to 90% of uses this year). The higher priority generally assigned to the support of contract customers over T&M calls is reflected in this increased level of satisfaction.
- Again, increases in contract flexibility were recognized by peripherals users in their dealings with third-party maintenance vendors as satisfaction with this aspect of support was up slightly from 1985 to 1986.



EXHIBIT III-16

USER SATISFACTION WITH SERVICE PERIPHERALS



Scale: 1 = Low Interest, 10 = High Interest

Standard Error of the Mean = 0.2

 1986
 1985



e. TPM Vendor Performance

- In judging the relative responsiveness of TPM support vendors to customer calls, user ratings of satisfaction can be measured against both the equivalent ratings of manufacturer response, as well as against TPM users' actual requirements for response and repair times on their units. Exhibits III-17 and III-18 present these two comparisons in graphic form.
- In Exhibit III-17, the range of response and repair times provided to users of the four product categories are clearly evidenced with the users of large systems support provided within two to three hours while PC users have reported waits of over 12 and 13 hours for support.
- Downtimes experienced by large systems users generally require immediate attention from their support vendor. Often a malfunction of these systems in critical applications can mean severe setbacks the productivity of the entire operational staff. The response times reported by respondents using third-party maintenance averaged at two hours for large system users. Compared to mean response of manufacturer-supplied service at just over one hour (see Exhibit III-17), it would appear initially that users would be less satisfied with the support response provided by TPM vendor.
- Upon reviewing Exhibit III-18, however, the comparison of this level of responsiveness with the level of responsiveness which is required by users reveals that TPM vendors are in fact exceeding the response times their users expect. This illustrates the importance of identifying user requirements when positioning support provision. Attempts to better response times achieved by manufacturer competition would not, in this case, affect significant change in TPM user satisfaction.
- TPM vendors, according to responses of our large systems sample, regain the time lost to manufacturers in response once they arrive on-site and perform



EXHIBIT III-17

TPM VERSUS MANUFACTURER SERVICE
RESPONSE AND REPAIR TIMES

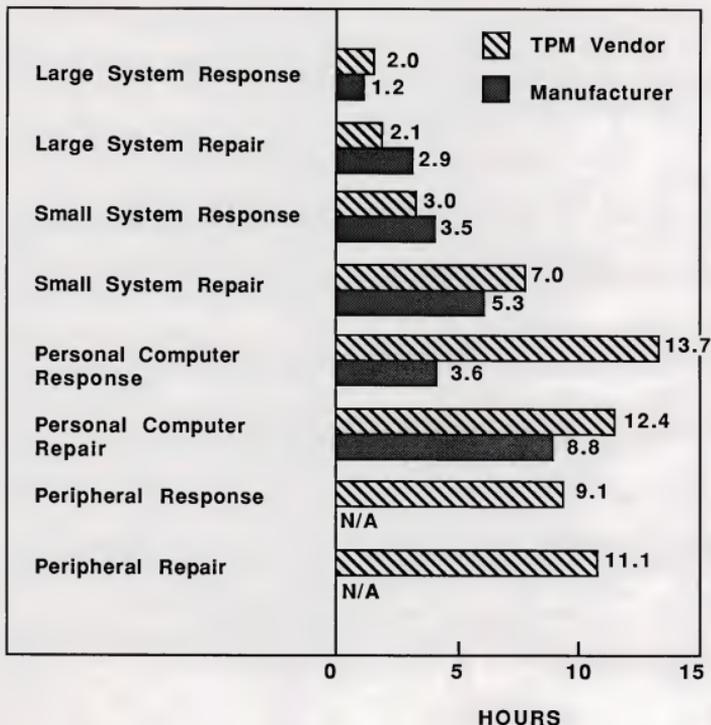
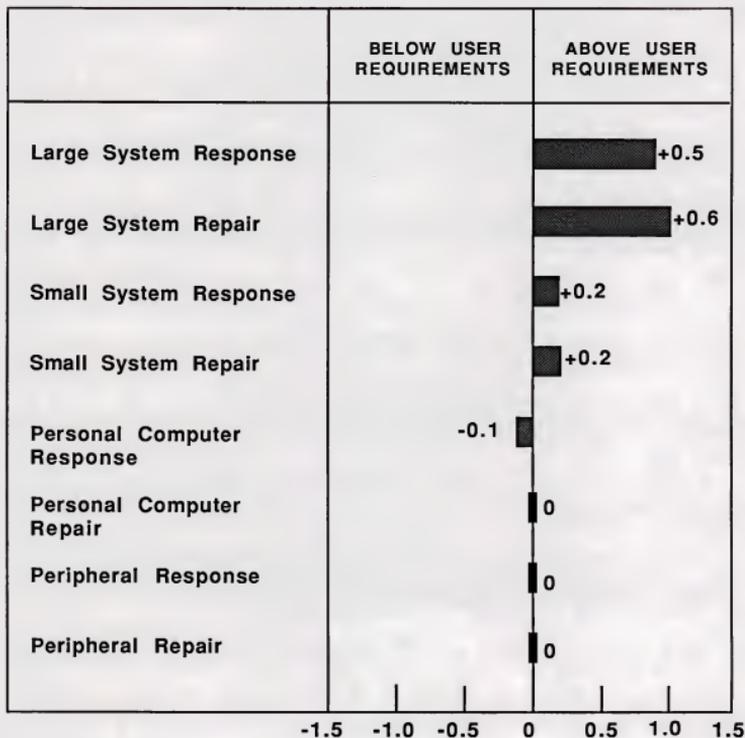




EXHIBIT III-18

TPM USER RESPONSE AND REPAIR TIME
REQUIREMENT VERSUS ACTUALS





the actual repair (see Exhibit III-17). Again, viewing this superior repair time to user requirements shows TPM vendors exceeding users' expectations for service performance. Although the combined performance equates to that delivered by manufacturers, user expectations are the relevant yardstick against which TPM servicers should judge their performance.

- Small systems TPM users, although experiencing significantly lower repair times than those enlisting manufacturer-supplied service, also perceive their vendors as delivering a level of support in both response and repair performance above their expectations.
- Users of personal computers, on the other hand, are receiving response to their calls exceeding that supplied by the manufacturer by over 10 hours and TPM engineers are effecting repair at a rate some three hours slower than vendor support (Exhibit III-17). Within the context of the requirements PC users place upon their TPM vendor, however, this repair performance is considered completely acceptable, with initial response times only slightly below their reported level of expectation (Exhibit III-18). The needs of the micro TPM users contacted are being well targeted and satisfied by their third-party maintenance vendors.
- Peripherals users engaging third-party vendors in support are averaging response times in excess of an eight-hour working day (see Exhibit III-17), but actual times reported by users in our sample ranged from one hour to three days, reflecting the variation in the types and applications of the machines included in this category. Repair times were equally disparate, running from an hour through a period of two full days. Overall, peripherals TPM users found both response and repair performance well within their requirements with TPM vendors on target in both categories of support delivery, as shown in Exhibit III-18.



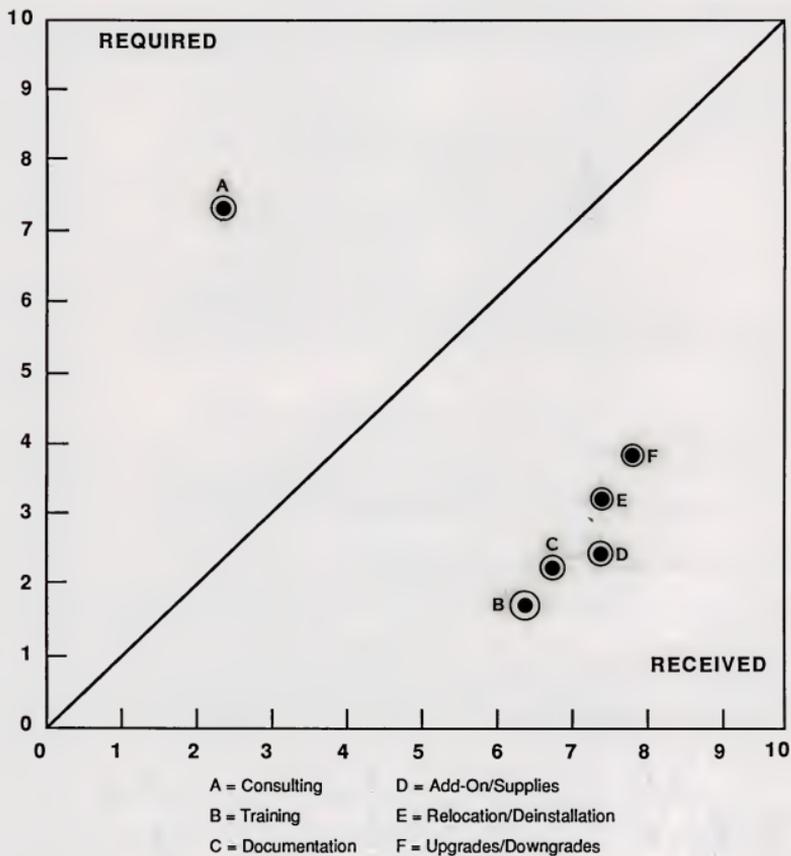
f. User Satisfaction with TPM Post-Sales Support

- An area of support in which third-party vendors are becoming increasingly involved is the services associated with post-sales support; i.e., supplying users with levels of extended support services beyond purely remedial maintenance activities. Traditionally considered a tangible advantage to service as offered by product manufacturers, professional services such as consulting, training, sales of supplies, and documentation support have been recognized by TPM vendors as an integral part of competitive support offerings.
- In general, users of TPM have had a reacted positively to the provision of these types of services by their third-party vendor, as illustrated in Exhibit III-19. Comparing the level of support received by users of various products in these areas such as consulting and training or upgrades and relocation activities shows that TPM vendors are performing far above their users' expectations for this type of extended support.
- Again, listing users' reported levels of requirement of their TPM vendor in these areas, Exhibit III-20 shows that the corresponding levels of support received are, in all categories, well above required levels. The percentages of users satisfied with support in each area is relatively high, the lowest proportion reported among users of third-party documentation support, an area of consistent complaint among computer equipment users industry wide.
- Exhibit III-21 shows the improvements made by third-party suppliers of these extended services between 1985 and 1986. All areas were perceived as improving with time (other than in the problem area of documentation) and especially pronounced improvement was seen in the provision of training services. As TPM vendors gain experienced in providing extended services, the level of support which they can offer in the market will continue to increase and, most likley, users' levels of expectation will follow.



EXHIBIT III-19

USER SATISFACTION WITH POST-SALE SUPPORT
ALL PRODUCTS



Rating: 1 = Low, 10 = High



EXHIBIT III-20

TPM VENDOR POST-SALE SUPPORT PERFORMANCE
ALL PRODUCTS

SUPPORT AREA	REQUIREMENT	RECEIVED	SATISFIED WITH LEVEL (Percent)
Consulting	2.3	7.2	84%
Training	1.7	6.4	94%
Documentation	2.2	6.7	70%
Add-On/Supplies Sales	2.4	7.4	82%
Relocation/Deinstallation	3.2	7.4	84%
Upgrades	3.8	7.8	75%



EXHIBIT III-21

**TPM VENDOR PERFORMANCE, 1985-1986
ALL PRODUCTS**

SUPPORT AREA	RECEIVED		IMPROVE- MENT (Degradation)
	1986	1985	
Consulting	7.1	6.4	0.7
Training	6.4	5.1	1.3
Documentation	6.7	6.8	(0.1)
Add-On/Supplies Sales	7.4	6.2	1.2
Relocation/ Deinstallation	7.4	6.4	1.0

Scale: 1 = Low, 10 = High



- Large systems users received adequate coverage in all post-sales support categories, as graphically represented in Exhibit III-22. Taking a closer look at the accompanying Exhibit III-23, however, shows in many categories a surprisingly low percentage of respondents expressing satisfaction with services provided. This reflects the wide range of responses received regarding these areas such as documentation, training, and upgrades.
- Exhibit III-24 illustrates the propensity of TPM support users to demand lower levels of service than do users of manufacturer-supplied service, as well as higher levels of support received relative to these needs. The responses of large systems TPM users averaged near 4.5 points below the requirements of users enlisting vendor support.
- Users of more complex large systems still feel more comfortable with the training assistance of the product vendor, rating manufacturer-supplied training services at 6.9 compared to 3.3 of TPM vendor support. TPM support users, however, have much lower requirements of their maintenance vendor in this area and thus are considered satisfied on the average with this lower level of training.
- The area of documentation, on the other hand, shows TPM vendors' support outranking that supplied by the manufacturer in absolute terms, even though the requirements placed upon TPM vendors are considerably lower than expected of manufacturers. The development of documentation support can provide a great competitive opportunity to third-party support vendors, as this area of service remains a significant weak spot for many manufacturers.
- Small systems TPM support customers, as illustrated in Exhibit III-25, perceive a number of areas in need of improvement by their support vendor. The extra sense of support provided through the availability of add-ons and supplied directly through the third-party as well as the services of upgrading and relocation of small systems are lacking according to the small systems users contacted.

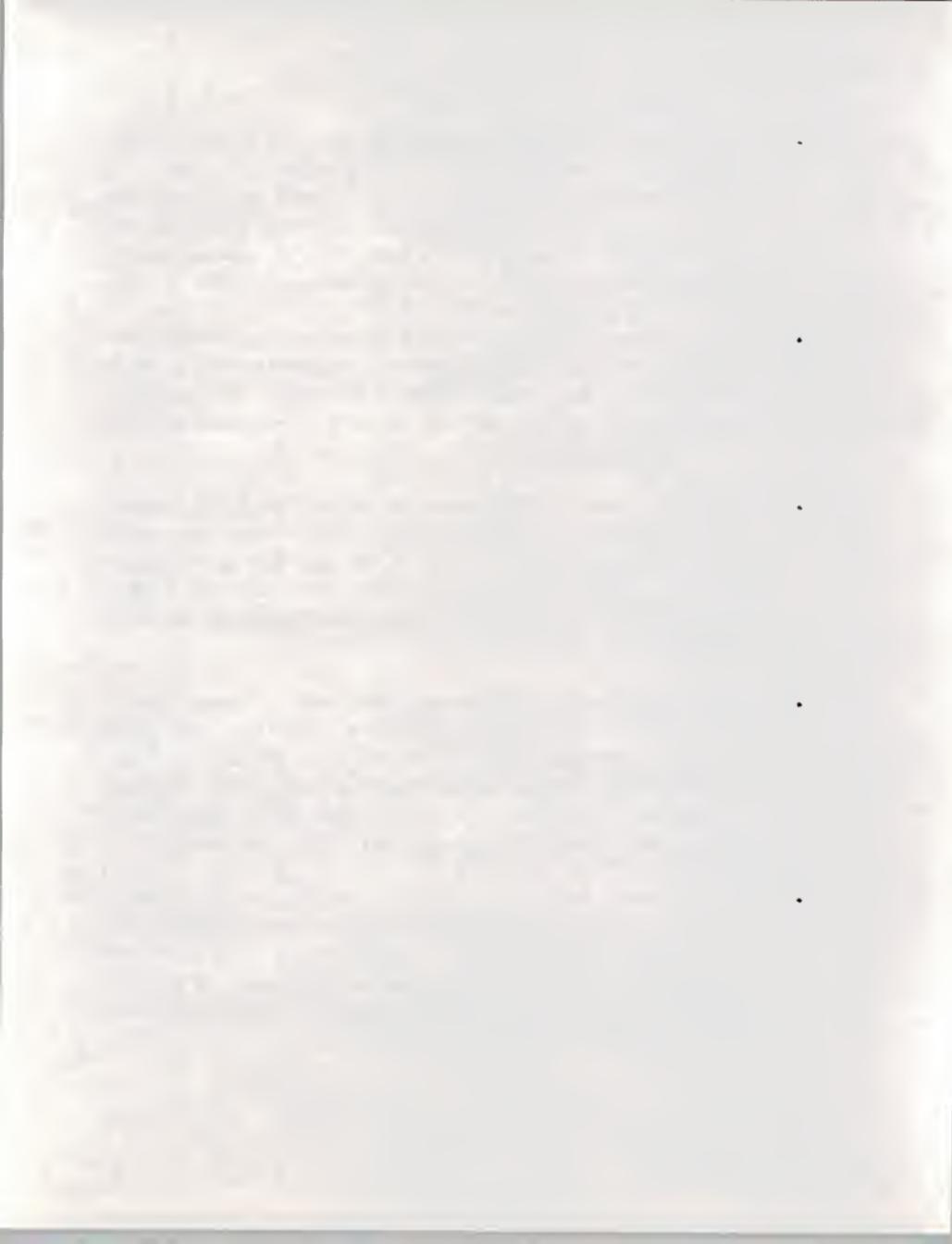
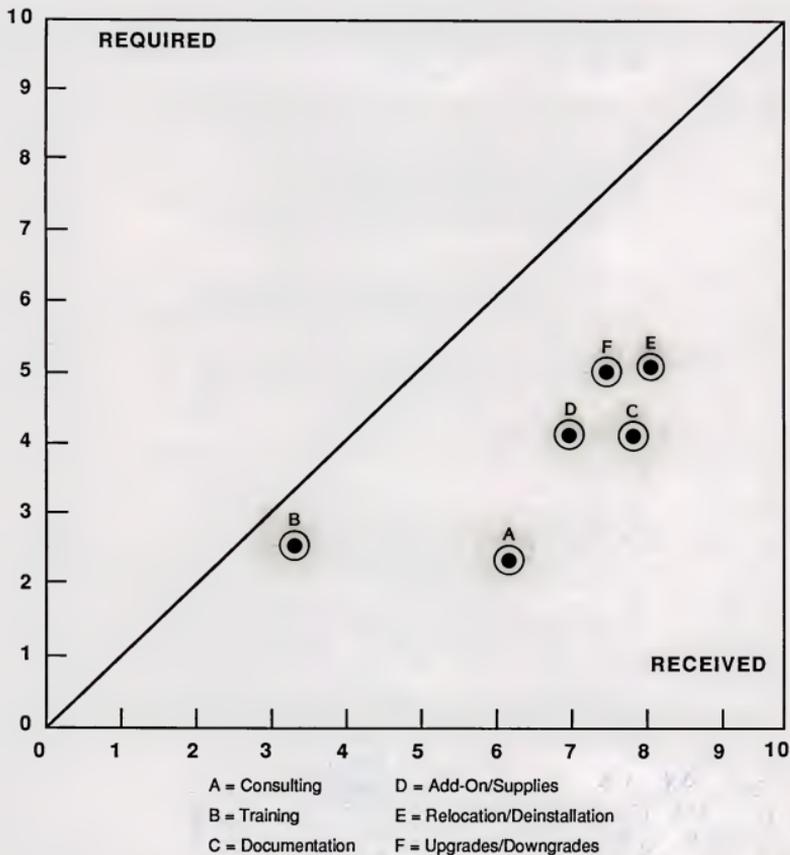


EXHIBIT III-22

USER SATISFACTION WITH POST-SALE SUPPORT
LARGE SYSTEMS



Rating: 1 = Low, 10 = High



EXHIBIT III-23

TPM VENDOR POST-SALE SUPPORT PERFORMANCE
LARGE SYSTEMS

SUPPORT AREA	REQUIREMENT	RECEIVED	SATISFIED WITH LEVEL (Percent)
Consulting	2.3	6.2	100%
Training	2.5	3.3	67%
Documentation	4.1	7.8	60%
Add-On/Supplies Sales	4.1	7.0	67%
Relocation/Deinstallation	5.1	8.1	85%
Upgrades	5.0	7.7	67%

Scale: 1 = Low, 10 = High



EXHIBIT III-24

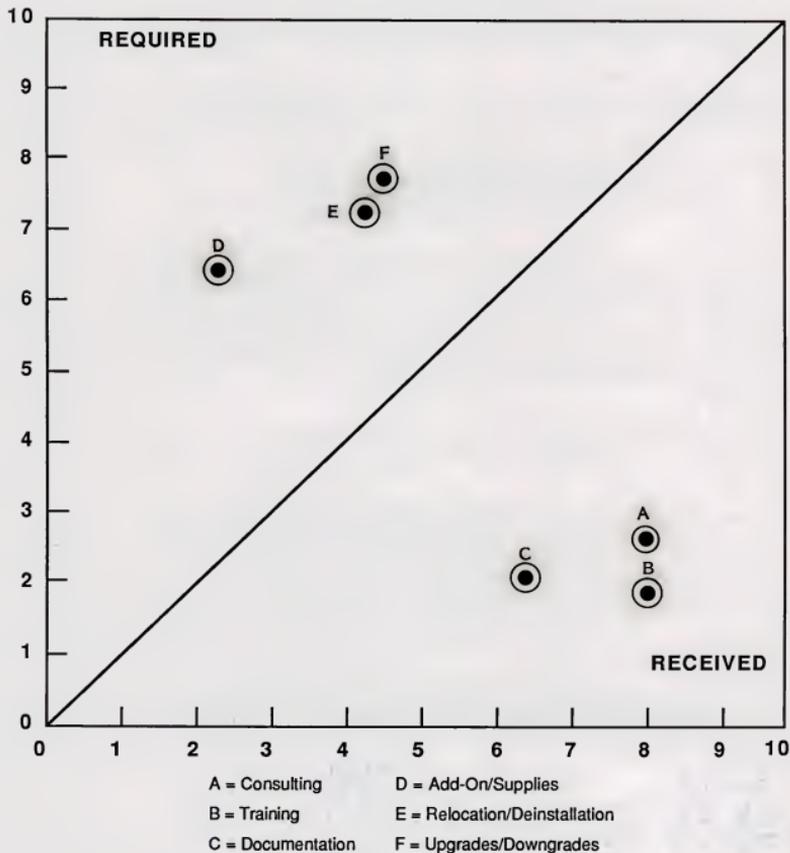
TPM POST-SALE SUPPORT PERFORMANCE VERSUS MANUFACTURERS'
LARGE SYSTEMS

SERVICE	REQUIREMENT		RECEIVED	
	Manufacturer	TPM Vendor	Manufacturer	TPM Vendor
Consulting	7.0	2.3	6.9	6.2
Training	7.4	2.5	6.9	3.3
Documentation	8.5	4.1	7.0	7.8



EXHIBIT III-25

USER SATISFACTION WITH POST-SALE SUPPORT
SMALL SYSTEMS



Rating: 1 = Low, 10 = High



- Each of these services are considered of significant importance to the users of small systems, as illustrated in Exhibit III-26. The considerably higher requirements reported for these extended services reflect the tendency among small systems users to take advantage of the upgradability and added features available for their systems. The servicers of small system customers should view this discrepancy as an opportunity to expand their support offerings and reallocate resources spent in other areas of support to these areas of high user priority.
- Exhibit III-27 compares the ratings received by manufacturer suppliers to those of third-party vendors. Small systems TPM vendors fare better than their manufacturer competition in both professional services of training and consulting and trail close behind product vendors in their provision of documentation support. Again, the small systems product user group showed a propensity toward placing significantly lower requirements on third-party vendors as compared to product manufacturers.
- The users of third-party microcomputer support rated their vendors very highly in all areas of post-sales support (see Exhibit III-28). PC maintenance vendors are well exceeding the expectations of their users in all areas of support considered, including higher level professional services (training, documentation) which are of relatively low importance to their user's base.
- Exhibit III-29 shows considerable satisfaction among personal computer users with the support received in the areas of supplies sales, as well as in upgrading and relocation services. In the categories of consulting and documentation, however, users report much less consistency across the service provided by their vendors and, although support received exceeded requirements overall, only half of the respondents felt satisfied with the levels of support received.
- Peripheral products users reported receiving levels of support from their third-party vendor far exceeding their requirements in all areas of support



EXHIBIT III-26

**TPM VENDOR POST-SALE SUPPORT PERFORMANCE
SMALL SYSTEMS**

SUPPORT AREA	REQUIREMENT	RECEIVED	SATISFIED WITH LEVEL (Percent)
Consulting	2.6	8.0	88%
Training	1.8	8.0	100%
Documentation	2.0	6.4	80%
Add-On/Supplies Sales	6.4	2.3	60%
Relocation/DeInstallation	7.2	4.2	83%
Upgrades	7.7	4.5	67%

Scale: 1 = Low, 10 = High



EXHIBIT III-27

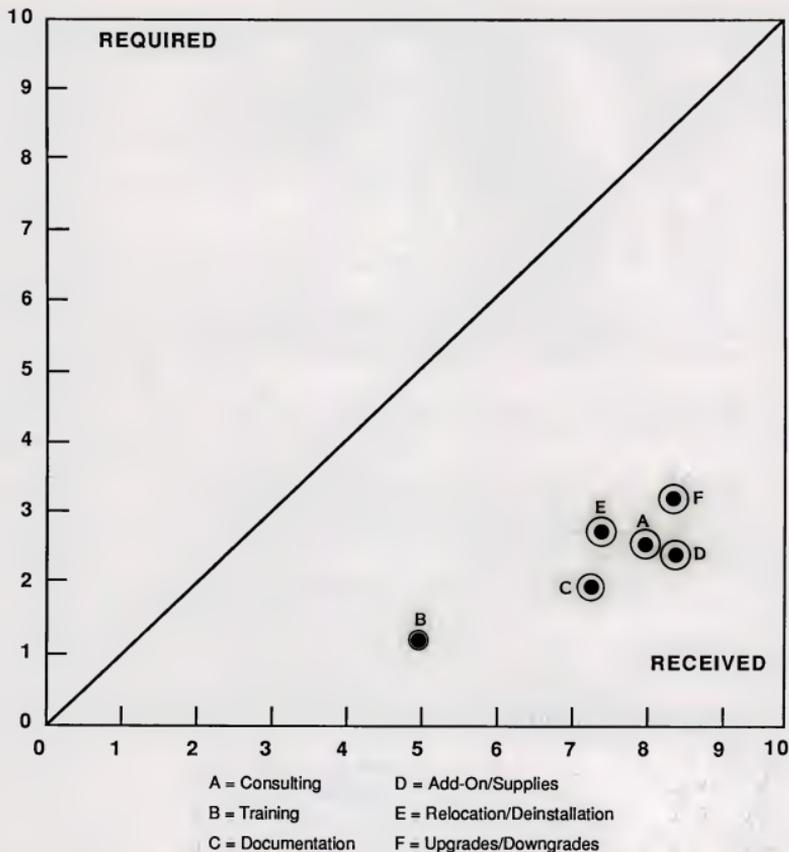
TPM POST-SALE SUPPORT PERFORMANCE VERSUS MANUFACTURERS' SMALL SYSTEMS

SERVICE	REQUIREMENT		RECEIVED	
	Manufacturer	TPM Vendor	Manufacturer	TPM Vendor
Consulting	5.9	2.6	6.3	8.0
Training	5.5	1.8	5.9	8.0
Documentation	6.5	2.0	6.6	6.4



EXHIBIT III-28

USER SATISFACTION WITH POST-SALE SUPPORT
PERSONAL COMPUTERS



Rating: 1 = Low, 10 = High



EXHIBIT III-29

**TPM VENDOR POST-SALE SUPPORT PERFORMANCE
PERSONAL COMPUTERS**

SUPPORT AREA	REQUIREMENT	RECEIVED	SATISFIED WITH LEVEL (Percent)
Consulting	2.5	8.0	50%
Training	1.2	5.0	*
Documentation	1.9	7.3	50%
Add-On/Supplies Sales	2.4	8.4	86%
Relocation/Deinstallation	2.7	7.4	71%
Upgrades	3.2	8.4	90%

Scale: 1 = Low, 10 = High

* Insufficient Response



discussed (see Exhibit III-30). Extremely high levels of satisfaction were experienced by the peripheral users in our sample (see Exhibit III-31), with percentages dissatisfied in each area of post-sales support all under 20%.

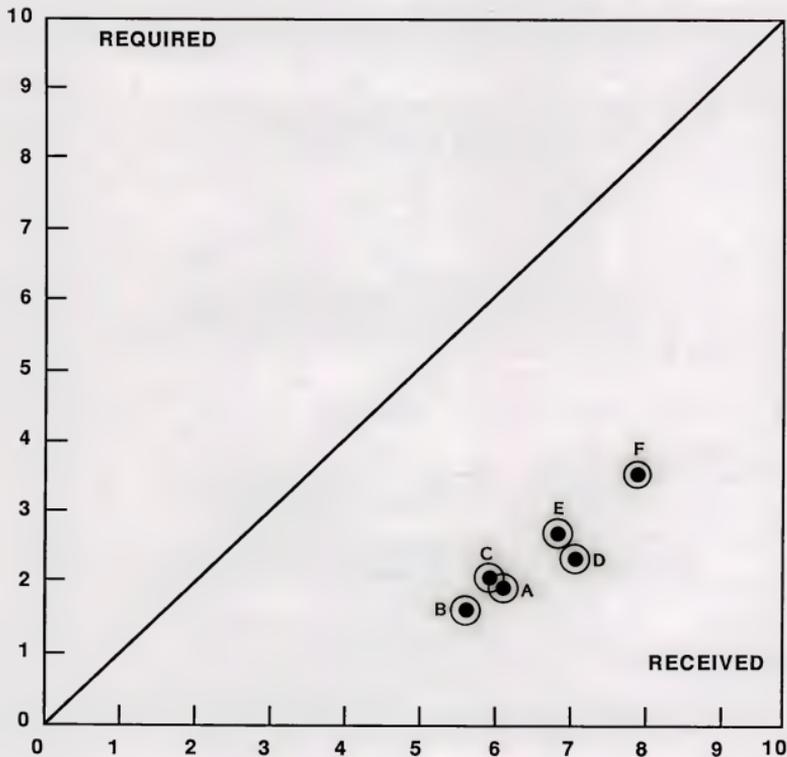
D. DIRECTIONS IN THIRD-PARTY MAINTENANCE

- The rise of the third-party maintenance market was spurred by a number of fundamental changes experienced within the computer equipment marketplace, most notably through the growth in popularity of the mixed vendor system as the number of manufacturers providing systems, peripherals, and other components to the market increased. Looking for an economic alternative to manufacturer-supplied support for each part of their mixed vendor systems, users began to turn to independent maintenance organizations which would provide competent service on a number of brands of equipment. Avoiding the hassles of finger-pointing among competing manufacturers maintaining their units within the system environment, users also often benefited from reduced support prices offered by third-party maintainers. As third-party servicers gained the confidence of users, TPM became a legitimate form of support even on critical systems and the demand for single-source service drew a host of independent suppliers into the market.
- As the third-party maintenance market begins now to move toward maturation, competition within the market undoubtedly will continue to intensify. Initially this competition has come from the variety of new players continually entering the market, both as independent service operations and as additions to manufacturers' own support operations. The lucrative draw of the TPM marketplace coupled with the ever-increasing demands of computer equipment users for high-quality, single-source service alternatives will continue to attract firms into the TPM arena and result in increasingly fierce competition in terms of numbers.



EXHIBIT III-30

USER SATISFACTION WITH POST-SALE SUPPORT PERIPHERALS



A = Consulting

D = Add-On/Supplies

B = Training

E = Relocation/Deinstallation

C = Documentation

F = Upgrades/Downgrades

Rating: 1 = Low, 10 = High



EXHIBIT III-31

TPM VENDOR POST-SALE SUPPORT PERFORMANCE
PERIPHERALS

SUPPORT AREA	REQUIREMENT	RECEIVED	SATISFIED WITH LEVEL (Percent)
Consulting	1.9	6.1	89%
Training	1.6	5.6	100%
Documentation	2.0	6.0	82%
Add-On/Supplies Sales	2.3	7.1	87%
Relocation/Deinstallation	2.6	6.8	94%
Upgrades	3.5	7.9	82%



- With the number of players increasing, competition in terms of support price and quality will correspondently heighten as more service firms compete for users' business. Differentiation between TPM suppliers will gain importance as users have a growing number of both independent and manufacturer-associated support alternatives from which to choose, augmenting the demand for premium service at a reasonable price.
- Even when the market eventually shakes out, the ability of the remaining players to provide comprehensive support, not only in terms of variety of vendors supported but also in the extent of services offered, will determine their continued success. As the number of manufacturers competing for third-party business increases, the provision of the types of "full-service" offerings associated with vendor support will gain importance as criterion for selection of a support supplier. Third-party maintenance business will depend even more on an organization's ability to provide support above and beyond the basic remedial maintenance duties previously associated with third-party support.

I. TPM SOFTWARE SUPPORT

- One area of support currently developing along these lines within the market is the support of systems software by TPM competitors. Manufacturers with software support resources already in place for their own products are provided with an advantage in this area, but a number of the independent third-party market leaders are entering this area of support with newly formed teams of software personnel.
- The support of systems software as well as the hardware components of an installed system makes the term "single-source service" even more meaningful to users. With the ability to avoid virtually all problems with placing the blame for a system disturbance, the user can rest assured that one call will allow relief regardless of the source of problem. On the other side of the same coin, third-party vendors providing support for systems software can



enjoy less concern over account retention as their users are given one less reason to reconsider manufacturer-supplied support.

- As illustrated in Exhibit III-32, there is great room for third-party expansion in the area of systems software support with only 14% of our 1986 sample receiving software support from their TPM vendor. A frequent comment recorded by interviewers of non-users regarded their interest in receiving software maintenance from their current third-party vendor.
- Of the users sampled who did not currently receive TPM support on their software, the level of interest in both on-site support as well as remote service showed a significant increase from last year's sample, up by as much as 1.1 points for remote patches and fixes. These numbers will no doubt continue to increase with users' levels of acceptance of software support from third-party sources.
- As users become more accepting of these types of additional services, the structure of support offerings available to users will necessarily change toward a more flexible format, allowing the discriminating TPM user to bundle-in the individual services seen fit for their particular support plan.

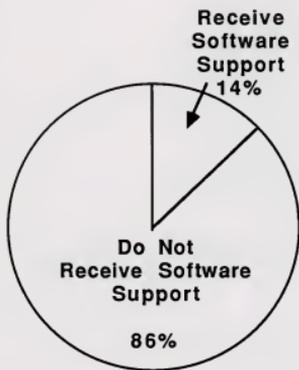
2. THE IMPORTANCE OF CONTRACT FLEXIBILITY

- As was illustrated in the body of the report, users are becoming increasingly sensitive to the fit of a vendor's service offerings with their individual support needs. The recent economic squeeze felt by most firms has heightened awareness of the cost of unnecessary services which users are often fenced into by standard contract offerings. Service vendors, reacting to the demands of their customers to choose the levels of support from which they can actually benefit, are increasingly allowing users to build their own service agreements which correspond to specific needs.



EXHIBIT III-32

TPM BUSINESS BASE - PERIPHERALS



Contract versus TPM

IF NOT RECEIVING-SOFTWARE SUPPORT	
SUPPORT CATEGORY	REQUIREMENT
Telephone Support	3.8
Remote Patches and Fixes	5.9
On-Site	5.0

Scale: 1 = Low, 10 = High Requirement



- Exhibit III-33 recapitulates the growths reported by users in the various product categories. Small systems users were the only group reporting a lower level of satisfaction from this year to last, reflective of the increasing demands which users of small systems are placing upon their support vendors. Large systems users report the most marked increase in their satisfaction with contract flexibility among the four user categories.
- Increasing competition has allowed users to, initially, enjoy an upper hand in the contract negotiation process, allowing at least more significant accounts to choose the types and amount of coverage they felt necessary. As vendors began to understand the importance of this flexibility to their future success in the market, more maintenance organizations began to integrate this aspect of user demand into their operation through the unbundling of services and offering of various levels of the types of support provided. Even manufacturer support operations are becoming more adaptable to user demand in these terms through the provision of "modular" contract offerings.
- Sensitivity to the cost of maintenance support has brought a rise in the number of users who retain staff to perform a number of the more basic aspects of systems support. This increase in user participation also contributed to the desire for flexibility in contract content as users' needs for support vary from full on-site coverage through the use of a support vendor strictly as a backup to their own service staff.

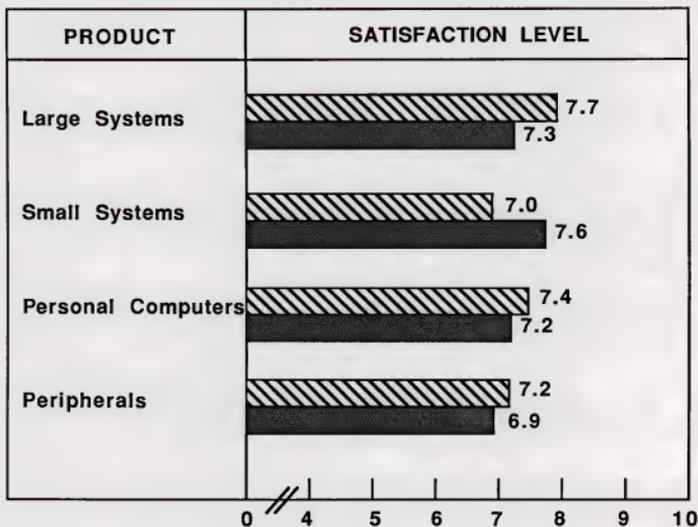
3. USER PARTICIPATION IN MAINTENANCE

- This user participation in the actual physical aspects of maintenance on their systems appears to have reached a peak, as illustrated by the lower interest users have expressed this year toward their participation in hardware maintenance (see Exhibit III-34). Willingness to perform board swaps, assist in problem diagnosis and fixes through telephone support or remote diagnostics, or transport components to a vendor site for depot repair have all decreased in some areas significantly.



EXHIBIT III-33

TPM USER SATISFACTION WITH CONTRACT FLEXIBILITY



Scale: 1 = Low Interest, 10 = High Interest

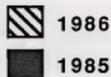
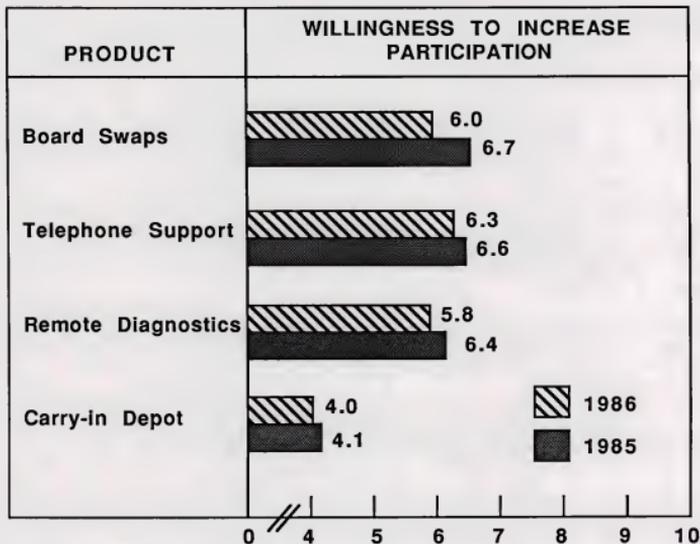




EXHIBIT III-34

TPM USER ATTITUDES TOWARD INCREASED PARTICIPATION
IN HARDWARE MAINTENANCE





- This is not to say that users are expressing no interest in this type of participation in the name of cost-savings, but rather that their willingness has not shown significant increases as were expressed by users in our 1985 sample. The levels of interest in increasing participation are still relatively high, all showing a significant willingness to participate more actively in maintenance, given appropriate discounts in service costs.
- As the costs imposed upon users decline, both in the absolute sense as competition in the market works to keep prices low and in the form of more appropriate allocations of the support-budget dollar through contract flexibility, users may be beginning to feel less inclined to become involved in support at this level and be leaning toward the reallocation of this freed-up capital to vendor-provided service. Users, however, are not abandoning the cost-savings opportunity presented by participation in support, and this alternative, although increasing in importance to users at a decreasing rate, will remain an avenue of cost saving to both the user and the vendor in the future.



VI APPENDIX

- The following section contains additional information sent at various times throughout the year to supplement the research findings for this module. Examples of such additional information includes questionnaire examples, definition lists, and industry summary exhibits.





APPENDIX VI-A: QUESTIONNAIRE

DEMOGRAPHICS

1. Third-party vendor used: _____
2. Supports which vendor: _____ product: _____
3. Age of product (years): _____
4. Length of service relationship (years): _____
5. Distance from service location to user's site (miles): _____
6. Current maintenance coverage: _____
 - a. Current maintenance coverage: _____
 - b. Time and Material _____
 1. Days covered: _____
 2. Hours covered: _____
 - c. On-site: _____
 - d. Depot _____
 1. Carry-in: _____
 2. Mail-in: _____
 3. Courier: _____



PURCHASTING CRITERIA

7. How important, on a scale of 1 to 10 (1 = least important, 10 = most important), were the following factors in choosing third-party maintenance (TPM) as your service source:

Importance 1 - 10

- | | |
|---|-------|
| a. Price | _____ |
| b. Geographic proximity | _____ |
| c. TPM vendor reputation | _____ |
| d. Ability of TPM vendor to service mixed-vendor hardware | _____ |
| e. Improved response time | _____ |
| f. TPM was only service available | _____ |
| g. Availability of SW support | _____ |
| h. Other (specify): _____ | _____ |

8. What percent discount over manufacturer-supplied maintenance do you expect for choosing TPM? _____
- _____



CUSTOMER SERVICE REQUIREMENTS

9. (Ask only if user receives on-site service. If not, go to Q11)

- a. What is your requirement for response time (hours): _____
- b. What do you receive, on the average (hours): _____

10. (Ask only if user receives on-site service. If not, go to Q12)

- a. What is your requirement for repair time (hours): _____
- b. What do you receive, on the average (hours): _____

11. (Ask only if user receives depot service)

- a. What is your requirement for total turnaround time for service (hours): _____
- b. What do you receive, on the average (hours): _____



- 12 a. Do you have a requirement (1 = lowest requirement, 10 = highest requirement), for any of the following services?
- b. How satisfied (1 = least satisfied, 10 = most satisfied), are you with the service you receive?

	a. Requirement	b. Satisfaction
1. Consulting	_____	_____
2. Training	_____	_____
3. Documentation	_____	_____
4. Add-on/Supplies Sales	_____	_____
5. Relocation/Deinstallation	_____	_____
6. Upgrades	_____	_____

13. How satisfied (1 = least satisfied, 10 = most satisfied) are you with your TPM vendor about the following:

	Satisfaction 1 - 10
a. FE skill level	_____
b. Hardware maintenance	_____
c. Parts availability	_____
d. Dispatching	_____
e. Contract flexibility	_____
f. Other (specify): _____	_____



SOFTWARE SUPPORT

14. Do you currently receive your system software support from your TPM vendor? ___ Yes ___ No

- a. If yes, how satisfied (1 = least satisfied, 10 = most satisfied), are you with your support? _____
- b. If no, please rate your requirement (1 = lowest requirement, 10 = highest requirement), for the following software support services:

	Requirement 1 - 10
1. On-site system software support	_____
2. Telephone support	_____
3. Remote patches and fixes	_____

USER PARTICIPATION IN MAINTENANCE

15. How willing, on a scale of 1 to 10 (1 = not willing, 10 = very willing), are you to participate in the following alternative maintenance methods (both hardware and software)?

	Hardware	Software
a. Remote Diagnostics	_____	_____
b. Telephone Support	_____	_____
c. User Performing Board Swaps/ Software Patches	_____	_____
d. Ship-in/Carry-in to Depot	_____	_____



16. Which new areas of service would you like your TPM vendor to cover?

17. Does your company expect to increase or decrease its use of TPM services over the next year?

Thank You!



APPENDIX VI-B: DEFINITIONS

- APPLICATIONS SOFTWARE - Software that performs processing to service user functions.
- CONSULTING - Includes analysis of user requirements and the development of a specific action plan to meet user service and support needs.
- DISPATCHING - The process of allocating service resources to solve a support-related problem.
- DOCUMENTATION - All manuals, newsletters, and text designed to serve as reference material for the ongoing operation or repair of hardware or software.
- END USER - May buy a system from the hardware supplier(s) and do his own programming, interfacing and installation. Alternatively, may buy a turnkey system from a systems house or hardware integrator.
- ENGINEERING CHANGE NOTICE (ECN) - Product changes to improve the product after it has been released to production.
- ENGINEERING CHANGE ORDER (ECO) - The followup to ECNs which include parts and a bill of material to effect the change in hardware.



- ESCALATION - The process of increasing the level of support when and if the field engineer cannot correct a hardware or software problem within a prescribed amount of time, usually two to four hours for hardware.
- FIELD ENGINEER (FE) - For the purpose of this study, field engineer customer engineer, serviceperson, and maintenance person were used interchangeably and refer to the individual who responds to a user's service call to repair a device or system.
- HARDWARE INTEGRATOR - Develops system interface electronics and controllers for the CPU, sensors, peripherals, and all other ancillary hardware components. May also develop control system software in addition to installing the entire system at the end-user site.
- LARGE SYSTEM - Refers to traditional mainframes including at the low end IBM 4300-like machines and at the high end IBM 308X-like machines. Large systems have a maximum word length of 32 bits and a standard configuration price of \$350,000 and higher.
- MEAN TIME BETWEEN FAILURES (MTBF) - The elapsed time between hardware failures on a device or a system.
- MEAN TIME TO REPAIR - The elapsed time from the arrival of the field engineer on the user's site until the device is repaired and returned to the user for his utilization.
- MEAN TIME TO RESPOND - The elapsed time between the user placement of a service call and the arrival at the user's location of a field engineer.
- MICROCOMPUTER (PERSONAL COMPUTER) - A microprocessor-based single- or multi-user computer system typically priced less than \$15,000. A typical configuration includes an 8- or 16-bit CPU, monitor, keyboard, two floppy disk drives, and all required cards and cables.



- MINICOMPUTER - See Small System.
- OPERATING SYSTEM SOFTWARE (SYSTEMS SOFTWARE) - Software that enables the computer system to perform basic functions. Systems software, for the purposes of this report, does not include utilities or program development tools.
- PERIPHERALS - Includes all input, output, and storage devices, other than main memory, which are locally connected to the main processor and are not generally included in other categories, such as terminals.
- PERSONAL COMPUTER - See Microcomputer.
- PLANNING - Includes the development of procedures, distribution, organization, and configuration of support services. For example, capacity planning, "installation" planning.
- PLUG-COMPATIBLE MAINFRAME (PCM) - Mainframe computers that are compatible with and can execute programs on an equivalent IBM mainframe. The two major PCM vendors at this time are Amdahl and National Advanced Systems.
- SMALL BUSINESS COMPUTER - For the purpose of this study, a system which is built around a Central Processing Unit (CPU), has the ability to utilize at least 20M bytes of disk capacity, provides multiple CRT workstations, and offers business-oriented system software support.
- SMALL SYSTEM - Refers to traditional minicomputer and superminicomputer systems ranging from a small multi-user, 16-bit system at the low end to sophisticated 32-bit machine at the high end.



- SOFTWARE ENGINEER (SE) - The individual that responds (either on-site or via remote support) to a user's service call to repair or patch operating systems and/or applications software.
- SOFTWARE PRODUCTS - Systems and applications packages which are sold to computer users by equipment manufacturers, independent vendors, and others. Also included are fees for work performed by the vendor to implement a package at the user's site.
- SUPERMINICOMPUTER - See Small System.
- SYSTEM INTERRUPTION - Any system downtime requiring an Initial Program Load (IPL).
- SYSTEMS HOUSE - Integrates hardware and software into a total turnkey system to satisfy the data processing requirements of the end user. May also develop system software products for license to end users.
- THIRD-PARTY MAINTENANCE (TPM) - Any service provider other than the original equipment vendor.
- TRAINING - All audio, visual, and computer-based documentation, materials, and live instruction designed to educate users and support personnel in the ongoing operation or repair of hardware and software.
- TURNKEY SYSTEM - Composed of hardware and software integrated into a total system designed to completely fulfill the processing requirements of a single application.

