ARGE - SYSTEM VENDOR COMPETITIVE ANALYSIS

INPUT

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INPUT Planning Services for Management

LARGE-SYSTEM VENDOR COMPETITIVE ANALYSIS

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LARGE-SYSTEM VENDOR COMPETITIVE ANALYSIS

ABSTRACT

This report provides a competitive analysis of the field service operations of the major large-system vendors, and culminates in recommendations that will improve user satisfaction and provide additional sources of revenue.

Service organization components such as dispatching, parts distribution, pricing, and invoicing are analyzed, and, wherever possible, improvements are presented.

Individual case studies of successful field service organizations are included, showing "real-world" applications of the strategies presented.

The report contains 98 pages, including 23 exhibits.

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LARGE-SYSTEM VENDOR COMPETITIVE ANALYSIS

EXHIBITS

1 INTRODUCTION

I INTRODUCTION

- This report is produced by INPUT as part of the 1983 Field Service Program for the United States.

- The progressive field service organization, having evolved from hardware maintenance to systems support, from cost center to profit center, is looking for new ways to reduce costs while exploring new sources of revenue generation. In this report, INPUT provides a competitive analysis of the field service operations of the major large-scale systems vendors, resulting in recommendations on service offerings and improvements that will increase user satisfaction and provide additional sources of revenue.

A. SCOPE

- In this report, INPUT analyzes components of the service organization such as dispatching, parts distribution, pricing, and invoicing, and indicates successful applications and improvements possible in each. In addition, potential new revenue sources, such as extended services and new service offerings, are explored.

- Finally, case studies of successful large-system vendors showing current application of recommended service techniques are presented, in order to show how these techniques have resulted in successful administration of the maintenance service.

B. METHODOLOGY

- The basis of this report is data gathered from large-scale vendors in interviews based on the questionnaire shown in Appendix A. The information was statistically analyzed in order to present trends in the industry while assuring that company confidentiality was maintained.

- Much of the following information resulted from extensive secondary research of all available public information, including annual reports, 10-Ks, press releases, and other media information.

- Additional information was derived from ongoing vendor analysis conducted by INPUT in multiclient and custom research.

II EXECUTIVE SUMMARY

II EXECUTIVE SUMMARY

A. TOTAL SERVICE CONCEPT

- Today's large-system user looks to the field service organization to provide him with systems support, which is currently defined as maintenance of systems software, systems hardware and, in some cases, the vendor's application software products.

- Other postsales support functions accomplished by marketing include user training, documentation and systems consulting, whereas the energies of the marketing staff should be concentrated on market definition, competitive analysis, sales argument development, and application analysis - in a word, market planning. The same can be said of some of the postsales functions carried out by the sales organization: add-on sales, supplies sales and upgrades which do not widen the market served.

- In contrast, the goal of the field service organization is the retention, satisfaction, and development of the installed user base. It is gradually becoming evident that responsibility for all postsales support activities needs to be concentrated in the hands of that part of a company's organization that is best suited to handle them: field service. This does not necessarily mean making a salesman out of the field service engineer, but it does mean placing account management responsibility in his hands.

- The benefits from such a move include improved client relations and communications, improved account control and management, and an increase in productivity from company employees (e.g., reduced duplication of visits to customers, and sales time freed to concentrate on new account development). Substantial improvement in the quality of feedback on user needs should result, eliminating unnecessarily optimistic sales forecasts and highlighting actual user needs.

- Naturally such a shift in responsibility is unlikely to happen overnight and will be met by internal resistance to such widesweeping change. A phased transfer of responsibility for activities such as ongoing user training consulting and user support documentation should begin now.

B. REVENUE GROWTH FROM USER REQUIREMENTS

- One disturbing trend that is becoming apparent is that like all of the previous IBM price umbrellas, the field service umbrella is about to come down. At present it is not clear how fast (or where) this will happen but it is clear that IBM intends to become very aggressive on all product fronts - and that probably includes service pricing.

- If this were to happen, new field service revenue sources would become necessary in order to sustain the top-line (revenue) and bottom-line (profit) contributions that top management has become accustomed to. The addition of software maintenance (and the potential growth of revenues from that source) are a first line of new revenue, but others must be found.

- In addition to the immediate transfer of some of the postsales support activities currently provided by marketing, user requirements can provide a strong guideline as to what additional/optional services can be targeted. This may include, for some sections of the user base, a contractual halfhour response

contract, guaranteed response time, guaranteed system availability and other services.

- This suggests that a new user base segmentation is needed that cuts across the standard groupings now used (e.g., customer size, industry sector) and concentrates on the type and quality of service needed. The result would be an expansion of the number of standard option contracts available to the user base, an increase in overall user satisfaction - and an increase in revenue.

- User resistance to hardware maintenance price increases is already manifest (and if the service price umbrella comes down, user resistance will increase) but there is no such resistance to software maintenance price increases as yet. This is due to the fact that it is currently a small-line item on the users budget. INPUT believes that software maintenance prices could be doubled, with little user reaction. This would provide the revenue needed to fund a much-needed improvement in software support and the revenues to support the next generation of on-line software maintenance services.

C. SINGLE-SOURCE MAINTENANCE: A MARKET WITHOUT IBM

- One very attractive option open to most equipment vendors that has the benefits of increased account control, increased service revenue and offers some nice options in the future, is single source maintenance. This is a special variety of third party maintenance - it is special in that it applies to a vendor's own customer base rather than someone else's.

- The single-source maintenance approach aims at eliminating all other vendors' maintenance contracts from a given vendor's customer sites. It can be achieved by offering a single maintenance contract to the user which covers all of the products connected to a vendor's system, whether they are the vendor's own or someone else's. The maintenance for the foreign devices can

either be accomplished directly by the system vendor himself or brokered to the equipment's manufacturer.

- The advantages of doing so are:

  - Competitive service contracts with user are eliminated.

  - User cannot make comparisons between foreign service and vendor's own.

  - Increase in revenue (brokerage fees are typically a 10% markup of the actual cost of the foreign service).

  - Future potential of accomplishing the service itself when the installed base density of such products is sufficient to support a service operation (with a 10% bonus - the markup can be continued).

  - The user need not know when the changeover from foreign to direct service occurs; the contract does not change, only the source of the service.

- One other attraction of the sole-service maintenance market is that it is a market free from IBM (who will not offer service to another vendor's products). A number of vendors are planning moves in this direction, including DEC, NCR, and Honeywell.

D. PROFIT CONTRIBUTION OF FIELD SERVICE IS SECURE

- Despite the gloomy outlook for field service prices, the continued growth of field service revenue from other sources seems enough to offset the expected downturn in standard contract fees. The recession appears to be over and

large-system shipments are improving. Productivity tools already in place (such as remote diagnostic tools) are capable of being applied to software maintenance as well as hardware maintenance. Computer-automated spares control and dispatching holds further gains in cost control, and field engineer productivity is rising.

- The result is that the profit contribution expected from field service will increase steadily providing healthy returns on the recent investments made in support centers, centralized dispatch facilities and repair centers.

- Some corrective steps are immediately necessary:

  - Large-scale system vendors must improve their software maintenance services, which are currently not adequate; the way to do this is to increase software maintenance charges and channel the revenue obtained into providing greater indepth support to end users, particularly remote tie-ins for diagnostics and downline loading of corrected code.

  - Focus all support in two areas:

    . Presale support: the responsibility of marketing, using field service manpower where appropriate (e.g., environmental planning, software/hardware configuration), but on a fee-paying basis (intracompany billing where necessary). This includes use of field service personnel for sales calls and goodwill visits.

    . Postsales support: the responsibility of field services, using sales manpower where appropriate (e.g., add-on sales, new models, additional systems). Customer satisfaction should be the sole responsibility of the field service organization.

  - Assume more involvement in product and documentation design, development, and production. Field service management reports little

influence in these areas, yet with their continual contact with the users, field service has first-hand knowledge of the users' needs and problems. Increased field service involvement in product development will result in increased customer satisfaction and reduced service expenses.

III LARGE-SYSTEM SERVICE MANAGEMENT ANALYSIS

III LARGE-SYSTEM SERVICE MANAGEMENT ANALYSIS

A. FIELD SERVICE REVENUE SOURCES

- The significance of the field service market within large-scale systems is depicted in Exhibit III-1 by a listing of 14 major participants in this market.

  - The six largest vendors by revenue size (Burroughs, CDC, DEC, Honeywell, IBM, and UNIVAC), or half of the companies listed, produced:

    . 92% of the total information systems revenue of large-scale vendors.

    . 92% of the worldwide field service revenue of this group of vendors.

  - The 12 participants derive revenue of more than $54 billion, 57% coming from the U.S.

  - Total field service revenues for the group were over $10 billion with individual revenues ranging from a low of $14 million (Cray Research) to a high of $3.8 billion (IBM).

  - The total growth rate in field service revenues between 1981 and 1982 is 16%.

EXHIBIT III-1

LARGE-SCALE SYSTEMS
KEY VENDOR 1982 SERVICE REVENUE

Company	Worldwide Information Systems Revenue ($ Millions)	Estimated Worldwide Field Service Revenue ($ Millions)			Field Services Growth Rate (Percent) 1981-1982	Field Service as Percent of Total Revenue 1982
		U.S.	Foreign	Total		
Amdahl	$ 462	$ 78	$ 52	$ 130	13%	28%
Burroughs	4,186	618	416	1,034	23	25
Control Data	3,301	236	49	285	11	9
Cray Research	141	12	2	14	58	10
Data General	806	93	57	150	27	19
Digital Equipment	3,881	496	319	815	33	21
Honeywell	1,685	217	235	452	2	27
IBM	34,364	3,800	2,600	6,400	21	19
NAS	236	41	7	48	30	20
Perkin-Elmer	211	26	20	46	5	22
Tandem	312	25	14	39	80	13
Univac	2,831	432	362	794	5	28
Total	$52,416	$6,074	$4,133	$10,207	16%	19%

- Tandem showed the highest growth field service revenues (at 80% on a small $39 million base) while Honeywell's growth was the lowest, 2%.

- Field service is becoming a more and more important source of revenue to computer manufacturers. Field service comprises 19% of the total information systems revenue reported.

  - Companies like Perkin-Elmer, Data General, IBM, NAS, Honeywell, Amdahl, Burroughs, DEC, and Univac, get 19-30% of total revenue from field service, as shown in Exhibit III-1.

  - Amdahl, Burroughs, Data General, DEC, IBM, Perkin-Elmer, Tandem, and Univac get over one-third of their field service revenue outside of the U.S. Honeywell gets more than 50%.

  - Amdahl measures field service on a profit contribution basis. It has a well-defined mission to assure customer satisfaction and provide support for marketing.

- Emphasis is now being placed on improving field service productivity and profits by improving product design and quality of the manufactured product and by employing innovative maintenance concepts, such as:

  - Remote diagnostics.

  - Redundant hardware with auto reconfiguration.

  - Self diagnostics.

- For large-scale system users, service has become a critical consideration in the original purchase decision. Service is therefore perceived by vendors as a strong sales and marketing tool for winning orders for large-scale systems.

- Guarantees of uptime performance are seen by users as an indication of a vendor's confidence in the system and fits well with today's user's "insurance-oriented" mentality. Guaranteed uptime has the potential of being a source of additional revenue for vendors.

- The main source of revenues for field service organizations continues to be the basic contract for maintenance, with maintenance charges ranging from 4-14% of the purchase value of installed equipment. Time and materials, spare parts sales, and installation fees make up most of the remainder of revenues. This mix will change, with single-source maintenance becoming a significant source of new revenues for companies such as DEC, NCR, and Honeywell.

- Large-scale system users are becoming more and more resistant to hardware service price increases on standard shift contracts. In fact, as hardware prices continue to fall, users will expect comparable decreases in the price of service and maintenance support, with the same high degree of system reliability. They will be encouraged in this section by the progressive lowering by IBM of the service price umbrella: IBM will be very aggressive over the next five years in field service.

- The resistance is of critical importance to field service managers who will be pressured by marketing into making concessions that are in line with the competition's.

- Revenue must be found that offsets this potential drop in basic maintenance revenue and maintains service revenue growth. In the large-systems area, several options are open to vendors, including:

  - Offer extended services for which premiums can be charged.

- Increase revenues from software maintenance, where user resistance to price increases is far less.

- Incorporate new revenue sources into field engineering (e.g., add-on equipment sales, supplies, upgrades, systems consulting, ongoing systems training).

- Extend the term of present contracts (to protect the current revenue base).

- Field service revenue per engineer continued to improve in 1983 for most vendors, with gains averaging 6.2%. The bulk of the increases are due to higher hourly field service rates, increased shipments as the recovery gathers momentum and the addition of software maintenance revenues to the field service revenue.

- Vendors should note that the revenue per engineer can be expected to show regular gains over the forecast period due to the following:

  - The turnover rate of the installed base (measured by the reciprocal of the average age of the installed systems) will increase as product life cycles decrease; the proportion of the installed base represented by newer, more reliable equipment will therefore increase, reducing the average number of fault calls per field service revenue dollar.

  - The proportion of the installed base to which productivity tools such as remote diagnostics can be applied will increase rapidly, which will reduce the overall number of calls necessary to support the base.

  - Software maintenance revenue is being incorporated into the field service revenue and is growing at a rapid rate. While this also means the addition of software support engineers, the ratio of revenue to headcount will improve substantially.

B. EXPENSE CONSTITUENTS

- Labor comprises over two-thirds of field service expense. The new developments and innovations in field service delivery modes are all aimed at controlling this labor component and at improving its productivity:

  - 1983 field service employment has increased by an average of 6% compared to 1982; in the period from 1983 to 1987 this is expected to increase by an average annual rate of only 3%.

  - Fully burdened costs for field service engineers in 1983 are up approximately 7.5% with annual salaries for field service engineers ranging from $21,000 to $40,000 depending on experience. Average salary ranges by function are shown in Exhibit III-2.

  - Expense per field service engineer averaged $86,000, up 6.2% from 1982.

- Parts, depreciation and logistics make up the remaining expenses.

- The cost of a typical fault call in 1983 averaged $331, an increase of 7.8% over 1982, as shown in Exhibit III-3. This is almost double the increase that vendors predicted in 1982. Increases in direct labor and travel costs contributed to this increase while reduced costs in parts, materials and overhead partially offset what would have been an even larger rise.

- (Note: it is not possible to subtract average expenses from average revenue and obtain average margins - see the following section; to be able to do this the averages shown would have to be weighted by the revenue base. Given the dominant share of revenue that IBM has, this would have distorted the picture to make all vendors' averages similar to IBM's - a false picture).

EXHIBIT III-2

LARGE-SCALE SYSTEMS
AVERAGE SALARY RANGES BY FUNCTION

	1982	1983	PERCENT CHANGE
Trainee	$17,100	$18,800	9.9%
Qualified FE	26,200	28,800	9.9
Senior FE	32,100	35,300	10.0
Software Support Engineer	28,900	31,200	8.0
Line Manager	31,900	35,100	9.7

SOURCE: Average of responding vendors

EXHIBIT III-3

COMPONENTS OF A TYPICAL FAULT CALL

LARGE-SCALE SYSTEM VENDORS

	1982	1983	PERCENT CHANGE
Direct Labor (Percent)	15%	18%	+3.0%
Travel Labor and Expense (Percent)	22	23	+1.0
Parts and Materials (Percent)	26	24	-2.0
Burden and Overhead (Percent)	37	35	-2.0
Average Cost ($ Thousands)	$307	$337	+7.8

SOURCE: Average of responding vendors.

C. GROSS MARGIN/PROFIT BEFORE TAX

- The average field service gross margin of large-scale system vendors rose slightly in 1983 with revenue gains marginally outweighing the larger than expected rise in expenses, as shown in Exhibit III-4. (With the rapid development of software maintenance revenues, the impending slowdown in growth of hardware maintenance will have less impact than would otherwise have been the case).

- The overall gross margin growth for field service across all categories of equipment vendors was 11.3%, substantially higher than the 2.3% of the large-scale system vendors. Most of this rapid growth occurred in small systems and office products (word processors, workstations, and personal computers).

- Although no verifiable values are available from IBM, INPUT estimates that the average revenue per field engineer is $180,000 per year, producing a gross margin of 35% on field service operations overall.

- Profit before tax on large-system field service revenue averaged 20.9% in 1983 - a small increase over 1982, but a solid contribution to the bottom line of overall company results, offsetting in some cases losses on operations.

- Profit margins are highest on service activities with the lowest labor content: principally parts sales where the profit before tax can be as high as 40%. Vendors should obviously try to reduce the labor content of all of their service activities, but must be careful not to compromise on customer satisfaction in the process. It is better to provide a higher level of service (at a higher cost to users) than to diminish service quality by cutting costs.

- One of the obvious targets for improved service to users is single-source maintenance, which develops the revenue base for small increases in the service staff at the same time.

EXHIBIT III-4

LARGE-SCALE SYSTEMS

ANNUAL FIELD SERVICE FINANCIAL DATA

	1982	1983	PERCENT CHANGE
Gross Margin (Percent)	28.7%	31.0%	+2.3%
Profit Before Tax (Percent)	19.6	20.9	+1.3
Revenue/Engineer ($ Thousands)	$113	$120	+6.2
Expense/Engineer ($ Thousands)	$ 81	$ 86	+6.2
Margin/Engineer ($ Thousands)	$ 32	$ 34	+6.3
Engineers/Total Field Service Staff (Percent)	67.0	66.0	-1.0

SOURCE: Average of responding vendors

D. CAPITAL INVESTMENT AND SPARE PARTS

- Capital investment, which has averaged approximately 27% of gross field service revenues, should remain fairly constant or possibly decrease slightly. This is because most of the heavy outlays for remote diagnostics and support center installations are behind many of the large-system vendors.

- Improved diagnostic design and production techniques will improve system availability, while tighter inventory control and improved dispatching are requiring a smaller spare-parts inventory for large-scale systems.

- Management techniques utilizing computerized systems for spare parts distribution and dispatching will reduce physical inventory and the amount of capital investment needed to support it. By automating their spare parts holding and distribution facilities, IBM increased its storage density to the point where their storage facility in Mechanicsburg, PA has less total square footage than the three storage facilities that it replaced.

- One trend running counter to the above decrease in inventory values is that of the steadily increasing value of the average large-system part. Increased integration of functions in new systems and larger boards offset the declining cost of standard parts in previous systems (and sometimes require special secure facilities for their storage, as in the case of some IBM 3081 parts).

- Another trend will be single-source maintenance: as the number of separate products maintained increases, the spares inventory needed to support them climbs exponentially. However, this is the proper time to envisage such expansions of the maintained products, given that vendors have obtained control of their spares inventory and dispatching.

E. EXCLUSIONS (INTERNAL TRANSFERS)

- There are several items and areas of responsibility that are handled by field service organizations for which they must receive reimbursement from internal groups. Some of these are:

  - Warranties.
  - Field changes.
  - Sales upgrades.
  - Internal field service.
  - Other.

- From vendors' discussions, many managers feel that the administrative overhead to handle these transfers is not worth the time and energy expended. The fact remains that these expenses must be tracked and the question is whether any other method would be effective. In the cast of high-volume products these costs can become staggering. An example is field changes: if the average field change costs $150, an installed base of 20,000 sytems gives rise to a possible cost of $3 million. Of course, most companies allow field service to set up a selective engineering change program, but there are costs involved there also. If a company wants to measure accurately the financial performance of field service, internal transfers are a necessity.

- Many vendors use the incident report as a means of generating an internal transfer request. This appears to be the most effective method of recovering real costs.

IV LARGE-SYSTEM FIELD SERVICE PERFORMANCE

IV LARGE-SYSTEM FIELD SERVICE PERFORMANCE

A. MANPOWER PRODUCTIVITY

- Field service activities at many large-scale system vendors are looked upon increasingly as corporate profit centers, with new focus placed on managing and reducing field service costs.

- Management productivity offers the greatest potential for improving profits and is a key area for field service management to focus on.

- Corporate management is supporting field service activities in other areas, e.g., giving field service greater influence in the design of new products, while at the same time making it responsible for producing greater revenues and profits. INPUT believes that the role of field service engineering must be geared more to postsales support, rather than just system maintenance.

- Besides improving upon the primary product functions, such as large-scale equipment design and quality control, several innovations that are aimed at increasing manpower productivity have been introduced in field service, including remote diagnostics and uptime guarantees.

- Improved product design, including recent innovations in imbedded diagnostic devices, have resulted in lower field service operating costs.

- Burroughs, DEC, Honeywell, Data General, Amdahl, Floating Point Systems, CDC, Perkin Elmer, and NAS market products and systems that incorporate remote diagnostic features, imbedded self-diagnostic features, or both.

- Those service areas that have experienced an improvement in productivity in 1983 greater than 25% include remote diagnostics, repair centers, support centers, field education, and training.

  - These areas should continue to show improvement as more companies will make use of these service offerings.

  - One vendor, Floating Point Systems, experienced manpower productivity improvements of 50% after implementing their remote diagnostic center.

- In addition to increasing manpower productivity, these field service maintenance innovations are a potential source of revenue, as premium fees can be charged for them.

- The success of the field service organization in meeting its service and financial goals depends on access to accurate and timely information about the following operational areas:

  - Parts management.

  - Field reporting.

  - System-fix data.

  - Centralized dispatch.

  - Field measurements.

- Field remote diagnostic systems.

- Engineering changes.

- Billing and receivables.

- Companies that have implemented, or are in the process of implementing, real-time information systems to provide this information to the field service organization include Amdahl, CDC, Cambex, Cray, and Perkin-Elmer.

- The key measurement of field service productivity in large-scale system vendors is the ratio of total field service revenue to engineer.

- On average, large-scale systems vendors have experienced an increase in field service revenue per engineer of 4 1/2-7% in 1983. However, the increase in revenue is due almost totally to higher hourly field services rates that have increased from 7-13%. Exhibit IV-1 shows field service rates for several large-scale system vendors, as well as minimum charges and mileage rates.

- Improvement has been made in 1983 in average maintenance repair time. In some cases, average repair times were cut by up to 50%.

- It is interesting to note that some vendors experienced an increase in the number of field calls per week, a trend which may be traced to the shorter time needed to implement repairs.

- Exhibit IV-2 shows the averages for 1982 and 1983 productivity factors. It is evident that management needs to concentrate more on the area of improving productivity.

EXHIBIT IV-1

LARGE-SCALE SYSTEMS
FIELD SERVICE AND MILEAGE RATES, 1983

	HOURLY RATE (Dollars)	MINIMUM CHARGE	MILEAGE RATE (Dollars/Mile)
Amdahl	$145	$290	*
Burroughs	133	133	$.40
Cambex	130	None	-
CDC	122	244	-
Data General	80	160	-
DEC	63	126	-
Floating Point Systems	105	None	-
Honeywell	165	330	.28
IBM	147	294	-
NAS	120	240	.35
Perkin-Elmer	85	-	-

* Included in hourly rate

EXHIBIT IV-2
LARGE-SCALE SYSTEMS
PRODUCTIVITY FACTORS

	AVERAGE		PERCENT CHANGE
	1982	1983	
Revenue/Engineer ($ Thousands)	$113	$120	+6.2
Hourly Rate ($ Per Hour)	$110	$118	+7.3%
Maintenance Repair Time (Hours)	5	3.25	-35.0%
Calls Per Week	4.1	4.5	+9.8

B. SERVICE DELIVERY MODES

- The types of services offered by vendors providing field service support for large-scale systems are shown in Exhibit IV-3. These service types are grouped according to primary and secondary importance as perceived by the vendors surveyed.

  - Remote diagnostics is emerging as a primary service delivery mode and will continue to gain in importance over the next several years.

  - Guaranteed uptime is receiving a lot of publicity from vendors and has been found to be popular with users.

    . Guaranteed uptime may be as important as a product selling point as it is a revenue generator for the field service unit.

    . Large-scale system vendors having some form of guaranteed uptime offering include Data General, DEC, Cambex, and CDC. Others, such as Floating Point, are planning to offer it soon.

- The popularity of remote-diagnostic services and imbedded self-diagnostics, by both vendors and users, may cause an unanticipated problem for vendors, i.e., loss of customer contact. Vendors are planning to offset this by offering several ancillary services to their customers, as shown in Exhibit IV-4. Each ancillary services offering is designed to reestablish and maintain direct contact with the customer.

- In addition, most vendors have, or are planning to institute, field quality assurance programs which include performing site audits, statistical studies and reporting engineering changes. All of these measures are aimed at improving field performance and customer satisfaction.

EXHIBIT IV-3

LARGE-SCALE SYSTEMS
TYPES OF SERVICE

PRIMARY IMPORTANCE TO VENDORS
Guaranteed Response Time
On-site Standby
On-site Spares
Remote Diagnostics

SECONDARY IMPORTANCE TO VENDORS
Preventive Maintenance
Field Changes During Non-prime Hours
Variable Shift Coverage
System Software Maintenance
Depot Maintenance

EXHIBIT IV-4

LARGE-SCALE SYSTEMS
ANCILLARY SERVICES OFFERED BY VENDORS

- Physical Site Planning (Layouts)
- Customer Training
- Installation Management and Coordination
- Facility Relocation
- De-installation

- Areas which continue to command the attention of the field service organization include:

  - Field service response time and repair time.

  - Maintenance pricing.

  - System availability and equipment reliability.

  - Remote maintenance.

- As part of an overall corporate strategy, field service is becoming more involved in the areas of test equipment selection and field service contract administration, particularly concerning exceptions to standard maintenance agreements.

- Areas in which field service organizations see themselves becoming more involved include:

  - Diagnostic development.

  - Spares requirement.

  - Documentation.

- Areas perceived to be needed by users, but which are either not provided by vendors or are provided outside of the field service organization include:

  - System consulting.

  - Hardware/software configuration.

- Systems training and documentation.

- Site audits.

- Most vendors have, or are planning to institute, field quality assurance programs. This includes performing site audits and statistical studies and reporting engineering changes, all aimed at improving field performance and customer satisfaction. Vendors understand the need to institute programs to measure their own performance in terms of response time, repair time, system availability, and spare-parts inventory control. Amdahl and Floating Point Systems have instituted such programs.

- Vendors who are not full system suppliers, whose equipment operates in a mixed-vendor environment, must nevertheless provide a "no fault" service philosophy. The customer is not concerned about whose equipment is causing the downtime, just that the system is down. Vendors, such as Amdahl, who can assist the user in identifying the problem and coordinating all other vendors involved, achieve high levels of customer satisfaction.

C. SPARE PARTS DISTRIBUTION AND CENTRALIZED DISPATCHING

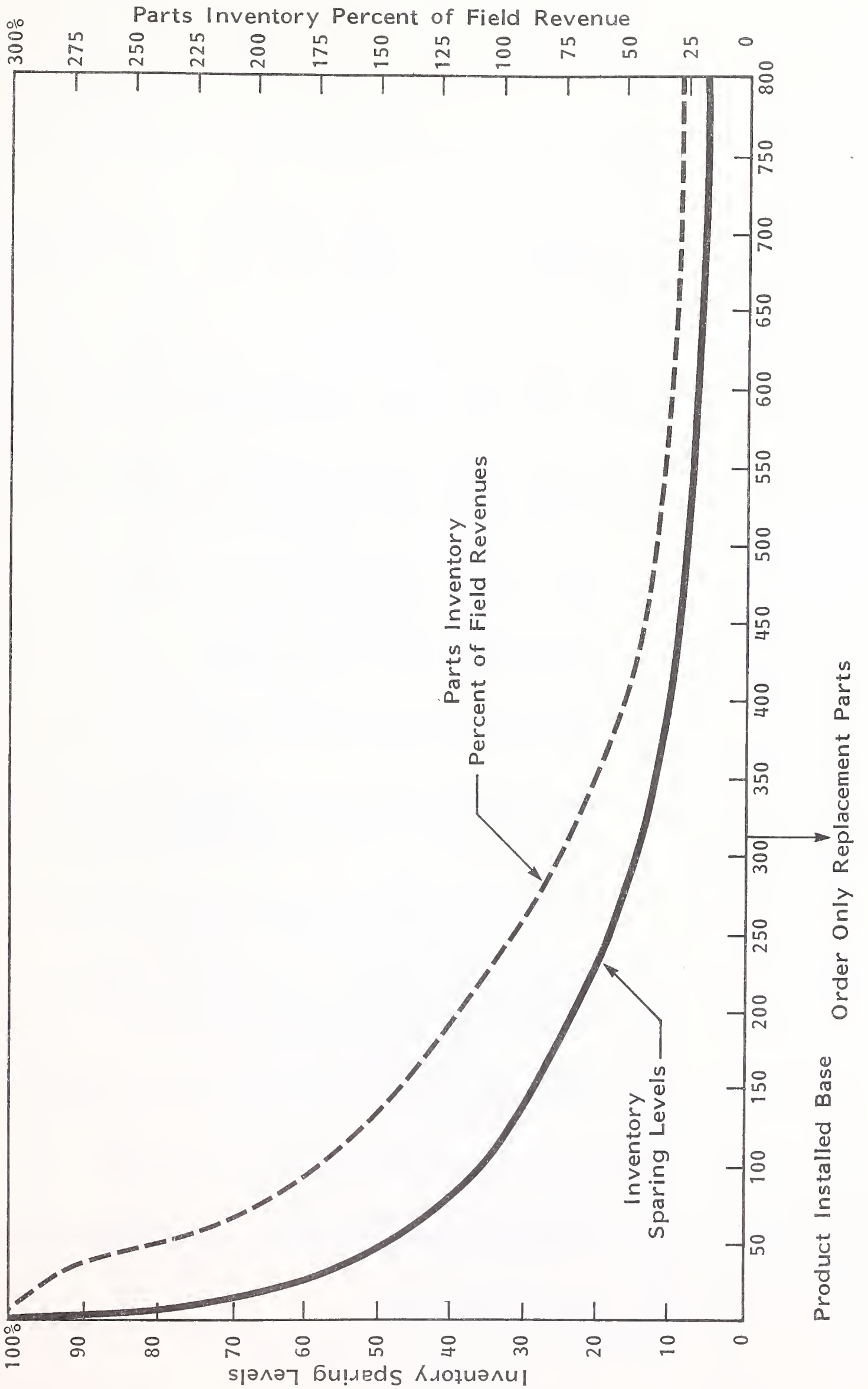
- As field service is viewed increasingly as a profit center, cost control will get more of management's attention. At the present, parts and materials make up 20-30% of a typical fault call.

  - High-priority items are the most costly to process and ship, and tend to inflate the cost of service industry.

- Exhibit IV-5 shows how field service vendors set spares levels. An efficient method for reducing spares costs would be to track product volumes carefully and to order only replacement spares at that specific product volume. In the

EXHIBIT IV-5

SPARE PARTS INVESTMENTS AND INVENTORY LEVELS



example shown in Exhibit IV-5, the product installed base has been set at 320 units.

- Typical problem areas encountered in field-support inventory are shown in Exhibit IV-6.

- In an attempt to control inventory costs, management is looking toward computerizing the functions of spare parts distribution and dispatching.

- Computerized systems for controlling spare parts distribution and centralized dispatching have achieved improved cost control by:

  - Substantially reducing emergency shipments.

  - Increasing inventory turnover rates.

  - Reducing the number of parts ordered.

  - Increasing the productivity of field engineers by reducing travel time and the occurrence of part unavailability on service calls.

  - Reducing paperwork associated with inventory control.

  - Providing a mechanism for tracking returned parts from customer through repair and return to the warehouse.

  - Providing better forecasts of the demand for parts.

- Amdahl has a unique logistic supply line consisting of:

  - Real-time, on-line parts management and centralized dispatch.

  - On-site parts support.

EXHIBIT IV-6

LARGE-SCALE SYSTEMS
TYPICAL FIELD SUPPORT INVENTORY PROBLEM AREAS

INVENTORY
Lack of Timely and Accurate Data on Stock Levels
Insufficient Usage Tracking
Poor Stock Level Forecasting

REVENUE
Poor Control Over "Give-aways" by Field Personnel
No Return Incentive for Loaners to Customers
Inaccurate and Late Service Reports for Billing
Lack of Clear Parts Warranty Policy
Inadequate Costing Methods for Carrying and Obsolesence Charges

RESOURCE MANAGEMENT
Insufficient Control Over Spare Parts
Distribution and Replenishment
Frequent Part Unavailability on Service Calls
Poor Tracking of Part Performance and Problems

- Metropolitan back-up centers.

- Contractual agreement with an air freight company that stocks expensive, lower-usage parts at air freight depots for emergency delivery inside Amdahl's service areas within two hours.

- Field engineer dispatching can be either centralized or decentralized.

  - Centralized dispatch implies that the dispatchers are at a single location. Field engineers are notified of calls from this location and then report back regarding call disposition to this dispatch center.

    . Dispatchers control specific service territories from a central location.

    . Dispatchers have access to the national data base.

    . Any dispatcher can handle any failure or contact any field engineer.

  - Decentralized dispatch places the dispatchers in field offices. Dispatchers are physically located within their service territories.

- Exhibit IV-7 compares the various dispatching schemes.

  - Centralized dispatching works best for organizations of up to 300 field engineers.

  - Regional dispatching is appropriate for mid-size organizations (300-800 field engineers).

EXHIBIT IV-7

LARGE-SCALE SYSTEMS

COMPARISON OF DISPATCH METHODS

OPERATIONAL CRITERIA	DISPATCH ALTERNATIVES		
	BRANCH	DISTRICT	CENTRAL
Field Management Control of FE	High	Moderate	Low
HQ Management Control of Daily Operations	Little	Moderate	Considerable
Call Escalation (Alert) Procedures	System alterts in sequence: Area/ branch office, district office regional office headquarters	System alerts dispatcher who contacts area/branch office and subsequently district manager, regional office and headquarters are alerted by FEs.	System only alerts dispatcher, dispatcher alerts in sequence area/branch office, district office, regional office, headquarters.
Ability of District Management to Affect Customer Satisfaction	Good	Very Good	Poor
Ability to Calm Irate Customer	Very	Good	Poor
Awareness of Local Conditions Affecting FE Dispatching	Good	Fair	Poor
Knowledge of Customer	Good	Good to Fair	Fair to Poor
Response of Dispatcher to FE Question	Fast: Branch Phones are Continually Staffed	Fast: District Phones are Adequately Staffed	Fast: Large Number of Distpatchers
Hardware & Communications Cost	High	Low to Moderate	Low
Off-hour Dispatch	Poor	Poor to Good	Same as Regular Shift
Protection from Loss of Dispatch Center	Adjacent Area Assumes Lost Center's Activity	Redundant Hardware	Redundant Hardware
Manual Backup	Easy	Moderate	Very Difficult

- Decentralization offers advantages for the large field engineer organization.

D. SOFTWARE MAINTENANCE INTEGRATION WITH HARDWARE MAINTENANCE

- A number of companies, e.g., Amdahl, and NAS, are integrating software maintenance with hardware maintenance. Exhibit IV-8 reveals that almost three-quarters of the vendors interviewed are currently implementing systems software support into hardware support function, while under half the vendors are integrating applications software.

  - Systems software has been more traditionally considered as an integral part of the hardware, thus accounting for the greater number of vendors currently integrating software support.

  - Vendors see that the degree of integration will grow in the next two years.

- NAS has integrated hardware and software support into a single domestic line organization, with management of these functions integrated up to the region level.

  - NAS has found hardware maintenance personnel easier and more willing to cross-train than software personnel. As a result, the mix of the maintenance staff who will be cross-trained will be 90% hardware and 10% software.

- Amdahl's maintenance organization has each field manager in charge of both hardware and software support. Reporting to the field manager are field

EXHIBIT IV-8

LARGE-SYSTEM INTEGRATION OF SOFTWARE SUPPORT INTO HARDWARE SUPPORT FUNCTION

INTEGRATION OF LARGE-SYSTEM SOFTWARE SUPPORT ACTIVITY	PERCENT OF VENDORS IMPLEMENTING	DEGREE OF INTEGRATION (percent)	
		1983	1985
Systems Software	71%	76%	88%
Applications Software	43	100	100
Third-Party Software	14	100	100

engineers and system engineers, 25% of whom are cross-trained in hardware and software maintenance.

- The integration of software support into hardware support is advantageous to vendors for two reasons. Firstly, in order to attain the concept of total service (discussed further in Large-Scale Systems User Requirements, August 1983), the field service organization will need to become proficient in both hardware and software support. Secondly, users are finding that single-source maintenance has become more attractive, as demonstrated in Large-Scale Systems User Requirements.

- In order to simplify the integration process, vendors will need to address certain hincrances. Firstly, cross-training programs will need to acknowledge the different backgrounds of hardware personnel and software personnel. Secondly, standardization of training and the use of diagnostic and repair tools and techniques will have to be devised. Thirdly, customization expertise will need to be developed.

E. VENDOR PERFORMANCE OBJECTIVES VERSUS ACTUALS

- Traditionally, field service performance has been judged by how well they meet previously self-defined objectives of response time, repair time, mean time between failures, and system availability. These objectives obviously take into account user requirements; however, vendors realize that the objectives must be based upon such factors as, for example, resource (both manpower and test equipment) availability and number/type of equipment maintained. This causes a conflict in how vendors and users perceive actual performance.

- In addition, vendors have different definitions of these performance factors. For example, system availability has been defined by some vendors as the ratio:

$$\frac{\text{Scheduled Use}}{\text{Actual Use and Downtime}}$$

- This definition ignores recovery time, an important time-consuming activity: recovery time, caused by system failure. Even though the field service organization has no control over this function, users still see recovery time as an important component of system availability since the system is not available to them during recovery time.

- A more acceptable definition, used by INPUT for the user requirements reports, takes recovery time into account. System availability can be defined as:

$$\frac{\text{Scheduled Use}}{\text{Actual Use + Downtime + Recovery Time}}$$

- Another point of conflict between users and vendors concerning field service performance is the actual start of downtime. Users measure downtime from the moment the equipment goes down, while some vendors consider the time of notification from the user as the starting point of downtime.

- Exhibit IV-9 presents large-system vendor responses for mean time to respond, mean time to repair, mean time between failures, and system availability. Note that vendors feel that they meet their performance objectives for all measurements except for mean time to repair. This is amplified by the large-systems users who reported that they received an average repair time that was significantly higher (3.5 hours to 2.5 hours) than the vendors' objectives and also higher than the actual repair times that the vendors reported (3.0 hours).

- It is interesting to note that the total elapsed "turnaround" time (mean time to respond and mean time to repair) reported as actual performance by the

EXHIBIT IV-9

VENDOR RESPONSES FOR
MEAN TIME TO RESPOND, MEAN TIME TO REPAIR,
MEAN TIME BETWEEN FAILURES, AND SYSTEM AVAILABILITY

SERVICE AREA	VENDOR PERFORMANCE		USER EXPERIENCE ACTUAL
	OBJECTIVE	ACTUAL	
Mean Time to Respond (Hours)	2.2	2.2	1.7
Mean Time to Repair (Hours)	2.5	3.0	3.5
Mean Time Between Failures (Hours)	550.0	540.0	N/A
Availability (Percent)	96.7%	96.1%	96.8%

vendor is identical to the total elapsed turnaround time reported by the users. This can be accounted for by the fact that actual response times experienced by users were much faster than the response times reported by the vendors, thus making up for the slower repair times. This supports two findings presented in Large-Scale Systems User Requirements, August 1983: first, that users are satisfied with the overall responsiveness of their vendors (90% of all large-scale system users received response times equal to or better than they required). Second, that vendors are experiencing a substantial overkill in the area of response time. Field service resources that could be better spent in other service areas are allocated to improving response time - despite the fact that most large-system users are satisfied with vendor performance in this area.

F. HANDLING REMOTE CUSTOMERS

- Selling solutions, rather than technology, has become the focal point in large-scale system vendors' marketing strategies. Vendors have keyed in on achieving customer satisfaction, and the quality of the maintenance service is central to the definition of satisfaction.

- Customer satisfaction in field service centers around what happens when a customer's equipment is down. A remote diagnostic capability helps to achieve a higher level of customer satisfaction by:

  - Allowing for faster and more effective down-time recoveries.

  - Resolving problems associated with multiple vendors.

  - Lowering the overall cost of service.

  - Providing service and support for complex equipment configurations.

- Remote diagnostic capabilities are becoming more important to vendors because of:
  - Growing shortage and expense of qualified field service personnel.
  - Increasing number of dispersed customer installations.
- Vendors realize that designing and implementing remote diagnostic capabilities within their equipment will ultimately result in:
  - Reduced field service costs.
  - Higher field service profits.
  - Increased sales, as customers perceive the added value of having remote diagnostic capability.
- Vendors must show customers that remote diagnostic capabilities will provide:
  - Improved service.
  - Reduced downtime costs.
- In addition to increasing customer satisfaction, remote diagnostic functions improve field engineer productivity.
  - Burroughs, DEC, Honeywell, Data General, Amdahl, Floating Point Systems, Perkin-Elmer, and NAS, are marketing products and systems that incorporate remote diagnostic features.
  - Floating Point Systems has realized as much as a 50% savings in field service manpower as a result of using its remote diagnostic center.

- Amdahl found that 50% of all problems could be solved via remote diagnostics before the FE arrived on site.

- Use of remote diagnostics can shift some of the maintenance burden onto the customer by having him initiate diagnosis before field personnel arrive at the customer's site. This should result in the field engineer having to travel less to the customer's site. Presently, however, vendors are somewhat reluctant to give users responsibility for performing diagnostics, as shown in Exhibit IV-10.

- While the prevalence of remote diagnostics is inevitable, there is some danger inherent in offering it. Less travel to the customer's site by field engineers will lower field service costs, but it will also lessen the amount of direct contact the vendor has with the customer.

- Remote diagnostics will improve system performance but may actually lower overall customer satisfaction, i.e., less vendor visability and hand holding. Vendors realize the importance of customer contact and are devising new approaches for maintaining it. As shown in Exhibit IV-10, vendors still perceive the importance of having on-site field support.

EXHIBIT IV-10

LARGE-SCALE SYSTEMS
VENDOR ATTITUDES TOWARD DIAGNOSTIC SERVICES

	AVERAGE RESPONSE (Scale 1-10: 10 = High)
Field Support via Remote Diagnostics	7.8
Field Support via User Self-diagnostics	3.0
Telephone Field Support	9.3
On-site Field Support	10.0

V MAINTENANCE PRICING

;

V MAINTENANCE PRICING

A. METHODOLOGIES USED

- The main source of revenues for field service organizations continues to be the basic contract for maintenance.

- While there is no straightforward method for establishing the proper price for providing maintenance support for large-scale systems, a combination of factors is used by most vendors.

  - One factor used most frequently by vendors is the percent of the purchase value of the equipment installed. This method is used by Amdahl, Honeywell, and Floating Point Systems. Maintenance charges range from 4-14% of the purchase value of installed equipment.

  - Competition and competitive analysis also play a prominent role in determining an appropriate price for maintenance services. IBM figures prominently in the determination of maintenance prices by some vendors - Honeywell, and Cambex.

  - Costs and profit margins are also factors in the maintenance price calculation:

    . Labor.

  - . Travel.
  - . Depreciation of spare parts.
  - . Burden and overhead.

- The maintenance and service track record can also play a part in determining whether a vendor can change a premium or must offer a discount for service:
  - . Mean time between failures (MTBF).
  - . Mean time to repair.
  - . Mean time to respond.
  - . Time of coverage.
  - . System availability.
  - Some vendors, such as Perkin-Elmer, base service pricing on a combination of all these factors.

- Exhibit V-1 shows the various methods for establishing maintenance pricing.
- Exhibit V-2 shows the maintenance pricing of selected vendors of large mainframes.

EXHIBIT V-1

LARGE-SCALE SYSTEMS

PRICING METHODOLOGY

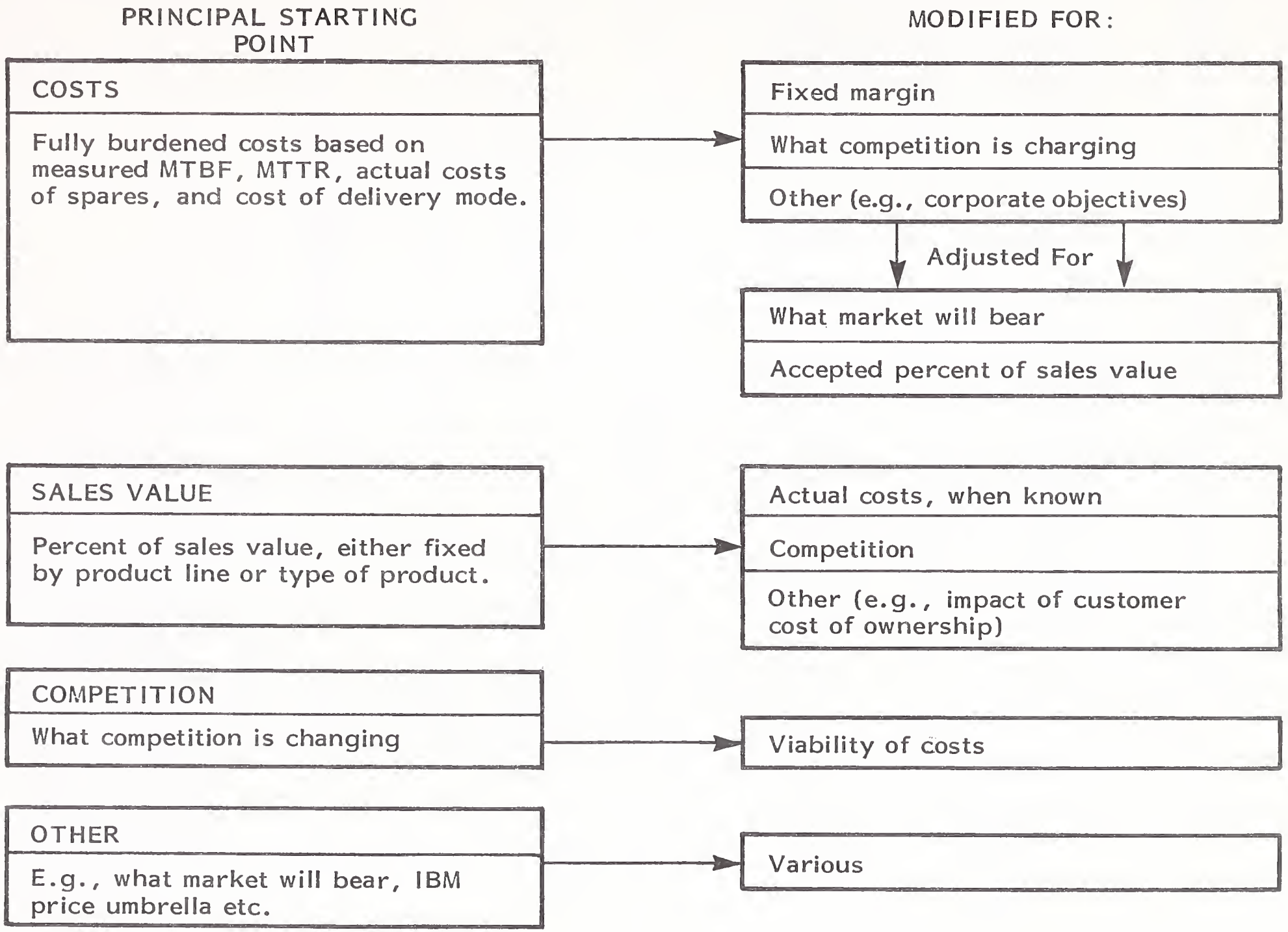


EXHIBIT V-2

MAINTENANCE PRICING OF
SELECTED VENDORS OF LARGE MAINFRAMES

VENDOR	AVERAGE PURCHASE PRICE	AVERAGE MONTHLY MAINTENANCE CHARGE	ANNUAL MAINTENANCE AS PERCENT OF PURCHASE PRICE
Amdahl	$2,525,000	$18,200	8.6%
Burroughs	3,150,000	10,600	4.0
CDC	4,426,800	14,500	3.9
Honeywell	2,054,919	9,400	5.5
IBM	2,229,000	7,800	4.2
IBM	4,520,000	8,961	2.4
NAS	1,995,000	7,662	4.6
UNIVAC	2,293,000	5,931	3.1

B. FREQUENCY OF PRICE CHANGES AND RECENT TRENDS

- As the reliability of large-scale systems has increased, and the price of the hardware has decreased, users have become more resistant to service price increases on standard shift contracts. Price resistance will continue, eventually becoming an expectation of service price decreases that are compatible with continued hardware price decreases and higher system reliability.

- For those vendors who base their maintenance price on either percent of purchase value of installed equipment, or costs and profit margins, maintenance prices are reviewed and changed annually.

- Those vendors who base their maintenance prices on competitive analysis are continuously monitoring the competition and react accordingly.

- Monthly maintenance price increases in 1983 have ranged from 5% to 10%, while basic hourly rates for field engineers have increased 7% to 13%.

- The notice period for price increases ranges from 30 to 90 days.

C. CONTRACT ADMINISTRATION

- The field service organization is becoming a more integral part of the overall corporate operation. As field service takes a more aggressive approach to sales and marketing, and continues to focus on providing customer satisfaction, it has also found itself more involved with administering contract terms and conditions. This is particularly true with respect to exceptions to standard maintenance agreements.

- The field service representative, either engineer or manager, has an intimate knowledge of his customer's equipment and operation and has a unique advantage for evaluating particular service needs. This provides him with the ability to modify standard service contracts to suit the customer's particular needs.

- Contract administration is presently handled by the vendor's sales or contract department. Exhibit V-3 shows the present characteristics of contract administration and what INPUT believes to be the trends that are developing.

  - While contract renewals should continue to be automatic, which generally simplifies paperwork, options should be kept open to modify standard contracts to suit a user's particular needs. This will make the user feel he is being offered special treatment and raise his level of satisfaction. The field service representative is in the best position to do this because of his close contact with the user.

  - Vendors should take advantage of the current preference for long-term contracts by customers. These provide a guaranteed stream of revenues.

  - Because of the field service representative's ongoing contact with the customer, INPUT believes that the responsibility for contract renewal, negotiation and administration should be shifted from the sales or contract department to the field service organization. At the minimum, the field service organization should play an active role in this function.

EXHIBIT V-3

LARGE-SCALE SYSTEMS
CONTRACT ADMINISTRATION

	PRESENT	FUTURE
Renewal	Automatic	Automatic
Contract Length	One Year	Multi-year
Invoice Cycle	Monthly	Monthly
Responsibility		
Negotiation	Contract Department	Field Service
Renewal	Contract Department	Field Service
Administration	Contract Department	Field Service

D. INVOICING AND COLLECTION

- A majority of vendors maintain a monthly invoice cycle. This is likely to continue in the future. Over 60% of large-system users interviewed opposed annual invoicing. This is due to unfavorable cash flow implications and the interest lost when bills are paid in advance of service rendered.

- Although invoicing disputes are the responsibility of administration (whether or not under the direction of the vice-president of customer services), they directly affect the image of the field service organization. The site engineer is also frequently involved in relaying the customer's point of view back to the vendor, although the engineer is almost always powerless to affect the outcome.

- Since invoicing disputes directly reflect the field service image, the field service organization should become more involved in their resolution, as part of overall contract administration and customer satisfaction.

E. PREMIUMS RELATED TO PERFORMANCE GUARANTEES

- Large-scale system users are becoming reluctant to accept increases on standard maintenance contracts. In fact, they have become expectant of service price decreases with continued high system reliability.

- Field service organizations must find revenues that offset this potential drop in basic contract revenues and maintain service revenue growth.

- One area that offers the potential for new revenues is that of extended services carrying premium prices, as shown in Exhibit V-4.

EXHIBIT V-4

LARGE-SCALE SYSTEMS
USER REQUIREMENTS FOR EXTENDED SERVICES AND
ATTITUDES TOWARD PREMIUMS

EXTENDED SERVICE	USERS RESPONDING YES TO REQUIREMENT		REASONABLE PREMIUM AS PERCENTAGE OF BASIC CHARGE FOR MAINTENANCE (percent)
	NUMBER	PERCENTAGE OF USERS	AVERAGE
Standby Coverage During Critical Periods	140	43.2%	8.8%
Guaranteed Uptime	113	34.9	10.8
Guaranteed Response Time	176	54.3	4.0
On-Site Spare Parts	183	56.5	2.8
Remote Diagnostics	154	47.5	3.1
Preventive Maintenance and Engineering Changes During Off-Prime Hours	229	70.7	3.2
Occasional Shift Coverage Versus Fixed Schedule	102	31.5	4.0
Full-Time, On-Site Service Engineer	99	30.6	2.6
Guaranteed Repair Time (Hardware)	94	29.0	9.8
Guaranteed Turnaround on Software Problems	65	20.1	4.6

- Principal among these (in premium value) is guaranteed uptime, for which users were willing to pay a substantial premium (over 10% of basic maintenance charge). This acts like a bonus scheme in reverse: if the system does not provide uptime equivalent to a guaranteed minimum, the user pays nothing; if the minimum is exceeded, the vendor is rewarded with a bonus (the premium).

- Companies currently offering such uptime guarantees include Digital Equipment Corporation and Data General Corporation.

  - DEC offers graduated levels of guaranteed uptime from 96-99% but charges no additional premiums. The guarantees are not limited to new product lines, as long as existing equipment passes through a reliability model measuring such factors as MTBF. In addition, all machines under guaranteed uptime provisions must also participate in remote diagnostics and error analysis programs.

  - Data General introduced guaranteed uptime provisions for 32-bit machines. From a base of 96% uptime guaranteed with no premium, DG offers extended uptime guarantee levels with a 10% premium attached. In addition, DG requires increased coverages with each increased level of guaranteed uptime.

- Other less-direct versions of this idea were less appealing to users.

  - Guaranteed response time is attractive to users, but there is little value added (average premium of 4%).

  - Guaranteed repair time was less attractive (29% had this requirement), but the premium users were willing to pay is high (over 9%).

- Standby coverage during critical periods was another popular item in terms of demand. (Over 40% of the large-scale users interviewed responded in the affirmative even when there was a substantial premium attached.)

- A confirmation of the attractiveness of remote diagnostics was obtained, but users were willing to pay only a small premium for it (just over 3%). Users see remote diagnostics as a productivity tool for the vendor, not as an added benefit to themselves.

- One surprising response was the overwhelming proportion of users that would consider paying a small premium to have preventive maintenance and engineering changes accomplished during non-prime hours.

- On-site spares are attractive, but the average user has no desire to purchase them. However, the user is willing to pay a premium over the normal monthly maintenance charge to offset the vendor's cost (tying up money in idle inventory).

- The answer to the question, "How much of a premium will users pay for each of the extended service options," indicates how quickly user acceptance falls off as the amount rises. In this manner the optimum revenue level can be approximately determined.

- Exhibit V-5 shows the percentage of users that will accept payment of successively higher levels of premium. For example, with standby coverage during critical periods:

  - 52.9% of users agree that this is worth paying for.

  - 32.1% agree to pay at least a 5% premium.

  - 17.9% agree to pay at least a 15% premium.

- By multiplying the minimum premium by the percentage of users agreeing to pay that level of increase, the optimum increase is obtained. Simultaneously, one obtains the percentage increase that can be expected over normal month-

EXHIBIT V-5

LARGE-SCALE SYSTEMS
CUMULATIVE DISTRIBUTION OF REASONABLE
PREMIUMS FOR EXTENDED SERVICES

EXTENDED SERVICE	PERCENTAGE OF USERS REQUIRING EXTENDED SERVICE WHO WILL PAY PREMIUM OVER BASIC MAINTENANCE CHARGE									
	PREMIUM GROUPS									
	>0%	>5%	>10%	>15%	>20%	>25%	>30%	>40%	>50%	>75%
Standby Coverage During Critical Periods	52.9%	32.1%	19.3%	17.9%	12.1%	8.6%	6.4%	5.0%	2.1%	2.1%
Guaranteed Uptime	54.9	32.7	21.2	15.9	10.6	8.8	7.1	7.1	5.3	5.3
Guaranteed Response Time	39.8	21.6	8.0	5.7	2.8	1.7	1.1	0.6	0.6	0.6
On Site Spare Parts	30.1	14.2	7.1	6.0	2.2	1.1	-	-	-	-
Remote Diagnostics	29.2	14.3	7.1	5.8	3.2	2.6	0.6	0.6	-	-
PM and Engineering Changes Installed Off-Prime Shift	34.5	15.7	3.9	2.2	1.7	1.3	1.3	0.9	0.9	0.9
Occasional Shift Coverage Versus Fixed Schedule	46.1	21.6	8.8	4.9	3.9	2.9	2.9	-	-	-
Full-Time, On-Site Service Engineer	29.3	13.1	5.1	5.1	2.0	1.0	1.0	1.0	-	-
Guaranteed Repair Time (Hardware)	48.9	27.7	20.2	16.0	10.6	7.4	6.4	6.4	5.3	5.3
Guaranteed Turnaround on Software Problems	53.8	23.1	7.7	6.2	3.1	3.1	3.1	3.1	-	-

ly maintenance charge revenue. In this example 15% is the optimum level of premium, yielding a 2.7% increase in overall monthly maintenance charge revenue.

- A 15% premium seems to be a psychologically acceptable premium level for the desirable extended services; two other services have this same optimum level of premium.

  - Guaranteed uptime.

  - Guaranteed repair time.

- A desirable extended service option has another characteristic: despite rapidly escalating premiums (up to and in excess of 75% above the monthly maintenance charge) there always remains a small group of users that refuses to be put off. Five such examples are shown in Exhibit IV-4.

- Vendors have reported varied acceptance of uptime guarantees from users. However, vendors do see such offerings as a boon to new equipment sales, as potential buyers see these guarantees as an indication that vendors believe in their equipment.

F. SERVICE-RELATED PRICE ELASTICITY

- Very few service vendors carry out regular reviews of the service price elasticity of their product lines. This is a standard business technique applied broadly in many other industries and has a value for every service manager who seeks to optimize his service revenue.

- The usual approach is to establish a relationship between service pricing and the potential revenue gain or loss (i.e., according to the impact on the user

base). The main assumption is that all data elements (e.g., service characteristics such as service quality, service contract options, etc.) remain constant. This is why it is necessary to review constantly the price/demand curves as the data elements are modified.

- The slope of the price/demand curve for large-scale systems is relatively flat, as shown in Exhibit V-6, because the number of customers to be gained by a price decrease is minimal (IBM excepted). Equally, the number of customers that would be lost is quite small for substantial price increases (e.g., 1.9% loss for a 20% increase).

- The curve for per-call business (as opposed to contract services) is far steeper. This is mainly because the labor content is far more visible in per-call business. Since this is the main item that changes, it becomes visible very quickly.

- The upper level of the price/demand curve in Exhibit V-6 is the only area that need occupy large-systems field service managers. They should constantly be thinking of ways of moving into this quadrant while avoiding customer losses. This move can be achieved in several ways:

  - Contractually.

  - Improved service that offsets the price increases.

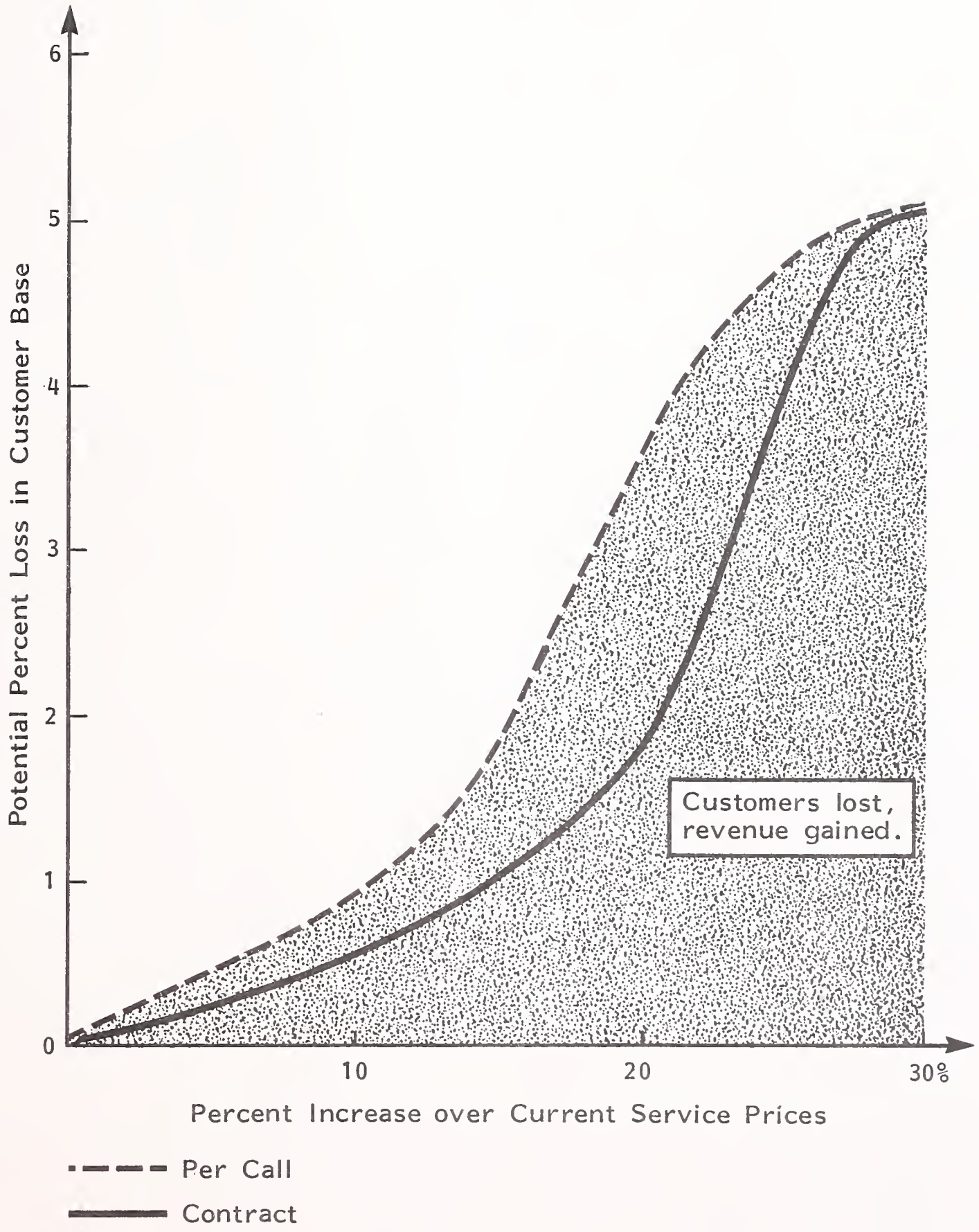
  - Decreasing the ability of alternative vendors (e.g., by making spares more difficult to obtain).

    . Univac, for example, maintains only one central location for TPMs to buy spares.

    . CDC offers off-line diagnostics to customers only, not to TPMs.

EXHIBIT V-6

LARGE-SYSTEMS PRICE/DEMAND CURVE



VI LARGE-SYSTEM VENDOR CASE STUDIES

VI LARGE-SYSTEM VENDOR CASE STUDIES

A. INTERNATIONAL BUSINESS MACHINES, INC.

- By far the largest vendor of computer equipment, with total worldwide sales of over $34 billion for fiscal year 1982 and a total of 364,796 worldwide employees, IBM increased its field service revenues by an estimated 21% in 1982.

- Its 1982 U.S. field service revenues have been estimated at $3.8 billion dollars which, if treated as a separate corporation, would make IBM Field Service the 98th largest U.S. company.

- IBM divides responsibility for field service into two separate divisions, both with headquarters in Franklin Lakes, New Jersey. The field engineering division is responsible for maintenance and support of all intermediate and large systems, while the customer service division is responsible for smaller systems, telecommunications equipment, and office products.

- IBM's share of the large-systems market is 45% - by far the largest segment of that market.

- In the area of large-systems support, IBM was responsible for the advancement of built-in diagnostics, remote support, field service communications, improved field engineer training, and automated spare parts storage and

distribution centers. Due to the very size of their operations, IBM found it necessary to develop these field service areas in order to provide quality service for its market and to move towards the development of P/L control at the field service level.

- IBM has been very active in improving out-of-class education tools for the training of its field service staff. Using computer-based training programs, along with videodiscs, film strips, audio cassettes, and written materials, students are put through self-paced instruction that includes both classroom and hands-on training. This achieves two major goals for IBM: first, it ensures that IBM field service personnel stay up-to-date on all current and future service techniques; second, it reduces the strain on training facilities caused by the dramatic increase in demand for qualified field service personnel.

- Another area where IBM succeeds in satisfying their large-system users requirements is in the area of spare parts availability. IBM instituted an automated central parts and publications storage and distribution center which handles 2.5 million parts and 24 million publication requests annually. The entire storage and distribution is controlled and monitored by computer, which keeps track of inventory location and movement. IBM has found that it can drastically reduce inventory space needed while providing better access to, and control of, spares.

B. HONEYWELL, INC.

- With a 12% share of the large-systems market, Honeywell qualifies as the second largest large-system vendor.

- Honeywell's customer service division, with over 4,000 employees and estimated U.S. field service revenues of $217 million, operates as an arm of Honeywell Information Systems.

- Major emphasis of Honeywell service activites lies in the development of improved communication between user and vendor and the further use of remote- and user-self-diagnostics on all systems.

- Communication is improved through the use of customer service account representatives who are assigned to each customer. Each service representative is trained specifically on the users systems, and oversees or performs all maintenance on that machine. In addition, each customer service representative is supported by technical specialists at technical assistance centers (to which users can also have access). The goal of the CSAR system is for the field engineer either to take personal responsibility for the majority of users' needs, or, if not able to provide the actual repairs, at least to keep in touch with the service being provided. Honeywell encourages CSARs to keep in constant touch with users.

- Honeywell has been committed to the user of remote diagnostics in their large-systems machines. Remote diagnostics are initiated by technical assistance centers, indicating the failed subassembly (defined as an optimum replaceable unit, or ORU), the replacement need, possible circumventions, and the tool necessary to make the exchange.

- Another way in which Honeywell is attempting to improve user satisfaction is the use of mobile vans with limited-parts inventories, an attempt to reduce downtime by having certain high failure rate parts with the FE at all times.

- Honeywell incorporates the current trend towards increased customer involvement in the maintenance process under its Customer Assisted Maintenance Program (CAMP). Recognizing the costs of maintaining multiple sites, Honeywell allows customers with this program access to TAC consulting, diagnostics analysis, and any other assistance, yet the customer can perform a number of routine maintenance functions, including exchange of failed customer replaceable units (CRUs).

C. DIGITAL EQUIPMENT CORPORATION

- DEC manufactures a wide range of computer equipment, ranging from microcomputers such as the DEC Rainbow up to large mainframes such as the DEC System-20.

- By July 2, 1983, DEC employed a total of 73,000 persons, with an estimated field service total of 15,000 employees.

- Total company revenues for fiscal year ending July 2, 1983 were just under $4.3 billion worldwide (of which $2.8 billion were from the U.S.). This was an increase of 10.1% over fiscal year 1982 revenues.

- Worldwide field service revenues for fiscal year 1983 were $1 billion, an increase of 29.3% over fiscal year 1982. Of that total, U.S. field service revenues were approximately $640 million dollars, a 29% increase over 1982 U.S. revenues of $496 million.

- DEC is the only large-systems vendor to have offered guaranteed uptime on their equipment. To be eligible, customer must sign up for remote diagnostics, environmental and physical site planning, and the appropriate error analysis and logging program. Users can choose from four specified system uptime percentages - 96%, 97%, 98%, or 99%, with no additional charge for the guarantees. To receive the 96% uptime guarantee, the customer need only meet the basic requirements already listed. To receive the increased uptime guarantees, the customer need only increase the amount of service coverage.

- Another service option made available by DEC is user self maintenance. DEC provides documentation, maintenance aids, spares inventory guidance, field charges, repair instruction, and other back-up support for customers who feel that they need to provide their own maintenance.

- DEC has also announced that they will provide maintenance on certain non-DEC products incorporated into DEC systems. At the present time, DEC will provide installation, warranty, and maintenance service on certain printers, disks, tape drives, controllers, and communication devices, from vendors such as Printronix, Inc., Control Data Corporation, Emulex, and Able Computer Inc., among others. This move was in response to customer requests for a more coordinated service effort. DEC stresses, however, that DEC is not endorsing the purchase and use of competitive products, nor will DEC become a service agent for competitors.

D. AMDAHL CORPORATION

- With overall worldwide revenues of $462 million, Amdahl is considered to be the largest plug-compatible mainframe vendor.

- Field services is handled by the Amdahl Product Support and Services Arm, which consists of over 1,000 employees and has estimated worldwide revenues of $130 million, $78 million of which is derived from the U.S.

- Amdahl provides large-systems users 24-hour access to remote diagnostics through the Amdahl Diagnostic Assistance Center (AMDAC). Amdahl estimates that one-half of all service problems can be solved before a FE arrives on site. Remote diagnostics are expected to be used for monitoring and sampling on a continual basis in order to identify a buildup of recoverable faults.

- Another key issue to Amdahl is the maintenance of competitive products. Although Amdahl is not a full-system supplier, Amdahl has attempted to address the service needs of its mixed-shop customers by adopting a "no-fault" philosophy. Amdahl FEs will assist users in determining fault location, and, in

the case of a few OEM vendors such as T-Bar and Data Switch, will actually perform service. In addition, Amdahl is exploring the coordination of service communication and network systems in which Amdahl products are used.

- Amdahl is also addressing the need for integration of software and hardware support. Over 25% of the support personnel are cross-trained, and education/ training is offered to all support personnel.

- Amdahl has addressed the need for better local spare parts inventories by signing a unique agreement with Burlington Northern Freight that has the freight company stock expensive lower-usage parts at airfreight depot at 20 airports in the U.S. These parts can then be delivered to any location in the service area within two hours.

VII RECOMMENDATIONS

VII RECOMMENDATIONS

A. USER REQUIREMENTS: GUIDE TO EXTENDED SERVICES

- Large-systems users are difficult to please. Compared to the other categories of users (office products, small business systems, etc.), they have a far greater level of knowledge about the hardware and software products provided by both their vendors and the competition. In addition their data processing requirements are more critical and affect their company's business to a far greater degree when failures occur.

- As a result it is not possible for the large-system vendor to think in terms of the average user in his base: the base is heterogeneous, not homogeneous. The best compromise that can be achieved when attempting to respond to users' requirements is to try to group users by their service needs, e.g.:

  - Those who require less than half an hour's response time.

  - Those who expect a 99.5% system availability to be guaranteed.

  - Those who accept the usefulness of remote diagnostics.

  - Those who demand on-site, three-shift coverage, etc., and provide standard contract extensions that offer the requisite guarantees in exchange for higher service charges.

- Some of the extended services that the user may find attractive may not be acceptable to the vendor, either because it is against policy to offer such a service (e.g., IBM's unwillingness to offer single-source maintenance) or because the user is not willing to pay the premium that would make the service extension a viable business proposition. In all of the analyses of the user requirements, the vendor should bear in mind that while user needs are useful guidelines, they are not obligations.

- Exhibit VII-1 shows the user reaction to some of the contract options proposed by INPUT. Each option was evaluated by the users in terms of the percentage of the monthly maintenance charge (MMC) that they say they would agree to pay. (In INPUT's experience the threshold of user resistance to cost tends to be at twice the level that they say they would agree to pay).

- Some of these services may not make sense even though a high percentage of users find them attractive. For example, in order to provide off-prime installation of ECOs or PM (71% acceptance), vendors would have to pay the service engineers overtime. This cost does not appear compatible with a premium of only 3-6% of the monthly maintenance charge.

- Each vendor needs to know his users' special requirements and use these as a guideline to the structuring of new service options that make good business sense.

B. ACCOUNT CONTROL THROUGH SINGLE-SOURCE MAINTENANCE

- The use of single-source maintenance contracts provides a strategic advantage in the fight for large-scale system account control: many large-scale sites are multiple vendor sites and customers generally find the approach appealing (this depends on the vendor, as shown in Exhibit VII-2).

EXHIBIT VII-1

LARGE-SYSTEMS MAINTENANCE
CONTRACT OPTIONS - ALL VENDORS

OPTION	PERCENT OF USERS	PREMIUM (Percent MMC)
Standby Coverage	43%	9%
Guaranteed Uptime	35	11
Guaranteed Response Time	54	4
Remote Diagnostics	48	3
PM/ECO in Off-prime	71	3
Occasional Shift	32	4
Guaranteed Hardware Repair Time	29	10

EXHIBIT VII-2

IMPORTANCE OF SINGLE-SOURCE MAINTENANCE TO USERS

LARGE SYSTEM VENDOR	MEAN (1-10)
Amdahl	4.74
Burroughs	7.36
CDC	6.92
Cray	7.60
DEC	6.77
Data General	8.29
Honeywell	8.30
IBM	6.21
NAS	6.43
Perkin-Elmer	6.90
Tandem	5.70
Univac	7.32

- The advantage provided is that, irrespective of the immediate third-party maintenance service intentions of the vendor, the option to move into that business is left open until events show that such an option is viable (e.g., product installation density, revenue base growth, etc.). If another vendor has made that move, no such options exist because the only user service contract is with another vendor.

- The other advantages that single-source maintenance offers are shown in Exhibit VII-3 and include:

  - Additional revenue (even if the foreign product service is only brokered, a 10% surcharge is usually levied).

  - Elimination of competitive service vendors.

  - Customer satisfaction.

  - Account control (above all).

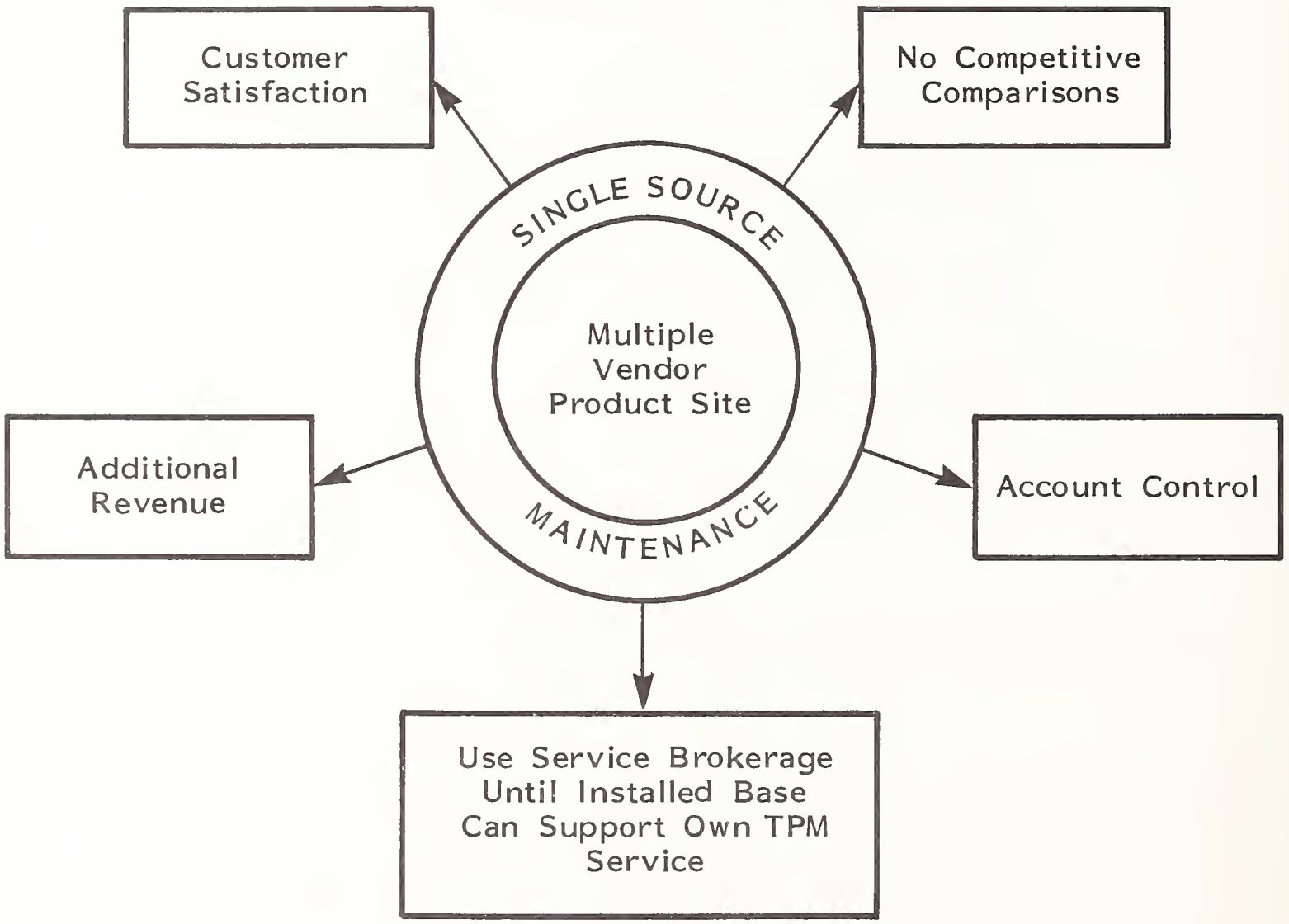
C. SYSTEM AVAILABILITY GOAL SETTING

- One useful tool for developing an understanding of each user's service requirements is the use of goal setting. This is a widespread practice in most aspects of today's business environment but one that vendors appear reluctant to implement with their user base. It should be made clear that the goals, once set, are not a contractual obligation between the vendor and the user, but a goal that each will strive to meet.

- The formulation of these goals must entail specific performance goals in terms that the user and vendor agree on. In this context it should be noted

EXHIBIT VII-3

ADVANTAGES OF SINGLE-SOURCE MAINTENANCE



that the user often has a different definition of such service measurements as "repair time." (Users often refer to repair time as the time between failure onset and the system coming up; vendors carefully divide this period into response time and repair time and sometimes eliminate from repair time the time needed to obtain a part).

- Perhaps the best goal, that users and vendors can readily agree on, is system availability (or scheduled use divided by total of actual use, downtime and recovery time). This essentially puts a value on the question, "What do I, as a user, want my system to do for me?" The attraction of having a user formulate (and periodically restate) such a goal is that it is far easier for the vendor to design a service contract that targets the user's need, including special options (at a premium) that complement standard service contract provisions.

- The other benefit of such an activity is that it provides a forum for regular discussion between the user and the vendor on the performance of the system, level of user dissatisfaction, need for improvements, etc. Much of this dialogue is currently lost because there is no opportunity for the user to express his needs.

D. REVISED MARKET SEGMENTATION

- It is customary for vendor organizations to segment their target markets according to some classical divisions:

  - Industry sector (e.g., banking, transportation, insurance, etc.).

  - Company size (e.g., Fortune 1000 companies).

  - Product market (e.g., minicomputers, small business systems).

- Model (e.g., IBM 3081 market).

- When organizing market planning for field service it may make sense to consider a new set of market segments, e.g.:

  - Data dependence: where users are heavily dependent on the accuracy and/or timeliness of the data processed by a given machine, there is a tendency to concentrate more on the system's performance, rather than the cost of service. Requiring service products that meet these performance goals is worthwhile since this will be a high revenue opportunity area.

  - Visible-need maintenance products: these are products for which the user has a clear understanding of the need for maintenance (e.g., printers); high use, high performance devices obviously need continuous monitoring and ongoing service to ensure maximum use (particularly since the accuracy of their output is essential to many applications).

  - Low failure/low dependency products: these are services which can fail without significant impact on the system's performance (e.g., a single terminal); service to these devices can be accomplished off-line, via the temporary use of replacement terminals or bases. Service rates must be competitive for these devices. In general the idea is to isolate markets worth spending extra effort and contract design time on, since the payback can be well worth the effort.

E. POSTSALES SUPPORT

- The benefits to be obtained from concentrating postsales support responsibilities within the field service organization may appear to be a revolutionary step. In actual fact it is nothing more than the extension of the concentration

of service already begun with the integration of systems software support with the hardware maintenance function.

- The user benefits in that all of his requirements, needs, comments, and criticisms are channeled to the vendor through a single conduit: the FE (or perhaps more properly the customer service representative).

- The benefits to the company are the increased visibility in gains of its user base and the improved productivity of its sales and service personnel, each of which now has clearly defined responsibilities.

- The drawback of such an approach is the (natural) reluctance with which marketing will have to relinguish account control. This will mean that the move to total service will be a long and sometimes painful step, but one that appears to be inevitable in the long run.

- Finally, vendors can improve support service before the product ever gets to the end user, by having increased field service involvement in product and documentation design, development, and production. Considering the reported lack of field service management influence in these important processes, one might conclude that vendors are more concerned with the initial product shipment schedule than with the necessary quality control measures essential for maintenance/service support. Field service, with continued contact with end users, can see first-hand problems caused by poor product design or by unclear documentation. Increased field service involvement in these areas will result in improved MTBF, fewer calls per year, lower travel expenses, fewer no-fault-found calls, increased user satisfaction, and, consequently, more revenues.

APPENDIX: QUESTIONNAIRE

A. General Management

1. Please check all of the direct services you currently offer or plan to offer in the near future.

DIRECT SERVICE OFFERED	1983	BY 1985	BY 1987
a) Third-party maintenance			
b) Facility maintenance management			
c) Guaranteed availability (uptime)			
d) Guaranteed response time			
e) Guaranteed repair time (hardware)			
f) On-site standby			
g) Variable shift coverage (versus fixed schedules)			
h) On-site spares			
i) Guaranteed turnaround on software repairs			
j) Remote diagnostics			
k) Preventive maintenance and field changes during nonprime hours			
l) System software maintenance			
m) Application software maintenance			
n) Depot maintenance (pickup)			
o) Depot maintenance (carry/mail)			
p) Local area network maintenance			

2. Please check the ancillary services your field service organization offers or plans to offer in the near future. Also, for those services you currently provide, please indicate the level of quality you believe that your users would give you. (Scale of 1-10: 10 = excellent, 5 = average, 1 = very poor.)

ANCILLARY SERVICES OFFERED	BY 1985	BY 1987	1983	ON A SCALE OF 1-10, USERS WOULD RATE YOU
a) Environmental planning				
b) Physical site planning (layouts)				
c) Consulting services (hardware)				
d) Consulting services (software)				
e) Customer training				
f) Installation management and coordination				
g) Supplies sales				
h) Add-on sales (additional equipment)				
i) Upgrade sales (new equipment or features)				
j) Site audits				
k) Facility relocation				
l) De-installation				
m) Software sales				
n) Ancillary equipment sales and service				

3. How do you rate your field service organization in the following categories, and how do you believe your users would rate you in the same categories? (Scale 1-10: 10 = excellent, 5 = average, 1 = very poor.)

CATEGORIES RATED: (service over the past 12 months)	RATING (1-10)	
	SELF RATING	EXPECTED USER RATING
a) Management's communication with users		
b) Hardware service engineer's communication		
c) Software service engineer's communication		
d) Ability to diagnose hardware problems and to make quality repairs		
e) Ability to maintain software		
f) General responsiveness of the organization to user requirements		
g) Overall service image		
h) Taking initiative to improve user operations		
i) Resolution of invoicing disputes		
j) Dispatching trouble calls		
k) Escalation procedures during extended outages		

4. Please either respond to the following questions or provide us with a functional organization chart (space is provided on the reverse side of this page for your sketch if that is more convenient for you).

FUNCTION	(√) IF NOT FS	TITLE	REPORTS TO (title/function)
a) Top-level field service executive	____	____	____
b) Top-level domestic line executive	____	____	____
c) Top international line executive	____	____	____
d) Field support, general	____	____	____
e) Field support, hardware	____	____	____
f) Field support, software	____	____	____
g) Financial operations	____	____	____
h) Administration	____	____	____
i) Logistics	____	____	____
j) Operations analysis	____	____	____
k) Education	____	____	____
l) Personnel	____	____	____
m) Field service marketing	____	____	____
n) Engineering liaison	____	____	____
o) OEM liaison	____	____	____
p) Legal	____	____	____
q) Other ____	____	____	____
r) Other ____	____	____	____

5. Lower level management and employees are encouraged by some companies to participate in the following activities. Please check those that apply now and in the near future for your company. (Enc. = Encouraged, Mand. = Mandatory.)

ACTIVITIES	1983		1985		1987	
	ENC.	MAND.	ENC.	MAND.	ENC.	MAND.
a) Making good-will calls on users	____	____	____	____	____	____
b) Selling maintenance contracts	____	____	____	____	____	____
c) Accompanying sales personnel on sales calls	____	____	____	____	____	____
d) Attending sales meetings	____	____	____	____	____	____
e) Furthering formal education	____	____	____	____	____	____
f) Making public appearances	____	____	____	____	____	____
g) Joining organizations such as AFSM, Jaycees, etc.	____	____	____	____	____	____
h) Reading trade journals	____	____	____	____	____	____
i) Other ____	____	____	____	____	____	____
j) Other ____	____	____	____	____	____	____
k) Other ____	____	____	____	____	____	____

B. Field Support/Product Support

1. Please rate the trends of the influence of your field service management in the following company activities relative to small systems. (Scale of 1-10: 10 = excellent, 5 = average, 1 = very poor.)

ACTIVITIES	RATING (1-10)		
	1982	1983	EXPECTED 1984
a) Product specification	_____	_____	_____
b) Product design	_____	_____	_____
c) Serviceability design	_____	_____	_____
d) Documentation	_____	_____	_____
e) Diagnostic development	_____	_____	_____
f) Selection of test equipment	_____	_____	_____
g) Spares requirements	_____	_____	_____
h) Geographic control of sales	_____	_____	_____
i) Exceptions to standard maintenance agreements	_____	_____	_____
j) Product performance objectives	_____	_____	_____
k) Quality control in manufacturing	_____	_____	_____
l) OEM acceptance criteria	_____	_____	_____
m) Customer education	_____	_____	_____

2. Please indicate the level that small system software support has been or will be integrated into the hardware support structure. (0% = no field service responsibility, 100% = fully integrated responsibility.)

SOFTWARE SUPPORT ACTIVITY	PERCENT INTEGRATED			
	1982	1983	1985	1987
a) System control programs at headquarters support level	____%	____%	____%	____%
b) System control programs in the field	____	____	____	____
c) Compilers and system utilities at headquarters	____	____	____	____
d) Compilers and system utilities in the field	____	____	____	____
e) Applications software developed, sold, or distributed by your company - headquarters support	____	____	____	____
f) Applications (as in "e" above) in the field	____	____	____	____
g) Maintenance of third-party software, including user's, at headquarters level	____	____	____	____
h) Maintenance of third-party software in the field	____	____	____	____

3. Please describe your field support or support center structure as it relates to:

a) User support requirements when users are involved via remote diagnostics.

b) User support requirements when users are assisted through preliminary stages of problem determination.

3. (Continued)

   c) Support of on-site field personnel via telephone and/or remote diagnostics.

   _____

   _____

   _____

   _____

   _____

   d) Physical, on-site support to field personnel (please discuss criteria):

   _____

   _____

   _____

   _____

   _____

4. Please provide the objectives and actuals in product performance for the most active small systems serviced by your organization.

MODEL NUMBER OR NAME OF MAINFRAMES	MEAN TIME TO REPAIR (hours)		MEAN TIME BETWEEN FAILURES (hours)		AVERAGE AVAILABILITY (percent)		MEAN TIME TO RESPOND (hours)	
	OBJ.	ACT.	OBJ.	ACT.	OBJ.	ACT.	OBJ.	ACT.
a) _____								
_____	____	____	____	____	____	____	____	____
b) _____								
_____	____	____	____	____	____	____	____	____
c) _____								
_____	____	____	____	____	____	____	____	____
d) _____								
_____	____	____	____	____	____	____	____	____
e) _____								
_____	____	____	____	____	____	____	____	____

5. Please check the following items that apply in your field support organization (even if applicable to only one product currently serviced in the field). If not presently implemented, please indicate year scheduled.

	CURRENTLY IMPLEMENTED? YES/NO	YEAR SCHEDULED
a) Remote diagnostics	_____	_____
b) Centralized dispatching	_____	_____
c) Modular, plug-in units for user to deliver to repair centers	_____	_____
d) Real-time incident reporting	_____	_____
e) Real-time IR (parts usage included)	_____	_____
f) Signature analysis (field)	_____	_____
g) Regional repair centers	_____	_____
h) Third-party repair centers	_____	_____
i) Third-party on-site maintenance	_____	_____
j) User support centers	_____	_____

6. a) What has been the trend in your capital investment in small system spare parts inventories for the years indicated below? Please respond by percentage of gross service revenues derived from support of small systems.

YEAR OF MEASUREMENT	PERCENT OF GROSS SERVICE REVENUES FOR YEAR
1981	_____ %
1982	_____ %
1983 (most recent inventory)	_____ %
1984 (projected)	_____ %
1985 (projected)	_____ %

b) To what most significant factors do you contribute the changes, i.e., growth of installed base, regional spares depots, regional repair centers, reliability of new products, etc.?

Comment: _____

_____

_____

_____

_____

7. a) Have you announced or have you set a policy on the maintenance and support of local area networks serving competitive products? Yes/No_____

b) If yes, please comment on your position.

_____

_____

_____

_____

_____

_____

c) If no, do you have any general comment on the subject of local area networks without making a policy statement?

_____

_____

_____

_____

_____

_____

_____

C. Financial/Administrative Operations

1. How do you measure changes in field service productivity when measuring the effectiveness of changes in operating methods or investment in capital improvements?

MEASUREMENT METHOD:	YES/NO
a) Ratio of gross revenue carried per field service person per month	_____
b) Ratio of personnel to equipment by category of equipment	_____
c) Ratio of personnel to management	_____
d) Net ratio of expenses to revenue after cost of improvement	_____
e) Other_____	_____
_____	_____
_____	_____

2. What levels of productivity have you realized in servicing small systems for the following? (Please classify measurement using a-e in question 1 above.)

IMPROVEMENT	MEASUREMENT METHOD (a-e)	PRODUCTIVITY IMPROVEMENT (percent)
a) Remote diagnostics	_____	_____
b) Repair centers	_____	_____
c) Regional parts depots	_____	_____
d) Centralized dispatch	_____	_____
e) Support centers	_____	_____
f) Field education	_____	_____
g) Cross training	_____	_____
h) Multiple territory assignments	_____	_____
i) Other_____	_____	_____
_____	_____	_____
_____	_____	_____

3. Please indicate the percentage of total operating revenues credited to the field service division coming from the following categories. (If fiscal is different from calendar, please supply FY dates.)

SOURCE OF REVENUE CREDITS	PERCENT OF TOTAL REVENUE		
	1982	1983	1984
a) Equipment warranty credits	%	%	%
b) Basic period contracts for maintenance			
c) Extra shift premium			
d) Time and material (labor)			
e) Time and material (parts)			
f) Third-party contracts			
g) Installation charges			
h) De-installation charges			
i) Technical consulting			
j) Management consulting			
k) Parts repairs			
l) Parts sales			
m) Supplies sales			
n) Sales of ancillary equipment			
o) Maintenance of ancillary equipment			
p) Sales of software products			
q) Maintenance of software products			
r) Revenues from other divisions			
s) Other _____			
t) Other _____			
u) Other _____			

4. Please indicate the percentage of total field service division expenses in the following categories (and supply FY dates if different from calendar year).

EXPENSE LINE ITEM	PERCENT OF TOTAL EXPENSES [use ( ) to indicate credit]		
	1982	1983	1984
a) Basic direct labor, wages, salaries			
b) Direct labor overtime shift premiums and standby pay			
c) Support personnel salaries			
d) Management and administrative salaries and premiums			
e) Benefits programs			
f) Net parts usage			
g) Inventory variances			
h) Depreciation			
i) Travel (includes auto leases)			
j) Relocation			
k) Education			
l) Equipment rental/lease			
m) Office, warehouse space			
n) Communications			
o) Interdivisional transfers			
p) Logistics, repair depot, and other expenses not reported above			
q) Corporate general and administrative allocation (overhead)			
r) Other significant categories			

5. Please check any of the following interdivisional transfers of revenues and expenses between your field service division and other departments, and indicate whether they are treated as revenue or expense items by checking the appropriate columns. (Check all columns that apply.)

INTERDIVISIONAL TRANSFERS OF ITEMS	REVENUE (FE)		EXPENSE (FE)	
	CREDIT (✓)	DEBIT (✓)	CREDIT (✓)	DEBIT (✓)
a) Warranty of equipment				
b) Spare parts used during warranty				
c) Direct labor during warranty				
d) Sales assistance				
e) Maintenance sales commissions				
f) Manufacturing assistance				
g) Engineering assistance				
h) Extended warranties				
i) Nonstandard contract terms, e.g., on-site engineers				
j) Defective spare parts				
k) Sales changes to equipment				
l) Saftey changes				
m) Engineering changes				
n) Other _____				
_____				
_____				

6. Please supply the figures as indicated for your overall financial performance (indicate fiscal year if different from calendar year).

FINANCIAL PERFORMANCE	FISCAL YEAR END _____			
	1982	1983	1984	1987
a) Field service revenue ($ millions)				
b) Field service expenses ($ millions)				
c) Pretax profit (percent)				
d) Revenue per field service engineer (direct labor)				
e) Direct expense per field service engineer (direct labor)				
f) Fully burdened expense per field service engineer (direct labor)				
g) Basic hourly rate charged for service				
h) Fully burdened field service expense per field service employee (all categories)				

7. Please comment below on service to remote customers: zone charges, response times, etc.

a) Zone definitions:

Primary zone 0 – ___ miles

Zone 2 ___ – ___ miles

Zone 3 ___ – ___ miles

Other criteria: _____

b) Zone premiums added to basic maintenance charges: _____

c) Response time targets for zones: _____

d) Other comments: _____

8. a) Please describe the methodology your company uses to set small system maintenance prices (percent of purchase tested against cost of service projection, etc.):

_____

_____

_____

_____

_____

b) At what ratio of basic maintenance price to list price do you believe that:

i) Small system users will actively consider alternative sources	____ %
ii) Small system users will definitely contract third party or maintain own equipment	____ %
iii) Users will refuse to buy the original product, given the option	____ %

c) How frequently have you and do you expect to change prices of maintenance for:

	FREQUENCY OF CHANGE (months)			
	1982	1983	1984	1985
i) Small systems	____	____	____	____
ii) Basic hourly rates	____	____	____	____
iii) Shift differential	____	____	____	____

d) Do you offer discounts for:

	PERCENT DISCOUNT
i) User assistance in remote diagnostics	____ %
ii) User replacement of plug-in modules or units	____ %
iii) User delivery of plug-in modules or units to repair center	____ %
iv) Relaxed requirement on response time	____ %
v) User purchase of spare parts kits	____ %
vi) Other: _____	____ %

9. Contract administration:

a) Are your maintenance contracts: (i) automatically renewed_____or (ii) negotiated each renewal cycle?_____

b) What is the length of your normal contract?_____(months)

c) Do you normally invoice (i) monthly_____, (ii) quarterly_____, (iii) semiannually_____, (iv) annually_____, (v) other_____.

d) Do you invoice for exceptions (time and material, etc.) at a different time than your normal cycle? Yes/No_____If yes, please describe:

_____

_____

_____

_____

e) Who is responsible for maintenance contract:

i) Negotiation_____

ii) Renewal_____

iii) Administration_____

10. a) Has your field service division implemented a field quality assurance program or other formal operational audit? Yes/No _____

b) If yes, please describe: _____

_____

_____

_____

_____

_____

_____

_____

11. What is the average cost breakdown of a typical fault call? (Please respond for products your company services.)

PRODUCT SERVICED	TOTAL COST (dollars)	DIRECT LABOR (percent)	TRAVEL (percent)	PARTS (percent)	OVERHEAD & SUPPORT
Large mainframes					
Medium mainframes					
Small systems					
Peripherals					
Terminals					
Word processors					
Personal computers					
Copiers, facsimile					
Work stations					
PABX, PBX					
Teleprocessing/communications					

D. Personnel

1. Please identify your sources of new employees and rate them on a scale of 1-10. (1 = little or no importance, 10 = highest importance.)

SOURCE OF NEW EMPLOYEES	RATING (1-10)			
	1982	1983	1984	1987
a) Competition				
b) Trade schools				
c) Military schools				
d) Two-year college programs				
e) Four-year colleges				
f) Apprenticeship programs				
g) Other division in company				
h) Employee referrals				
i) Headquarters				
j) Other: _____				

2. Do you provide in-company formal training for:

	YES/NO
a) Indoctrination	
b) Basic training (apprentice level)	
c) Product (technical)	
d) Systems software (system)	
e) Applications software	
f) Management development	
g) Technological upgrading	

3. Do you fully (F) or partially (P) reimburse or otherwise provide financial support for:

	F/P
a) University courses	
b) Out-company seminars in management development	
c) Professional association membership	
d) Purchase of company stock	
e) Professional trade journals	
f) Matching grants to educational institutions	
g) Children's higher education	
h) Out-company training in professional (technical) development	
i) Nonexempt employee relocation	
j) New-hire relocation	
k) Exempt employee relocation	
l) Lease or purchase of automobiles to be used for business	
m) Lease or purchase of company products (micros, minis, personal computers, typewriters, etc.)	
n) Other: _____	
_____	
_____	

4. Do your personnel policies and procedures provide for the following employee benefits and assurances? (Y/N)

FRINGE BENEFITS	EXEMPT		NONEXEMPT	
	1983	BY 1985	1983	BY 1985
a) Life insurance				
b) Hospitalization				
c) Major medical (80% or better)				
d) Limited medical (out patient)				
e) Dental				
f) Eyesight/glasses				
g) Retirement				
h) Disability insurance				
i) Matched savings				
j) Profit-sharing				
k) Paid sick leave				
l) Grievance procedures				
m) Improvement programs for marginal performers				
n) Exit interviews				
o) Appraisal and counseling				
p) Career path definitions				
q) Pay for performance guidelines				

5. Does your company provide incentives for field service employees? (Indicate by check mark.)

INCENTIVES	MANAGEMENT		EXEMPT		NONEXEMPT	
	1983	BY 1985	1983	BY 1985	1983	BY 1985
a) Stock options						
b) Performance bonuses						
c) Suggestion awards						
d) Periodic recognition awards ("FE of the quarter," etc.)						
e) Special projects, foreign assignments, etc.						
f) Award conferences, trips						
g) Competitive scholarships for employees or family						
h) Other: _____						
_____						
_____						

6. a) How many direct labor field service personnel were hired in the following years?

1982 _____

1983 _____ (forecast)

1984 _____ (forecast)

b) How many direct-labor field service personnel left your company in:

1982 _____

1983 _____ (forecast)

c) What percentage of the persons leaving leave for the following reasons:

	1982	1983
i) Voluntary, no reason given	%	%
ii) Left for higher salary, better total compensation		
iii) Released for company reasons		
iv) Promotion in another company		
v) Relocation by another company		
vi) Promoted within own company		
vii) Transferred to foreign subsidiary or other division		
viii) Other _____		
Total	100%	100%

d) Staffing levels:

U.S. EMPLOYEES	1983	1984
i) Total employees in company		
ii) Total in field service division		
iii) Number of direct-labor FEs		
iv) Number of field support engineers		
v) Number of field supervisors		
vi) Number of managers in field		
vii) Line managers at headquarters		
viii) FE staff managers (total)		
ix) FE staff personnel (nonmanagement including administration)		

7. 1983 annual salaries, small system field engineers (front-line product field service technicians)

JOB DESCRIPTION	TITLE	(✓) EXEMPT	NUMBER IN U.S.	RANGE		AVERAGE PAID (actual)	AVERAGE GAIN OVER 1982 (percent)
				MAXIMUM	MINIMUM		
a) Entry-level trainee for hardware maintenance		( )					%
b) Entry-level trainee in software maintenance		( )					%
c) Minimum experience level qualified to respond to trouble calls, generally requires assistance		( )					%
d) Qualified field service technician carries territory, requires occasional assistance, renders some aid to lower levels		( )					%
e) Senior-level field service technician: generally gives more assistance than received, assigned field training duties to assist in development of first two categories (above)		( )					%
f) Qualified field service engineer in software support		( )					%
g) Senior level software support in field							
h) Top-level hardware specialist located in field office		( )					%
i) Top-level software specialist located in field office		( )					%

8. 1983 annual salaries, field office staff personnel

JOB DESCRIPTION	TITLE	(✓) EXEMPT	NUMBER IN U.S.	RANGE		AVERAGE PAID (actual)	AVERAGE GAIN OVER 1982 (percent)
				MINIMUM	MAXIMUM		
a) Repair depot, repair technician trainee	_____	( )	_____	_____	_____	_____	_____ %
b) Repair depot, repair technician	_____	( )	_____	_____	_____	_____	_____ %
c) Senior-level repair depot technician	_____	( )	_____	_____	_____	_____	_____ %
d) Office administrator, Jr.	_____	( )	_____	_____	_____	_____	_____ %
e) Office administrator, Sr.	_____	( )	_____	_____	_____	_____	_____ %
f) Field service supervisor may work approximately 50/50 on equipment and management	_____	( )	_____	_____	_____	_____	_____ %
g) First-line manager of field service engineers	_____	( )	_____	_____	_____	_____	_____ %
h) Second-line manager located in field offices	_____	( )	_____	_____	_____	_____	_____ %
i) Staff manager in education and field support	_____	( )	_____	_____	_____	_____	_____ %
j) Staff manager in operations and financial analysis	_____	( )	_____	_____	_____	_____	_____ %
k) Field service administration manager	_____	( )	_____	_____	_____	_____	_____ %
l) Field service personnel manager	_____	( )	_____	_____	_____	_____	_____ %