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SERVICE VENDOR ANALYSIS— SMALL SYSTEMS

INPUT®

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Customer Service Program (CSP)

Service Vendor Analysis—Small Systems

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Abstract

This report, *Service Vendor Analysis —Small Systems*, is the second deliverable in the small systems module of INPUT's 1988 Customer Service Program. The first report, *Small-Systems Service Analysis*, measured user requirements for and satisfaction with service and support as provided by leading vendors of small systems. The last report in the series, *Service Market Analysis—Small Systems*, will provide a current market size and five-year forecast for small systems service, as well as summarize the year's research findings.

The report contains profiles of the service organizations of 12 leading small-systems vendors: Apollo Computer, AT&T, Concurrent Computer, Data General, Digital Equipment Corporation, Harris, Hewlett-Packard, Honeywell-Bull, IBM, NCR, Stratus, and Tandem. Each profile begins with a short discussion of the company and important service news items from the past year. Next, each profile presents demographic data about the service organization, including revenue totals, employee counts, and office locations, when available. Each profile concludes with a discussion of service delivery, including contract coverage and services provided.

Following these profiles, the report provides summary tables of key service information about the profiled service organizations. These tables will allow quick comparisons between companies analyzed in this study.

The report contains 70 pages, including 21 exhibits.

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Introduction

Introduction

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A Scope

This report contains profiles of the service organizations of 12 leading small systems vendors: Apollo Computer, AT&T, Concurrent Computer, Data General, Digital Equipment Corporation, Harris, Hewlett-Packard, Honeywell-Bull, IBM, NCR, Stratus, and Tandem. Each profile begins with a short discussion of the company and important service news items from the past year. Next, each profile presents demographic data about the service organization, including revenue totals, employee counts, and office locations, when available. Each profile concludes with a discussion of service delivery, including contract coverage and services provided.

Following these profiles, the report provides summary tables of key service information about the profiled service organizations. These tables will allow quick comparisons between companies analyzed in this study.

Appendixes at the end of this report contain an example of the questionnaire used for this study, as well as a list of definitions used in the report.

B

Methodology

INPUT attempted to survey the companies profiled in this study, using the questionnaire contained in Appendix A. When necessary, INPUT supplemented this effort with information (annual reports, Form 10Ks, press releases, marketing brochures, and press clippings) contained in INPUT's Information Center, located at INPUT's Mountain View (CA) headquarters office.

Service Vendor Profiles

APOLLO COMPUTER INC.
330 Billerica Road
Chelmsford, MA 01824
(617) 256-6600

Thomas A. Vanderslice, President and CEO
Douglas P. Langenberg, VP, Apollo Computer Services
Total Employees: 3,992
Service Employees: 580
Total Revenue, Fiscal Year-End 12/31/88: $553,660,000
Service Revenue: $86,869,000

The Company

Apollo Computer, founded in 1980, is a supplier of technical workstations for the engineering and scientific markets.

Apollo virtually created and, until early 1987, dominated the workstation market, but aggressive entrants into the workstation scene, most notably Sun Microsystems, have rapidly pushed Apollo out of its leadership position.

In 1986, Apollo began the transition from its proprietary Aegis operating system to UNIX, to bring Apollo systems more in line with industry standards and to respond to Sun's adoption of and success with open systems. When AT&T and Sun announced an alliance to develop future versions of UNIX in early 1988 Apollo--along with Hewlett-Packard, DEC, and IBM--rallied to form the Open Software Foundation (OSF), which plans to create an open system environment based on current and emerging industry standards.

Apollo delivers customer service and support through its subsidiary, Apollo Computer Services, Inc. In 1988, Apollo introduced two new offerings, the Network Services Program and the Professional Services Program. With the Network Services Program, Apollo provides assistance in the planning and design of networks, installation, network verification and certification, and network management services. The Apollo Professional Services Program provides software consulting in such areas as application design and development, performance optimization, and systems integration and customization.

Service Demographics

Apollo's service revenue for 1987 grew 52% from $57.1 million in 1986 to $86.9 million in 1987, as shown in Exhibit II-1. Apollo attributed this increase to growth in the customer installed base and revenue gained from the introduction of additional service programs.

Apollo employs approximately 580 service employees working out of 70 service locations within the United States.

Service Delivery

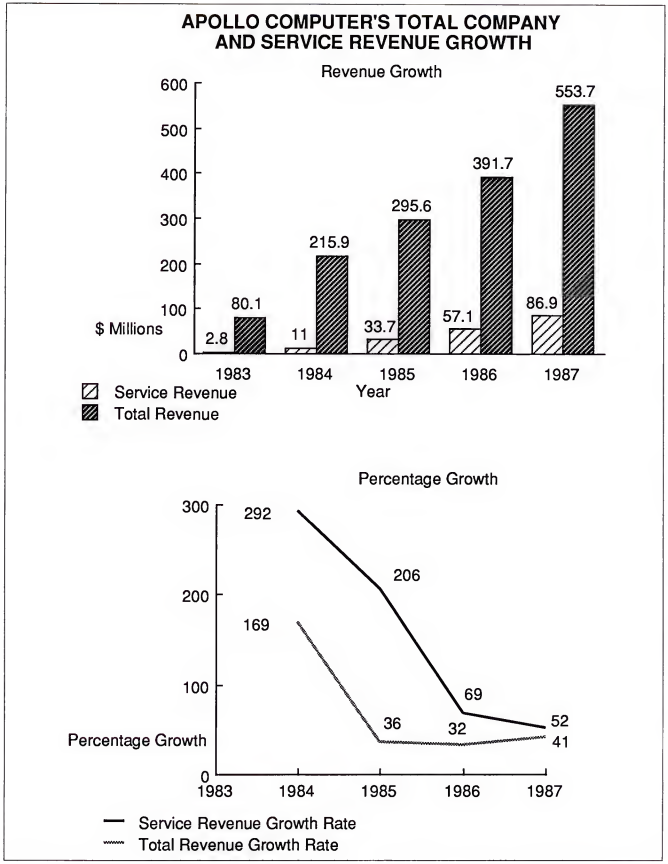
Apollo offers the following services: manufacturer's warranty, hardware maintenance, software maintenance, training, installation and relocation, conversions and upgrades, and refurbishment.

Apollo's Basic Service program offers 9/5 coverage and includes on-site maintenance and a 4-hour response time. Extended hardware and software options are also available.

The Apollo Network Services Program is offered for Domain token ring and Ethernet IEEE 802.3 networks. It includes Dedicated Planning and Design Services, a needs analysis and site-planning service; Network Installation Service, a complete installation service provided through Apollo-authorized vendors; Network Verification and Certification Services, offered free of charge to customers as part of the installation service and charged at $125 per hour for existing networks; and Network Management Services, which provides on-going support in the maintenance and operation of the customer's local area network.

The Professional Services program provides customized consulting at two levels: basic, at $85 per hour; and premium, at $150 per hour. Basic services include projects such as utility customization, application integration and conversion assistance. Premium services include projects such as system design and performance tuning.

EXHIBIT II-1



AT&T
295 N. Maple Avenue
Basking Ridge, NJ 07920
(201) 221-2000

Robert E. Allen, President and CEO
W. Frank Blount, President, Network Operations Group
Total Employees: 303,000
Total Revenues, Fiscal Year-End 12/31/87: $33,598,000,000

The Company

Since its entry into the information systems market following divestiture, AT&T has been contending with a tide of red ink in the competition against established players like IBM and DEC. Unable to parley its telecom expertise into a significant share of the information systems market, AT&T has lost upwards of $1 billion a year since the inception of AT&T-IS.

By restructuring its computer operations in the last two years, AT&T has positioned itself for profitability. Organizational streamlining and cost-cutting slashed losses by 70% in 1987. In late 1987, AT&T broke out a 600-member sales force dedicated solely to pushing computer products rather than, as previously, the mixed bag of PBXs, phone service, and computer equipment that make up AT&T's repertoire of products. Two new products were released: the AT&T 6386 WorkGroup System, a minicomputer based on the 32-bit 80386 chip; and the AT&T 3B 4000, positioned at the high end of the 3B minicomputer line. Early shipments have reportedly exceeded AT&T's (somewhat modest) sales targets.

AT&T eased its relationship with its microcomputer manufacturer, Olivetti, cancelling orders for 40,000 units in 1987 due to slack demand. Bonds with workstation industry superstar Sun Microsystems were strengthened when AT&T, in early 1988, raised its stake in Sun by agreeing to acquire a 20% share. Future AT&T hardware will be running on Sun's SPARC chip, while both AT&T and Sun continue to collaborate on developing a standardized version of UNIX.

Service Demographics

AT&T employs more than 2,000 hardware and software technicians working out of over 200 service locations in the U.S.

AT&T delivers its customer services through the Data Services Organization, which operates under the Network Operations Group.

Service Delivery

AT&T provides the following standard maintenance offerings:

- Hotline Service provides users with access to AT&T support personnel to aid in the reporting, diagnosis, and resolution of both hardware and software problems. Remote diagnosis (and software fixes) are implemented in many cases while the user is on the line. Should a problem require further attention, the hotline staff will automatically release a field engineer to the user site without requiring the customer to place an additional call to a dispatch center. Hotline is a standard service provided during warranty terms and is included as a part of all maintenance contract agreements.

- Business Day Service offers 9/5 coverage and includes on-site maintenance and parts replacement.

- Around-the-Clock Service provides 24/7 coverage and includes on-site maintenance and parts replacement. The response objective for major failures is 4 hours and 24 hours for non-critical problems. Requests for response to minor failures outside prime business hours, however, are subject to a premium.

- AT&T offers Customer Inventory Management (CIM) for customers that prefer to be responsible for the diagnosis, removal, and reinstallation of replacement units. Under CIM, a courier service is provided once a month to a predetermined customer location. AT&T will deliver replacement units in exchange for an equal number and type of non-working units within 10 business days of customer notification. CIM provides one exchange per month and requires the customer to maintain an inventory of spare units. All similar items purchased and located at a CIM site are required to receive CIM maintenance. Additional monthly exchanges may be requested and provided by AT&T subject to an additional charge.

- Customer On-Site Exchange, AT&T On-Site Exchange, and mail-in/depot services are also available.

The Custom Maintenance Agreement allows customers to design a service package to fit their service requirements. Custom maintenance programs may include upgraded response times,

support for integrated systems, enhanced program management and performance tracking, and a dedicated technician.

- Dedicated On-Site support for specific sites is available. Dedication of on-site personnel can supplement a user's Around-the-Clock support or can be contracted as a separate service activity.

- Service PLUS offers network management activities. AT&T acts as the single point of contact, managing all support activities at any number of a client's facilities. The AT&T contact will field all trouble calls, assist in diagnosis or dispatch, escalate missed commitments and oversee all calls through to resolution.

CONCURRENT COMPUTER CORPORATION
106 Apple Street
Tinton Falls, NJ 07724
(201) 758-7500

James K. Sims, President and CEO
Joe Rechner, Vice President, Services
Total Employees: 2,782
Service Employees: 900
Total Revenues, Fiscal Year-End 7/31/87: $247,765,000
Service Revenue: $83,522,000

The Company

Concurrent Computer Corporation develops, manufactures, markets, and services a range of compatible hardware and software that includes superminicomputers utilizing a single processing element, and multiprocessor systems employing parallel processing technology.

Concurrent offers a variety of maintenance service and support programs for its hardware and software products. The company also offers contract service for selected third-party equipment. The service and support programs offered include technical and business consulting; spare parts sales, rentals and exchanges; diagnostic service; preventive maintenance; customer training and education; and configuration management and provisioning.

At the time of this writing, Concurrent was being acquired by Massachusetts Computer Corporation (Masscomp), a Massachusetts-based developer of standards-based real-time computer systems. Masscomp will be purchasing all outstanding shares of Concurrent stock for approximately $230 million. According to Concurrents' management the merger should have been finalized by October 1,1988.

The new entity created from the merger will continue to be called Concurrent Computer, headquarted at Tinton Falls, and be led by James Sims as chairman, president, and chief executive officer.

Service Demographics

Concurrent's service revenue for fiscal 1987 reached $83.5 million, a 10% increase over fiscal 1986 revenue of $78.7 million. Five-year revenue and percentage growth charts are shown in the Exhibit II-2.

Concurrent offers its services throughout the U.S., and currently maintains approximately 70 service offices nationwide. Its domestic service workforce numbers approximately 550 , 250 of which are field engineers. In addition, Concurrent has approximately 50 international offices in Europe and Asia.

Service Delivery

Concurrent provides a variety of service options for appropriate levels of support to self-maintaining users as well as full coverage for non-supporting customers. Service offering plans currently provided by Concurrent include:

- Product Repair Service, one of three plans geared to the needs of users that maintain the majority of their system components, offers an alternative repair service. It is charged at fixed rate prices for all Concurrent assemblies, peripherals, modules, or third-party add-ons, and an option to receive module updates and revisions is available.

- The FASTBACK Module Repair Service helps self-maintaining customers meet their sparing requirements through guarantees of 10-day turnaround on module repairs and expedited air freight returns. Parts leave the Concurrent facility fully tested and warranted for 90 days to assure that a reliable unit is being returned to the user's inventory.

- The Emergency Exchange Service assures expedited shipment of critically needed assemblies. Replacement parts installed with the most current revision level are shipped to user sites and also warranted for 90 days. Users call the National Logistics Center with their request, and needed parts are located and shipped within the same day.

Concurrent provides three separate contract plans for more traditional maintenance support. The contracts include the following:

- The Primary Service plan supplies users with unlimited access to a hardware support hotline, service through Concurrent's Technical Assistance center, as well as on-site support during the customer's chosen hours of coverage. Response times and preventive maintenance periods are also tailored to suit particular customer needs.

- The two other contracts, Comprehensive and Comprehensive-Plus, provide users with critical applications and a 95% or 98%

uptime guarantee, backed by a premium refund agreement in the event of missed commitments. On-site hardware and software support is provided as needed, with response times quoted at four hours or less.

Software support options offered by Concurrent include:

- Comprehensive support through the Software Service offering, which supplies toll-free phone support from Concurrent's national support center in Oceanport (NJ); on-site support when needed; access to remote diagnostic and fix technologies; and automatic updates, revisions, and changes to software and documentation. A software Subscription Service that gives a synopsis of upcoming changes and current field information is also included.

- The Extended Software Maintenance contract supplies the essential update and revision services, as well as a subscription to Concurrent's software publication and documentation updates. Telephone hotline assistance can be added to the package to provide any needed backup to users maintaining their own software.

- Concurrent also allows software support components to be unbundled and purchased separately, providing users with the components needed to build a software support plan suited to their particular needs.

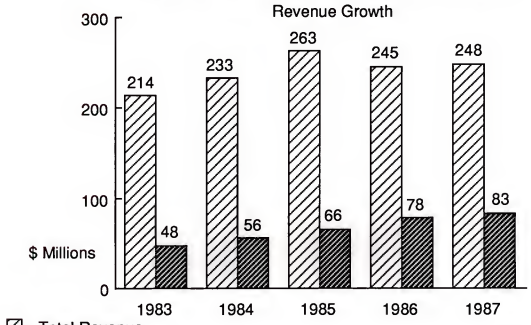
The company offers a guaranteed eight-hour response time.

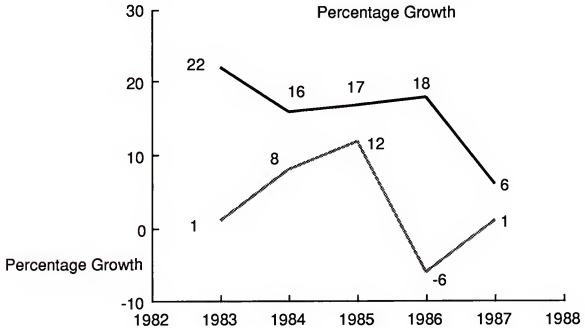
Discounts available from Concurrent include the following:

- Multi-year
- Prepaid one-year discount up to 5%
- Dollar volume discount between 4% and 20%.

EXHIBIT II-2

CONCURRENT COMPUTER'S TOTAL COMPANY AND SERVICE REVENUE GROWTH





DATA GENERAL CORPORATION
4400 Computer Drive
Westboro, MA 01581
(617) 366-8911

Edson DeCastro, President
Richard A. Camuso, Sr. VP,
Worldwide Field Engineering
Total Employees: 15,685
Service Employees: 1,500
Total Revenues, Fiscal Year-End
9/26/87: $1,274,348,000
Service Revenue: $423,893,000

The Company

Data General Corporation, founded in 1968, designs, manufactures, and sells general purpose computer systems and provides peripheral equipment, software, communications systems, and related products and services, including training and maintenance. Since its inception, DG has installed more than 226,000 computer systems worldwide.

The year 1987 proved to be a difficult one for DG. Sales remained flat for the third year in a row, while net income dropped to $127 million in the red. In order to cut costs, DG closed its facilities in Denver (CO), Milford (MA), and Hookset (NH), and in late 1987 laid off 950 employees, primarily in manufacturing, administrative, and field engineering positions. The field sales force, however, was to be increased by 15%.

At the same time, DG revised its marketing strategy, shifting its focus from large end users (which brought DG into direct competition with larger vendors DEC and IBM), to middle companies with annual revenues of $500,000 to $2.5 billion. Its much vaunted strategy of targeting large corporations, begun in 1981, had caused some of DG's traditionally strong technical OEM base to defect to DEC and IBM, and to workstation vendors Apollo and Sun Microsystems. In order to reverse this trend, DG established a new VAR marketing and development division to restore its reseller business.

These changes may very well have contributed to DG's improved performance in fiscal 1988. While sales remain relatively flat, DG consistently posted profits for the first, second, and third quarters of 1988.

On the customer service front, DG began providing on-call customer support services for third-party peripherals integrated

into DG systems. These services, first announced in 1987, provide coverage for Genicom, Dataproducts and NEC-IS printers; Urix interactive voice processors; Micom communications equipment; and other non-DG products. DG also introduced a network services package, which consists of a network planning and design service; a network physical installation management service; a network installation consultation service; and on-site maintenance service. In 1988 DG unveiled five new/revised service offerings for its value-added reseller and end-user customers: the Multi-Year Plus Agreement; the VAR Service Seller and the VAR Service Manager programs; the extension of Remote Assistance coverage; and CEO (Comprehensive Electronic Office) Start-Up services.

Service Demographics

As indicated in Exhibit II-3, service revenue for fiscal 1987 totaled $424 million, a 6% increase from fiscal 1986 service revenue of $399.7 million.

DG employs approximately 1,500 service personnel (including 800 field engineers) working out of 68 service locations within the United States. DG operates a centralized Customer Support center in Norcross (GA) and logistics and repair operations in three major centers in Fountain (CO), England, and Australia.

Service Delivery

New service offerings introduced in late 1988 include the following:

- Multi-Year Plus is available for 3-, 4-, or 5-year terms. Under the terms of the agreement, on-site hardware maintenance prices are fixed for the first three years, with a price increase cap of 5% for the fourth and fifth years. In addition, customers receive discounts of 5% on on-site hardware maintenance during the second year and 10% during the third, fourth, and fifth years. When equipment under warranty is purchased with the Multi-Year Plus Agreement, customers will receive the full benefit of contract service, in lieu of warranty service, at no charge during the warranty period.

- Around-the-clock Remote Assistance Coverage is now a standard offering for on-site hardware contract customers who opt for DG's remote diagnostic services. Previously offered as an option, this extended service provides customers with diagnostic coverage from DG's Customer Support Center 24 hours a day, seven days a week.

- The VAR Service Seller program allows resellers to offer DG's service programs along with its products, while earning commission credit to their accounts with DG. VARs who sign customers to Multi-Year Plus contracts will earn a one-time commission credit of 10% of the annual billable amount of the contract, and VARs who sign their customers to one-year contracts will earn a one-time commission credit of 4%.

- The Service Manager program provides qualified VARs and compensation through direct reductions on service contract invoices. These VARs participate in the maintenance process, purchase service, assist in managing the service process for their customers, and maintain greater account control and the ability to offer full packages of systems and service. Reduction levels, meanwhile, range from 5% for an annual on-site hardware service base valued at $100,000, to 15% on a $4.25 million base.

- The CEO Start-Up service package provides implementation services for CEO office automation software. Each package includes implementation and installation services, educational services, and ongoing software maintenance.

DG's portfolio of hardware support options include the following:

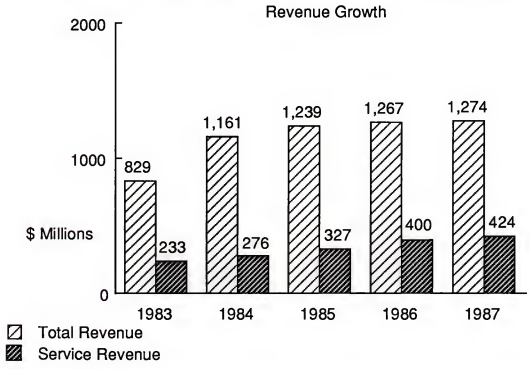
- On-Call Service provides standard preventive and remedial maintenance with flexible coverage periods.

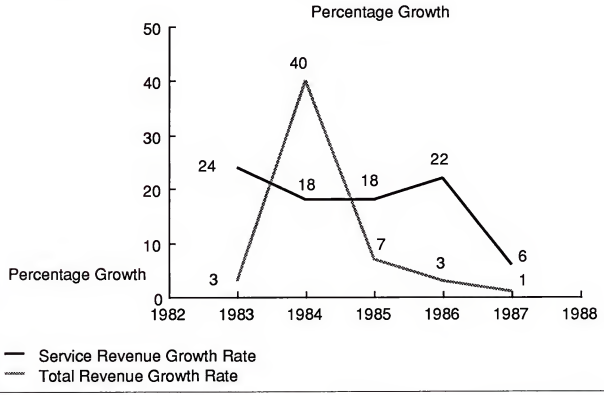
- DG's REV-UP, a hardware subscription service, provides delivery of documentation and materials updates to users as a yearly subscription package.

- Spare Mail, an exchange and repair service for DG spare parts, provides three levels of expedited mail-in support to systems customers. Ranging from emergency, next-day delivery service to a more economic, three-week turnaround, Spare Mail Express through Spare Mail Saver options include automatic installation of the latest ECOs on the component.

EXHIBIT II-3

DATA GENERAL CORPORATION'S TOTAL COMPANY AND SERVICE REVENUE GROWTH





DIGITAL EQUIPMENT CORPORATION
146 Main Street
Maynard, MA 01754
(508) 493-5111

Kenneth Olson, President and CEO
David Grainger, VP Corp. Field Support
Total Employees: 110,500
Total Service Employees: 42,000
Total Revenues, Fiscal Year-End 06/27/88: $10,475 Million
Service Revenue: $3,934 Million

The Company

Founded in 1957, Digital Equipment Corporation (DEC) is a leading manufacturer of information processing equipment and services to the commercial, financial, and engineering/scientific marketplaces. With the introduction of its first line of VAX 32-bit minicomputers in the mid-1970s, DEC established itself as the leader in networked minicomputer systems. It continued to hold this position with the introduction of its popular VAX 8XXX line of mini- and superminicomputers in 1985.

In 1988 DEC announced a major new strategic direction in the systems integration and support services arena by introducing a comprehensive series of multivendor, enterprise-wide services and network management capabilities.

The new Enterprise-Wide Services expand on existing service capabilities already provided by DEC. The specific new services include:

- Enterprise Planning and Design Services, consulting services that help formulate business organization and technology strategies, designs, and architectures
- Program Management, involving hardware, software, services, and people resources
- Integrated Support Services, assuring a single-source of support and services
- Service Alliances, in which DEC establishes formal relationships with leading service suppliers in selected technologies (similar to IBM's Technical Services Management)

The Network Enterprise Management Program serves as a platform for many existing network management service offerings,

as well as introducing several new services, including the establishment of seven new cooperative development relationships with such vendors as Codex Corporation, DCS Inc., Siemens, AG, Stratacom Inc., Timeplex Inc., TSB International Inc., and Vitalink Communications Corporation. These companies have agreed to provide access, control, and monitoring capabilities.

Service Demographics

Service revenue for fiscal year ending June 30, 1988 was $3.9 billion, up 26% over fiscal year 1987, as shown in Exhibit II-4. DEC employs 42,000 total field service employees out of 450 service locations worldwide (250 of these are located in the U.S.). In addition, DEC offers carry-in/mail-in service out of 150 depot/spare parts centers in the U.S..

DEC offers telephone and remote support out of 14 worldwide Customer Support Centers (three of which are in the U.S.), which employ 1,300 technical support specialists. The largest of these centers, located in Colorado Springs, CO, occupies 50,000 square feet, employs 500 people, and includes a 30,000 square foot lab where DEC technicians can recreate and resolve system interruptions remotely.

Service Delivery

DEC offers a wide range of support services to users of its systems. For hardware maintenance, most users choose between two levels of service:

- BASICService, which provides next-day response to any hardware failure that occurs between 8 AM and 5 PM, Monday through Friday.
- DECService, a premium level of service which provides 4-hour response to hardware failures that occur (2-hour response on VAX 8XXX products) between 8 AM and 5 PM, Monday through Friday (users can upgrade to 24-hour/7-day coverage in BASICService or DECService)

DEC also offers a wide range of software support plans that begin with a core of telephone, on-site, and remote support. Software support options include:

- Software Support Service, which keeps layered software products at the most current level to assure continuous support
- Media & Documentation Distribution Service, which provides all documentation and media updates and technical bulletins

- Documentation Service, which allows customers to receive documentation updates

DEC also offers two additional "Value-Added Service" (professional services) options:

- System Management Service, where DEC reviews system operation and management and submits recommendations for improving performance

- Software Update Installation Service, under which a DEC software engineer installs new versions of software, resets parameters, advises on operational matters, and updates installation plans

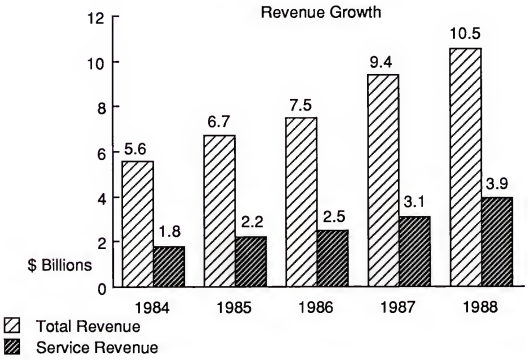
DEC differentiated its service philosophy from that of rival IBM by offering a wide "menu" of "unbundled" of service levels that allowed users to choose the level, and cost, of service that best fit their needs. In 1988, DEC added Integrated Service Portfolio, a comprehensive service plan that combines the hardware maintenance and software support offerings discussed above.

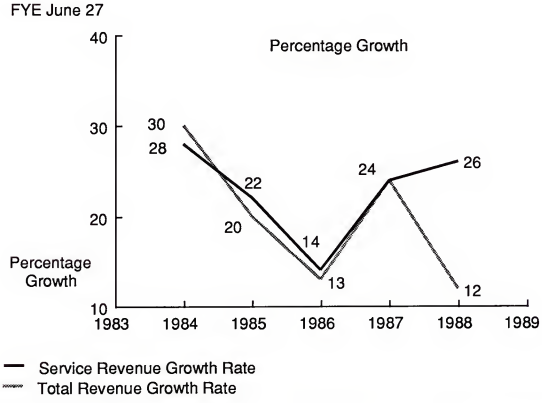
Predictive support is the main goal of DEC support. Users of DEC VAX products benefit from a number of automated support features that signal potential problems, allow users to contact a Customer Support center via a 24-hour, 7-day per week toll-free telephone line. If the problem is software related, the DEC technical support specialist can usually isolate and rectify it while the user is still on the line. Symptom-directed diagnosis tools, called Standard Package for Error Accounting and Reporting (SPEAR), also helps detect and analyze hardware problems before they occur. If on-site intervention is required, an engineer is automatically dispatched, along with any parts necessary.

In April 1988, DEC introduced VAXsimPLUS, an enhanced artificial intelligence-based diagnostic tool that is imbedded in all VAX systems. The tool allows predictive maintenance by monitoring system performance, catching and storing intermittent and more-critical system interruptions, and signalling before threshold levels are reached. VAXsimPLUS is provided free of charge to all VAX customers (customers who do not want such remote support pay a 15% surcharge for support).

EXHIBIT II-4

DEC'S TOTAL COMPANY AND SERVICE REVENUE GROWTH





HARRIS CORPORATION
16001 Dallas Parkway
Dallas, TX 75248-3399
(214) 386-2000

John T. Hartley, President and CEO
Carleton Smith, VP Customer Support
Total Employees: 24,300
Service Employees: 900
Total Revenues, Fiscal Year-End 6/30/87: $2,078,964,000
Information Systems Sector: $328,200,000
Service Revenue: $100,000,000*

* INPUT estimate

The Company

Harris Corporation, founded in 1926, is a worldwide supplier of information processing, communications and semiconductor products, systems and services to government and commercial markets.

Harris' Information Systems Sector provides computers, software, workstations and data communications, computer integration, voice-switching, and specialized information-handling systems.

Harris Customer Support, an operating unit of the Information Systems Sector, provides service and support for Information Systems Sector products and, through its SourceOne program, third-party products.

Service Demographics

INPUT estimates Harris' service revenue for fiscal 1987 was $100 million compared with $75 million in 1986. Approximately $2 million was derived from TPM services delivered through the SourceOne program. Total revenue figures are shown in Exhibit II-5.

Harris employs 650 field engineers and a total of approximately 900 service employees. Harris Customer Support provides nationwide service coverage, including Alaska, Hawaii, and Puerto Rico, through 170 service locations. All calls for assistance are centralized through the group's National Dispatch Control Center headquartered in Dallas.

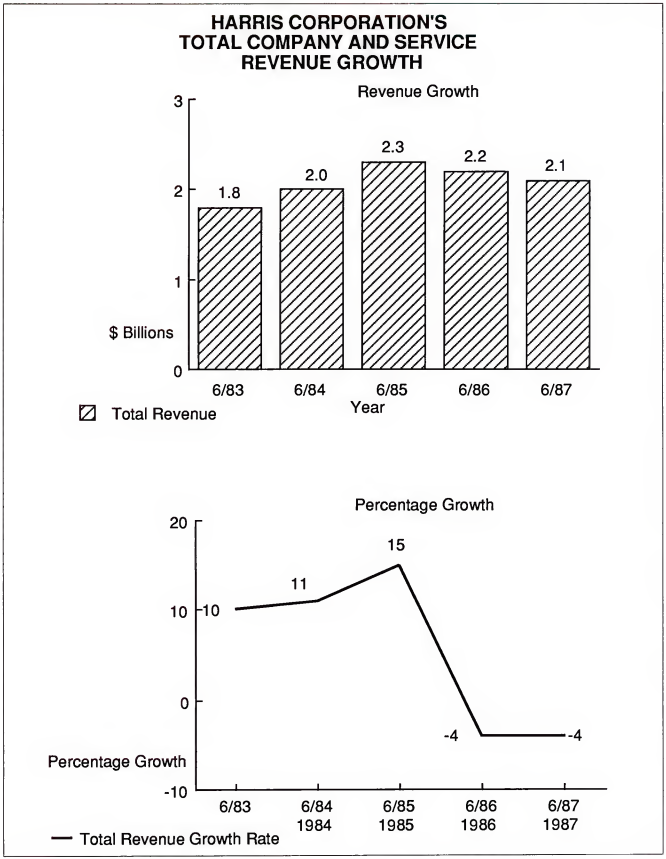
Service Delivery

Harris offers several packages that can be combined with support options to meet the different support requirements of customers.

- Harris Standard Support provides 9/5 coverage that includes on-site remedial maintenance, preventive maintenance, parts replacement, and 4-hour response time.
- Harris Basic Monthly Support and Basic Monthly Support "Plus" offer an economical alternative to standard support. Both offer the services available under Standard Support, but with a 24-hour response time. Support "Plus" gives the customer the option for a 4-hour response during critical situations.
- An option for extended 24/7 coverage is also available.
- Harris Dedicated On-Site Support provides the services of a Field Engineer trained in the operation of the customer's facility and stationed at the customer's site. This service includes 40 hours of on-site coverage during contract hours, parts replacement with on-site stock, and scheduled preventive maintenance.
- Harris Special Program Support is a customized offering whereby Harris will work with the customer in analyzing the customer's support requirements and designing a special support program to meet those needs.

Other support options include Central Facility Service, whereby the customer may accumulate at least five units at a single location to be serviced collectively by a Harris engineer; GOLD (Guaranteed On-Site Loaner Device), whereby Harris will provide the customer with a sufficient number of spare devices for immediate replacement for those needing repair, remote diagnostics and repair services; and Cooperative Maintenance Option, whereby the customer's technicians will handle routine maintenance with the option of having Harris Customer Support supplemented when necessary.

EXHIBIT II-5



HEWLETT-PACKARD COMPANY
3000 Hanover Street
Palo Alto, CA 94304
(415) 857-1501

John A. Young, President and CEO
Michael C. Leavell, VP Customer Support Operations
Total Employees: 82,000
Service Employees: 15,800
Total Revenues, Fiscal Year-End 10/31/87: $8,090,000,000
Service Revenue: $1,775,000,000

The Company

Hewlett-Packard Company, founded in 1947, designs, manufactures, markets, and services electronic products and systems for measurements and computation, including electronic test equipment, computer systems and peripheral products, medical electronic equipment, handheld calculators, solid state components, and instrumentation for chemical analysis.

In August 1988, HP introduced its own third-party service offering, the Multivendor Support Operation (MSO). A formal TPM program, MSO provides service and support for specified multivendor hardware, software, and networking products. These services include single-source support, repair and restoration, microcomputer hardware and software diagnosis, LAN support, flexible coverage periods, flexible response times, loaner equipment, preventive maintenance, repair reporting, and installation and relocation management.

In addition to offering multivendor support, HP announced the HP Strategic Partners Program, which offers HP service and support to selected OEM peripherals, microcomputer and network suppliers that do not have adequate service capabilities of their own. Through the Strategic Partners Program, MSO can maintain one or all of a Strategic Partner's product lines; focus on one geographic area or provide wordwide support of a Strategic Partner's products; and deal directly with a Strategic Partner's customers or serve as support backup to dealers.

HP strengthened its telecommunications support offerings by establishing a customer network center in Atlanta in early 1987 to provide support for customer X.25 private packet networks and introducing OpenView, a network management system that allows

network managers to monitor and troubleshoot local and remote networks.

In June 1988, HP announced the opening of the Atlanta Customer Support Center, which will be the hub of HP's worldwide support activities. The new center is the first HP facility to provide five main support operations at a single location: the Customer Network Center; the Atlanta hub of the North American Response Center; the Customer Education Center; the Project Center, which provides systems integration services; and the Regional Customer Service Center, a repair depot.

Antitrust suits filed against HP by two independent service organizations, Datagate (CA) and HyPoint Technology (OH), continued into 1988. In late 1987, HyPoint charged HP with monopolizing the maintenance market for HP products after HP changed its response policies for noncontract customers, heavily impacting HyPoint's ability to provide service to its customers. Later, in February 1988, the Ohio federal court enjoined HP from pursuing its new policy for the length of the litigation period. In July 1988, a California federal judge dismissed the antitrust portion of Datagate's $35 million suit against HP. Datagate had filed suit against HP in 1986, charging the manufacturer with restricting the flow of spare parts to Datagate and making disparaging remarks about Datagate's service capabilities.

Service Demographics

HP's service revenue for fiscal 1987 was $1.8 billion, a 20% increase over 1986 service revenue of $1.5 billion, as shown in Exhibit II-6. This figure includes revenue derived from servicing equipment, systems, and peripheral products, as well as servicing electronic equipment and analytical instrumentation. Revenue derived solely from servicing equipment, systems, and peripherals amounted to $1.5 billion.

HP employs approximately 15,800 service personnel and operates more than 200 service locations worldwide with 149 service locations in the U.S. In addition, HP's 32 response centers worldwide draw on a common data base for problem diagnosis and resolution assistance, while its three Customer Network Centers, located in Atlanta (GA), Singapore, and England, provide design project management, operation, training, and support for customers with X.25 private packet networks.

Service Delivery

HP offers the following services:

- HP's Standard System Maintenance Agreement offers 12 hour/5 day through 24 hour/7 day on-site coverage with 4-hour response time guaranteed. Basic System Maintenance offers 8 hour/5 day on-site availability and next-day response time.

- HP's Cooperative Support Program provides extensive customer service training, parts and exchange, inventory management guidance, engineering change service notes, and phone-in technical assistance. An HP customer engineer is also available for on-site time and materials assistance.

- Implementation services are provided through HP-Assist, which offers implementation analysis, training for the customer's implementation team, and assistance throughout the actual project implementation.

- Telecommunications support is offered through several programs:

  - Through Net Assure, HP provides remote troubleshooting between 7 AM and 9 PM, Eastern Standard Time, Monday through Friday, via modem link from the Atlanta Customer Support Center, via telephone between the customer's network operator and HP personnel, or with an on-site visit.

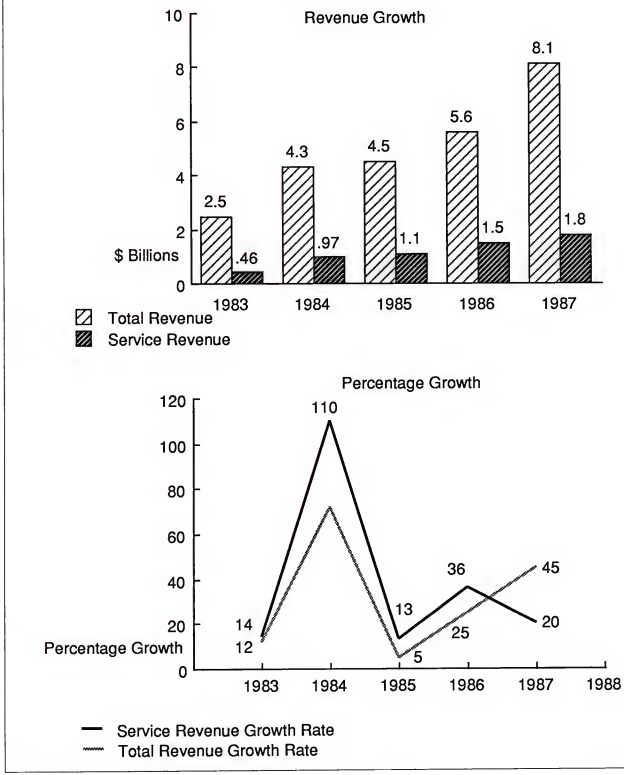
  - WAN Network Operations Support provides part- or full-time monitoring of a customer's network backbone and private X.25 networks via leased lines.

  - HP also offers OpenView, a network management system that provides information to allow a network manager to monitor and troubleshoot local and remote networks. There are six OpenView offerings: Status and Diagnostic Monitor software, which monitors HP 3000 systems; Performance Monitor software, which collects network performance information; Network Command Interpreter software, which enables a manager to execute commands and programs remotely; and the In-Service Transmission Impairment Measurement Set software, which allows managers to perform centralized line analysis and fault isolation.

- HP's Escalation Management Program makes special provisions for responding to critical "down" situations. An HP manager is assigned Problem Site Manager, and coordinates all HP resources to find a satisfactory solution.

EXHIBIT II-6

HP'S TOTAL COMPANY AND SERVICE REVENUE GROWTH



HONEYWELL BULL INC.
141 Needham Street
Newton Highlands, MA 02161
(617) 552-6000

Roland Pampel, President and CEO
Owen F. Keefe, VP Customer Service Operations
Total Employees: 19,700
Service Employees: 2,800
Total Revenues, Fiscal Year-End 12/31/87: $2,059,000,000
Service Revenue: $514,750,000*

* Company estimate

The Company

Honeywell Bull, formed by an alliance forged in early 1987 by Groupe Bull of France, NEC, and Honeywell Inc., is a privately owned information systems company with strengths in networking, data management, and transaction processing. The company is 42.5% owned by Bull, 42.5% owned by Honeywell, and 15% owned by NEC. Bull is expected to increase its holdings to 65.1% in 1989, while Honeywell will reduce its interest to 19.9%. NEC will retain its 15% share.

The synergy formed by this alliance may well have turned around the fortunes of the company formerly known as Honeywell Information Systems. While profits were nil in 1986 for Honeywell Information Systems, Honeywell Bull posted profits of approximately $17 million for 1987. In an effort to reduce administrative costs and unneeded production capacity, the company trimmed its workforce by 1,600, eliminating about 1,000 jobs in manufacturing and related support services and cutting 600 positions in marketing, sales, service, and other areas. Plans were underway to add about 250 people in software development, field sales, and field technical support.

Service Demographics

Service revenue for 1987 was $515 million, a 164% increase compared with $195 million in 1986 when the company was still Honeywell Information Systems.

Honeywell Bull employs 2,800 service employees working out of 163 service locations in the U.S. In addition, Honeywell Bull operates more than a dozen walk-in/mail-in service and support centers. A National Response Center located in Atlanta (GA), accessible 24 hours a day, 7 days a week through a toll-free

number, dispatches field service personnel and maintains a problems data base containing the complete equipment service and performance history of every Honeywell Bull customer. Three Technical Assistance Centers (TAC) provide on-line remote diagnostic support for select systems.

Service Delivery

Honeywell Bull offers several support programs:

- Standard Maintenance Service provides 10/5 on-site coverage and includes remedial maintenance, preventive maintenance, and parts replacement. Several extended coverage options are also available.

- The Premium Service Program is available only for large systems and DPS PLUS systems which have maintenance coverage on a 24/7 basis. Service offerings include guaranteed response-time credits, preventive maintenance during scheduled extended maintenance periods, equipment installation, field change order installation, and equipment malfunction protection credit. The guaranteed response-time credit consists of a $100 credit for each half-hour delay in meeting the 2-hour response time. The equipment malfunction protection credit gives the customer credit, subject to formula and maximum limits, for each hour the equipment is inoperable.

- Honeywell Bull also provides the services of a dedicated field engineer for qualified customers at the rate of $6,000 per man/shift/month. Weekend rates are charged at an hourly rate per man/shift/month.

- The Customer Assistance Maintenance Program (CAMP) is an optional service that allows the customer to participate in the maintenance process. CAMP is available only for select CAMP equipment that have been designed for this program. Customers may send or bring the part to the nearest service center for repair and may call the National Response Center for assistance. For certain Honeywell Bull products, the customer may maintain an inventory of spares at the customer's site.

In addition to the above services, Honeywell Bull offers third-party services for equipment from more than 50 manufacturers. These services include on-site maintenance, repair, installation and relocation, manufacturer's warranty, and non-contractual service.

INTERNATIONAL BUSINESS MACHINES CORPORATION
Armonk, NY 10504
(914) 765-1900

John Akers, President and CEO
David E. McDowell, President, National Service Division
Total Employees: 398,348
Service Employees: 27,000 (U.S. estimate)
Total Revenues, Fiscal Year-End 12/31/87: $54.2 Billion
Service Revenue: $7.69 Billion

The Company

IBM is a leading manufacturer of information processing equipment and services to all industries. In the small-systems market, IBM manufactures and markets a wide range of products, including the System 3X, 43XX, 937X, and AS/400 lines.

On June 21, 1988 IBM finally announced the much discussed "replacement" to its System 3X line. Code-named "Silverlake," this new product line, the AS/400, is intended to strengthen IBM's position in the small-systems market, where rival Digital Equipment Corporation had wrestled away the leadership role. The AS/400 addresses four key concerns of small-systems users: ease of use, ease of application migration, software development, and connectivity. Integral to improving ease-of-use (including service and support) was the introduction of an integrated set of support functions IBM calls Electronic Customer Support (discussed under the Service Delivery section).

The year 1988 proved to be a pivotal year for IBM in a number of areas. On January 28, IBM announced a major restructuring effort that in effect decentralized authority throughout the organization. IBM set up six new technology businesses under IBM United States. They are: IBM Enterprise Systems (where all IBM System 370 architecture systems and products are handled, including 309X, 438X, and 937X computers and their associated peripherals and operating systems); IBM Applications Business Systems (responsible for all System 3X and AS/400 computers and their associated peripherals and operating systems); IBM Personal Systems (responsible for all copiers, typewriters, personal computers, and their associated peripherals and operating systems); IBM Technology Products (responsible for semiconductors and technology packaging); IBM Communications Systems (responsible for communications products); and IBM Programming Systems (responsible for SAA and other software

development). IBM United States Marketing and Services Group (responsible for marketing and service, including the National Service Division) remains under IBM United States.

Beginning in late 1986 and continuing through 1987, IBM made significant changes in its service pricing and offerings. To win back service customers, IBM offered unprecedented service discounts (i.e., the Corporate Service Amendment and the Mid-Range System Amendment), service coverages (extending all systems service coverage to 24-hour/7-day per week), and parts policies (pared down the number of nationwide parts centers to 21, and instituted new emergency and after-hour parts order charges).

IBM continued to make significant changes in its service direction in 1988 by announcing Technical Services Management (TSM). Recognizing the growing need for comprehensive support for all equipment at a mixed-vendor data processing site, TSM provides three levels of IBM support of non-IBM products at an IBM system user's site. This service discussed further in the Service Delivery section.

In August 1988, IBM announced a series of product and service price hikes, effective in November. All maintenance agreement rates (including CSA and MRSA) will increase by 3%; T&M rates, installation charges, and system engineering charges will increase by 5%. These increases followed earlier price adjustments in February 1988, marking a rare situation when IBM changes price more than once a year.

In September 1988, IBM announced a broad series of telecommunications products and services; the most important (in a service sense) is IBM Telecommunications Services, Network Support. This offering is for voice and data communications networks involving both IBM and non-IBM devices. It provides the customer with network problem determination assistance from problem detection through fix verification from an IBM Network Support Center that operates around the clock. In essence, this offering is a TSM-like service offering for users of telecommunications products/services.

IBM's telecommunications support offering appears to be a by-product of IBM's acquisition of the Spectrum Services division of Pacific Telesis in March 1988. Founded in 1985, Spectrum Services offers diagnosis and support of problems of data and voice communications networks.

IBM also won a decision in the courts in 1988. A Philadelphia-based U.S. District Court ruled against upgrade and reconfiguration specialist Allen-Myland, Inc. AMI had contented that in 1980 IBM unfairly dominated the large-computer market and unfairly restrained trade (against the Sherman Antitrust Act) by bundling the parts and labor charges into one charge for IBM 308X upgrades. Key to IBM's defense was the definition of the large-system "market." The court ruled for IBM that smaller computer systems actually competed with IBM 308X's, contradicting AMI's contention that IBM held up to 79% of the large-computer "market." The court also ruled that IBM's thermal conduction module (integral to 308X design and a major cost component) actually made upgrades easier and reduced labor costs.

On November 3, 1987, IBM extended the Base Period of Maintenance coverage offered to users of all covered small systems to 24-hours a day, 7-days per week. This extension of IBM service coverage was a logical by-product of the MSRA, which already provided small-systems users with "around-the-clock" coverage.

Service Demographics

In 1987 worldwide maintenance revenues for IBM were $7,691 million, up 3.7% over 1986, as shown in Exhibit II-7. U.S. maintenance revenues actually declined in 1987, falling from $4,016 million in 1986 to $3,688 million. IBM attributed the decline in revenues to "improved product reliability and a greater proportion of maintenance gross income derived from long-term agreements at lower prices [read: CSA and MRSA], and increased competition [from third-party maintenance as well as other manufacturers]."

INPUT estimates that IBM employs 27,000 total service employees in the U.S., approximately two-thirds of which (18,000) are hardware engineers. These engineers are dispatched out of 233 service locations throughout the nation.

Service Delivery

All IBM system users receive 24-hour/7-day a week coverage as their standard maintenace coverage. Maintenance agreement holders are assured of around-the-clock availability of IBM spare parts (assured by IBM's Parts Inventory Management System, which tracks spares through two national parts distribution centers, 21 regional distribution centers, 323 branch office locations, and countless parts vans and customer engineer tool kits). Each customer engineer carries a 28-ounce portable terminal which links him via digital network to an extensive technical support network that provides dispatching, parts handling, and diagnostic and technical support capabilities.

Small-system users can opt for the Mid-Range System Amendment service plan. Available in three- and five-year contract lengths, the MRSA provides discounts of up to 30%. For these discounts, users agree to set and man a "help desk," which assures that operational problems have been corrected, error recovery procedures have been followed, failures have been clearly identified and logged, and Customer Problem Analysis and Resolution (CPAR) procedures have been performed properly. The customer must also fill out a written questionnaire, called the Self-Initialization Review in order to qualify for MRSA.

Another new option available to systems users is Customized Operational Services, a series of site management and planning services that includes site readiness service, contractor services, installation management, cabling, data center evaluation and design consulting, and relocation planning and management services.

IBM offers substantial prepayment discounts to users of selected small systems via the Extended Maintenance Option (EMO), which provides a discount ranging from 11-26%, depending on system and length of contract. In addition, the EMO option provides a guaranteed maintenance price for the length of the term selected. These discounts may be combined with discounts received from CSA and MRSA, provided that the length of terms are identical.

In August 1988, IBM announced the Technical Services Management service offering, under which IBM provides support on non-IBM products at IBM system sites. Specifically, IBM provides three levels of support under TSM:

- Repair Coordination, where IBM acts as the customer's designated representative in coordinating dispatching, escalation, problem tracking, and service status on all covered

non-IBM equipment. Customers continue their service contracts with the other service vendor.

- Maintenance Coordination, where IBM coordinates scheduled (i.e., preventive) maintenance visits as well as remedial service calls (covered under Repair Coordination)

- Service Management is the most expansive of the TSM options. With this option, IBM works with a list of "strategic alliances" and subcontracts the necessary service to selected service vendors. IBM takes responsibility for service vendor identification, contract negotiation and administration, and invoice reconciliation. IBM will consolidate all maintenance charges and present the user with a single monthly bill. TSM customers who opt for Service Management automatically receive Repair Management; Maintenance Coordination remains optional. IBM retains the option of doing the service itself rather than subcontract.

Users of IBM's newest family of small systems, the AS/400 line, benefit from Electronic Customer Support, which provides the following:

- Improved remote diagnostics and support, including "FAST PATH" automated dispatching of field engineers with the necessary parts

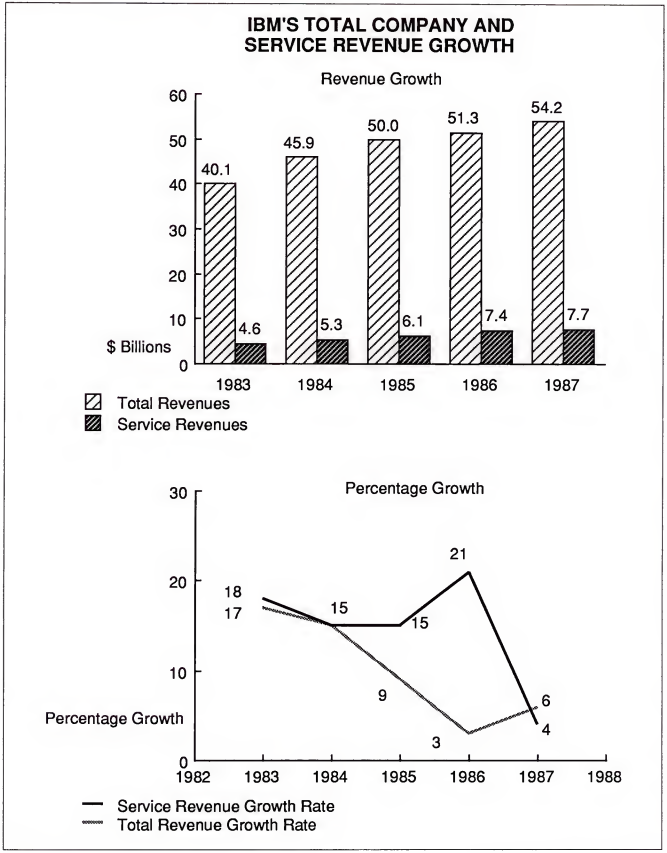
- Access to product and service information via IBMLink

- The ability to exchange technical information with IBM

- The ability to create and access local and remote data bases that can be customized by the user

- Resource and configuration management services

EXHIBIT II-7



NCR CORPORATION
1700 South Patterson Boulevard
Dayton, OH 45479
(513) 445-5000

Charles E. Exley, Jr., CEO
Richard Reese, VP Customer Services
Total Employees: 62,000
Service Employees: 20,000
Total Revenues, Fiscal Year-End
12/31/87: $5,641,000,000
Service Revenue: $1,952,000,000

The Company

NCR Corporation develops, manufactures, markets, installs, and services business information processing systems with products and services grouped in the following categories: industry-specific workstations, general purpose workstations, multiuser computer systems, large computer systems, communications processors, and synergistic products and services.

NCR continues to expand the definition of cutomer services by offering enhanced service options, such as consulting, systems integration, and network support. NCR launched its System Integration unit in May 1988. Operating under the Product Marketing and Support division, the new unit will concentrate on the financial services and retail industries and in the future may target the manufacturing, education, and government markets.

In late 1987, NCR's Worldwide Service Parts Center in Peachtree City (GA) began offering reconditioning and repair services on industry-standard equipment from more than 50 computer component manufacturers. The Georgia facility joins two other field engineer service centers (in Bethlehem, PA and Reno, NV) in providing third-party services.

Also in late 1987, NCR acquired the printer group of the Datagraphix division of Anacomp. Datagraphix, based in San Diego (CA), supplies computer output micrographic equipment and markets and services a line of high-speed laser and ion-deposition printers. The printer unit, with its 112 employees, was integrated into NCR's Customer Services Division, bringing new business opportunities in printer maintenance to NCR.

Service Demographics

As indicated in Exhibit II-8, NCR's service revenue for 1987 totaled $1.9 billion, a 13% increase from 1986 service revenue of $1.7 billion. This figure includes revenues from hardware and software maintenance, custom programming services, and data processing services. Service revenue for 1987 represents 34.6% of NCR's total revenues, as compared with 35.3% of total revenues in 1986. The increase in 1987's revenues was attributed to gains in international operations, particularly in software maintenance and third-party maintenance, as well as by data processing services in the U.S.

NCR employs approximately 6,000 field engineers working out of 400 service locations within the U.S. NCR also operates 114 repair and exchange centers as well as five parts distribution centers within the U.S. NCR's service network is made up of 15 regions, with an average of seven districts per region. These districts are segmented into zones covered by field engineers who specialize in a particular product line, such as retail or financial systems.

The Worldwide Service Parts Center (WSPC) in Peachtree City (GA) is the main ordering, stocking, and control center for service parts for all NCR customer service organizations worldwide. WSPC maintains an on-line real-time inventory system covering 230,000 different parts. WSPC actively manages 90,000 different parts and ships an average of 5,000 domestic and international orders, per day.

Service Delivery

NCR delivers the following services: manufacturer's warranty, hardware maintenance, software maintenance, education and training, installation and relocation, fourth-party maintenance, conversions and upgrades, and refurbishment.

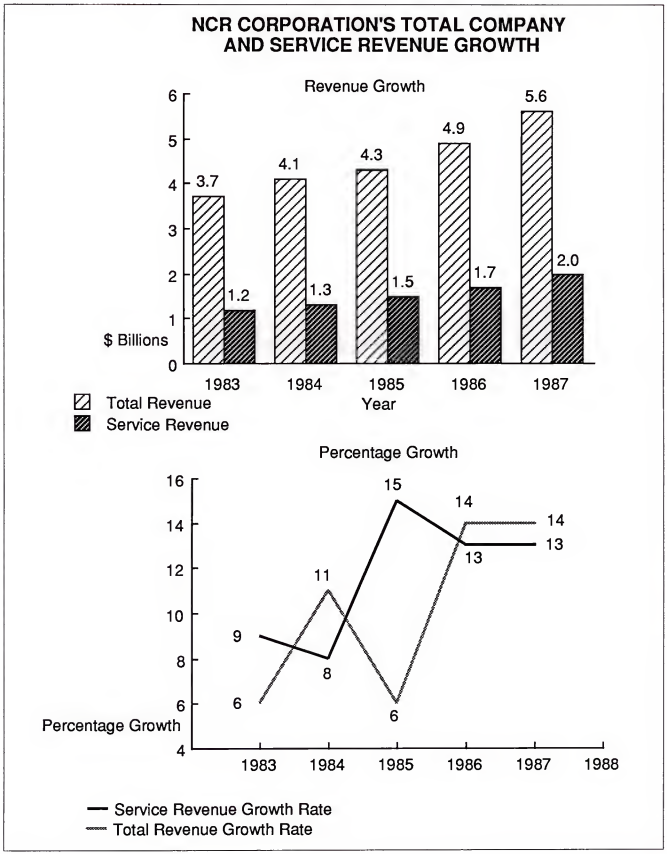
Standard hardware maintenance offerings include both 24/7 and 9/5 on-site coverage, with the length of the principal period of maintenance depending on the product covered by the agreement. NCR guarantees response times of 4 hours for micros and workstations, 2 to 4 hours for midrange systems, and 2 hours for large systems. Discounts are available for multi-year agreements, pre-payment of maintenance fees, carry-in service, call screening, performance, deferred response, and remote support. Both dollar and unit volume discounts are also available.

NCR offers remote support services, combining telephone communication and problem lead through with remote diagnostics. NCR provides a single point of contact for hardware-, software-, or firmware-related problems, a convenience since the

growing complexity of computer systems have made diagnosis of the problem source difficult for the customer. NCR has the capability to load firmware enhancements to the customer's system from its Central Support office. NCR also provides regularly scheduled preventive maintenance checks for certain NCR systems, using the Expert Systems Preventive Maintenance (ESPM) remote diagnostic tool. If ESPM detects any potential problem with the customer's system, the error logs are automatically sent to the NCR Remote Support Center, which then analyzes the log and proposes solutions.

NCR boasts that its training facility, the Central Technical Education Center (CTEC) in Dayton (OH), conducts over 100,000 student days of training for both NCR and customer personnel per year. In addition, NCR operates Customer and Support Education (CASE) facilities at Sugar Camp in Dayton, and provides regional training facilities at NCR offices throughout the U.S.

EXHIBIT II-8



STRATUS COMPUTER, INC.
55 Fairbanks Boulevard
Marlboro, MA 01752
(617) 460-2000

William Foster, President
Greg Sheard, Vice President,
Customer Services
Total Employees: 1,224
Service Employees: 180
Total Revenues, Fiscal Year-End
12/31/87: $184,150,000
Service Revenue: $20,131,000

The Company

Stratus Computer, Inc., founded in 1980, designs, manufactures, markets, and services a family of fault-tolerant Continuous Processing® Systems for on-line transaction processing and communications control.

Stratus services its customers by building remote detection and diagnostic features into its computers' architecture.

- Stratus computers monitor their own performances, isolate and identify problems and automatically dial in their self-diagnosis to a Stratus Customer Assistance Center (CAC).

In 1987, the company made advances in building a worldwide distributed-call data base. The expansion of its Remote Service Network will offer users with 24-hour on-line global support by unifying the six CACs, creating a single monitoring system.

The Stratus user-serviceable disk drive was introduced in 1987. These disk drives enable users to handle replacement and simple maintenance tasks without the assistance of Stratus technicians.

Service Demographics

In 1987 service revenue reached $20.1 million, a 60% increase over 1986 service revenue of $12.6 million, as shown in Exhibit II-9. Stratus management expects a 40% increase in service revenue in 1988.

Stratus provides support in the field through its workforce of approximately 30 field engineers out of a total of 180 service employees. The various remote support capabilities, as well as the redundant systems' reduced need for immediate field dispatching availability, allow Stratus to effectively support users while keeping support staff numbers relatively low.

Stratus currently operates customer assistance centers in Marlboro (MA) and Phoenix (AZ) to all domestic users. The company also has international customer assistance centers in London, Hong Kong, Amsterdam, and Frankfurt.

Service Delivery

The computers' diagnostic capabilities are the core of Stratus' Remote Customer Service Network, an on-line support service available to customers. All failures are monitored and detected by the system, and the user is notified of the exact location of the failure while the Stratus system logs a service call via dedicated modem directly to the CAC without user intervention or any degradation in processing.

CAC personnel, upon securing permission from the user site, run diagnosis remotely on the failed component and confirm the unit problem. If the system diagnoses a software problem, Stratus technicians can solve the problem remotely. If there is a hardware problem, the CAC arranges for next-day delivery of replacement parts. Users can replace parts while the system continues running at full speed. All problems and concurrent action taken by Stratus staff are recorded and filed for access in Stratus' Call Management data base.

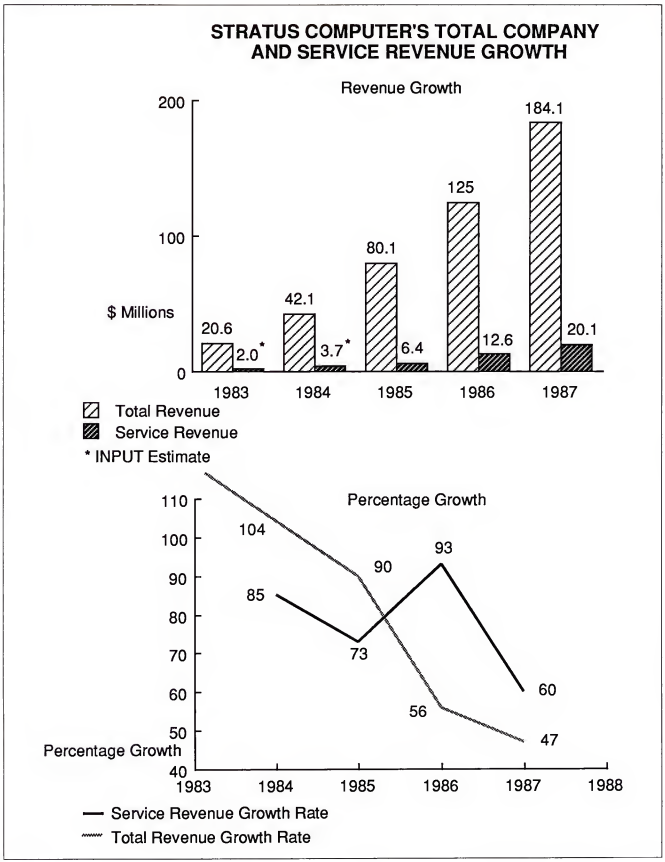
Primary services included in the service contract are: manufacturer warranty, hardware maintenance, software maintenance, training for fee, installation and relocation, and conversions and upgrades.

Three service agreements are offered to Stratus customers:

- The first option, available at 5% of list price, provides self-maintaining users with parts and assistance from the CAC when needed.
- The Co-Active Maintenance agreement is the second option and is available at 6.5% of list price. This option leaves routing and low-level replacement to user operators, but provides full Stratus support for the more complex units. Approximately 90% of all Stratus customers opt for this agreement.
- Traditional on-site maintenance contracts are also available to users at 10.5% of system list price.

Stratus offers one-year, prepaid fee discounts up to 10% to its contract customers.

EXHIBIT II-9



TANDEM COMPUTERS INC.
19333 Vallco Parkway
Cupertino, CA 95014
(408) 725-6000

James C. Treybig, President and CEO
Robert C. Marshall, Sr. VP, Customer Service Group
Total Employees: 7,007
Service Employees: 824
Total Revenues, Fiscal Year-End 9/30/87: $1,035,495,000
Service Revenue: $174,000,000

The Company

Tandem Computers Inc., founded in 1974, is a supplier of computer systems and networks for on-line transaction processing (OLTP).

In June 1988, Tandem consolidated its divisions into five operating groups, each headed by a senior vice president, in order to incorporate recent mergers and acquisitions into the company operations and to reflect an integration of present functions. The five groups are: the Tandem Systems Group, responsible for developing on-line transaction processing systems; the Tandem Marketing and Sales Group, responsible for marketing and sales of all Tandem products worldwide; the Ungermann-Bass Group, responsible for the development, manufacture, and sales of enterprise-wide local and wide area networking systems; the Tandem Companies Group, responsible for coordinating the development and manufacturing activities of several new Tandem divisions, creating products to expand Tandem's OLTP system capabilities; and the Tandem Customer Service Group, responsible for customer service and support.

Tandem beefed up its telecommunications operations with the acquisition of Integrated Technology Inc. of Plano (TX), now known as Tandem Telecommunications Systems Inc., and Ungermann-Bass of Santa Clara (CA), a leading supplier of network systems. These acquisitions allow Tandem to address the fastest growing sector of its on-line transaction processing business.

Tandem's first user-serviceable systems, able to diagnose faults and alert the computer operator, were introduced in 1987. These new systems are configured with field-replaceable units that enable on-line servicing. These systems incorporate on-board

sparing, duplication of components that allows continuous processing even if one of the components fails.

Service Demographics

As shown in Exhibit II-10, service revenue for fiscal 1987 grew 29% from $135 million in 1986 to $174 million in 1987. Growth in service revenue slowed in 1987 as a result of new technology that lowered service costs to customers.

Tandem employs 824 service personnel working out of approximately 80 locations in the U.S. Tandem operates more than 130 service locations worldwide. Support centers in Austin (TX), Germany, and England provide a combination of remote hardware and software support.

The National Support Center in Austin fields service requests, logging all calls in the Automated Call Tracking system. The Customer Assistance Center (CAC) gives over-the-phone support for Tandem's small-system products while large-systems remote support is provided by the On-Line Support Center. The National Dispatch Center receives and routes incoming service calls to customer engineers and the appropriate support specialists.

Service Delivery

Several service programs are available:

- Full On-Site maintenance is available for large, critical applications. One or two Tandem customer engineers are assigned to a customer's account. The standard package offers 9/5 coverage and includes preventive maintenance, remedial maintenance, implementation of field change orders, and a response time of 4 hours. Extended 24/7 coverage is available, and service coverage can be customized to schedule preventive maintenance and field change order installation during non-prime hours. The services of a resident CE are an available option.

- For customers willing to share maintenance responsibilities, Tandem offers the Cooperative Service option and the Shared On-Site option.

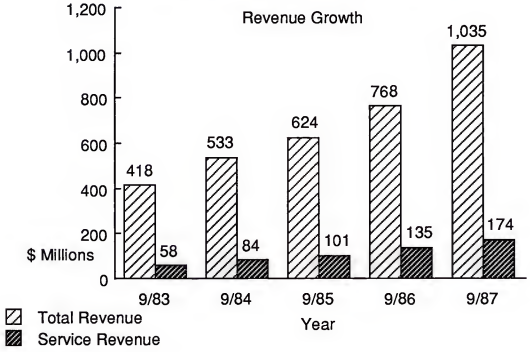
  - With the Cooperative Service option, Tandem provides assistance in problem diagnosis and resolution. Although customers perform the necessary repairs and replacement of parts, they have 24-hour access to National Support Center assistance. Customers can choose several parts delivery programs: priority delivery, with overnight parts shipment; 5-day delivery for non-crucial applications; and on-site parts

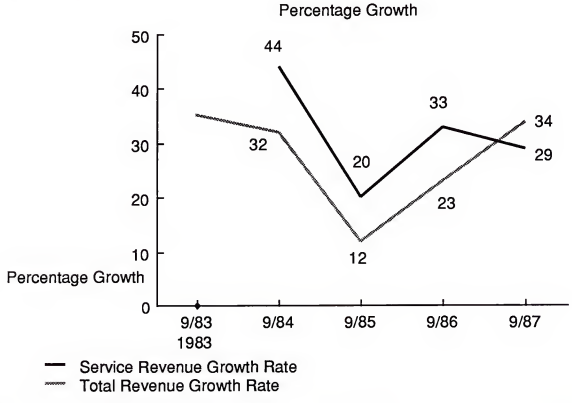
inventory, whereby customers may purchase and maintain on-site inventories of parts while Tandem specialists determine which parts to stock.

- Through the Shared On-Site option, Tandem provides preventive maintenance and assists the customer in performing remedial maintenance. The customer assumes responsibility for problem diagnosis and repair, but Tandem may dispatch a CE to verify on-site problem diagnosis and to replace parts.

EXHIBIT II-10

TANDEM COMPUTER'S TOTAL COMPANY AND SERVICE REVENUE GROWTH





Small-Systems Service Vendor Comparative Tables

EXHIBIT III-1

SMALL-SYSTEM VENDOR REVENUE ANALYSIS

Company	Total Company Revenues ($ Millions)	Percent Growth 1986-1987	Service Revenue ($ Millions)	Percent Growth 1986-1987
Apollo	554	41	87	52
AT&T	33,598	1	*	*
Concurrent	248	1	83	6
Data General	1,274	1	424	6
DEC	10,475	12	3,934	26
Harris	328	<47	100	*
HP	8,090	45	1,775	20
Honeywell Bull	2,059	* *	515	*
IBM	54,217	6	7,691	4
NCR	5,641	14	1,952	13
Stratus	184	47	20	60
Tandem	1,035	34	174	29

Note: All revenue figures are consolidated.

* - Company did not respond.
* * - New company formed 1987.

EXHIBIT III-2

SMALL-SYSTEM VENDOR SERVICE REVENUE ANALYSIS

Company	Total Service Revenue ($ Millions)	Total Service Employees (U.S. only)	Total FEs
Apollo	77	700	*
AT&T	*	*	*
Concurrent	83	650	250
Data General	424	1,500	800
DEC	3,934	42,000**	*
Harris	100	900	650
HP	1,775	*	*
Honeywell Bull	535	2,800	*
IBM	7,691	27,000†	18,000†
NCR	1,900	10,000	6,000
Stratus	20	180	30
Tandem	174	824	*

Note: All revenue figures are consolidated.

* - Company did not respond.
† - INPUT Estimate
** - Consolidated

EXHIBIT III-3

SMALL-SYSTEM VENDOR CONTRACT COVERAGE

Company	Standard Coverage (Hours/Days)				
	24/7	24/5	9/5	11/5	Other
Apollo			X		
AT&T			X		
Concurrent			X		
Data General			X		
DEC			X		
Harris			X		
HP			X		
Honeywell Bull					10/5
IBM	X				
NCR			X		
Stratus	X				
Tandem			X		

SMALL-SYSTEM VENDOR SERVICE EXCLUSIONS

Company	Billable Exclusions				
	Customer Error	Product Not under Contract	Software Problem	Alter./ Attach.	Act of God
Apollo		X		X	
AT&T		X		X	X
Concurrent		X		X	X
Data General	X	X	X	X	X
DEC		X		X	X
Harris	X	X	X	X	X
HP	*	*	*	*	*
Honeywell Bull	*	*	*	*	*
IBM	X	X		X	X
NCR		X		X	X
Stratus			X		
Tandem	*	*	*	*	*

* - Company did not respond.

EXHIBIT III-5

SMALL-SYSTEM VENDOR HOURLY RATE

Company	Hourly Rate			
	M-F 8 a.m - 5 p.m.	M-F After 5 p.m.	Saturday	Sunday & Holidays
Apollo	$125.00	$140.00	$140.00	$140.00
AT&T	120.00	180.00	180.00	240.00
Concurrent	110.00	130.00	130.00	130.00
Data General	*	*	*	*
DEC	150.00	150.00	150.00	150.00
Harris	150.00	170.00	170.00	170.00
HP	145.00	145.00	145.00	145.00
Honeywell Bull	159.00	175.00	175.00	175.00
IBM	262.00	301.00	301.00	301.00
NCR	156.00	203.00	203.00	203.00
Stratus	120.00	150.00	150.00	210.00
Tandem	*	*	*	*

* - Company did not respond.

SMALL-SYSTEM VENDOR DISCOUNTS—MULTI-YEAR AND PREPAY

Company	Discounts Available					
	Multi-Year			Prepayment		
	1st Yr	2nd Yr	3rd Yr	1st Yr	2nd Yr	3rd Yr
Apollo	Neg.			5%		
AT&T	X			X		
Concurrent	X			5%		
Data General	Variable			Variable		
DEC	Variable			5%		
Harris	Variable			7%	7%	7%
HP	*	*	*	*	*	*
Honeywell Bull	*	*	*	*	*	*
IBM		12-25**	17-30**			
NCR	Variable					
Stratus				10%		
Tandem	*	*	*	*	*	*

X - Provides discount, would not divulge discount
* - Company did not respond.
** - Includes call screening

EXHIBIT III-7

SMALL-SYSTEM VENDOR—OTHER DISCOUNTS OFFERED

Company	Other Discounts					
	Carry-In	Call Screens	Dollar Volume	Unit Volume	Remote Support	Deferred Response
Apollo			3-12	1-20		
AT&T	X					
Concurrent			4-20			
Data General						
DEC			1-21			
Harris	X	X	X	X	X	X
HP						
Honeywell Bull						
IBM		X	XX	XX		
NCR	X	X	X	X	X	X
Stratus						
Tandem						

X - Provides discount, did not divulge amount
XX - P/C only

SMALL-SYSTEM VENDOR SOFTWARE SUPPORT

Company	Software Support				
	How Performed			How Charged	
	On-Site	Remote	Both	Bundled	Hourly (H) or Monthly (M)
Apollo			X		M
AT&T			X	X	
Concurrent			X		M
Data General			X		M/H
DEC			X		M
Harris					
HP			X		M
Honeywell Bull					
IBM			X	X	
NCR			X		M/H
Stratus					
Tandem			X		NA

EXHIBIT III-9

SMALL-SYSTEM VENDOR SOFTWARE SUPPORT DISCOUNTS

Company	Software Support Discounts			
	Multi-Copies	Call Screen	Prepay	Multi-Year
Apollo	Neg.		5	Neg.
AT&T			X	X
Concurrent	X			
Data General	X		X	X
DEC	6-15		5	X
Harris				
HP	*	*	*	*
Honeywell Bull				
IBM				
NCR	X	X		
Stratus				
Tandem	*	*	*	*

* - Company did not respond.

EXHIBIT III-10

SMALL-SYSTEM VENDOR SUPPORT PROVIDED FOR OTHER EQUIPMENT

Company	Support Other Manufacturer's Products				
	Peripherals	Workstations/ Micro-computers	Mid-Range Systems	Large Systems	Software
Apollo	X				
AT&T	X	X	X		X
Concurrent	X	X	X		X
Data General		X			
DEC	X	X	X	X	X
Harris	X	X	X	X	
HP		X			
Honeywell Bull	X	X	X		
IBM	X				
NCR	X	X	X	X	
Stratus					
Tandem		X			

EXHIBIT III-11

SMALL-SYSTEM VENDOR SUPPORT PROVIDED TO TPMS

Company	Support Provided to TPMs							
	Local Access to Parts	Central Access to Parts Only	Maintenance Documentation	Engineer Change Orders	Tech. Support All Hours	Tech. Support	Training	Software Documentation
Apollo		X	X				X	X
AT&T		X						
Concurrent		X						
Data General								
DEC		X	X	X			X	X
Harris								
HP								
Honeywell Bull								
IBM	*		X	X		X	X	X
NCR								
Stratus								
Tandem								

* - Major parts centers only

Appendix: Questionnaire

Appendix: Questionnaire

A. Background

1 manufacturer/model: _____

2 service vendor: ❑ a. manufacturer
❑ b. TPM (go to TPM questionnaire)

3 service coverage: _____ a. days
_____ b. hours

B. Hardware Maintenance

4 a. How many system interruptions (on average) do you experience per month?
_____/mo.

b. What percent of these are:

1. hardware related?	%HW	_____
2. systems software related?	%sys SW	_____
3. applications software related?	%app SW	_____
4. other (user, power source, etc.)	%other	_____

5 On average over the past year:

	a. required	vs.	b. received
1. system availability	_____.__%		_____.__%
2. response time	_____.__ hrs.		_____.__ hrs.
3. repair time	_____.__ hrs.		_____.__ hrs.

6 a. Please rate on a scale of 1 to 10 (1 low, 10 high) the importance of each of the following aspects of support.

b. Then, on the same scale, please rate your current level of satisfaction with the support you're receiving from your vendor in that area.

	a. imptce (1-10)	vs.	b. sat.
1. HW engineer skill	_____		_____
2. HW phone-support staff	_____		_____
3. HW dispatch	_____		_____
4. spare parts availability	_____		_____
5. overall HW maintenance	_____		_____

7 a. Are you currently involved in the service of your system by performing any of the following tasks?

b. If no: On a scale of 1 to 10, how willing would you be perform these tasks for a discount on your systems service contract? _____

c. If yes: Do you receive a discount currently? (Yes/No) _____

If no: what discount would you expect to receive? (Q c.)

	a. involved now? (y/n)	b. willing (1-10)	c. percent discount (%)
1. board swaps	_____	_____	_____
2. component replacement	_____	_____	_____
3. diagnosis	_____	_____	_____
4. depot (mail/carry-in)	_____	_____	_____
5. support mgmt/control ("help desk") functions	_____	_____	_____

C. Software Support

8 a. Are you currently receiving operating software support from your system vendor? (Yes/No) _____

b. What percent of license fee do you pay for support? _____ %

9 a. Are you receiving support from your system vendor on any application software packages? (Yes/No) _____

b. What percentage (or range) of license fee(s) do you pay for support? _____ %

If no on both 8 and 9, proceed to question 13.
If yes on either 8 or 9:

10 Which of the following software services do you receive from your system vendor on a contract basis, and/or an ad-hoc basis? (check all that apply)

	a. contract	vs.	b. ad-hoc
1. on-site support	❑		❑
2. telephone hotline	❑		❑
3. remote support	❑		❑
4. problems database	❑		❑

11 a. Please rate on a scale of 1 to 10 (1 low, 10 high) the importance of each of the following aspects of software support.

b. Then, on the same scale, please rate your current level of satisfaction with the support you're receiving from your system vendor.

	a. imptce vs. (1-10)	b. sat.
1. on-site support	_____	_____
2. telephone hotline	_____	_____
3. remote support	_____	_____
4. problems data base	_____	_____
5. SW engineer skill	_____	_____
6. SW product reliability	_____	_____
7. software support overall	_____	_____

12 For the following questions, a "major software problem" can be defined as one in which processing cannot be continued, while a "minor software problem" allows processing to be performed with minor degradation. All questions refer to an average number of problems over the past 12 months.

a. average number of major problems reported _____
b. average number of major problems resolved _____
c. turnaround time of major problem resolution _____ hrs.

d. average number of minor problems reported _____
e. average number of minor problems resolved _____
f. turnaround time of minor problem resolution _____ hrs.

D. Educational Services

13 a. Which of the following types of education or training services do you receive from your system vendor? (Qs 1.-3.)

b. If yes: Do you receive that training on-site?
c. At a training center?
d. Through interactive video?
e. As computer-based training?
(check all that apply)

a. y/n	education training service	b. on-site	c. training center	d. inter-active video	e. computer-based training
1.	operational training				
2.	maintenance training				
3.	other				

14 Please rate your current level of satisfaction with the training/education support you're receiving from your system vendor.

	satisfaction (1-10)
1. subject matter	_____
2. amount of training	_____
3. training methods	_____

15 Are there areas in which you feel more courses should be offered? _____

_____

E. Documentation

16 a. Please rate on a scale of 1 to 10 (1 low, 10 high) the importance of each of the following aspects of systems documentation.

b. Then, on the same scale, please rate your current level of satisfaction with the documentation and manuals you're receiving from your vendor.

	a. imptce (1-10)	b. sat. (1-10)
1. HW user documentation	_____	_____
2. SW user documentation	_____	_____
3. training manuals	_____	_____

17 Please rate your system vendor's documentation in terms of the following qualities:

	(1-10)
a. accuracy	_____
b. usability	_____
c. clarity	_____
d. completeness	_____

18 a. How do you receive updates to your systems documentation? (check all that apply)

1. on-line _____
2. mail _____
3. other? _____

b. How often do you receive updates? _____

c. 1. Please rate your satisfaction with the update information (1 low, 10 high) _____

2. With the update process? (1 low, 10 high) _____

19 a. Does your vendor provide an avenue for feedback on documentation? (Yes/No) _____

b. On a scale of 1 to 10, how effective is it? _____

20 Which aspect of documentation do you feel needs most improvement? _____

_____

_____

F. Professional Services

21 a. Please rate the importance of planning and consulting services in each of the following areas (1-10).

b. Then rate your satisfaction with the service you've received from your vendor in each area (1-10).

	a. imptce vs. (1-10)	b. sat
planning:		
1. installation planning (environmental/site)	_____	_____
2. needs assessment planning	_____	_____
3. capacity planning	_____	_____
4. network design planning	_____	_____
5. overall planning services	_____	_____
consulting:		
6. site/facility management	_____	_____
7. network management	_____	_____
8. systems integration	_____	_____
9. disaster recovery	_____	_____
10. overall consulting services	_____	_____
other:		
11. installation/moves	_____	_____
12. changes/upgrades	_____	_____

22 Please rate on a scale of 1 to 10 (1 low, 10 high) your current level of satisfaction with the support you've received from your vendor in each area of planning/consulting.

	satisfaction (1-10)
a. expertise of staff	_____
b. offerings suitable to needs	_____
c. results of plng/consulting	_____

23 In what areas do you foresee a need for planning/consulting in the future? _____

_____

G. Pricing

24 Please rate your level of satisfaction with the price of the following services:

	(1-10)
a. hardware service	_____
b. software support	_____
c. education/training	_____
d. planning/consulting	_____

25 Do you receive a discount for any of the following reasons?

	(Yes/No)
a. reduced service coverage	_____
b. scheduled maintenance visits	_____
c. other (specify) _____	_____

H. TPM Related Issues

26 a. Does your HW vendor supply service to any other brands of equipment in your system? (Yes/No) _____

b. if yes: how satisfied? (1-10) _____

c. if no: if available, would you use HW vendor to support other brands of equipment? (Yes/No) _____

27 a. Have TPM companies approached you about your system service? Yes/No _____

b. Which ones? _____

28 Have you considered TPM:

	(Yes/No)
a. for HW	_____
b. for SW	_____
c. for education and training	_____
d. for planning and consulting	_____

if yes:	(Yes/No)
1. currently use TPM?	_____
2. plan to use in future?	_____

3. reasons for attraction: _____

_____

_____

THANK YOU!

Appendix: Definitions

Appendix: Definitions

Applications Software - Software that performs processing to service user functions.

Artificial Intelligence - The academic discipline involving the study of the processes by which humans perceive and assimilate data (and use reasoning to process this data) for the purpose of duplicating these processes within computer systems. Also, this term refers to the computer systems that accomplish these duplicated processes.

BOC - Bell Operating Company.

Consulting - Includes analysis of user requirements and the development of a specific action plan to meet user service and support needs.

Dispatching - The process of allocating service resources to solve a support-related problem.

Divestiture - The action, stemming from antitrust lawsuits by the Department of Justice, which led to the breakup of AT&T and its previously owned local operating companies.

Documentation - All manuals, newsletters, and text designed to serve as reference material for the ongoing operation or repair of hardware or software.

End User - May buy a system from the hardware supplier(s) and do own programming, interfacing, and installation. Alternatively, may buy a turnkey system from a systems house or hardware integrator.

Expert Systems Applications - Applications for expert systems—a computer system based on a data base created by human authorities on a particular subject. The computer system supporting this data base contains software that permits inferences based on inquiries against the

information contained in the data base. Expert systems is often used synonymously with "knowledge-based systems," although this latter term is considered to be broader and to include expert systems within its scope.

Engineering Change Notice (ECN) - Product changes to improve the product after it has been released to production.

Engineering Change Order (ECO) - The follow-up to ECNs that include parts and a bill of material to effect the change in hardware.

Escalation - The process of increasing the level of support when and if the field engineer cannot correct a hardware or software problem within a prescribed amount of time, usually two to four hours for hardware.

Fiber Optics - A transmission medium which uses light waves.

Field Engineer (FE) - For the purpose of this study, field engineer, customer engineer, service person, and maintenance person were used interchangeably and refer to the individual who responds to a user's service call to repair a device or system.

Field Service Management System (FSMS) - A specialized application program that automates some (if not all) of the following activities of a field service organization: call handling, dispatching, parts inventory and tracking, billing, efficiency reporting, and other functions. Ideally, the system accesses one data base from which each function can use and modify data.

Hardware Integrator - Develops system interface electronics and controllers for the CPU, sensors, peripherals, and all other ancillary hardware components. May also develop control system software in addition to installing the entire system at the end-user site.

ISDN - Integrated Services Digital Network. A proposed standard for digital networks providing transport of voice, data, and image using a standard interface and twisted pair wiring.

LADT - Local Area Data Transport. Data communications provided by the BOCs within local access transport areas (LATA).

Large System - Refers to traditional mainframes including at the low end IBM 4300-like machines and at the high end IBM 308X-like machines. Large systems have a maximum word length of 32 bits and a standard configuration price of $350,000 and higher.

Mean Time Between Failures (MTBF) - The elapsed time between hardware failures on a device or a system.

Mean Time to Repair - The elapsed time from the arrival of the field engineer on the user's site until the device is repaired and returned to the user for his utilization.

Mean Time to Respond - The elapsed time between the user placement of a service call and the arrival at the user's location of a field engineer.

Microcomputer - A microprocessor-based single- or multi-user computer system typically priced less than $15,000. A typical configuration includes an 8- or 16-bit CPU, monitor, keyboard, two floppy disk drives, and all required cards and cables.

Minicomputer - See Small System.

Operating System Software (Systems Software) - Software that enables the computer system to perform basic functions. Systems Software, for the purposes of this report, does not include utilities or program development tools.

PBX - Private Branch Exchange. A customer premises telephone switch.

Peripherals - Includes all input, output, and storage devices, other than main memory, which are locally connected to the main processor and are not generally included in other categories, such as terminals.

Planning - Includes the development of procedures, distribution, organization, and configuration of support services. For example, capacity planning, "installation" planning.

Plug-Compatible Mainframe (PCM) - Mainframe computers that are compatible with and can execute programs on an equivalent IBM mainframe. The two major PCM vendors at this time are Amdahl and National Advanced Systems.

Professional Services - A category services including system design, custom programming, consulting, education, and facilities management.

RBOC - Regional Bell Operating Company. One of seven holding companies coordinating the activities of the BOCs.

Remote Diagnostics - Gaining access to a computer from a point physically distant from the computer in order to perform problem determination activities.

Remote Support Implementation - An extension of remote diagnostics where some level of support delivery is performed from a point physically distant from the computer. Currently, this capability is more common to software support where problems can be solved or circumvented through downline loading of new code (fixes).

Reseller - A marketing organization which buys long-distance capacity for others at wholesale rates, selling services at retail but discounted prices and profiting on the difference.

Small Business Computer - For the purpose of this study, a system which is built around a Central Processing Unit (CPU), has the ability to utilize at least 20M bytes of disk capacity, provides multiple CRT workstations, and offers business-oriented systems software support.

Small System - Refers to traditional minicomputer and superminicomputer systems ranging from a small multi-user, 16-bit system at the low end to sophisticated 32-bit machine at the high end.

Software-Defined Network - A private network which uses public network facilities and which is configurable on an as-needed basis by the user (see Virtual Private Network).

Software Engineer (SE) - The individual who responds (either on-site or via remote support) to a user's service call to repair or patch operating systems and/or applications software.

Software Products - Systems and applications packages which are sold to computer users by equipment manufacturers, independent vendors, and others. Also included are fees for work performed by the vendor to implement a package at the user's site.

Superminicomputer - See Small System.

Systems Integration - The action of a single service vendor's design, development, and implementation of a system or subsystem including integration of hardware, software, and communications facilities for a customer.

System Interruption - Any system downtime requiring an Initial Program Lod (IPL).

Systems House - Integrates hardware and software into a total turnkey system to satisfy the data processing requirement of the end user. May also develop systems software products for license to end users.

T-1 - Refers to a standard I.544 megabit per second digital channel used between telephone company central offices and now used for microwave, satellite, fiber optics, or other bypass applications.

Third-Party Maintenance (TPM) - Any service provider other than the original equipment vendor.

Training - All audio, visual, and computer-based documentation, materials, and live instruction designed to educate users and support personnel in the ongoing operation or repair of hardware and software.

Turnkey System - Composed of hardware and software integrated into a total system designed to completely fulfill the processing requirements of a single application.

VSAT - Very Small Aperture Terminal. A small satellite dish system, usually using Ku-band frequencies.

Virtual Private Network - A portion of a public network dedicated to a single user.