INPUT

MANAGEMENT PLANNING PROGRAM IN FIELD SERVICE

MANAGEMENT PLANNING PROGRAM

IN

FIELD SERVICE

OBJECTIVE: To provide senior field service executives with basic information and data to support their management of the total field service activity.

DESCRIPTION: Clients of this program receive the following services each year:

- Field Service Briefs - Six reports which analyze important new technical and management issues within the field service areas. Reports focus on specific issues that require timely attention by senior management.
- Major Planni… of major tec… will assist ir… field service… an in-depth analysis ommendations that in the planning of
- Annual Repo… services incl… field service… and manage… requirement… tivities in the field effects on future anges in technical affect the future
- Annual Pres… field servic… research an… program for… of each year… se presentation to e previous year's s for the research ur in the first half
- Inquiry Serv… needed basi… staffed ever… ch staff on an as- ecial "hot line" is uirements.

RESEARCH METH… omputers, commu-nications and assoc…

- Research to… sentatives. with client repre-
- Research fo… universities, ith users, vendors,
- Conclusions … staff. gement of INPUT's
- Professional staff members supporting this program have 20 or more years of experience in data processing and communications, including senior management positions with major vendors and users.

F-1981
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Alternative Training Methods for Field Service Personnel.

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FIELD SERVICE PROGRAM

FIELD SERVICE BRIEF

ALTERNATIVE TRAINING METHODS FOR FIELD SERVICE PERSONNEL

APRIL 1981

ALTERNATIVE TRAINING METHODS FOR FIELD SERVICE PERSONNEL

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I INTRODUCTION

A. OVERVIEW

- Over the past 25 years, field engineering education has progressed at a much faster rate than conventional forms of education. Methods being introduced in public and private institutions have been in use in many data processing corporations for several years.

- Today, computer technologies are advancing at such a rapid rate that field engineering groups are finding themselves faced with an increasing number of product types and a change in the basic skill base. New diagnostic methods, advanced test equipment, and system software complexities are forcing education departments to be more innovative.

- It is not unusual for a complete field force to spend one month in training each year. In the future, the training required to maintain an adequate field force will increase at such a rate that FEs could find themselves spending more time in school than in providing service to their customers. Therefore, the challenge for education is to incorporate training methods which provide a high-quality education while minimizing the impact on field operations.

- This brief discusses several training methods being used today in education, their advantages and disadvantages and their impact on day-to-day operations. It also examines what can be done to alleviate the shortage of qualified field engineers, and what impact the shortage is having on the industry today.

- The increased number of corporations entering the computer industry has caused a serious shortage of experienced field engineers.

  - As a result of the movement of FEs from company to company, an unstable field force has developed and salaries within the industry have escalated drastically. Corporations are finding themselves forced to hire the few experienced people, and paying the premium demanded, rather than building their own field force through training and education.

- The lack of militarily trained people has caused the trade schools to attempt to fill the gap; unfortunately their concept of what industry requires often does not match the real needs.

- The industry must commit itself to building future labor pools either by cooperative ventures or by instituting extensive basic training programs within their corporations.

- Many options are open to a corporation to improve the effectiveness of its educational system. The four options discussed in this brief are:

  - Lecture/lab.

  - Self-study.

  - Video instruction.

  - Computer Programmed Instruction (CPI).

- Details of these four options, the costs of each, and their advantages and disadvantages are covered.

B. THE IMPORTANCE OF TRAINING

- The skills required by a field engineer are changing because of the rapid advances in today's technology. The internal speed of a system is causing old test equipment to become obsolete and diagnostics to play an increasing role in product maintenance.

  - Mixed vendor environments are also causing interface knowledge requirements to be much more critical.

  - It is no longer valid for a company to teach only its own equipment: FEs must understand the overall system to provide adequate service.

- Problem determination will be the main direction of education over the next several years.

- Steady progress toward remote maintenance on large mainframes will require field personnel to become more involved with managing customer situations and less technically proficient. The impact of this on FE morale is being felt more and more.

  - Documentation, such as map charts, is also shifting the skill level of the FE toward interpretation rather than equipment knowledge. The continuing maintenance philosophy of board replacement and fault locating diagnostics supports the overall concept of site management as the key role of FEs. Training will have to match this philosophy.

  - Continuing to teach equipment theory becomes detrimental to the goals of most corporations.

1. COST

- The cost of keeping a student in class for 20 days is approximately $1,860.00. This cost is based on the following estimates:

Average airline ticket $500.00/20 days	=	$25.00 per day
Average hotel or apartment costs	=	30.00 per day
Meals $20.00 per day for seven days/five days	=	28.00 per day
Car rental, two students per car	=	10.00 per day
Total student cost per day of class	=	$93.00 per day

- Although the above costs may vary, they have risen over 40% compared to the average of $65.00 four years ago. With an average of eight students per class, the unburdened expense of running a 20-day class has gone from $10,400 to $14,880. Nine classes per year will cost an additional $40,320, a very real reason to look to alternative methods.

2. TRAINING BY EQUIPMENT TYPE

- Training differs greatly, depending on the equipment type. Although large mainframes are more complex than other equipment, they are not more difficult to repair. Therefore, the same training stress must be applied to all equipment, regardless of size or complexity.

- Mainframe computers: training for mainframes is usually done in phases; e.g.:

  - Hardware training in-depth for support specialists.

  - Diagnostics, or phase 1, training for field engineers.

- Support, or phase 2, training for branch and region specialists.

- System software training for program support representatives and for a growing number of field engineers.

- Minicomputers: unlike mainframes, minicomputers are generally taught in total rather than phases. Hardware theory, diagnostics and Field Replaceable Unit (FRU) training are taught, along with applications and systems software.

  - Applications and systems software are an important part of the minicomputer business.

  - Teaching the mini as a total system forces the field engineer to learn business applications: how his hardware impacts its user, which is something he normally does not have the chance to learn but must understand.

- Teleprocessing and terminals: teleprocessing and terminal training require very clear objectives and carefully defined maintenance philosophies. All field engineers are trained in FRU replacement and adjustment procedures. Some percentage must be trained in teleprocessing-environment troubleshooting.

  - This is one of the most difficult courses to write because of the variation in communication methods.

  - Problem determination can be very difficult when terminal replacement is not possible.

- Point of sales: point of sales equipment training has its own set of challenges. This customer environment is different from that of any other data processing group.

  - Nontechnical training must be dealt with seriously. The FE must understand his customer's business and what impact his actions will

have on that business. This forces education to provide in-depth support training to ensure that the field engineer is capable of keeping the business operating.

- Along with FE training, education has to consider store management training, operator training, and real-time system applications.

II UNDERSTANDING EDUCATION

A. TRAINING

- Upper management must understand and evaluate education as it does any other part of its business. In order to build an effective education package, regardless of the method used, the following steps must be taken:

  - Define the task field engineering must perform.

  - Set training objectives to ensure these tasks are covered.

  - Constantly evaluate the class by administering practice performance problems, tests, and student evaluations.

  - Implement a strong measurement program to test the effectiveness of the training.

  - Be prepared to adjust the course to the measurement results.

- The cost of any education department must stay within a predetermined percentage of the field engineering revenues. The responsibility of the education manager is to stay within the parameters of this plan, monitor the overall business situation and adjust the department accordingly. Ideally, this monitoring is done monthly.

- A corporation's future growth and existing requirements must be considered before it makes decisions to adopt new training methods. The time required to institute new programs is substantial. Almost all methods, except lecture/lab, require long development programs and a commitment of resources. The end result, however, more than justifies the means.

B. THE IMPACT OF CURRENT EVENTS ON EDUCATION

- The events taking place today give us a very good indication of the next five years.
  - The technology being developed will obsolete many of the existing troubleshooting techniques.
  - This, combined with the use of highly sophisticated test equipment, will necesitate the upgrading of present field forces.
  - The trend toward software maintenance will increase at a more rapid rate, causing a severe shortage of software support personnel.
  - In order to fill this gap, companies will be forced to train their hardware FEs in software support.
- Increasing maintenance costs and mixed shop environments are increasing the number of users handling their own maintenance. This will require the suppliers to furnish educational programs available to, and tailored to, specific users.
- Nontechnical training, such as customer relations, interviewing skills, and management development, will have to increase in order to instruct the FE in proper site management. To keep up with the demand of new products and field upgrades, new training methods must be adopted. Corporations must

commit themselves to basic training programs to compensate for the continuing shortage of qualified field engineers.

- With the continuing inflation spiral, corporations will be forced to become more dependent on computer assisted education, video systems and programmed instruction.

III AVAILABLE TRAINING METHODS

A. OVERVIEW

- Several factors must be considered when selecting a training method.
  - Development time.
  - Cost.
  - Effectiveness.
  - Existing training facilities.
- Every training method carries with it a difference in commitment, cost, and other advantages/disadvantages. This section examines the following four most common training methods in use today:
  - Lecture/lab.
  - Self-study.
  - Video.
  - Computer Based Instruction (CBI).

B. LECTURE/LAB TRAINING

1. ADVANTAGES

- Lecture is the most common method of education in field engineering used today. It is also the easiest method because of its short development time and low resource requirements.

  - The development cycle of a lecture/lab course is approximately eight hours of writing for every one hour of lecture time.

  - Due to the interaction between the students and the instructor, greater student interest is maintained, providing, of course, the instructor staff is of high quality.

- Lecture/lab best fits the basic education courses because new employees can be evaluated easily. Due to the low development costs, lecture/lab is the least expensive method of training for small numbers of students.

2. DISADVANTAGES

- There are disadvantages to this method:

  - The quality of courses is often inconsistent because of instructor capabilities.

  - The length of classes varies because of extraneous information discussed.

  - Lecture/lab requires dedicated instructors for the duration of the course.

- Resurrecting courses becomes difficult because of the reassignment of instructors.

- There is also the problem of limiting the students' capacities because of the size of both the instructor staff and the required facilities. High-volume product education becomes very expensive with this method.

3. COSTS

- Lecture/lab course cost estimates are based on the following assumptions:

-	Instructor salary	$28,000.00 per year
-	Student living expense	$ 68.00 per day
-	Air travel expense	$ 500.00 per student
-	Facilities costs at $2 per square foot for 1,150 square feet	$ 2,300.00 per month
-	Class length	20 days
-	Number of students	8 per class
-	Number of instructors	2 per class

- Following is a breakdown of each of the above categories.

  - Course development costs - using the industry standard of eight hours of development time for every one hour of class time, a 20-hour course would require 160 days of development: eight months. Eight months of development would cost $18,000 in instructor salary.

- Student expenses - the student expenses per class can be broken down as follows:

  . Living expenses - $68 x 20 days = $1,360 per student

  . Travel expenses - $500 average cost = $ 500 per student

  Total per student per class = $1,860

- Instructor salary - two instructors at a standard salary of $2,333 per month each, equals a cost of $4,666 per class.

- Facilities cost - approximately 1,150 square feet of space are needed, at a cost of $2.00 per square foot, for a total cost of $2,300.

- Based on these estimates, an eight-man class would cost:

  . Student expenses = $14,800

  . Instructor salaries = 4,666

  . Facilities costs = 2,300

  Total = $21,846

4. SUMMARY

- Based on the previous estimates, the training of students over a one-year period would cost $240,306.

  - The estimates are based on a limited capacity. More instructors, more facilities, or both may be required.

- Although the upfront costs of lecture/lab are low, the ongoing costs become prohibitive if large groups must be trained.

C. SELF-STUDY METHOD

- Self-study is an extremely valuable training method, but it can rarely stand alone. Self-study can be used very effectively in situations where students are learning differences about products they have already been trained for. Also, interspersed with other training methods, self-study increases the effectiveness of that method.

- The most widely used self-study method is linear, where the information is simply transposed into sections and tests. Many of the other methods of self-study offer remedial training. Their development time can be up to four times that of the linear method as they are very difficult to write.

1. ADVANTAGES

- Once the self-study course is written, it is the most inexpensive field training method. When used with other training methods, such as video, self-study is extremely effective. Also, self-study tends to compress the course because the extraneous information found in the classroom is deleted. Industry standards estimate a two to one compression. Some immediate advantages of self-study are:

  - The quality of courses is consistent.

  - Large volumes of students are handled quickly.

  - Courses are available anywhere in the field at any time.

2. DISADVANTAGES

- A major disadvantage of self-study is the time required to develop a self-study package. The linear method, which simply takes information and transposes it into sections, requires approximately 26 hours of writing for each hour of instruction.

- It is very difficult to measure or control the effectiveness of self-study. No records of who has been trained, or their performance level, can be made.

- Another difficulty with the self-study course is that when it is administered in the field the proper time or facilities required may not be allocated.

- Students also experience difficulty in understanding and retention because of the lack of instructor-student interaction.

3. COSTS

- Since each hour of self-study requires 26 hours of writing (this is based on the linear method), a 20-day course would require 520 days of development time, or 4,160 hours. A breakdown of the total price of a 20-hour course is:

-	4,160 hours/160 hours	=	26 months
-	Instructor costs, 26 months	=	$60,658
-	Printing costs, estimated	=	$12,000
	Total	=	$72,658

- From a straight cost standpoint it appears to be very attractive. However, the following questions need to be answered.

  - Is a lab required for the course?

- If there is a serious maintenance problem in the field, how quickly can it be resolved?

- How are the results of the course going to be validated?

- Who is available if the student has problems understanding the material?

- The solutions to these questions can increase the cost of a self-study course considerably.

D. VIDEO AND MEDIA COURSES

- Video is one of the fastest growing methods of training large groups spread over several locations. The recent advances in technology and the ability to interact with microprocessors make the potential of video tremendous.

- In field engineering, a majority of the information is technical, requiring that the producers of video courses be extremely knowledgeable about the equipment taught, the functions involved in the jobs of an FE, and the video media itself. This results in a large investment of time and money when putting together a training staff.

- There are very few independent companies specializing in video education for field engineering. Those that do specialize in video courses should be used, not only to develop video courses but to assist in the development of in-house video departments.

  - There are several other forms of media education. Unfortunately their uses are not as flexible as video. For example, audio-slide presentation is excellent for teaching large groups but one is limited to what can be shown on a slide.

- Audio-tapes are easy to carry and can be used in a variety of applications, however, with no visual capabilities, students have a difficult time retaining the information.

- Due to its growing popularity, only video will be addressed.

I. ADVANTAGES

- The advantages of video far outnumber the disadvantages, as the following list indicates.

  - Video matches the entertainment media. Thus, students used to watching television are receptive to it.

  - Information is compressed 4:1, resulting in shorter classes.

  - Expenses are reduced by:

    . Less student time at the educational center.

    . Eliminating travel completely in many cases.

  - The quality of courses is consistent and can be updated very easily.

  - New microprocessor systems allow video to interact with the student.

  - Facility requirements can be stabilized.

  - Training on discontinued products can be ongoing, with little or no impact on the field.

2. DISADVANTAGES

- The major disadvantage of video is the high front-end expense of equipment and staff personnel.

  - Video also requires a long development cycle: about 50 hours of development for one finished hour of video.

  - Video, like the self-study courses, is very difficult to manage in the field.

3. COSTS

- Video costs are based on the following assumptions:

  - Video coordinator salary of $28,000 per year.

  - A 20-day lecture course to be placed on tape.

  - Existing installation of 20 remote locations of learning.

  - Purchase of equipment capable of producing a high-resolution 3/4-inch master (this will used to film at remote locations with low light).

  - All equipment costs amortized over five years.

  - Fifty hours of development for one hour of video with existing lesson plan.

- Course development costs: an average of 1,000 man-days of development are required for 20 hours of video (calculated at 50 hours of development for one hour of video) using three staff people. This breaks down further to 8,000 man-hours, 160 per month, for a total of 50 man-months. The cost of 50 man-months of development is $166,650.

- Equipment costs: the cost of equipment, amortized over five years, breaks out as follows:

-	$80,000 production equipment costs	=	$1,333 per month
-	$25,000 remote learning equipment*	=	416 per month
	Total monthly payment	=	$1,749

*Video playback equipment

- Services and material costs: video is not the total answer to education; the upfront costs are considerable. Video is an appropriate medium when other forms of education are interspersed to increase its effectiveness. The following costs are based on in-house production. However, unless at least ten productions a year are made, outside vendors should be retained.

-	Duplicating and final edit	$ 2,000
-	Blank tapes	650
-	Salary costs	166,650
-	Equipment costs	1,599
-	Services	2,650
	Total cost	$173,549

E. COMPUTER BASED INSTRUCTION

- Computer Based Instruction (CBI) has been used very effectively by both IBM and CDI (Control Data Institute) over the past several years. It not only has

all the advantages of interactive self-study, it also handles many of the management functions which limit the self-study method.

- In the past, education managers were very reluctant to use CBI because of the extensive programming and terminal network required. Now that many branch offices are already tied to the central data base for logistics and other management information services, CBI is a natural add-on.

- The programming effort has also been significantly reduced with the availability of educational program packages. The main problem today is the availability of qualified instructors with experience in writing CBI courses.

I. ADVANTAGES

- The advantages of computer based instruction courses are many, as illustrated below.

  - Time spent at the education center is reduced significantly.

  - Large volumes of students can be handled quickly.

  - Remedial education is already built into most systems.

  - Education schedules can be flexible because instructors and classrooms need not be scheduled.

  - Software education can be done totally from any location because the remote terminal will simulate any environment needed.

  - Most systems offer management tracking and automatic enrollment.

- Courses can be corrected and updated at the central site quickly.

- Student comments and questions can be monitored from the central site, allowing instructor-student interaction.

- Measurement results are available at the central site to validate course results.

- Tests and quizzes can be changed to eliminate cheating.

2. DISADVANTAGES

- The disadvantages of CBI are as follows:

  - Hardware system costs are high.

  - A long development cycle is required - 100 hours of development to one hour of instruction.

  - Students tire of communicating with a terminal.

  - Lack of visuals prevents certain types of information from being effectively taught on terminals.

  - System terminal networks are required.

3. COST

- The cost of CBI is extremely difficult to calculate.

  - If a terminal network is in place, then only course development and monitoring are required. However, if the purchase of a terminal network is necessary, the cost will obviously be significantly higher.

- Companies who are not equipped to put a network in place still have the CBI option by using outside learning centers, such as those offered by CDI. These centers are located throughout the country and will also assist in course development.

- Regardless of resources, course development time must be considered as a primary cost item. Course development calculations are based on 100 hours of writing for a one-hour course. This would result in 16,000 hours of development, or 1,000 days, for a 20-day course. So, 16,000 hours divided by 160 hours per month equals 100 months, or over four man-years. This adds up to development costs of $224,000 at today's instructor salaries.

- At first glance, CBI seems to be extremely expensive. However, eight students in a lecture/lab course cost $14,880 in expenses alone. Therefore, the development costs of CBI are more than paid for after 16 classes.

IV COST COMPARISONS

A. HARDWARE COST COMPARISON

- In the previous section, the cost of each training method when used exclusively was analyzed. In reality, this is rarely the case. To teach a hardware course with any method, a lab is usually required. Therefore, airfares, living expenses, and other facilities are still required.

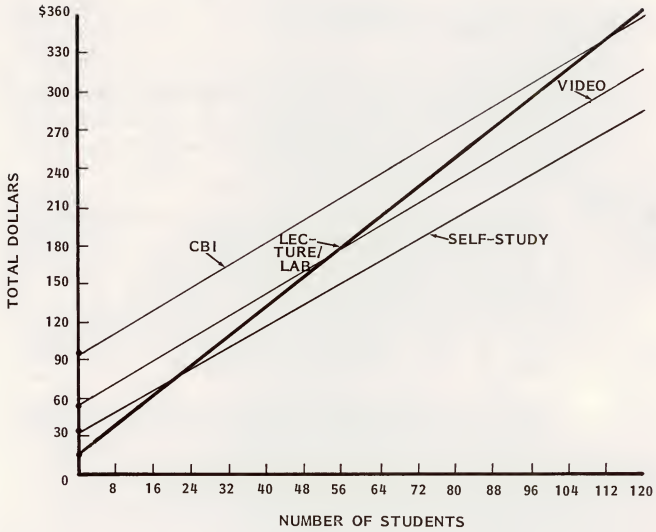
- A reduction of 35% of the length of a lecture course is considered the optimum, and the goal most companies try to attain. For example, a course of 20 days reduced 35%, would shorten the time by seven days. The expense of keeping a student at the education center is approximately $68.00 per day. So, with a 35% reduction, the savings would be in the neighborhood of $476.00 per student per class. This results in an overall savings of $52,120 for 120 students.

- Exhibit IV-1 graphically displays the breakeven point and the projected cost for each method as opposed to a 20-day lab/lecture hardware cost. The following assumptions were used in creating the graph:

  - Twenty-day lab/lecture development cost = $18,664
  - Thirteen-day lab/lecture development cost = 12,132
  - Seven-day self-study development cost = 21,230

EXHIBIT IV-1

COSTS OF A TWENTY-DAY
HARDWARE COURSE TAUGHT
BY VARIOUS METHODS



- Seven-day video development cost = 40,827
- Seven-day CBI development cost = 81,655
- Twenty-day lab/lecture class expense = 19,546
- Thirteen-day lab/lecture class expense = 13,403

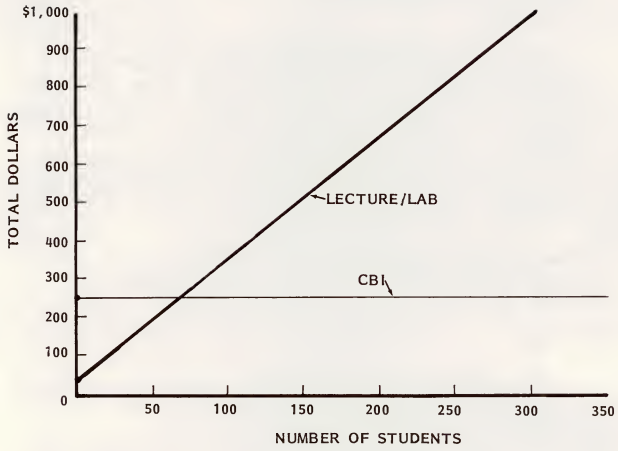
B. SOFTWARE COST COMPARISON

- Software courses are almost completely lecture, with lab training done on a console or terminal. Using CBI and video, software courses can be done completely at the branch level. This eliminates travel, living and training expenses. So, after the development effort, the expenses become academic. As shown in Exhibit IV-2, after fewer than 100 students, the course pays for itself. After training 200 students, a savings of $300,000 will have been realized.

- Companies contemplating extensive software training must examine CBI. CBI will, in the long run pay for all the resources needed for its implementation.

EXHIBIT IV-2

COSTS OF A TWENTY-DAY
SOFTWARE COURSE TAUGHT
BY CBI VERSUS LECTURE/LAB



V CONCLUSIONS AND RECOMMENDATIONS

- Many education departments decide on a specific training method and then tailor their course to fit that method. No one training method should be used exclusively. The method that best accomplishes the goal should be used; then other methods should be integrated to achieve an optimum.

- Video deals with visuals better than any other method, and should be used for that purpose.

  - It must, however, be supported by study guides; tests must be administered to validate performance; and management should be notified of the student's progress. Companies with terminals in all, or most, of the branch offices are ideally positioned to use computer based instruction also.

- To start video, CBI, or any new program, takes a large investment in both time and money. The time to begin is now. IBM, CDC, Honeywell, and Univac have been instituting new methods of training for many years. Their educational costs per installed revenues are well below those of the medium sized companies within the industry. Other corporations must follow their lead.

- Many common courses are being taught by several data processing companies, and such duplication is expensive. Those companies who are creating courses which may already exist elsewhere should investigate education companies, such as AVES and TTS, to determine if cooperative ventures could help

alleviate their costs. This would allow the companies to concentrate on their products, rather than on education.

- In order to stay current, education managers must be familiar with state-of-the-art teaching techniques.

  - As new methods are introduced, they should be judged on merit and used where they will be most appropriate.

  - Innovation has been the key to field engineering education over several years. Training methods developed by FE are being incorporated into universities and other learning institutions.

- Over the next several years, training departments will be required to keep up with increasing demands. Those who are not postured to take advantage of the latest and most cost-effective training methods will face a bleak future.

SUBSCRIPTION PROGRAMS: Designed for clients with a continuing need for information about a range of subjects in a given area. All subscription programs are fixed-fee and run on a calendar-year basis:

- Management Planning Program in Information Systems - Provides managers of large computer/communications facilities with timely and accurate information on developments which affect today's decisions and plans for the future.

- Management Planning Program for the Information Services Industry - Provides market forecasts and business information to software and processing services companies to support planning and product decisions.

- Company Analysis and Monitoring Program for the Information Services Industry - Provides immediate access to detailed information on over 2,500 companies offering turnkey systems, software and processing services in the U.S. and Canada.

- Management Planning Program in Field Service - Provides senior field service managers in the U.S. and in Europe with basic information and data to support their planning and operational decisions.

MULTICLIENT STUDIES: Research shared by a group of sponsors on topics for which there is a need for in-depth "one-time" information and analysis. A multiclient study typically has a budget of over $200,000, yet the cost to an individual client is usually less than $30,000. Recent studies specified by clients include:

- Selling Personal Computers to Large Corporations

- Productivity Improvement, 1980-1983: Survival Strategies for EDP Executives

- Opportunities in Communications Services for Digital Information: A Study of User Networks and Needs

- Improving the Productivity of Engineering and Manufacturing Using CAD/CAM

- CAD/CAM System and Service Market Opportunities

CUSTOM STUDIES: Custom studies are sponsored by a single client on a proprietary basis and are used to answer specific questions or to address unique problems. Fees are a function of the extent of the research work. Examples of recent assignments include:

- Determination of the U.S. market for small computer systems in 1985.

- Analysis of the opportunities and problems associated with field service capabilities for CAD/CAM systems.

- Analysis of the market potential for third-party maintenance.

- 1981 ADAPSO Survey of the Computer Services Industry.

- Evaluation of the current status and future trends of software terms and conditions.

- Analysis and forecast of user self-maintenance for a vendor's line of equipment.

ABOUT INPUT

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff members analyze and interpret the research data, then develop recommendations and innovative ideas to meet clients' needs. Clients receive reports, presentations, access to data on which analyses are based, and continuous consulting.

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Formed in 1974, INPUT has become a leading international consulting firm. Clients include over 100 of the world's largest and most technically advanced companies.

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MANAGEMENT PLANNING PROGRAM IN FIELD SERVICE

MANAGEMENT PLANNING PROGRAM

IN

FIELD SERVICE

OBJECTIVE: To provide ser information and data to support their manage

DESCRIPTION: Clients of th s each year:

- Field Service Briefs w technical and management issu issues that requi cus on specific
- Major Planning n-depth analysis of major techni mendations that will assist in th the planning of field services.
- Annual Report - ties in the field services industry fects on future field service pl ges in technical and managemer ect the future requirements of
- Annual Presenta presentation to field service ex previous year's research and to r the research program for the n the first half of each year.
- Inquiry Service staff on an as-needed basis thr al "hot line" is staffed every wo ements.

RESEARCH METHOD: outers, communications and associate

- Research topics are selected by INPUT based on discussions with client representatives.
- Research for this program includes professional interviews with users, vendors, universities, industry associations, and other analysts.
- Conclusions derived from the research are based on the judgement of INPUT's staff.
- Professional staff members supporting this program have 20 or more years of experience in data processing and communications, including senior management positions with major vendors and users.

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FIELD SERVICE PROGRAM

FIELD SERVICE BRIEF

MAINTENANCE OF WORD PROCESSING EQUIPMENT

JUNE 1981

MAINTENANCE OF WORD PROCESSING EQUIPMENT

TABLE OF CONTENTS

LIST OF EXHIBITS

I INTRODUCTION

A. SCOPE

- This brief is published as part of INPUT's 1981 Field Service Program (FSP).

- The focus of this brief is to explore the maintenance of word processing equipment as viewed by administrative managers and by EDP managers.

- The area was chosen because of the growing importance of word processing systems among FSP clients. This growth results from the emergence of office automation in the integration of word and data processing systems leading to the office of the future.

- Some data for this brief was gathered from EDP managers as part of INPUT's annual survey of EDP managers. A separate mail questionnaire was sent to administrative managers. The intent is to:

  - Develop an analysis of similarities and differences between EDP managers and administrative managers, the two key buyers of word processing equipment.

  - Create a link between INPUT's analysis of EDP equipment and the 1981 information on word processing equipment. (Word processing equipment

is covered for the first time in FSP in 1981, and was included as an equipment type in the 1981 EDP user survey.)

- Data included in this brief results from analysis of responses from 22 EDP manager and 28 administrative manager interviews, all from companies having installed word processing equipment. The EDP managers represented those who, from a total survey of 108 EDP managers, indicated a responsibility for word processing equipment. The fact that only 20% of EDP managers had this responsibility reaffirms earlier INPUT findings that the great majority of EDP managers are not yet active in word processing equipment procurement.

B. WORD PROCESSING EQUIPMENT MAINTENANCE MARKETS

1. WORD PROCESSING AND OFFICE AUTOMATION

- INPUT determined in its study, Managing the Integration of Office Automation in the EDP Environment, that total 1978 expenditures on computer and communications products to support office automation were less than 10% of office personnel costs of over $72 billion. Office automation represents an enormous potential market for information systems products and services, including maintenance.

  - The referenced study found management responsibility for procurement and administration of office automation products was still widely dispersed, particularly in large companies. Although EDP managers almost universally recognized that because word processing systems can categorize and store information they are key to office automation, fewer than 60% of EDP managers in nearly 500 respondent companies had any responsibility for word processing systems.

  - Word processing systems are currently being used by over 50% of respondents to the study mentioned above, and will be used by nearly 80% by 1985.

- Analysis in INPUT's impact report, Office of the Future: Opportunities for Service Companies, indicates that over 200,000 word processors are currently installed and serviced, and that the number will increase by a factor of 5 by 1985.

  - Currently priced between $10,000 and $20,000, shared logic or communicating word processors with expanded capabilities are increasingly providing data processing-like facilities for their users.

  - INPUT believes that the distinction between word and data processing will blur as the office of the future evolves through the decade.

2. PRELIMINARY MARKET FORECAST FOR MAINTENANCE SERVICES

- Assuming that the average installed word processing system costs $12,500, then the value of the 1980 installed base of 200,000 units exceeds $2 billion. With an annual unit growth rate forecast of 25% and a net unit price increase forecast of 5% resulting from added functions and inflation, offset in part by technology cost reduction, the 1985 value of installed word processing systems will exceed $9 billion. This is shown graphically in Exhibit I-1.

- An average current annual price of maintenance of 6% of purchase price indicates the 1980 market for maintenance of word processing systems was $150 million in the United States. The growth of this market will depend on three major factors:

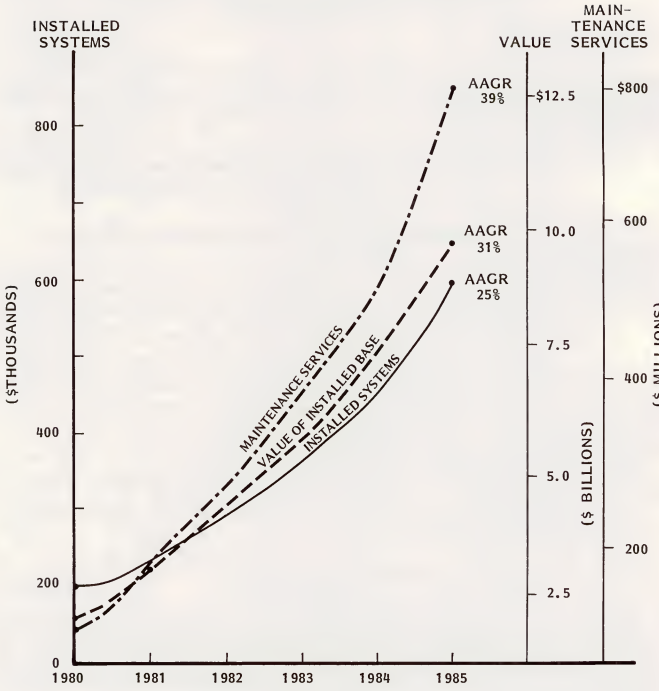
  - The rate of new equipment installation.

  - The price of the new equipment. Because of increased functions on new equipment, particularly communications capability, INPUT estimates that the average price of new equipment will increase by 5% per year.

  - The relationship of the price of maintenance to the price of equipment. Prices will tend to increase due to inflation, particularly with regard to

EXHIBIT I-1

MARKET FORECAST OF MAINTENANCE SERVICES FOR WORD PROCESSING SYSTEMS, 1980-1985



AAGR = AVERAGE ANNUAL GROWTH RATE

labor and travel. These increases will be partially offset by greater user involvement in maintenance, and by more reliable equipment. INPUT estimates that a likely rate of increase in the price of maintenance relative to equipment is 6% per year.

- The actual growth of the maintenance market therefore depends on the actions vendors take in the design of product offerings as well as the demand of the market. New products which are complex and expensive will increase the market faster than new products which are simpler and less expensive to maintain.

- In Exhibit I-1 the potential range of market growth rates is presented.

  - The minimum rate, 25%, parallels the rate of new unit installations, and assumes the average maintenance revenue per new unit is the same as the current average maintenance revenue for installed units.

  - The maximum rate, 39%, assumes more complex units, and applies a 5% annual price increase and a 6% annual increase to the maintenance rate relative to the price. The high growth rate results from a compounding of those factors.

- Data which INPUT has gathered on growth rates of individual vendors of word processing equipment maintenance shows individual rates in the 25% to 100% annual growth range. While the actual growth rate of word processing maintenance cannot be forecast with certainty from available data, it is clear that it is growing faster than the rate of field service revenues for EDP equipment.

- Although preliminary, INPUT's assessment of the market for maintenance of word processing systems indicates a highly attractive market, particularly in prospects for growth. The 30% growth in word processing maintenance is half again as great as the 20% rate forecast by INPUT for EDP product maintenance revenues.

3. BUYING POINTS

a. Word Processing Equipment

(i) EDP Managers' Viewpoint

- Word processing equipment is unique because it logically falls under the responsibility of the administrative manager where typing is largely controlled; yet the systems which are evolving often include data processing concepts, hence the involvement of the EDP managers. It is essential for vendors to recognize this duality.

  - Nearly 50% of respondent EDP managers in companies with word processing equipment reported that they had primary responsibility for the equipment either directly or as members of the corporate automation committee. As shown in Exhibit I-2, another 30% were involved in the buying process.

  - In most cases, although the dominant voice today is still the administrative manager, the EDP manager is clearly a target for selling word processing equipment maintenance services.

- INPUT believes that as word processing and data processing functions are integrated in the office, the importance of EDP managers as a buying source for word processing maintenances services will increase.

(ii) Administrative Managers' Viewpoint

- Buying points for word processing systems differ between the company corporate office and operating division/plant locations. As shown in Exhibit I-3, administrative managers at corporate headquarters reported that the primary buying point is either at the operating department/division or administrative executive level. Over 20% reported that the buying decision can be made without involving others.

EXHIBIT I-2

BUYING POINTS FOR WORD PROCESSING EQUIPMENT
AS REPORTED BY DATA PROCESSING MANAGERS

LEVEL	FUNCTION	PORTION OF RESPONDENTS
PRIMARY DECISION-MAKER	MIS/DP EXECUTIVE	43%
	CORPORATE EXECUTIVE	19
	OPERATING DIVISION/DEPARTMENT EXECUTIVE	19
	ADMINISTRATIVE SERVICES EXECUTIVE	14
	AUTOMATION COMMITTEE	5
OTHERS INVOLVED	ADMINISTRATIVE SERVICES MANAGER	37
	OPERATING DIVISION/DEPARTMENT EXECUTIVE	29
	MIS/DP EXECUTIVE	19
	AUTOMATION COMMITTEE	10
	CORPORATE EXECUTIVE	5

NUMBER OF RESPONDENTS = 21

EXHIBIT I-3

BUYING POINTS FOR WORD PROCESSING EQUIPMENT
AS REPORTED BY ADMINISTRATIVE
MANAGERS AT COMPANY HEADQUARTERS

LEVEL	TITLE/FUNCTION	PORTION OF RESPONDENTS
PRIMARY DECISION-MAKER	OPERATING DIVISION/DEPARTMENT EXECUTIVE	42%
	ADMINISTRATIVE SERVICES EXECUTIVE	42
	CORPORATE EXECUTIVE	11
	MIS/DP EXECUTIVE	5
OTHERS INVOLVED	NONE	21
	WORD PROCESSING SUPERVISOR	21
	ADMINISTRATIVE SERVICES EXECUTIVE	21
	OFFICE/ADMINISTRATIVE MANAGER	16
	CORPORATE EXECUTIVE	16
	MIS/DP EXECUTIVE	5

NUMBER OF RESPONDENTS = 19

- There is an apparent conflict between what administrative managers at corporate centers and DP managers reported about buying points for word processing systems. Apparently EDP managers are involved in those selections where EDP is given responsibility, but are left out of many selections entirely.

- The selling situation is simplified at division/plant locations. Here the primary decision-maker, as shown in Exhibit I-4, is the division/plant manager or the administrative services director. The director of purchasing and the word processing supervisor are frequently involved in the buying process.

b. Changes In The Buying Process

- Over 90% of EDP managers and over 80% of administrative managers reported that the buying point for word processing equipment was not changing in their companies.

- The greatest changes reported were at division/plant locations where administrative managers reported greater involvement in the buying decision at the local versus corporate level. This stability in the buying process was also a finding in INPUT's 1981 survey of 108 users as reported in the 1981 Field Services Annual Report.

c. Maintenance Services

- DP and administrative managers by and large confirmed that the buying point for maintenance services is the same as for word processing equipment.

- While the buying points for word processing equipment and for maintenance services at the corporate level remain the same, over 20% of administrative managers reported that the procurement/purchasing manager is the buying point at the division/plant level.

EXHIBIT I-4

BUYING POINTS FOR WORD PROCESSING
EQUIPMENT AS REPORTED BY ADMINISTRATIVE
MANAGERS AT COMPANY DIVISIONS/PLANTS

LEVEL	TITLE/FUNCTION	PORTION OF RESPONDENTS
PRIMARY DECISION-MAKER	PLANT/DEPARTMENT MANAGER	44%
	ADMINISTRATIVE SERVICES DIRECTOR	44
	AUTOMATION COMMITTEE	12
OTHERS INCLUDED	NONE	12
	PURCHASING	22
	WORD PROCESSING SUPERVISOR/ MANAGER	22
	ADMINISTRATIVE SERVICES MANAGER	22
	OPERATING MANAGER	11
	COMPUTER COMMITTEE	11

NUMBER OF RESPONDENTS = 9

- Little change was reported in the buying point for maintenance services by either DP managers or administrative managers. Administrative managers did report greater involvement of the end user in the buying process.

- It is clear that vendors wanting to capitalize on this growing market must identify the key decision-maker at the user location from among the alternatives discussed above.

II WORD PROCESSING EQUIPMENT AND MAINTENANCE SERVICES

A. WORD PROCESSING EQUIPMENT

- The mix of word processing equipment vendors as reported by administrative managers and EDP managers is quite similar, with one significant difference, as shown in Exhibit II-1. Administrative managers reported fewer installations of IBM and more of Wang equipment than did EDP managers, but otherwise the vendor distribution is comparable. IBM's strong position in EDP equipment clearly carries over into word processing equipment in EDP-dominant environments.

B. WORD PROCESSING MAINTENANCE VENDORS

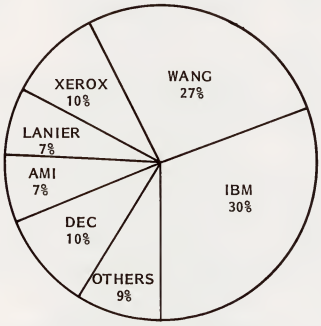
- The distribution of word processing maintenance vendors, as shown in Exhibit II-2, shows a similar pattern to that for equipment vendors, as reported by administrative and EDP managers.

- Comparison by vendor indicates that for word processing equipment as with EDP equipment, the equipment vendor is usually the maintenance vendor. Over 90% of administrators and EDP managers confirmed this finding.

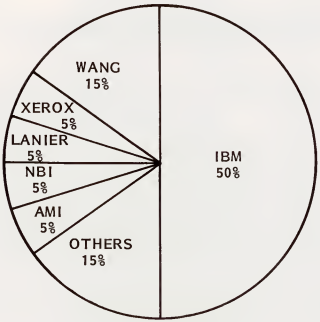
- Some shift away from using the equipment vendor as the maintenance vendor was reported.

EXHIBIT II-1

DISTRIBUTION OF WORD PROCESSING EQUIPMENT
VENDORS IN RESPONDENT COMPANIES



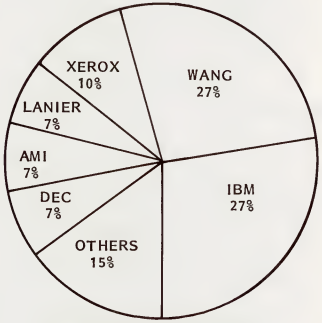
ADMINISTRATIVE MANAGERS



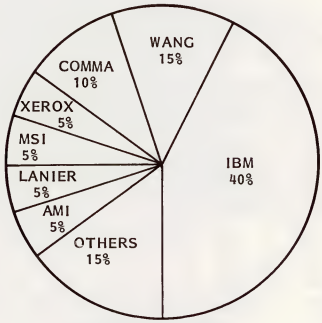
EDP MANAGERS

EXHIBIT II-2

DISTRIBUTION OF WORD PROCESSING MAINTENANCE SERVICES VENDORS IN RESPONDENT COMPANIES



ADMINISTRATIVE MANAGERS



EDP MANAGERS

- The shift occurred for IBM installations and some equipment vendors grouped in the "other" category.

- EDP managers with IBM data centers and IBM administrative terminal systems, when using a third-party maintenance vendor, are likely to also contract maintenance of word processing equipment with the same third-party vendor (an example is Comma, as reported by 10% of EDP managers).

C. MEAN TIME TO RESPOND

- Administrative managers reported that it generally took the maintenance vendor less time to respond when called than did EDP managers. Exhibit II-3 shows that across the range of response times from 1 to 24 hours, office managers reported better vendor responsiveness. A likely reason is the more direct link between the end user and the maintenance vendor as opposed to the added level of communication when maintenance is requested through the EDP manager.

- Administrative managers rated mean time to respond approaching eight hours as unacceptable.

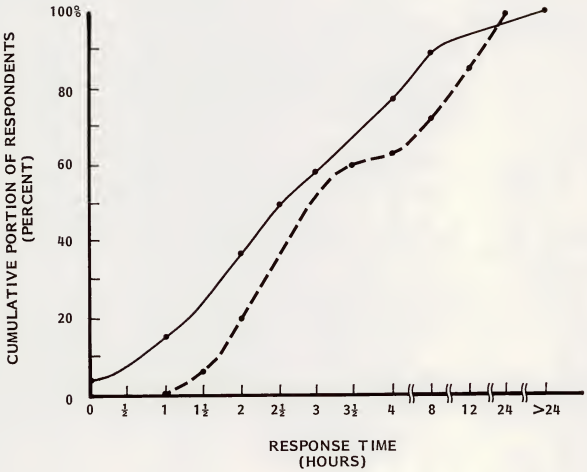
- Those rating response time as unacceptable are willing to pay increased maintenance costs of up to 10% to achieve a desired response time of less than four hours.

D. MEAN TIME TO REPAIR

- Administrative managers reported that it generally took the maintenance vendor less time to repair word processing equipment than did EDP managers.

EXHIBIT II-3

MEAN TIME TO RESPOND
FOR MAINTENANCE OF WORD PROCESSING
EQUIPMENT AS REPORTED BY RESPONDENTS



- Exhibit II-4 shows that across the range from 1 to 24 hours, administrative managers reported better vendor performance. Vendor effectiveness is nearly the same for times up to two and one-half hours to repair.

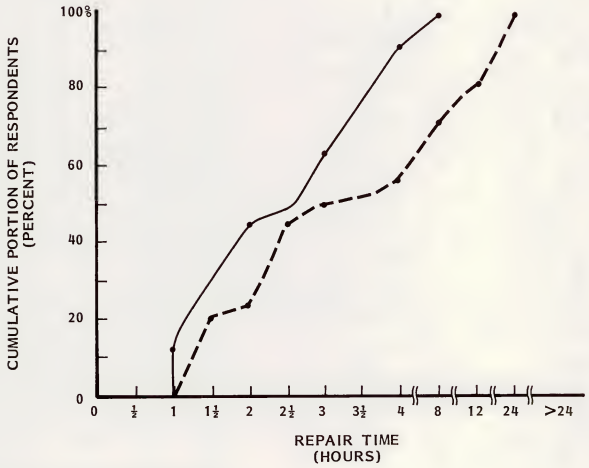
- The concentration of administrative manager respondents from corporate headquarters (67%) in large metropolitan areas, with resulting better spare parts availability, is a likely reason for the wide difference in vendor performance for mean times to repair greater than two and one-half hours.

- Administrative managers rated mean time to repair approaching three and one-half hours as unacceptable.

  - Those rating repair times as unacceptable are willing to increase maintenance costs up to 10% to achieve a desired mean time to repair times of no more than one and one-half hours.

EXHIBIT II-4

MEAN TIME TO REPAIR WORD PROCESSING
EQUIPMENT AS REPORTED BY RESPONDENTS



III USER ATTITUDES TOWARD MAINTENANCE

A. USER SATISFACTION

1. EQUIPMENT UTILIZATION

- Utilization of word processing equipment as reported by administrative managers and by EDP managers is contrasted in Exhibit III-1. Single-shift operation over a five-day week results in five shifts; the maximum number of shifts is 21.

- The major portion (67%) of administrative manager respondents were from corporate headquarters where five-day single-shift operation is the norm. Over 70% of administrative managers reported five-shift utilization, whereas just over 25% of EDP managers reported such utilization.

- EDP managers reported considerably greater word processing equipment utilization. The probable explanation is that word processing systems falling under EDP manager responsibility are located in operational areas where multi-shift operation is more the norm.

2. SYSTEM AVAILABILITY

- EDP managers reported greater word processing availability than did administrative managers, as shown in Exhibit III-2:

EXHIBIT III-1

UTILIZATION OF WORD PROCESSING
EQUIPMENT AS REPORTED BY RESPONDENTS

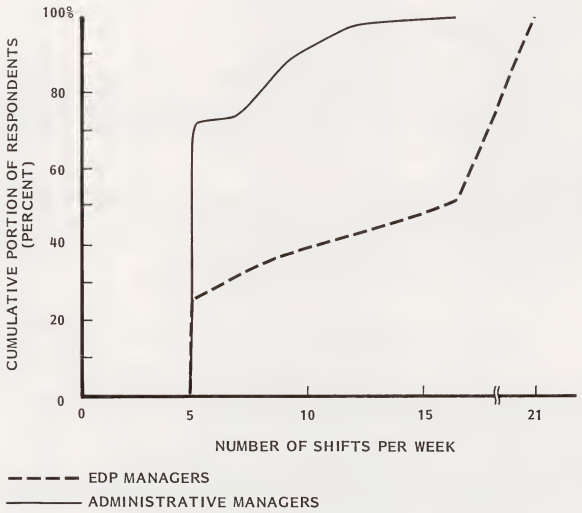
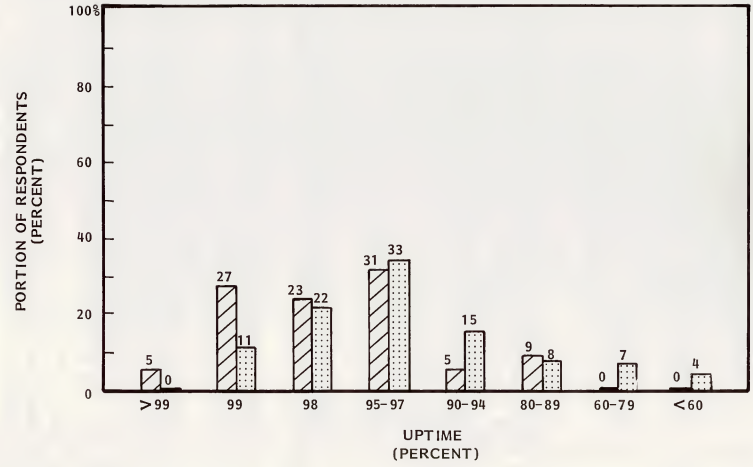


EXHIBIT III-2
WORD PROCESSING EQUIPMENT UPTIME
AS REPORTED BY RESPONDENTS



- Over 30% of EDP managers reported uptime exceeding 98%.

- Over 50% of both EDP and administrative managers reported word processing equipment was available between 95% to 98% of the time.

- Over 30% of administrative managers reported uptimes of less than 95%.

- The higher uptime for EDP managers is related to the higher number of shifts, in that any downtime can be spread over a larger operating time.

- In confirmation of the above finding, EDP managers reported better mean time between failures (MTBF) experience for word processing equipment than did administrative managers. Although the number of available data points (five responses) for EDP managers is insufficient for more detailed comparison, Exhibit III-3 confirms that EDP managers consistently reported better MTBF than did administrative managers (23 responses).

3. QUALITY OF MAINTENANCE

- Both administrative managers and EDP managers were uniformly consistent in rating the quality of maintenance for word processing systems.

- As shown in Exhibit III-4, nearly 80% of both administrators and EDP managers rated maintenance quality high.

- The data is consistent with the finding that only 22% of administrative managers experienced unacceptable combinations of mean time to respond and mean time to repair word processing equipment.

- Over 15% of administrative managers at company headquarters had replaced word processing systems within the past two years primarily due to unsatisfactory response time. This indicates that vendors are well advised to monitor response times at headquarters locations.

EXHIBIT III-3

MEAN TIME BETWEEN FAILURES OF WORD PROCESSING EQUIPMENT AS REPORTED BY RESPONDENTS

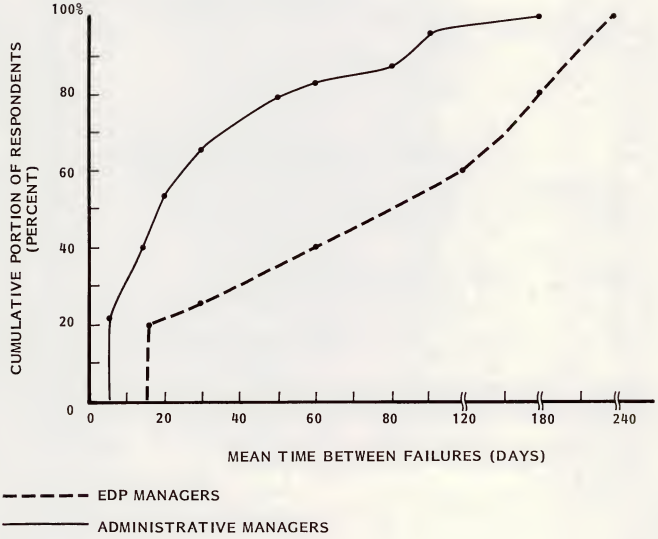
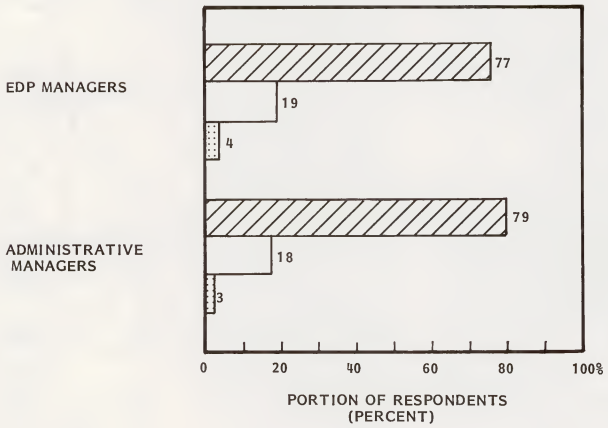


EXHIBIT III-4

SATISFACTION WITH THE QUALITY OF
MAINTENANCE FOR WORD PROCESSING
EQUIPMENT AS REPORTED BY RESPONDENTS



B. MAINTENANCE RELATED ISSUES

- Administrative and EDP managers' attitudes toward a number of issues related to maintenance are contrasted in Exhibit III-5. EDP managers' ratings cover both data processing and word processing equipment, whereas administrative managers' ratings are for word processing equipment only.

- Equipment reliability, corresponding uptime, response time and repair time are of highest importance to both administrative and EDP managers.

- Software maintenance is next in importance, even more so to administrative managers than to the EDP managers who often have the capability to accomplish software maintenance in-house.

- EDP managers rated having field engineers on-site for maintaining both data processing and word processing equipment much higher than did administrative managers. In fact, except where large numbers (i.e., 50 or more) of word processing systems are installed, administrative managers rated having on-site field engineers as unimportant.

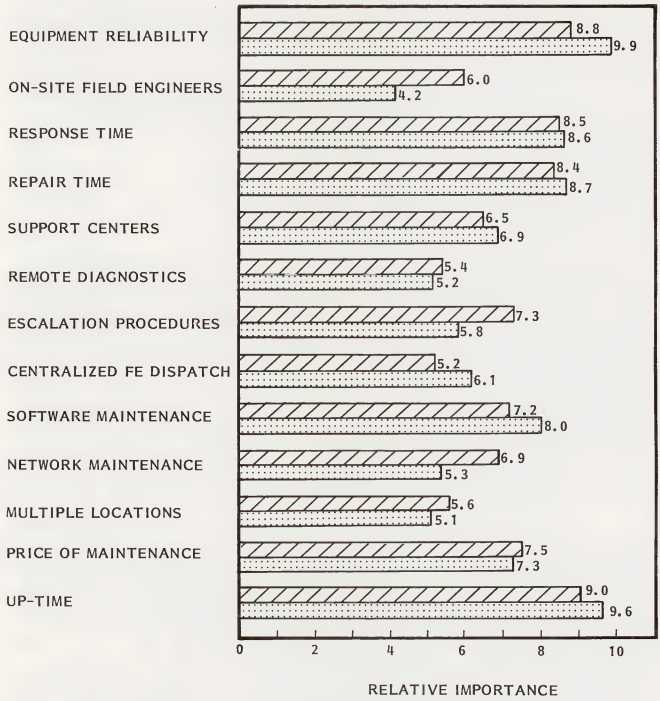
- More familiar with the process, EDP managers rated escalation procedures as considerably more important than did administrative managers. INPUT expects this difference to disappear as word processing equipment is integrated into communications networks, permitting remote diagnostics to be used as the first maintenance level.

- With few word processing systems connected in either local or remote networks, administrative managers rated network maintenance of much lesser importance than did EDP managers. This difference will fade as data and word processing are integrated in the office environment.

- On balance, administrative managers and EDP managers rated the maintenance related issues remarkably alike.

EXHIBIT III-5

RESPONDENTS' RATINGS OF MAINTENANCE RELATED ISSUES



- Administrative managers were even stronger than EDP managers in rating uptime and equipment reliability as the top two issues.

- Administrative managers ranked price of maintenance as the sixth most important issue versus fifth for EDP managers; the difference is the higher rating of software maintenance among administrative managers.

IV FINDINGS AND RECOMMENDATIONS

A. FINDINGS

- Responsibility for the procurement of word processing equipment currently resides with either the operating executive or the EDP executive at corporate headquarters level and primarily with the operating executive at the division/plant level. Procurement responsibility will be shifting to EDP managers as word and data processing become increasingly more integrated. Users are becoming more involved in the buying process.

- The buying points for maintenance services for word processing equipment are essentially the same as for the equipment, except at the division/plant level where the purchasing manager is, at times, the responsible executive. Except for greater user involvement, little other evidence of change in the buying process for maintenance services was noted.

- The market for maintenance services for word processing systems, at $150 million in 1980, will exceed $2 billion in 1985. This annual growth rate of 68% is greater than the rates for both the number and value of installed word processing equipment.

- Word processing systems are maintained primarily by the equipment vendor. There is some evidence of maintenance vendors capable of maintaining word processing as well as data processing equipment being used as third-party maintenance vendors on a single source basis.

- Companies feel that if a word processing equipment failure cannot be responded to and repaired within one shift, then the level of maintenance service is unacceptable. Companies believe that they should not have to spend more than 10% in increased maintenance costs to achieve a satisfactory level.

- Nearly 80% of responsible executives believe that maintenance vendors as a whole do an excellent job of maintaining word processing equipment. What equipment replacement thus far has taken place as a result of unsatisfactory maintenance has resulted primarily from poor response to calls for maintenance.

- Software is rising in importance as a component of maintenance services for word processing equipment.

B. RECOMMENDATIONS

- Word processing maintenance vendors must consider the data processing or information processing executive as well as the end user. Over time, DP executives will become more involved in decision-making about office automation systems as electronic information systems become key to company competitive position or indeed survival.

- As systems proliferate at a growth rate exceeding 30% per year, word processing maintenance vendors must plan to maintain word processing equipment with user initiated remote diagnostic systems.

  - Remote diagnostics have the potential to reduce the on-site labor requirement by either determining the problem and correcting it remotely, or determining the problem area so the FE arrives with the correct replacement parts.

  - Remote diagnostics can be sold to the user as a means of improving his uptime.

- Vendors must design and administer maintenance services to respond to and repair word processing equipment in less than one shift. They must pay particular attention to response time, to avoid being replaced by vendors with a superior capability.

- Also maintenance vendors must add the capability for maintaining software. Software maintenance has the potential of being a major revenue source to vendors.

- Finally, vendors must project an image of being providers of high reliability equipment, to capitalize on the user's high rating of reliability and uptime as desirable characteristics.

SUBSCRIPTION PROGRAMS: Designed for clients with a continuing need for information about a range of subjects in a given area. All subscription programs are fixed-fee and run on a calendar-year basis:

- Management Planning Program in Information Systems - Provides managers of large computer/communications facilities with timely and accurate information on developments which affect today's decisions and plans for the future.
- Management Planning Program for the Information Services Industry - Provides market forecasts and business information to software and processing services companies to support planning and product decisions.
- Company Analysis and Monitoring Program for the Information Services Industry - Provides immediate access to detailed information on over 2,500 companies offering turnkey systems, software and processing services in the U.S. and Canada.
- Management Planning Program in Field Service - Provides senior field service managers in the U.S. and in Europe with basic information and data to support their planning and operational decisions.

MULTICLIENT STUDIES: Research shared by a group of sponsors on topics for which there is a need for in-depth "one-time" information and analysis. A multiclient study typically has a budget of over $200,000, yet the cost to an individual client is usually less than $30,000. Recent studies specified by clients include:

- Selling Personal Computers to Large Corporations
- Productivity Improvement, 1980-1983: Survival Strategies for EDP Executives
- Opportunities in Communications Services for Digital Information: A Study of User Networks and Needs
- Improving the Productivity of Engineering and Manufacturing Using CAD/CAM
- CAD/CAM System and Service Market Opportunities

CUSTOM STUDIES: Custom studies are sponsored by a single client on a proprietary basis and are used to answer specific questions or to address unique problems. Fees are a function of the extent of the research work. Examples of recent assignments include:

- Determination of the U.S. market for small computer systems in 1985.
- Analysis of the opportunities and problems associated with field service capabilities for CAD/CAM systems.
- Analysis of the market potential for third-party maintenance.
- 1981 ADAPSO Survey of the Computer Services Industry.
- Evaluation of the current status and future trends of software terms and conditions.
- Analysis and forecast of user self-maintenance for a vendor's line of equipment.

ABOUT INPUT

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff members analyze and interpret the research data, then develop recommendations and innovative ideas to meet clients' needs. Clients receive reports, presentations, access to data on which analyses are based, and continuous consulting.

Many of INPUT's professional staff members have nearly 20 years experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed in 1974, INPUT has become a leading international consulting firm. Clients include over 100 of the world's largest and most technically advanced companies.

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INPUT Planning Services for Management

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MANAGEMENT PLANNING PROGRAM IN FIELD SERVICE

MANAGEMENT PLANNING PROGRAM

IN

FIELD SERVICE

OBJECTIVE: To provide senior field service executives with basic information and data to support their management of the total field service activity.

DESCRIPTION: Clients of this program receive the following services each year:

- Field Service Briefs - Six reports which analyze important new technical and management issues v … focus on specific issues that require …
- Major Planning F … -depth analysis of major technic … endations that will assist in the … the planning of field services.
- Annual Report - … ties in the field services industry … ects on future field service pla … es in technical and managemen … ct the future requirements of …
- Annual Presenta … resentation to field service e… previous year's research and to … r the research program for the … the first half of each year.
- Inquiry Service … staff on an as-needed basis thr… "hot line" is staffed every wo… ments.

RESEARCH METHOD: … uters, commu-nications and associate…

- Research topics … h client repre-sentatives.
- Research for thi… users, vendors, universities, indu…
- Conclusions deri… … nt of INPUT's staff.
- Professional staff members supporting this program have 20 or more years of experience in data processing and communications, including senior management positions with major vendors and users.

For further information on this report or program, please call or write:

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INPUT

FIELD SERVICE PROGRAM

FIELD SERVICE BRIEF

MAINTENANCE OF WORD PROCESSING EQUIPMENT

JUNE 1981

MAINTENANCE OF WORD PROCESSING EQUIPMENT

TABLE OF CONTENTS

LIST OF EXHIBITS

I INTRODUCTION

A. SCOPE

- This brief is published as part of INPUT's 1981 Field Service Program (FSP).

- The focus of this brief is to explore the maintenance of word processing equipment as viewed by administrative managers and by EDP managers.

- The area was chosen because of the growing importance of word processing systems among FSP clients. This growth results from the emergence of office automation in the integration of word and data processing systems leading to the office of the future.

- Some data for this brief was gathered from EDP managers as part of INPUT's annual survey of EDP managers. A separate mail questionnaire was sent to administrative managers. The intent is to:

  - Develop an analysis of similarities and differences between EDP managers and administrative managers, the two key buyers of word processing equipment.

  - Create a link between INPUT's analysis of EDP equipment and the 1981 information on word processing equipment. (Word processing equipment

is covered for the first time in FSP in 1981, and was included as an equipment type in the 1981 EDP user survey.)

- Data included in this brief results from analysis of responses from 22 EDP manager and 28 administrative manager interviews, all from companies having installed word processing equipment. The EDP managers represented those who, from a total survey of 108 EDP managers, indicated a responsibility for word processing equipment. The fact that only 20% of EDP managers had this responsibility reaffirms earlier INPUT findings that the great majority of EDP managers are not yet active in word processing equipment procurement.

B. WORD PROCESSING EQUIPMENT MAINTENANCE MARKETS

1. WORD PROCESSING AND OFFICE AUTOMATION

- INPUT determined in its study, Managing the Integration of Office Automation in the EDP Environment, that total 1978 expenditures on computer and communications products to support office automation were less than 10% of office personnel costs of over $72 billion. Office automation represents an enormous potential market for information systems products and services, including maintenance.

  - The referenced study found management responsibility for procurement and administration of office automation products was still widely dispersed, particularly in large companies. Although EDP managers almost universally recognized that because word processing systems can categorize and store information they are key to office automation, fewer than 60% of EDP managers in nearly 500 respondent companies had any responsibility for word processing systems.

  - Word processing systems are currently being used by over 50% of respondents to the study mentioned above, and will be used by nearly 80% by 1985.

- Analysis in INPUT's impact report, Office of the Future: Opportunities for Service Companies, indicates that over 200,000 word processors are currently installed and serviced, and that the number will increase by a factor of 5 by 1985.

  - Currently priced between $10,000 and $20,000, shared logic or communicating word processors with expanded capabilities are increasingly providing data processing-like facilities for their users.

  - INPUT believes that the distinction between word and data processing will blur as the office of the future evolves through the decade.

2. PRELIMINARY MARKET FORECAST FOR MAINTENANCE SERVICES

- Assuming that the average installed word processing system costs $12,500, then the value of the 1980 installed base of 200,000 units exceeds $2 billion. With an annual unit growth rate forecast of 25% and a net unit price increase forecast of 5% resulting from added functions and inflation, offset in part by technology cost reduction, the 1985 value of installed word processing systems will exceed $9 billion. This is shown graphically in Exhibit I-1.

- An average current annual price of maintenance of 6% of purchase price indicates the 1980 market for maintenance of word processing systems was $150 million in the United States. The growth of this market will depend on three major factors:

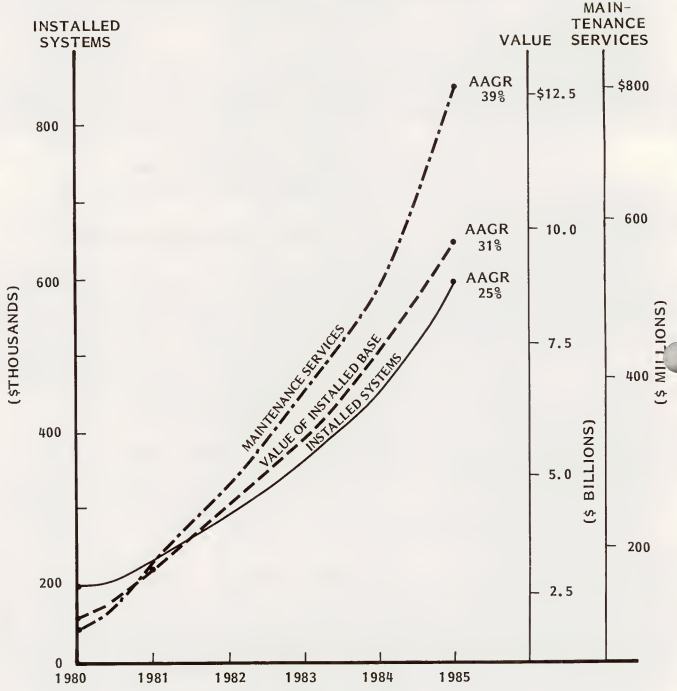
  - The rate of new equipment installation.

  - The price of the new equipment. Because of increased functions on new equipment, particularly communications capability, INPUT estimates that the average price of new equipment will increase by 5% per year.

  - The relationship of the price of maintenance to the price of equipment. Prices will tend to increase due to inflation, particularly with regard to

EXHIBIT I-1

MARKET FORECAST OF MAINTENANCE SERVICES FOR WORD PROCESSING SYSTEMS, 1980-1985



AAGR = AVERAGE ANNUAL GROWTH RATE

labor and travel. These increases will be partially offset by greater user involvement in maintenance, and by more reliable equipment. INPUT estimates that a likely rate of increase in the price of maintenance relative to equipment is 6% per year.

- The actual growth of the maintenance market therefore depends on the actions vendors take in the design of product offerings as well as the demand of the market. New products which are complex and expensive will increase the market faster than new products which are simpler and less expensive to maintain.

- In Exhibit I-1 the potential range of market growth rates is presented.

  - The minimum rate, 25%, parallels the rate of new unit installations, and assumes the average maintenance revenue per new unit is the same as the current average maintenance revenue for installed units.

  - The maximum rate, 39%, assumes more complex units, and applies a 5% annual price increase and a 6% annual increase to the maintenance rate relative to the price. The high growth rate results from a compounding of those factors.

- Data which INPUT has gathered on growth rates of individual vendors of word processing equipment maintenance shows individual rates in the 25% to 100% annual growth range. While the actual growth rate of word processing maintenance cannot be forecast with certainty from available data, it is clear that it is growing faster than the rate of field service revenues for EDP equipment.

- Although preliminary, INPUT's assessment of the market for maintenance of word processing systems indicates a highly attractive market, particularly in prospects for growth. The 30% growth in word processing maintenance is half again as great as the 20% rate forecast by INPUT for EDP product maintenance revenues.

3. BUYING POINTS

a. Word Processing Equipment

(i) EDP Managers' Viewpoint

- Word processing equipment is unique because it logically falls under the responsibility of the administrative manager where typing is largely controlled; yet the systems which are evolving often include data processing concepts, hence the involvement of the EDP managers. It is essential for vendors to recognize this duality.

  - Nearly 50% of respondent EDP managers in companies with word processing equipment reported that they had primary responsibility for the equipment either directly or as members of the corporate automation committee. As shown in Exhibit I-2, another 30% were involved in the buying process.

  - In most cases, although the dominant voice today is still the administrative manager, the EDP manager is clearly a target for selling word processing equipment maintenance services.

- INPUT believes that as word processing and data processing functions are integrated in the office, the importance of EDP managers as a buying source for word processing maintenances services will increase.

(ii) Administrative Managers' Viewpoint

- Buying points for word processing systems differ between the company corporate office and operating division/plant locations. As shown in Exhibit I-3, administrative managers at corporate headquarters reported that the primary buying point is either at the operating department/division or administrative executive level. Over 20% reported that the buying decision can be made without involving others.

EXHIBIT I-2

BUYING POINTS FOR WORD PROCESSING EQUIPMENT
AS REPORTED BY DATA PROCESSING MANAGERS

LEVEL	FUNCTION	PORTION OF RESPONDENTS
PRIMARY DECISION-MAKER	MIS/DP EXECUTIVE	43%
	CORPORATE EXECUTIVE	19
	OPERATING DIVISION/DEPARTMENT EXECUTIVE	19
	ADMINISTRATIVE SERVICES EXECUTIVE	14
	AUTOMATION COMMITTEE	5
OTHERS INVOLVED	ADMINISTRATIVE SERVICES MANAGER	37
	OPERATING DIVISION/DEPARTMENT EXECUTIVE	29
	MIS/DP EXECUTIVE	19
	AUTOMATION COMMITTEE	10
	CORPORATE EXECUTIVE	5

NUMBER OF RESPONDENTS = 21

EXHIBIT I-3

BUYING POINTS FOR WORD PROCESSING EQUIPMENT
AS REPORTED BY ADMINISTRATIVE
MANAGERS AT COMPANY HEADQUARTERS

LEVEL	TITLE/FUNCTION	PORTION OF RESPONDENTS
PRIMARY DECISION-MAKER	OPERATING DIVISION/DEPARTMENT EXECUTIVE	42%
	ADMINISTRATIVE SERVICES EXECUTIVE	42
	CORPORATE EXECUTIVE	11
	MIS/DP EXECUTIVE	5
OTHERS INVOLVED	NONE	21
	WORD PROCESSING SUPERVISOR	21
	ADMINISTRATIVE SERVICES EXECUTIVE	21
	OFFICE/ADMINISTRATIVE MANAGER	16
	CORPORATE EXECUTIVE	16
	MIS/DP EXECUTIVE	5

NUMBER OF RESPONDENTS = 19

- There is an apparent conflict between what administrative managers at corporate centers and DP managers reported about buying points for word processing systems. Apparently EDP managers are involved in those selections where EDP is given responsibility, but are left out of many selections entirely.

- The selling situation is simplified at division/plant locations. Here the primary decision-maker, as shown in Exhibit I-4, is the division/plant manager or the administrative services director. The director of purchasing and the word processing supervisor are frequently involved in the buying process.

b. Changes In The Buying Process

- Over 90% of EDP managers and over 80% of administrative managers reported that the buying point for word processing equipment was not changing in their companies.

- The greatest changes reported were at division/plant locations where administrative managers reported greater involvement in the buying decision at the local versus corporate level. This stability in the buying process was also a finding in INPUT's 1981 survey of 108 users as reported in the 1981 Field Services Annual Report.

c. Maintenance Services

- DP and administrative managers by and large confirmed that the buying point for maintenance services is the same as for word processing equipment.

- While the buying points for word processing equipment and for maintenance services at the corporate level remain the same, over 20% of administrative managers reported that the procurement/purchasing manager is the buying point at the division/plant level.

EXHIBIT I-4

BUYING POINTS FOR WORD PROCESSING
EQUIPMENT AS REPORTED BY ADMINISTRATIVE
MANAGERS AT COMPANY DIVISIONS/PLANTS

LEVEL	TITLE/FUNCTION	PORTION OF RESPONDENTS
PRIMARY DECISION-MAKER	PLANT/DEPARTMENT MANAGER	44%
	ADMINISTRATIVE SERVICES DIRECTOR	44
	AUTOMATION COMMITTEE	12
OTHERS INCLUDED	NONE	12
	PURCHASING	22
	WORD PROCESSING SUPERVISOR/ MANAGER	22
	ADMINISTRATIVE SERVICES MANAGER	22
	OPERATING MANAGER	11
	COMPUTER COMMITTEE	11

NUMBER OF RESPONDENTS = 9

- Little change was reported in the buying point for maintenance services by either DP managers or administrative managers. Administrative managers did report greater involvement of the end user in the buying process.

- It is clear that vendors wanting to capitalize on this growing market must identify the key decision-maker at the user location from among the alternatives discussed above.

II WORD PROCESSING EQUIPMENT AND MAINTENANCE SERVICES

A. WORD PROCESSING EQUIPMENT

- The mix of word processing equipment vendors as reported by administrative managers and EDP managers is quite similar, with one significant difference, as shown in Exhibit II-1. Administrative managers reported fewer installations of IBM and more of Wang equipment than did EDP managers, but otherwise the vendor distribution is comparable. IBM's strong position in EDP equipment clearly carries over into word processing equipment in EDP-dominant environments.

B. WORD PROCESSING MAINTENANCE VENDORS

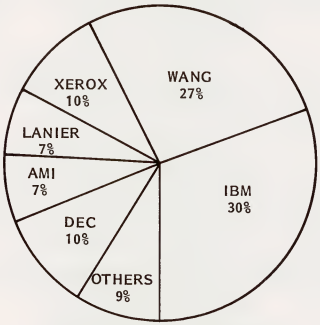
- The distribution of word processing maintenance vendors, as shown in Exhibit II-2, shows a similar pattern to that for equipment vendors, as reported by administrative and EDP managers.

- Comparison by vendor indicates that for word processing equipment as with EDP equipment, the equipment vendor is usually the maintenance vendor. Over 90% of administrators and EDP managers confirmed this finding.

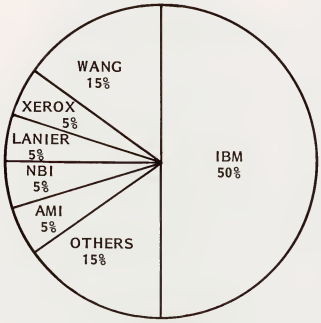
- Some shift away from using the equipment vendor as the maintenance vendor was reported.

EXHIBIT II-1

DISTRIBUTION OF WORD PROCESSING EQUIPMENT
VENDORS IN RESPONDENT COMPANIES



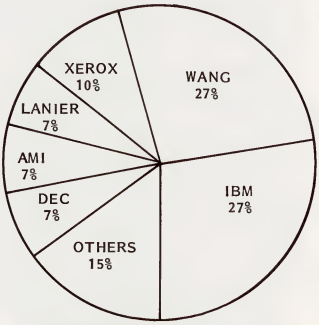
ADMINISTRATIVE MANAGERS



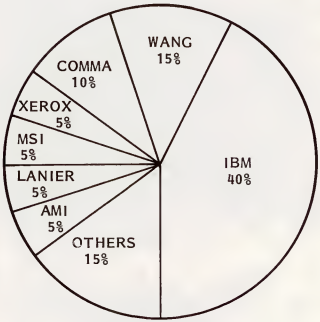
EDP MANAGERS

EXHIBIT II-2

DISTRIBUTION OF WORD PROCESSING MAINTENANCE SERVICES VENDORS IN RESPONDENT COMPANIES



ADMINISTRATIVE MANAGERS



EDP MANAGERS

- The shift occurred for IBM installations and some equipment vendors grouped in the "other" category.

- EDP managers with IBM data centers and IBM administrative terminal systems, when using a third-party maintenance vendor, are likely to also contract maintenance of word processing equipment with the same third-party vendor (an example is Comma, as reported by 10% of EDP managers).

C. MEAN TIME TO RESPOND

- Administrative managers reported that it generally took the maintenance vendor less time to respond when called than did EDP managers. Exhibit II-3 shows that across the range of response times from 1 to 24 hours, office managers reported better vendor responsiveness. A likely reason is the more direct link between the end user and the maintenance vendor as opposed to the added level of communication when maintenance is requested through the EDP manager.

- Administrative managers rated mean time to respond approaching eight hours as unacceptable.

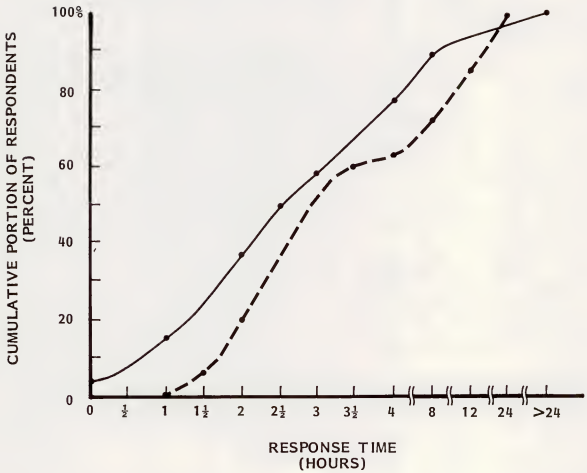
- Those rating response time as unacceptable are willing to pay increased maintenance costs of up to 10% to achieve a desired response time of less than four hours.

D. MEAN TIME TO REPAIR

- Administrative managers reported that it generally took the maintenance vendor less time to repair word processing equipment than did EDP managers.

EXHIBIT II-3

MEAN TIME TO RESPOND
FOR MAINTENANCE OF WORD PROCESSING
EQUIPMENT AS REPORTED BY RESPONDENTS



- Exhibit II-4 shows that across the range from 1 to 24 hours, administrative managers reported better vendor performance. Vendor effectiveness is nearly the same for times up to two and one-half hours to repair.

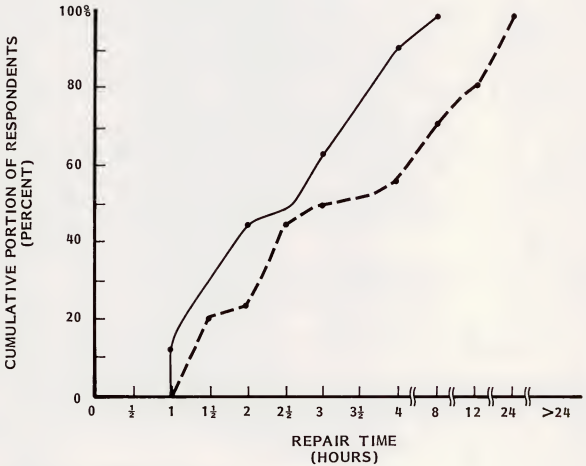
- The concentration of administrative manager respondents from corporate headquarters (67%) in large metropolitan areas, with resulting better spare parts availability, is a likely reason for the wide difference in vendor performance for mean times to repair greater than two and one-half hours.

- Administrative managers rated mean time to repair approaching three and one-half hours as unacceptable.

  - Those rating repair times as unacceptable are willing to increase maintenance costs up to 10% to achieve a desired mean time to repair times of no more than one and one-half hours.

EXHIBIT II-4

MEAN TIME TO REPAIR WORD PROCESSING
EQUIPMENT AS REPORTED BY RESPONDENTS



III USER ATTITUDES TOWARD MAINTENANCE

A. USER SATISFACTION

1. EQUIPMENT UTILIZATION

- Utilization of word processing equipment as reported by administrative managers and by EDP managers is contrasted in Exhibit III-1. Single-shift operation over a five-day week results in five shifts; the maximum number of shifts is 21.

- The major portion (67%) of administrative manager respondents were from corporate headquarters where five-day single-shift operation is the norm. Over 70% of administrative managers reported five-shift utilization, whereas just over 25% of EDP managers reported such utilization.

- EDP managers reported considerably greater word processing equipment utilization. The probable explanation is that word processing systems falling under EDP manager responsibility are located in operational areas where multi-shift operation is more the norm.

2. SYSTEM AVAILABILITY

- EDP managers reported greater word processing availability than did administrative managers, as shown in Exhibit III-2:

EXHIBIT III-1

UTILIZATION OF WORD PROCESSING
EQUIPMENT AS REPORTED BY RESPONDENTS

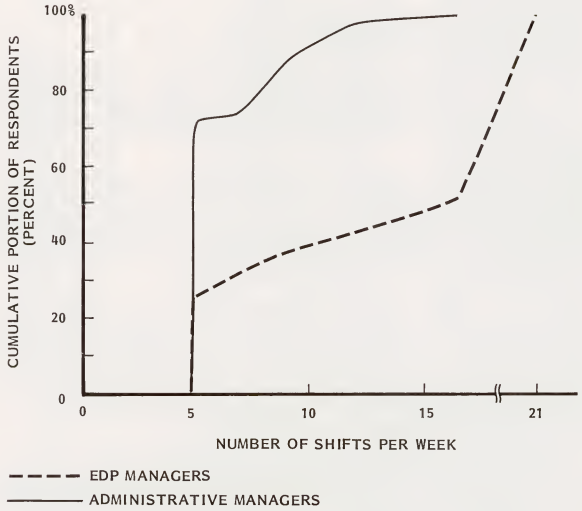
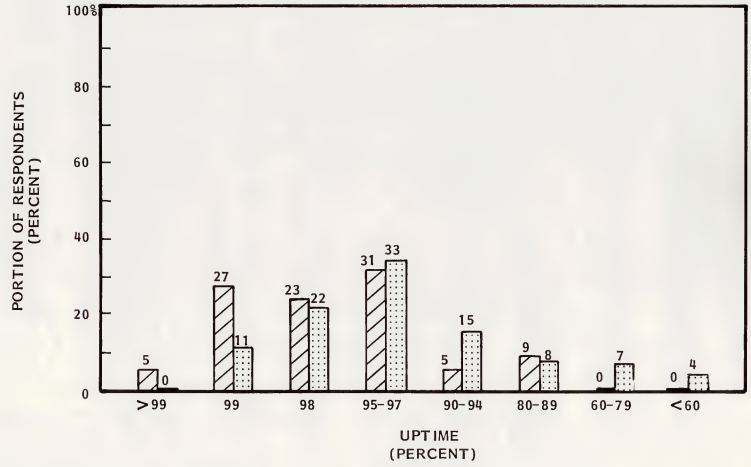


EXHIBIT III-2
WORD PROCESSING EQUIPMENT UPTIME
AS REPORTED BY RESPONDENTS



- Over 30% of EDP managers reported uptime exceeding 98%.

- Over 50% of both EDP and administrative managers reported word processing equipment was available between 95% to 98% of the time.

- Over 30% of administrative managers reported uptimes of less than 95%.

- The higher uptime for EDP managers is related to the higher number of shifts, in that any downtime can be spread over a larger operating time.

- In confirmation of the above finding, EDP managers reported better mean time between failures (MTBF) experience for word processing equipment than did administrative managers. Although the number of available data points (five responses) for EDP managers is insufficient for more detailed comparison, Exhibit III-3 confirms that EDP managers consistently reported better MTBF than did administrative managers (23 responses).

3. QUALITY OF MAINTENANCE

- Both administrative managers and EDP managers were uniformly consistent in rating the quality of maintenance for word processing systems.

- As shown in Exhibit III-4, nearly 80% of both administrators and EDP managers rated maintenance quality high.

- The data is consistent with the finding that only 22% of administrative managers experienced unacceptable combinations of mean time to respond and mean time to repair word processing equipment.

- Over 15% of administrative managers at company headquarters had replaced word processing systems within the past two years primarily due to unsatisfactory response time. This indicates that vendors are well advised to monitor response times at headquarters locations.

EXHIBIT III-3

MEAN TIME BETWEEN FAILURES OF WORD PROCESSING EQUIPMENT AS REPORTED BY RESPONDENTS

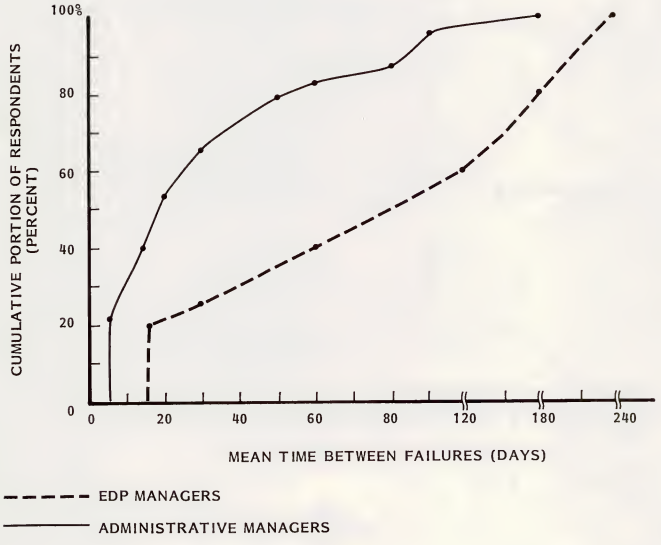
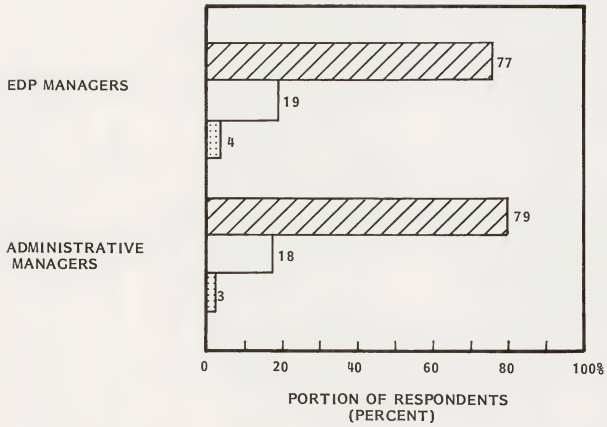


EXHIBIT III-4

SATISFACTION WITH THE QUALITY OF
MAINTENANCE FOR WORD PROCESSING
EQUIPMENT AS REPORTED BY RESPONDENTS



B. MAINTENANCE RELATED ISSUES

- Administrative and EDP managers' attitudes toward a number of issues related to maintenance are contrasted in Exhibit III-5. EDP managers' ratings cover both data processing and word processing equipment, whereas administrative managers' ratings are for word processing equipment only.

- Equipment reliability, corresponding uptime, response time and repair time are of highest importance to both administrative and EDP managers.

- Software maintenance is next in importance, even more so to administrative managers than to the EDP managers who often have the capability to accomplish software maintenance in-house.

- EDP managers rated having field engineers on-site for maintaining both data processing and word processing equipment much higher than did administrative managers. In fact, except where large numbers (i.e., 50 or more) of word processing systems are installed, administrative managers rated having on-site field engineers as unimportant.

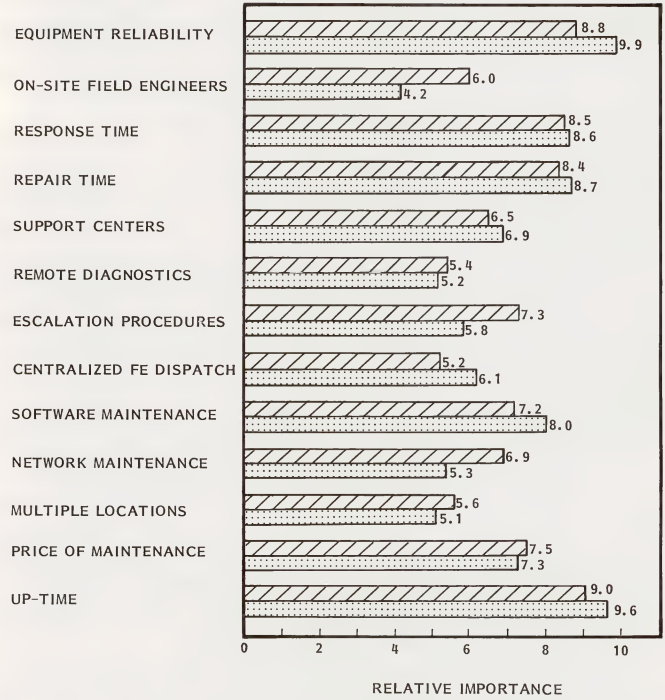
- More familiar with the process, EDP managers rated escalation procedures as considerably more important than did administrative managers. INPUT expects this difference to disappear as word processing equipment is integrated into communications networks, permitting remote diagnostics to be used as the first maintenance level.

- With few word processing systems connected in either local or remote networks, administrative managers rated network maintenance of much lesser importance than did EDP managers. This difference will fade as data and word processing are integrated in the office environment.

- On balance, administrative managers and EDP managers rated the maintenance related issues remarkably alike.

EXHIBIT III-5

RESPONDENTS' RATINGS OF MAINTENANCE RELATED ISSUES



- Administrative managers were even stronger than EDP managers in rating uptime and equipment reliability as the top two issues.

- Administrative managers ranked price of maintenance as the sixth most important issue versus fifth for EDP managers; the difference is the higher rating of software maintenance among administrative managers.

IV FINDINGS AND RECOMMENDATIONS

A. FINDINGS

- Responsibility for the procurement of word processing equipment currently resides with either the operating executive or the EDP executive at corporate headquarters level and primarily with the operating executive at the division/plant level. Procurement responsibility will be shifting to EDP managers as word and data processing become increasingly more integrated. Users are becoming more involved in the buying process.

- The buying points for maintenance services for word processing equipment are essentially the same as for the equipment, except at the division/plant level where the purchasing manager is, at times, the responsible executive. Except for greater user involvement, little other evidence of change in the buying process for maintenance services was noted.

- The market for maintenance services for word processing systems, at $150 million in 1980, will exceed $2 billion in 1985. This annual growth rate of 68% is greater than the rates for both the number and value of installed word processing equipment.

- Word processing systems are maintained primarily by the equipment vendor. There is some evidence of maintenance vendors capable of maintaining word processing as well as data processing equipment being used as third-party maintenance vendors on a single source basis.

- Companies feel that if a word processing equipment failure cannot be responded to and repaired within one shift, then the level of maintenance service is unacceptable. Companies believe that they should not have to spend more than 10% in increased maintenance costs to achieve a satisfactory level.

- Nearly 80% of responsible executives believe that maintenance vendors as a whole do an excellent job of maintaining word processing equipment. What equipment replacement thus far has taken place as a result of unsatisfactory maintenance has resulted primarily from poor response to calls for maintenance.

- Software is rising in importance as a component of maintenance services for word processing equipment.

B. RECOMMENDATIONS

- Word processing maintenance vendors must consider the data processing or information processing executive as well as the end user. Over time, DP executives will become more involved in decision-making about office automation systems as electronic information systems become key to company competitive position or indeed survival.

- As systems proliferate at a growth rate exceeding 30% per year, word processing maintenance vendors must plan to maintain word processing equipment with user initiated remote diagnostic systems.

  - Remote diagnostics have the potential to reduce the on-site labor requirement by either determining the problem and correcting it remotely, or determining the problem area so the FE arrives with the correct replacement parts.

  - Remote diagnostics can be sold to the user as a means of improving his uptime.

- Vendors must design and administer maintenance services to respond to and repair word processing equipment in less than one shift. They must pay particular attention to response time, to avoid being replaced by vendors with a superior capability.

- Also maintenance vendors must add the capability for maintaining software. Software maintenance has the potential of being a major revenue source to vendors.

- Finally, vendors must project an image of being providers of high reliability equipment, to capitalize on the user's high rating of reliability and uptime as desirable characteristics.

SUBSCRIPTION PROGRAMS: Designed for clients with a continuing need for information about a range of subjects in a given area. All subscription programs are fixed-fee and run on a calendar-year basis:

- Management Planning Program in Information Systems - Provides managers of large computer/communications facilities with timely and accurate information on developments which affect today's decisions and plans for the future.

- Management Planning Program for the Information Services Industry - Provides market forecasts and business information to software and processing services companies to support planning and product decisions.

- Company Analysis and Monitoring Program for the Information Services Industry - Provides immediate access to detailed information on over 2,500 companies offering turnkey systems, software and processing services in the U.S. and Canada.

- Management Planning Program in Field Service - Provides senior field service managers in the U.S. and in Europe with basic information and data to support their planning and operational decisions.

MULTICLIENT STUDIES: Research shared by a group of sponsors on topics for which there is a need for in-depth "one-time" information and analysis. A multiclient study typically has a budget of over $200,000, yet the cost to an individual client is usually less than $30,000. Recent studies specified by clients include:

- Selling Personal Computers to Large Corporations

- Productivity Improvement, 1980-1983: Survival Strategies for EDP Executives

- Opportunities in Communications Services for Digital Information: A Study of User Networks and Needs

- Improving the Productivity of Engineering and Manufacturing Using CAD/CAM

- CAD/CAM System and Service Market Opportunities

CUSTOM STUDIES: Custom studies are sponsored by a single client on a proprietary basis and are used to answer specific questions or to address unique problems. Fees are a function of the extent of the research work. Examples of recent assignments include:

- Determination of the U.S. market for small computer systems in 1985.

- Analysis of the opportunities and problems associated with field service capabilities for CAD/CAM systems.

- Analysis of the market potential for third-party maintenance.

- 1981 ADAPSO Survey of the Computer Services Industry.

- Evaluation of the current status and future trends of software terms and conditions.

- Analysis and forecast of user self-maintenance for a vendor's line of equipment.

ABOUT INPUT

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff members analyze and interpret the research data, then develop recommendations and innovative ideas to meet clients' needs. Clients receive reports, presentations, access to data on which analyses are based, and continuous consulting.

Many of INPUT's professional staff members have nearly 20 years experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed in 1974, INPUT has become a leading international consulting firm. Clients include over 100 of the world's largest and most technically advanced companies.

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INPUT Planning Services for Management

INPUT

MANAGEMENT PLANNING PROGRAM IN FIELD SERVICE

MANAGEMENT PLANNING PROGRAM
IN
FIELD SERVICE

OBJECTIVE: To provide senior field service executives with basic information and data to support their management of the total field service activity.

DESCRIPTION: Clients of this program receive the following services each year:

- Field Service Briefs - Six reports which analyze important new technical and management issues w ocus on specific issues that require ti

- Major Planning Rep epth analysis of major technical dations that will assist in the f e planning of field services.

- Annual Report - Th s in the field services industry t ts on future field service plann in technical and management the future requirements of us

- Annual Presentati sentation to field service exe vious year's research and to f the research program for the c he first half of each year.

- Inquiry Service - iff on an as-needed basis thro "hot line" is staffed every work ents.

RESEARCH METHOD: I ers, commu-nications and associated

- Research topics a client repre-sentatives.

- Research for this ers, vendors, universities, indus

- Conclusions derived from the research are based on the judgement of INPUT's staff.

- Professional staff members supporting this program have 20 or more years of experience in data processing and communications, including senior management positions with major vendors and users.

For further information on this report or program, please call or write:

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Saddle Brook, NJ 07662
(201) 368-9471

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Palo Alto, CA 94303
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INPUT

FIELD SERVICE PROGRAM

FIELD SERVICE BRIEF

MAINTENANCE OF SMALL COMPUTERS
IN AN OFFICE ENVIRONMENT

JUNE 1981

MAINTENANCE OF SMALL COMPUTERS IN AN OFFICE ENVIRONMENT

TABLE OF CONTENTS

LIST OF EXHIBITS

I INTRODUCTION

A. SCOPE

- This brief is published as part of INPUT's 1981 Field Service Program.
- The focus of this brief is to explore the maintenance of small computers in an office environment as viewed by administrative and EDP managers.
- For purposes of this brief small computers are those having a purchase or equivalent rental price of less than $15,000.
- This area was chosen because of the growing importance of small computers in office automation, and of personal computing as an alternative to centralized data processing systems.
- Data for this brief was gathered from EDP managers as part of INPUT's annual survey of EDP managers. A separate mail questionnaire was sent to administrative managers previously interviewed in conjunction with INPUT's multiclient study, Selling Personal Computers to Large Companies.
- Data included in this brief results from analysis of 18 EDP manager and 24 administrative manager interviews, all from companies having procured small computers.

B. SMALL COMPUTERS AND MAINTENANCE MARKETS

1. SMALL COMPUTERS AND THE DATA PROCESSING ENVIRONMENT

- INPUT's study, Selling Personal Computers to Large Companies, estimated the installed base of small computers selling for less than $15,000 in 1980 at 85,000 reaching 600,000 in 1985, an AAGR of 48% over five years.

- The study found the average system price in 1980 was just under $10,000, with vendor and user expectations of a price decline to $8,000 by 1985.

- With over 25% of end users dissatisfied with EDP services and effective small computers selling for less than required corporate approval levels, administrative executives are purchasing small computers to use in marketing, manufacturing planning, financial planning, engineering, legal, personnel and operations administration offices.

- Late to recognize the importance of small computers to help ease the large backlog of user requests for data processing services, EDP managers see the widespread use of small computers, as shown in Exhibit I-1.

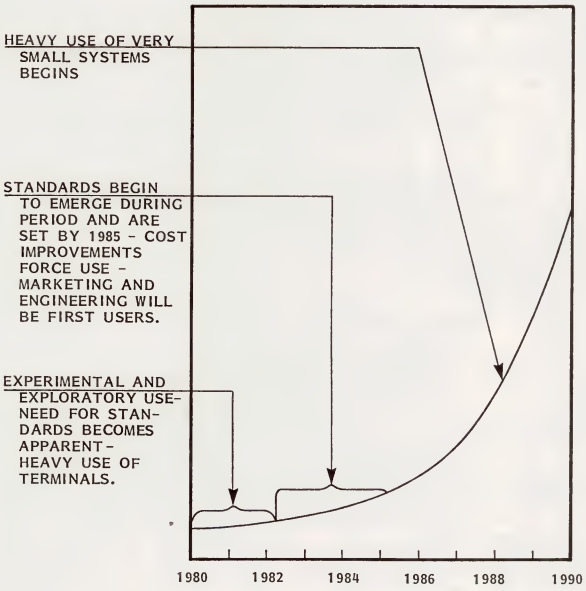
  - More disciplined data communications and data base standards must be set so that pieces of electronic office information equipment can be interfaced one with another and with, as necessary, the host system.

  - The use of the EDP department in a consulting and approval role will increase.

  - End users will become more involved in office information system definition, and in equipment and maintenance vendor relations.

EXHIBIT I-1

TIMETABLE FOR USE OF SMALL COMPUTERS AS SEEN BY EDP MANAGERS



- The study found the next breakthrough in competition will be bulk sales of small computers through the EDP department to end users. Computer vendors already having "presence" will have the inside track.

- Overall, 48% of the respondents said that small computers were acquired with newly budgeted funds; for another 37% of the respondents, the money came from existing department data processing budgets. The remaining 15% identified their acquisitions as "other than small computers" to avoid formal review.

- Over 75% of the small computers were purchased directly from the computer vendor.

  - Nearly 70% of small computer maintenance came from the hardware vendor.

  - Fifteen percent of small computers were maintained by the companies themselves.

2. BUYING POINTS

   a. Small Computers

      (i) EDP Managers' Viewpoint

- Over half of EDP managers in companies having small computers reported that they had primary responsibility for buying small computers either directly or as members of the corporate automation committee. As shown in Exhibit I-2, another 28% were involved in the buying process. Clearly the EDP manager is a source for selling maintenance services for small computers.

- INPUT believes that as data processing functions are integrated in the office, the importance of EDP managers as a buying source for small computers will increase.

EXHIBIT I-2

BUYING POINTS FOR SMALL COMPUTERS
AS REPORTED BY DATA PROCESSING MANAGERS

LEVEL	TITLE/FUNCTION	PORTION OF RESPONDENTS
PRIMARY DECISION MAKER	MIS/DP EXECUTIVE	50%
	CORPORATE EXECUTIVE	21
	OPERATING DIVISION/DEPARTMENT EXECUTIVE	15
	ADMINISTRATIVE SERVICES EXECUTIVE	7
	AUTOMATION COMMITTEE	7
OTHERS INVOLVED	OPERATING DIVISION/DEPARTMENT EXECUTIVE	33%
	MIS/DP EXECUTIVE	28
	ADMINISTRATIVE SERVICES MANAGER	17
	CORPORATE EXECUTIVE	11
	AUTOMATION COMMITTEE	11

NUMBER OF RESPONDENTS = 21

(ii) Administrative Managers' Viewpoint

- Buying points for small computers differ between the company corporate office and operating division/plant locations. As shown in Exhibit I-3, administrative managers at corporate headquarters reported that the primary buying point is either at the corporate executive or operating executive level. Nearly 40% report that the buying decision can be made without involving others.

- There is an apparent conflict between what administrative managers at corporate centers and DP managers reported with respect to buying points for small computers. Maintenance vendors need to test the waters to determine the best approach to selling maintenance services for small computers. Involvement of all three executives in sales presentations is warranted when selling maintenance services at company corporate headquarters.

- The selling situation is simplified at division/plant locations. Here the primary decision-makers, as shown in Exhibit I-4, are the division/plant managing executives. The operating manager is frequently involved in the buying process.

b. Changes in the Buying Process

- Nearly 80% of EDP and administrative managers reported that the buying point for small equipment was not changing in their companies.

- The greatest change reported was greater involvement of the end user in the buying decision both at the local as well as the corporate level.

c. Maintenance Services

- EDP managers almost totally agreed that the buying point for maintenance services for small computers is the same as that for small computers themselves.

EXHIBIT I-3

BUYING POINTS FOR SMALL COMPUTERS
AS REPORTED BY ADMINISTRATIVE
MANAGERS AT COMPANY HEADQUARTERS

LEVEL	TITLE/FUNCTION	PORTION OF RESPONDENTS
PRIMARY DECISION MAKER	OPERATING DIVISION/DEPARTMENT EXECUTIVE	31%
	CORPORATE EXECUTIVE	31
	MIS/DP EXECUTIVE	23
	ADMINISTRATIVE SERVICES EXECUTIVE	15
OTHERS INVOLVED	NONE	38%
	OFFICE/ADMINISTRATIVE MANAGER	23
	CORPORATE EXECUTIVE	23
	ADMINISTRATIVE SERVICES EXECUTIVE	8
	DP COMMITTEE	8

NUMBER OF RESPONDENTS = 19

EXHIBIT I-4

BUYING POINTS FOR SMALL COMPUTERS
AS REPORTED BY ADMINISTRATIVE MANAGERS
AT COMPANY DIVISIONS/PLANTS

LEVEL	TITLE/FUNCTION	PORTION OF RESPONDENTS
PRIMARY DECISION MAKER	PLANT/DEPARTMENT MANAGER	64%
	MIS MANAGER	18
	FINANCIAL/ADMINISTRATIVE EXECUTIVE	18
OTHERS INCLUDED	NONE	28%
	OPERATING MANAGER	36
	ADMINISTRATIVE EXECUTIVE	9
	PURCHASING	9
	COMPUTER COMMITTEE	9
	MIS MANAGER	9

NUMBER OF RESPONDENTS = 9

- Administrative managers at the division/plant level agreed with EDP managers on maintenance buying points.

- At the company corporate level nearly 40% of administrative managers differed with EDP managers, reporting that maintenance services are bought elsewhere, for example by the end user or the procurement director.

- Little change was reported in the buying point for maintenance services by either data processing managers or administrative managers. Administrative managers did report greater end user involvement in the buying process for maintenance services.

3. PRELIMINARY MARKET FORECAST FOR MAINTENANCE SERVICES

- Assuming as much as 60% of all small computers sold to companies (versus individuals) were sold to large companies (Fortune 500/50 class), then the total installed base for all companies was 142,000 small computers for 1980 and will grow to one million in 1985, an AAGR of 48%.

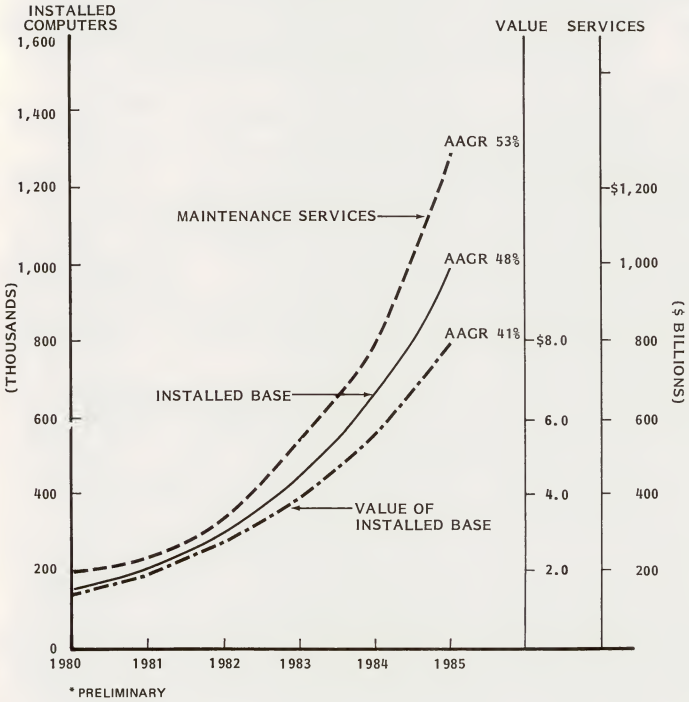
  - Using $10,000 as the average small computer purchase price in 1980, falling to $8,000 by 1985, the value of the installed base, $850 million in 1980, will reach $4.8 billion in 1985, an AAGR of 41%.

  - As indicated above, these market figures represent 60% of the total market.

- Assuming that annual average maintenance costs for small computers were 10% of average purchase price ($10,000) in 1980, and will rise to 15% of average purchase price ($8,000) in 1985, then the market for maintenance services for small computers was $150 million in 1980, and will approach $1.3 billion in 1985, an AAGR of 53% over the forecast period, as shown in Exhibit I-5.

EXHIBIT I-5

MARKET FORECAST OF MAINTENANCE SERVICES FOR SMALL COMPUTERS IN AN OFFICE ENVIRONMENT, 1980-1985*



* PRELIMINARY

- The forecast assumes that other factors are constant; for example, the savings in maintenance due to increased reliability will be offset by increased revenues from software maintenance. This forecast must be considered preliminary because data is thin and the dispersed nature of the market makes data gathering difficult. For example, heavy use of depot maintenance or user self-maintenance would decrease the maintenance services growth.

II SMALL COMPUTERS AND MAINTENANCE SERVICES

A. SMALL COMPUTERS

- The mix of small computer vendors reported by administrative and EDP managers is quite different, as shown in Exhibit II-1. Administrative managers reported fewer installations of IBM and more HP small computers than did EDP managers.

- Administrative managers reported a significant number of Apple computers, whereas EDP managers reported none. In its study, Changing Economics in the Information Organization, INPUT found that end users frequently purchased small computers below $5,000 out of operating versus EDP budgets, thereby avoiding the formal EDP equipment renewal cycle.

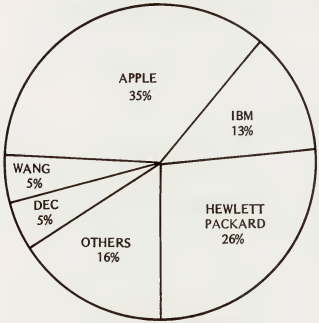
B. SMALL COMPUTER MAINTENANCE VENDORS

- The distribution of small computer maintenance vendors, as shown in Exhibit II-2, shows a similar pattern to that for equipment vendors for EDP managers but not for administrative managers.

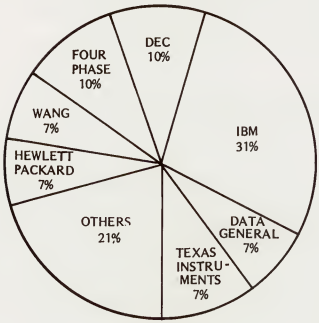
- Comparison by vendor indicates that EDP managers reported the small computer vendor is also the maintenance vendor.

EXHIBIT II-1

DISTRIBUTION OF SMALL COMPUTER
VENDORS IN RESPONDENT COMPANIES



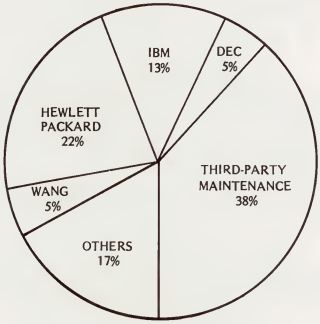
ADMINISTRATIVE MANAGERS



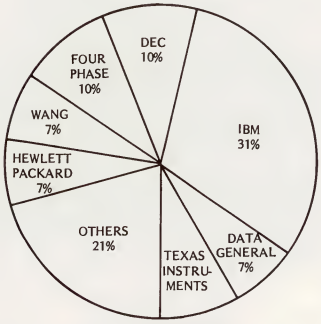
EDP MANAGERS

EXHIBIT II-2

DISTRIBUTION OF SMALL COMPUTER MAINTENANCE SERVICES VENDORS IN RESPONDENT COMPANIES



ADMINISTRATIVE MANAGERS



EDP MANAGERS

- Administrative managers reported that they use third-party maintenance vendors nearly 40% of the time, particularly when servicing personal computers, such as the Apple.

C. MEAN TIME TO RESPOND

- Administrative managers reported that it took the maintenance vendor consistently longer to respond to maintenance problems than did EDP managers. Exhibit II-3 shows that beyond one hour EDP managers reported better vendor responsiveness.

- Administrative managers rated mean time to respond beyond eight hours as unacceptable.

- Those rating response times as unacceptable are willing to pay increased maintenance costs up to 10% to achieve a desired response time of four hours.

D. MEAN TIME TO REPAIR

- EDP managers reported that it generally took the maintenance vendor a little less time to repair small computers than did administrative managers. Exhibit II-4 shows that for mean time to repair of up to four hours EDP managers reported better vendor performance.

- Administrative managers rated mean time to repair in excess of eight hours as unacceptable. Those rating repair times as unacceptable are willing to increase maintenance costs up to 10% to achieve mean time to repair of no more than four hours.

EXHIBIT II-3

MEAN TIME TO RESPOND
FOR MAINTENANCE OF SMALL COMPUTERS
AS REPORTED BY RESPONDENTS

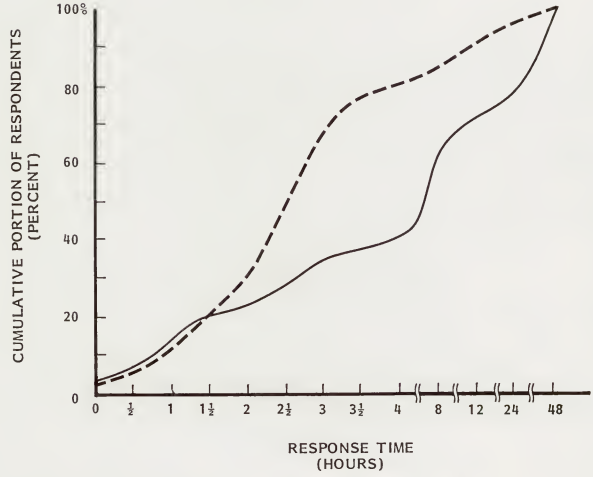
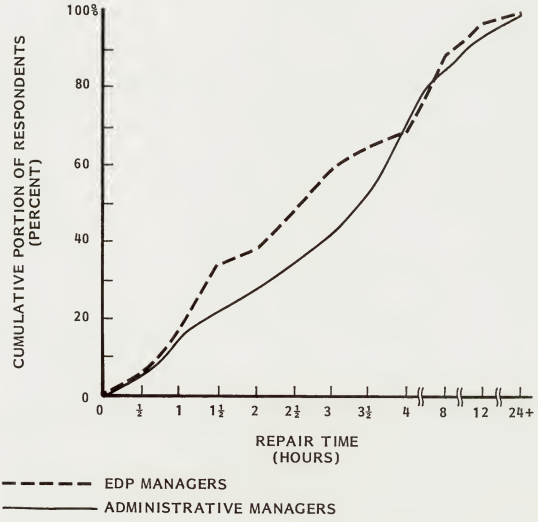


EXHIBIT II-4

MEAN TIME TO REPAIR SMALL COMPUTERS
AS REPORTED BY RESPONDENTS



III USER ATTITUDES TOWARD MAINTENANCE

A. USER SATISFACTION

1. SMALL COMPUTER UTILIZATION

- Utilization of small computers as reported by administrative managers and EDP managers is contrasted in Exhibit III-1. Single-shift operation over a five-day week results in five shifts; the maximum number of shifts per week is 21.

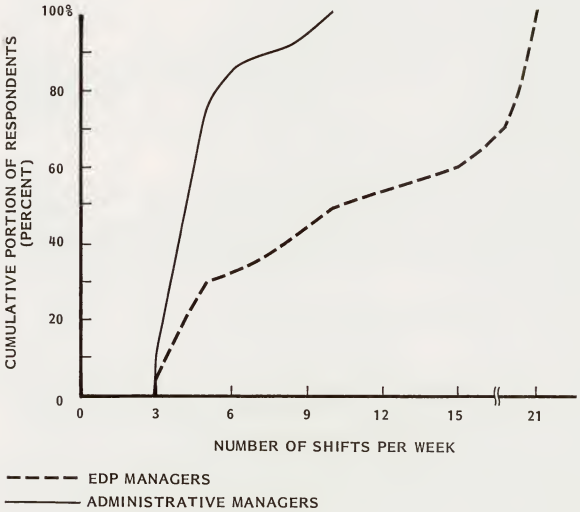
- The major portion of administrative manager respondents (67%) were from corporate headquarters, where five-day single-shift operation is the norm. Nearly 80% of administrative managers reported a maximum of five-shift utilization, whereas only 30% of EDP managers reported such utilization.

  - EDP managers reported considerably greater small computer utilization.

  - The probable explanation is that small computers, as reported by EDP managers, are in operational areas where more than one-shift operation is the norm. Hence 35% of EDP managers reported small computer utilization between five and 16 shifts per week.

EXHIBIT III-1

UTILIZATION OF SMALL COMPUTERS
AS REPORTED BY RESPONDENTS



2. SMALL COMPUTER AVAILABILITY

- EDP managers reported somewhat greater small computer availability than did administrative managers, as shown in Exhibit III-2.

  - Over 40% of EDP managers reported uptime exceeding 97%.

  - Over 30% of EDP managers and administrative managers reported small computer availability between 95% to 97% of the time.

  - Over 40% of administrative managers reported uptime of less than 95%.

- In confirmation of the above findings, EDP managers reported better mean time between failures (MTBF) experience for small computers than did administrative managers. As shown in Exhibit III-3, EDP managers (11 responses) consistently reported better MTBF rates than did administrative managers (15 responses).

3. QUALITY OF MAINTENANCE

- Both administrative managers and EDP managers were largely consistent in rating the quality of maintenance for small computers.

- As shown in Exhibit III-4, over 60% of both EDP and administrative managers rated maintenance quality as high.

  - The data is consistent with the finding that 14% of administrative managers experienced unacceptable combinations of mean time to respond and mean time to repair small computers.

  - Over 10% of EDP managers and 9% of administrative managers reported replacement of small computers due to poor maintenance, which was primarily unsatisfactory vendor maintenance response time.

EXHIBIT III-2

SMALL COMPUTER UPTIME AS REPORTED BY RESPONDENTS

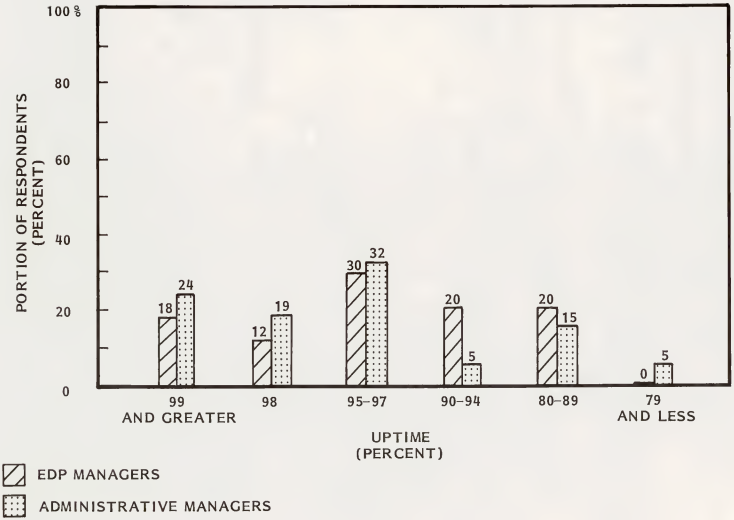


EXHIBIT III-3

MEAN TIME BETWEEN FAILURES OF
SMALL COMPUTERS AS REPORTED BY RESPONDENTS

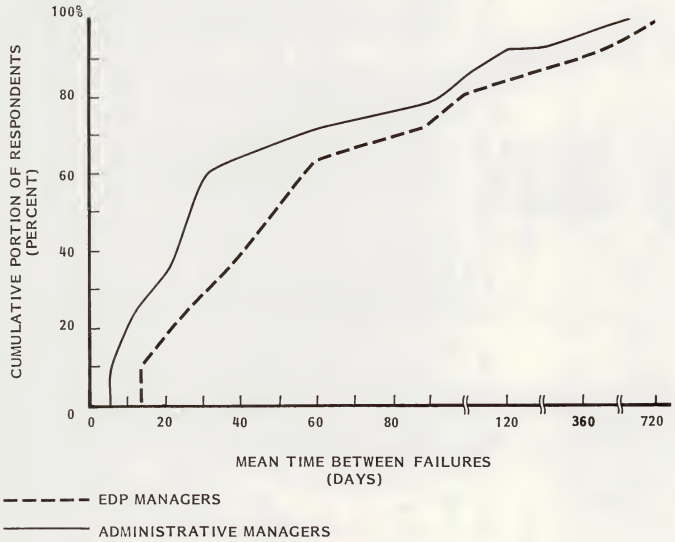
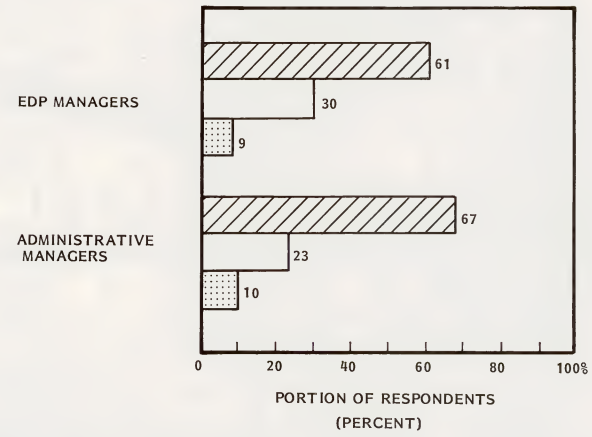


EXHIBIT III-4

SATISFACTION WITH THE QUALITY OF
MAINTENANCE FOR SMALL COMPUTERS
AS REPORTED BY RESPONDENTS



B. MAINTENANCE RELATED ISSUES

- Administrative managers' and EDP managers' attitudes toward a number of issues related to maintenance are contrasted in Exhibit III-5. EDP manager ratings cover both data processing and word processing equipment, whereas administrative manager ratings are for small computers only.

- Equipment reliability, corresponding uptime, response time and repair time are of highest importance to administrative and EDP managers.

- Software maintenance is next in importance, even more so to administrative managers than to the EDP managers who often have the capability to accomplish software maintenance in-house.

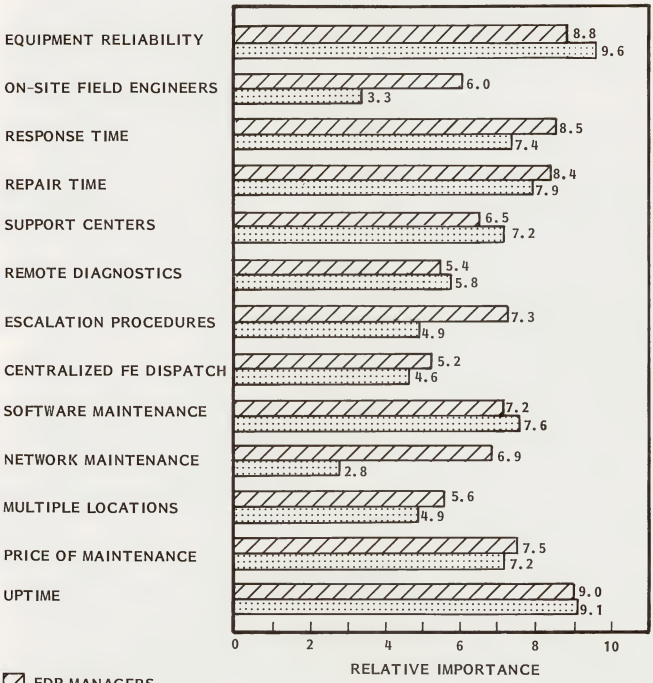
- EDP managers rated having field engineers on site for maintaining both data processing and word processing equipment much higher than did administrative managers. In fact, except for one respondent having a large number (more than 20) of small computers installed, administrative managers rated having on-site field engineers as unimportant.

- More familiar with the process, EDP managers rated escalation procedures as considerably more important than did administrative managers. INPUT expects this difference to disappear as small computers are integrated with word processing and other office automation equipment in the office of the future, permitting user-initiated remote diagnostics to be used as part of maintenance escalation procedures.

- With few small computers connected in either local or remote networks, administrative managers rated network maintenance as much less important than did EDP managers. This difference will fade as data and word processing are integrated in the office environment.

EXHIBIT III-5

RESPONDENTS' RATINGS OF ISSUES RELATED TO MAINTENANCE OF SMALL COMPUTERS



0 = UNIMPORTANT
10 = VERY IMPORTANT

IV FINDINGS AND RECOMMENDATIONS

A. FINDINGS

- Responsibility for the procurement of small computers currently resides with either the operating executive or the EDP executive at corporate headquarters, and primarily with the managing executive at the division/plant level. A significant portion of small computers are directly purchased by operating managers with no others involved in the buying process.

- Procurement responsiblity will be shifting to the EDP executive with greater end user involvement in the buying process as small computers proliferate in the office environment.

- The buying points for maintenance services for small computers are essentially the same as for small computers themselves.

- The definable market for maintenance services for small computers is just evolving.

- Small computers are currently maintained by the small computer vendor. Third-party maintenance vendors are used primarily for personal computers. There is some indication that maintenance vendors capable of maintaining EDP equipment as well as small computers are being used as third-party maintenance vendors on a single source basis.

- Companies feel that if a small computer failure cannot be responded to and repaired within one day, then the level of maintenance service is unacceptable.

- Users are dissatisfied with current maintenance procedures for personal computers, procedures which require return to the distributor, or remote depot maintenance.

- Companies believe that they should not have to spend more than 10% in increased maintenance costs to achieve a satisfactory maintenance level.

- Over 60% of responsible executives believe that maintenance vendors as a whole do an excellent job in maintaining small computers. What small computer replacement has taken place as a result of unsatisfactory maintenance has resulted primarily from poor responses to maintenance calls.

- Software is rising in importance as a component of maintenance for small computers. This is particularly true of small computers sold to administrative managers.

B. RECOMMENDATIONS

- As office automation proceeds, maintenance vendors will find that users will look toward a single source for maintenance of small computers, word processing systems, and other electronic information systems in the office environment.

  - Small computer vendors offering maintenance services must be prepared in the near term to offer maintenance of all their office electronic offerings.

- Successful third-party maintenance vendors in the long term will offer a full line of maintenance services for both office and data processing environments.

- Small computer maintenance vendors must target their offerings to the data or information processing executive as well as to the end user.

  - Data processing executives are becoming more involved in controlling the proliferation of small computers.

  - Corporate management is recognizing the need to maintain the integrity of the company's information base in a distributed environment as key to corporate viability, or indeed survival.

- Maintenance vendors must design and administer maintenance services to respond to and repair small computers within one day if they intend to supply the office environment.

- As small computers proliferate in company offices, maintenance vendors must plan to develop user self-maintenance as the first level, followed by escalation procedures that include user-initiated remote diagnostic systems.

- They must add capability for maintaining software as a component of maintenance service offerings.

- Because the mix of maintenance services required is largely a result of the design of the product, field services management must participate actively in the design phase of new small computers to insure that the product can be maintained at a profit.

SUBSCRIPTION PROGRAMS: Designed for clients with a continuing need for information about a range of subjects in a given area. All subscription programs are fixed-fee and run on a calendar-year basis:

- Management Planning Program in Information Systems - Provides managers of large computer/communications facilities with timely and accurate information on developments which affect today's decisions and plans for the future.

- Management Planning Program for the Information Services Industry - Provides market forecasts and business information to software and processing services companies to support planning and product decisions.

- Company Analysis and Monitoring Program for the Information Services Industry - Provides immediate access to detailed information on over 2,500 companies offering turnkey systems, software and processing services in the U.S. and Canada.

- Management Planning Program in Field Service - Provides senior field service managers in the U.S. and in Europe with basic information and data to support their planning and operational decisions.

MULTICLIENT STUDIES: Research shared by a group of sponsors on topics for which there is a need for in-depth "one-time" information and analysis. A multiclient study typically has a budget of over $200,000, yet the cost to an individual client is usually less than $30,000. Recent studies specified by clients include:

- Selling Personal Computers to Large Corporations

- Productivity Improvement, 1980-1983: Survival Strategies for EDP Executives

- Opportunities in Communications Services for Digital Information: A Study of User Networks and Needs

- Improving the Productivity of Engineering and Manufacturing Using CAD/CAM

- CAD/CAM System and Service Market Opportunities

CUSTOM STUDIES: Custom studies are sponsored by a single client on a proprietary basis and are used to answer specific questions or to address unique problems. Fees are a function of the extent of the research work. Examples of recent assignments include:

- Determination of the U.S. market for small computer systems in 1985.

- Analysis of the opportunities and problems associated with field service capabilities for CAD/CAM systems.

- Analysis of the market potential for third-party maintenance.

- 1981 ADAPSO Survey of the Computer Services Industry.

- Evaluation of the current status and future trends of software terms and conditions.

- Analysis and forecast of user self-maintenance for a vendor's line of equipment.

ABOUT INPUT

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff members analyze and interpret the research data, then develop recommendations and innovative ideas to meet clients' needs. Clients receive reports, presentations, access to data on which analyses are based, and continuous consulting.

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INPUT Planning Services for Management

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MANAGEMENT PLANNING PROGRAM IN FIELD SERVICE

MANAGEMENT PLANNING PROGRAM

IN

FIELD SERVICE

OBJECTIVE: To provide sen nformation and data to support their manage

DESCRIPTION: Clients of t s each year:

- Field Service Briefs - w technical and management issues w ocus on specific issues that require tir
- Major Planning in-depth analysis of major techr mendations that will assist in t the planning of field services.
- Annual Report vities in the field services indust ffects on future field service p nges in technical and managem ffect the future requirements o
- Annual Presen e presentation to field service previous year's research and t for the research program for th in the first half of each year.
- Inquiry Service h staff on an as-needed basis t cial "hot line" is staffed every v irements.

RESEARCH METHOD mputers, commu-nications and associat

- Research topic with client representatives.
- Research for this program includes professional interviews with users, vendors, universities, industry associations, and other analysts.
- Conclusions derived from the research are based on the judgement of INPUT's staff.
- Professional staff members supporting this program have 20 or more years of experience in data processing and communications, including senior management positions with major vendors and users.

For further information on this report or program, please call or write:

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FIELD SERVICE PROGRAM

FIELD SERVICE BRIEF

USER ATTITUDES REGARDING EQUIPMENT FROM JAPAN

OCTOBER 1981

USER ATTITUDES REGARDING EQUIPMENT FROM JAPAN

CONTENTS

USER ATTITUDES REGARDING EQUIPMENT
FROM JAPAN

EXHIBITS

I INTRODUCTION

- This brief is part of INPUT's 1981 Field Service Program (FSP).
- This brief will provide clients with an early reading of the attitudes of users in the United States toward information processing equipment from Japan.
  - To date, penetration by Japanese companies into other than narrow slices of the U.S. information processing industry has been small.
  - The success of the Japanese in penetrating the automobile, consumer electronics, copier, and printer markets makes an assessment of their strength in total information processing a priority management task.
  - An understanding of the Japanese capability to compete is an element in the planning process for field service management, and this brief is designed to contribute to this understanding.
- The new data in this brief comes from over 200 managers of large information processing centers. The data provides insight into how "preconditioned" these potential buyers are to the purchase of Japanese manufactured equipment.
- The purpose of this brief is twofold:
  - First, to present a profile of current user opinion of Japanese products. This is included in the following chapter.

- Second, to present an overview of current developments and product lines from Japan. This is included in the later chapters.

- Data was gathered via INPUT's 1981 Survey of Information Systems Directors. The survey was mailed in the second quarter, and results were tabulated in August.

  - The respondents manage the larger EDP installations, and represent a major portion of the current U.S. installed base. Also, they tend to be the target of marketing efforts by multiple vendors, and therefore are informed about product and service alternatives. Backup data regarding budgets of the respondent sample is included in Appendix A, so that readers of this brief can judge the data with a good knowledge of its source.

  - The questions asked regarding equipment from Japan were part of a much larger questionnaire. The total questionnaire is included in Appendix B. Clients may use the inquiry service portion of the Field Service Program to obtain data from other sections of the questionnaire.

- The second part of this brief is a discussion and analysis of Japanese activities, including comments on strengths and weaknesses. A summary of the activities of major Japanese companies concludes the brief; this part is derived largely from material in INPUT's library, and is intended to put the subject of the potential threat from Japan in a concise perspective for client review.

- Client comment and inquiry on the material in this brief are welcome.

II RECEPTIVITY OF USERS TO JAPANESE EQUIPMENT

A. THE JAPANESE THREAT IN PERSPECTIVE

- The large amount of publicity given to the threat of Japanese producers' gaining a major share of the U.S. computer market distorts some basic facts:

  - Japan's success to date has been restricted to market segments where competitive pricing and reliability are crucial, and where the marketing channel is relatively simple.

  - For those companies in the path of a Japanese offensive - Centronics is an example in the case of printers - the effect can be catastrophic. Centronics is estimated to have lost half of its market share to Japanese producers.

  - Personal computers appear to be the next target of the Japanese, with the major unknown being the level of available software. Japanese producers have already regained a major share of the market in Japan.

- In reality, however, the Japanese have made little penetration in computer mainframe and memory markets, the controlling segment of the dominant EDP installations.

- Most available estimates place Japan's share of the U.S. computer market at under 10% in 1985, perhaps reaching 20% by 1990.

- The strengths Japan brings to the market include meticulous planning, very competitive pricing, high reliability, and a willingness to wait for profitability over a longer period than most of its U.S. competitors.

- The weaknesses which retard market dominance by Japan include an estimated five-year lag in software, unproven service capability, and inadequate channels of distribution.

- The challenge to U.S. vendors is to optimize their strengths in services and software, and to target their products based on a superior knowledge of the total needs of the U.S. user.

- For field service management, Japanese competition is particularly relevant because field service provides U.S. producers with a current edge, and it is important that this edge be maintained if U.S. producers are to retain market share.

B. RESULTS OF THE USER SURVEY

- A striking result of the user survey, as presented in Exhibit II-1, is that not a single respondent of the 208 stated that he would not buy Japanese equipment. This indicates that virtually all buyers will at least consider the Japanese-produced alternative.

  - Of the alternative distribution channels, respondents tended to prefer distributors (62.5% affirmative) to direct from manufacturer (54.3% affirmative). (The total of over 100% is a result of some respondents indicating they would buy from both channels.) Possibly the distributor conveys more of an image of local presence, giving this channel the

EXHIBIT II-1

CURRENT USER ATTITUDES TOWARD PURCHASE
OF JAPANESE EQUIPMENT

USER INDUSTRY SECTOR	ATTITUDE REGARDING JAPANESE EQUIPMENT					
	NUMBER OF RE-SPON-DENTS	NOW USING	WOULD BUY		WON'T BUY	NO RE-SPONSE
			DIRECT	FROM U.S. DIS-TRIBU-TORS		
Discrete Manufacturing	44	3	23	29	0	2
Process Manufacturing	32	2	17	20	0	1
Banking and Brokerage	13	0	7	9	0	1
Insurance	13	0	6	8	0	0
Transportation	4	0	4	4	0	0
Distribution	16	0	6	9	0	1
Utilities	10	2	6	7	0	1
Education	16	3	10	11	0	2
Government	21	0	18	17	0	1
Services and Other	39	2	16	16	0	2
Total	208	12	113	130	0	11
Percent of Total*	100%	6%	54%	63%	0	5%

*INDIVIDUAL RESPONSES ADD UP TO MORE THAN 100% BECAUSE OF MULTIPLE RESPONSES PER RESPONDENT

edge. In comparison, U.S. producers primarily use direct sales forces to reach the U.S. information equipment buyer.

- Responses are fairly uniform across industry sectors.

  . The distribution sector showed the lowest willingness (37.5% affirmative) to buy direct from Japanese manufacturers. This sector is made up largely of local, small firms, perhaps a cause for a less venturesome procurement posture.

  . Interestingly, the government sector had the highest willingness to buy direct from Japanese manufacturers (an 85.7% affirmative response). Obviously there is little "Buy American" sentiment among the government respondents, although government policies may retard respondents from acting on their willingness to buy Japanese.

  . The major sectors from the standpoint of size of EDP expenditures, manufacturing and banking, were solidly willing to buy Japanese poducts.

  . From the survey result, it is clear that no protection is forthcoming for U.S. manufacturers due to a negative attitude regarding Japanese equipment in any particular industry sector; all sectors are receptive to Japanese equipment.

- The current penetration of Japanese equipment among respondents is quite low, as shown in Exhibit II-2.

  - Only seven installations had Japanese equipment installed - only 3% of the sample. Six percent planned to install Japanese equipment. The current situation evidently is that users are receptive, but have not yet made purchase decisions.

EXHIBIT II-2

PLANS OF RESPONDING USERS FOR
BUYING JAPANESE EQUIPMENT

TYPE OF EQUIPMENT / SOFTWARE	NUMBER OF RESPONSES		
	HAVE IN-STALLED	PLAN TO PURCHASE	NO PLANS
Mainframes	3	2	145
Minicomputers	0	1	139
Printers	1	3	138
Other Peripherals	2	2	141
Terminals	0	2	140
Word Processing Equipment	1	4	122
Software	0	1	142
Total	7	15	-

- Only two respondents out of a total of 208 indicated that they intend to buy Japanese manufactured mainframes.

- The success of Japanese manufacturers in certain OEM markets, notably printers, is not reflected directly in these figures because the identity of the component part often is not known to the user; therefore the amount of Japanese equipment installed is greater than indicated because some users are unaware of the origin of some parts of a system.

- Responses to the question of which Japanese computer products are currently in use in the installations surveyed were the following:

  - Hitachi (five mentions, one each of the Intel AS-6, the National NAS-6, the NAS 7000, a "NASCO mainframe and tape drives (7420)," and "Hitachi tape units").

  - Fujitsu tape drives.

  - NEC (three mentions, all for printers).

- Responses to the question concerning what Japanese computer products are likely to be acquired within the next two years were the following:

  - Audio-video equipment.

  - Printers, terminals, minis.

  - CPU memory.

  - DATACOM 300 teleprinter.

  - PCM equipment.

- CRTs, printers.
- CPU, DASD.
- More tape and CPU.
- Terminals.
- "We have too much trouble getting maintenance on other than IBM equipment."
- NEC ASTRA.
- Media, terminals.
- Microprocessors.
- Fujitsu Winchester disk drives.
- Telecommunications equipment, word processing equipment.
- Terminals, other standalone components such as minis.
- Marketed through NAS.
- Character printers.
- Tape drives.

- Given that the current penetration of Japanese equipment in U.S. markets is low, and that users are willing to consider purchasing Japanese equipment, a key question becomes, "What are users' preconceptions about Japanese equipment - are they leaning toward, or away from, purchase?" The survey addressed this question by asking the respondent to rate each Japanese

equipment category as poor, fair, good, or very good on the issues of reliability, price/performance, and maintenance. The results are presented in Exhibit II-3.

- It is significant that most respondents did not give an opinion, in that over 70% did not rate the equipment/software categories; this is evidence that most opinions are still forming. However, those who did respond give an indication of the emerging shape of opinion, and therefore are worthy of analysis.

- Particularly on computers and minicomputers, respondents had positive images of reliability.

- Consistent with earlier comments regarding Japan's penetration of the printer market with lower priced products, price/performance is the current dominant impression among respondents regarding printers. The same profile applies to word processors. As will be discussed later, word processors may be the next target market for Japanese producers.

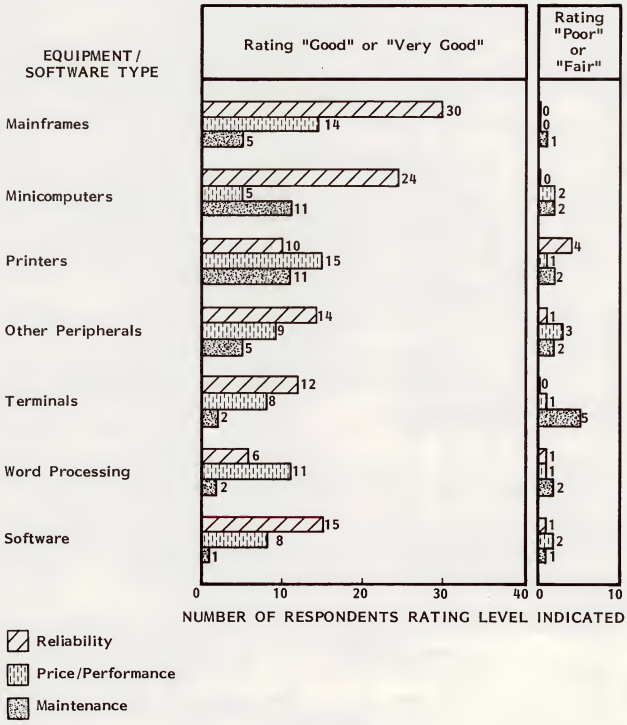
- The ratings for software significantly lag those for mainframes, reflecting the perceived lag in software development in Japan - a lag the Japanese are working to eliminate.

- The low level of "good" and "very good" mentions for price/performance for minicomputers reflects the competitiveness of U.S. manufacturers.

  . Not only are the traditional manufacturers such as Digital Equipment, Hewlett-Packard, and Data General perceived to be competitive, but IBM with its 4300 announcement in 1979 proved again that U.S. manufacturers can in fact develop equipment with excellent price/performance characteristics relative to Japanese offerings.

EXHIBIT II-3

RESPONDENTS' RATING OF JAPANESE EQUIPMENT/SOFTWARE



- Observers in Japan reported that the IBM 4300 announcement took Japanese manufacturers by surprise in terms of price/performance - perhaps a desire by IBM for a surprise is a reason for its aggressive pricing on this mid-range product line. Actually, the stock price of Fujitsu dropped nearly 4% on the day of the 4300 announcement.

- The small number of "poor" or "fair" ratings shown on Exhibit II-3 is in itself a message - to the extent users have a preconception about Japanese equipment, it tends to be a positive preconception.

  - The ratio of "good" and "very good" mentions for maintenance compared to the ratio of "poor" and "fair" mentions is 37:12. This ratio is similar to the satisfaction levels users in other INPUT surveys express regarding maintenance of U.S. equipment, with 60% expressing a "high" level of satisfaction. At this point, Japanese and U.S. producers are equal on average with regard to user satisfaction with maintenance.

  - The relatively high level of "poor" and "fair" ratings for terminal maintenance is an indicator that adequate field engineering coverage is not yet in place.

C. THE FULL IMPACT IS YET TO COME

- While the Japanese companies bring significant resources to the U.S. market, none have yet made a sizable penetration in the computer equipment area:

  - Other than Fujitsu, the Japanese companies tend to be conglomerates, with a secondary interest in computers. This configuration has not been successful for U.S. companies, with General Electric and RCA being two examples; both had unsuccessful ventures into computers in the

1960s and 1970s, even though they had been successful in consumer electronics, communications, and related markets.

- The advantage which U.S. companies have in understanding the applications from a user viewpoint will be a growing, rather than diminishing, factor. The success of the Japanese companies will depend in large measure on their ability to gain applications understanding.

- The willingness of U.S. users to consider purchase of Japanese equipment, as shown in the survey in the beginning of this chapter, adds to the strength of the Japanese producers. If these producers overcome their weaknesses - software, applications knowledge, field service, and distribution - they can expect to find willing buyers.

- It may well be that the Japanese producers will be a greater threat in the latter half of the decade when they can bring their total capability in data processing, text processing, video, satellite communications, and low-cost manufacturing, to bear on the applications mix of the late 1980s.

III THE OVERALL JAPANESE COMPUTER INDUSTRY EFFORT

A. GOVERNMENT-INDUSTRY COOPERATION

- An understanding of the Japanese effort must start with their concept of government-industry cooperation. In this case, basic research money comes from the Ministry of International Trade and Industry (MITI). MITI has pledged more than $300 million to be spent in this decade to develop a "supercomputer" plus a "fifth generation" computer and a new family of computer building blocks.

  - One hundred fifty million dollars is for the "supercomputer," targeted to be 66 times faster than America's Cray 1.

  - A portion of the remainder will be spent on a "fifth generation" machine which will be designed to have artificial intelligence. As such, it will be able to solve problems it has not been directly instructed to solve in its software. If this is successful, the machine will be functioning more in the fashion of a human brain.

  - A third program involves development of semiconductor devices which will function in extreme environments such as inside nuclear reactors or in outer space.

- While the success of these projects cannot be certain, the success of the MITI sponsored VLSI program in the 1976-1979 period lends credence to their potential.

- Japanese companies often cooperate with each other, or with companies in other countries.

  - Typical of an all-Japanese agreement is a recent agreement between Toshiba and Ishikawajima-Harima Heavy Industries (IHI) to exchange in-house electronics expertise. This agreement is in addition to an existing six-man intercompany committee (presidents and vice presidents) which has existed between the two giant companies.

  - Nippon Electric Co. (NEC) plans to implement a technological exchange program with the Soviet Union's National Science and Technology Committee (NSTC) regarding small computer systems.

  - Fujitsu has had an agreement with Siemens of West Germany which includes Siemens' marketing of Fujitsu mainframes. More recently Fujitsu completed an agreement and set up a company with TRW, a development which will be discussed in more detail in the next chapter.

- Joint activities extend beyond hardware manufacturing.

  - Management Information Science International, a Japanese software development firm, formed a joint venture with a New York consulting group to provide bilingual DP expertise.

  - Fuyo Data Processing and Systems Development Ltd., part of a group headed by Fuji Bank, is actively seeking joint ventures with U.S. firms interested in Japanese software markets.

- While cooperation is a characteristic, Japanese firms also compete aggressively in the marketplace. Some MITI projects, notably solar and

nuclear power, were considered by some to be not successful because companies participating in the research became less cooperative as the commercial potential became apparent. The computer related projects could encounter similar difficulties.

- Joint ventures are not solely a Japanese activity. Control Data Corporation is a prime example of a U.S. company which has successfully participated in joint ventures (with NCR, Honeywell, and ICL, among others). The point is that the Japanese use such ventures, plus government funding, to do research and development on a massive scale, rather than on an exception basis.

B. JAPAN'S CURRENT AND NEAR-TERM U.S. MARKETS

1. PRINTERS

- While the serious threat to large computer markets in the U.S. may be several years off, the impact of Japanese printers has already been felt.

  - Concentrating on the under $2,500 market, Japanese producers such as Fujitsu, NEC, Ricoh, Okidata, Shinshu Seiki, and C. Itoh are offering printers at prices of up to 25% less than U.S. produced models.

  - In addition to a price advantage, the printers often are perceived to have higher quality and reliability.

- American producers such as Anadex, Centronics, and Integral Data Systems are either abandoning the lower priced markets, or fighting back with arguments of better print quality, better service, or more features.

- One U.S. manufacturer, Tally Corp. (acquired in 1979 by Mannesmann, a German firm) is retaliating by emulating the Japanese in setting up low-cost production facilities and imposing strict quality control.

- The message for U.S. vendors, however, is that the Japanese manufacturers were able to target a market segment and achieve over 20% penetration in some areas in a period of only two to three years.

2. PERSONAL COMPUTERS

- Much recent publicity has centered on the personal computer market where names such as NEC, Panasonic, Hitachi, Sharp, Casio, Sord Computer Systems, and AI Electronics are appearing against Apple, Radio Shack, and Commodore.

- Some significant differences exist, however, between the printer and personal computer markets.

  - Software, a U.S. advantage, is important in personal computers.

  - U.S. producers have recently been joined by products from IBM and Xerox, two companies with ultimate staying power.

  - Distribution channels are crucial in personal computers, and the U.S. producers are more established in this area.

- The outcome of the fight in personal computers will give insight into the probable outcome in later fights for market share among larger computers. The personal computer market is a solution-oriented, relatively unstructured market rather than the hardware dominated, structured printer market. It will be a test of the Japanese ability to adapt to the new conditions.

3. WORD PROCESSORS

- More recently, the Japanese have entered the U.S. word processing markets.

  - Toshiba made the first Japanese announcement of an English language word processor, in July of this year.

- The product, the EW-100, is priced at an average of $8,600; company plans include signing up at least 100 dealers by year-end.

- Ricoh expects to soon add a low-cost word processor to its existing offerings of printers, copiers, and cameras.

- Sony has begun shipping a portable electronic keyboard called a typecorder, priced in the $1,450-2,500 range. Sony will use over 200 dealers and some direct sales in selected markets. Later in the year Sony anticipates adding a more expensive standalone word processor which will be sold by 30 dealers.

- Fujitsu has to date invested most heavily in the U.S. word processing market.

  - In April 1980 Fujitsu acquired the word processor development department from DPF, Inc. Called Word Machine, the word processor has now been installed in test locations.

  - Some difficulties in development have been encountered, which Fujitsu claims have been overcome.

- The inherent tie of word processing to language can be a major obstacle to the Japanese. Also, they lack experience in keyboard based typing systems. This, combined with the same obstacles as apply to personal computers (software, distribution, and service), may cause the Japanese to have a difficult time achieving early market penetration. Product quality and reliability can be expected to be the cornerstone of the Japanese effort.

C. JAPANESE SOFTWARE

- Due to differences in languages and business practices, software developed in the Japanese market is not exportable to the U.S. This fact, combined with

Japan's lag in the level of software expertise versus the U.S.'s increases the size of the barrier which software represents in Japan's entry into U.S. computer markets.

- MITI, discussed earlier in terms of funding hardware research, has sponsored research aimed at automating the production of software. The so-called Program Productivity Development System (PPDS) is yet to go commercial, although it has been demonstrated to the public.

  - One goal is to write programs that are machine independent.

  - Another is to increase programmer productivity by building a total system which includes syntax checkers, flowchart generators, automatic documentation production aids, and cross-checking of variables.

- Prior to the PPDS project, the government loaned almost $3.0 million to fund the development of salable software packages.

  - Sale of the packages has been hindered by the tendency of Japanese users not to use packaged software.

- All indications to date are that the Japanese will put heavy emphasis on software, but that becoming competitive with the U.S. in software will be a far more difficult task than becoming competitive in hardware.

IV ACTIVITIES OF KEY JAPANESE COMPANIES

- This section will discuss a range of Japanese companies in terms of their current and potential activities in the United States.
  - The focus is on computer activities.
  - In the long term, however, a discussion of Japanese activities will have to expand to include all information processing. Japanese firms are very active in related equipment such as PABX, facsimile, copiers, and word processing. Office automation is a definite target. Japan is already taking a leading position in video conferencing.

A. FUJITSU LTD.

- Fujitsu is generally recognized as the leading Japanese computer manufacturer in terms of size and commitment to the industry. Compared to some other firms which are giant conglomerates, over 70% of Fujitsu's revenues come from computer activities.
  - In 1979 Fujitsu overtook IBM as the largest EDP supplier in Japan.
  - Fujitsu has had a major investment in Amdahl, estimated at 30%.

- Fujitsu also has an agreement with Memorex on memory.

B. TRW-FUJITSU COMPANY (TFC)

- Formed in May 1980, TFC represents Fujitsu's major thrust into the U.S. market. Characteristics of the joint venture company are:
  - Fujitsu owns 51% and TRW owns 49%.
  - Fujitsu is primarily responsible for supplying the hardware; TRW supplies the marketing, service, and applications software.
  - The board of directors initially consists of six TRW and seven Fujitsu executives.
- Product announcements have followed the sequence forecast in the press coverage given to the startup of the company.
  - This is an indication that TRW and Fujitsu have been able to implement their plan to date.
  - In January 1981, a point of sale (POS) terminal, the TFC 7880 was announced at the National Retail Merchants Convention. Features include optional plasma display, magnetic stripe credit card reader, and data entry capability for OCR Wand readers. Sale price is in the $5,300 range.
- The TFC 8500, a 16-bit minicomputer, was introduced in March 1981. It is targeted for distributed as well as standalone environments.

- Because of unusually dense circuit boards, major components are estimated to have a mean time between failures of 10,000 hours, according to some outside sources.

- The product literature for the TFC 8500 emphasizes characteristics which capitalize on user attitudes documented earlier in this brief. Examples are:

  . "The expansion economy you've always wanted."

  . "The quality and reliability you deserve."

  . "Technology you can depend on."

- Press reports indicate that initial marketing is through third-party software houses but that TRW-produced software will be available for 1982 customer shipments.

- In June 1981, an offering to the banking industry, the TFC 5200 Bank Transaction System was unveiled at the American Banking Association Automation Conference. The system includes a branch processor and up to 24 video display terminals for managers, tellers, and customers.

  - The hardware is from Fujitsu, the applications software from TRW.

  - The software includes teller functions, administrative functions, and customer inquiry into balances; it was developed by TRW's Systems Development Group in San Diego.

- Most recently, TFC announced the TFC 3450 family of information systems.

  - A desktop computer, it is targeted at financial planning, general accounting, word processing, and scientific or engineering applications.

- It is a 16-bit machine with prices in the $6,000-10,000 range depending on configuration and quantities ordered.

- Called the Affinity 16, it will also be serviced by TRW's customer service division. Press releases describe that division as "a nationwide network of over 200 service centers staffed by more than 3,000 employees."

- Obviously, TRW's Customer Service Division is viewed by TFC as a major advantage in overcoming the field service deficiency perceived by many users relative to Japanese manufactured equipment.

C. HITACHI, LTD.

- A diversified manufacturing company, sometimes called the "GE of Japan," Hitachi's revenues are approximately evenly distributed between:

  - Communications and electronics equipment.

  - Electric utility apparatus.

  - Industrial machinery.

  - Wire, cable, chemicals, other products.

- Hitachi's main product focus is its large and mid-range H, M, and L series computers.

- The major U.S. marketing thrust is a marketing agreement with National Advanced Systems Corp.

- National Advanced Systems replaced Hitachi's previous U.S. marketing arm, Itel.

- Hitachi has a similar agreement in Europe with Olivetti Computers, SPA. Evidently Hitachi is not yet ready to make the direct commitment in the U.S. evidenced by Fujitsu.

D. NIPPON ELECTRIC CO., LTD. (NEC)

- With a basic focus on communications, NEC produces over 14,000 products ranging from satellite communications systems, through data processing and industrial electronic systems, to electron devices and finally consumer electronics.

- In late 1980, NEC announced the Acos 1000, a large computer intended to compete with the large IBM offerings, although it is not IBM compatible (Fujitsu and Hitachi offerings tend to be "near compatible" with the larger IBM offerings).

  - Target markets for the Acos 1000 include universities, research laboratories, and major business concerns.

  - Initial buyers are expected to be in Japan.

- NEC's main U.S. thrust has been in the small business computer market.

  - Its Astra series of small business computers was introduced in the U.S. in early 1979 by its U.S. subsidiary, NEC Information Systems, Inc. (NECIS).

  - At announcement time, NEC contended that the company had spent three years designing the system for the U.S. market.

- NECIS uses a network of dealers for distribution.

- A more recent report estimates that NEC, although the most successful Japanese entry in the U.S. overall computer market, still has less than a 1% market share. A major limitation is software, which NECIS is attempting to solve by working with software companies and OEMs.

E. TOSHIBA CORP.

- From a beginning in 1890 as a small manufacturer of electric light bulbs, Toshiba today produces power and transportation equipment, communications equipment, industrial equipment, and consumer products in addition to computers and office machines.

  - Toshiba produces 16K chips in its Sunnyvale, California, facility. Recently it announced that it would ship chips to Japan, enabling it to stamp "made in U.S.A." on each chip.

  - Toshiba is concentrating on personal computers, small business systems, and word processors in the U.S. market.

  - To date, Toshiba has a direct sales force in the Los Angeles area and plans a nationwide dealer network. It is also opening two retail stores in southern California.

F. MITSUBISHI ELECTRIC CO., LTD.

- Mitsubishi's ties to the United States date back at least to 1923 when a technical agreement was signed with Westinghouse Electric International. This was expanded to a technical exchange agreement in 1966. Today,

Mitsubishi produces a range of products similar in many ways to those of NEC, Hitachi, and Toshiba. These include heavy industrial equipment, motors, communications equipment, components, and consumer products, in addition to computer products.

- Mitsubishi began selling its Melcom 80 Series of small office computers in early 1979, through Melcom Business Systems, a sales subsidiary in Los Angeles. The initial thrust was on direct sales via a 20-man sales force.

  - Initial forecasts by Mitsubishi projected a 10% share of the West Coast market by 1982. This forecast is now viewed as overly optimistic.

  - Current marketing is direct in the Los Angeles area, and through dealers in other areas. As of mid-1981, eastward coverage had reached Denver.

  - Dealers are responsible for maintenance, perhaps a reason geographical coverage is moving slowly.

EXHIBIT A-1

EDP BUDGET GROWTH

INDUSTRY SECTOR	AVERAGE 1980 BUDGET ($ MILLION)	ACTUAL INCREASE (PERCENT)	AVERAGE 1981 BUDGET ($ MILLION)	EXPECTED INCREASE (PERCENT)	AVERAGE 1982 BUDGET ($ MILLION)	INCREASE 1981-1982 ($ MILLION)
DISCRETE MANUFACTURING	$10.07	+19.1%	$11.99	+16.9%	$14.02	$2.03
PROCESS MANUFACTURING	6.51	+16.6	7.59	+14.5	8.69	1.10
TRANSPORTATION	9.92	+ 8.1	10.72	+ 9.2	11.71	0.99
UTILITIES	39.78	+21.2	48.23	+15.8	55.86	7.63
BANKING/FINANCE	2.21	+17.2	2.59	+17.0	. 3.03	0.44

SOURCE: 1981 INPUT USER PANEL SURVEY

(Continued)

EXHIBIT A-1 (CONT.)

EDP BUDGET GROWTH

INDUSTRY SECTOR	AVERAGE 1980 BUDGET ($ MILLION)	ACTUAL INCREASE (PERCENT)	AVERAGE 1981 BUDGET ($ MILLION)	EXPECTED INCREASE (PERCENT)	AVERAGE 1982 BUDGET ($ MILLION)	INCREASE 1981-1982 ($ MILLION)
INSURANCE	$2.51	+14.7%	$2.87	+11.8%	$3.21	$0.34
EDUCATION	2.37	+ 5.5	2.50	+ 6.4	2.66	0.16
DISTRIBUTION	4.61	+11.5	5.14	+12.3	5.77	0.63
GOVERNMENT	3.21	+10.6	3.55	+11.3	3.95	0.40
SERVICES & OTHER	4.01	+12.7	4.52	+11.9	5.06	0.54
AVERAGE FOR ALL SECTORS	$6.67	+16.7%	$7.79	+14.8%	$8.94	$1.05

SOURCE: 1981 INPUT USER PANEL SURVEY

EXHIBIT A-2

CHANGES IN EDP BUDGETS FOR
RESPONDENTS IN ALL INDUSTRY SECTORS

BUDGET CATEGORY	1981 AVERAGE BUDGET ($ 000)	1981 PERCENT REPORTING	1982 AVERAGE BUDGET ($ 000)	1981-1982 PERCENT CHANGE
SALARIES	$3,457.9	87.1%	$3,881.7	+12.3%
EDP TRAINING	35.8	63.3	38.7	+ 8.1
NON-EDP TRAINING	26.7	12.1	29.3	+ 9.7
CENTRAL SITE MAINFRAMES	973.0	71.4	1,108.9	+14.0
CENTRAL SITE PERIPHERALS	400.6	52.2	426.2	+ 6.4

SOURCE: 1981 INPUT USER PANEL SURVEY

(Continued)

CHANGES IN EDP BUDGETS FOR RESPONDENTS IN ALL INDUSTRY SECTORS

BUDGET CATEGORY	1981 AVERAGE BUDGET ($ 000)	1981 PERCENT REPORTING	1982 AVERAGE BUDGET ($ 000)	1981-1982 PERCENT CHANGE
REMOTE SITE MAINFRAMES	$1,015.2	11.6%	$1,207.1	+18.9%
REMOTE SITE PERIPHERALS	203.8	15.2	212.4	+ 4.2
MINICOMPUTERS	687.1	24.1	833.4	+21.3
MICROCOMPUTERS/ PERSONAL COMPUTERS	9.8	6.7	18.1	+84.7

SOURCE: 1981 INPUT USER PANEL SURVEY

(Continued)

EXHIBIT A-2 (CONT.)

CHANGES IN EDP BUDGETS FOR
RESPONDENTS IN ALL INDUSTRY SECTORS

BUDGET CATEGORY	1981 AVERAGE BUDGET ($ 000)	1981 PERCENT REPORTING	1982 AVERAGE BUDGET ($ 000)	1981-1982 PERCENT CHANGE
TERMINALS	$ 473.9	60.3%	$ 521.4	+10.0%
COMMUNICATIONS HARDWARE AND SOFTWARE	263.6	48.7	295.6	+12.1
NETWORK EXPENSE	1,218.2	44.2	1,354.1	+11.2
OTHER SOFTWARE	205.0	55.4	241.6	+17.9

SOURCE: 1981 INPUT USER PANEL SURVEY

(Continued)

CHANGES IN EDP BUDGETS FOR RESPONDENTS IN ALL INDUSTRY SECTORS

BUDGET CATEGORY	1981 AVERAGE BUDGET ($ 000)	1981 PERCENT REPORTING	1982 AVERAGE BUDGET ($ 000)	1981-1982 PERCENT CHANGE
VENDOR MAINTENANCE	$ 895.6	62.5%	$1,003.7	+12.1%
THIRD-PARTY MAINTENANCE	104.6	16.1	111.1	+ 6.2
OUTSIDE SERVICES	365.2	28.6	398.6	+ 9.1
DATA SECURITY	81.7	15.6	70.5	- 13.7
DISASTER PLANNING	20.5	13.4	20.9	+ 2.0
SUPPLIES AND OTHER	784.2	77.7	867.1	+10.6

SOURCE: 1981 INPUT USER PANEL SURVEY

EXHIBIT A-3

RATIO OF EDP EMPLOYEES VERSUS
TOTAL COMPANY EMPLOYEES

INDUSTRY SECTOR	NUMBER OF EDP EMPLOYEES PER 100 COMPANY EMPLOYEES	
	COMPANY SIZE (ANNUAL SALES OR ASSETS)	
	UNDER $250 MILLION	OVER $250 MILLION
DISCRETE MANUFACTURING	2.0	1.3
PROCESS MANUFACTURING	1.5	1.8
TRANSPORTATION	0.6	2.5
UTILITIES	5.3	1.8
BANKING/FINANCE	9.6	2.0
INSURANCE	8.5	8.7
EDUCATION	1.5	0.4
DISTRIBUTION	1.2	0.8
GOVERNMENT	1.9	-
SERVICES AND OTHER	5.9	1.6

SOURCE: 1981 INPUT USER PANEL SURVEY

EXHIBIT A-4

BUDGET PER EDP EMPLOYEE

INDUSTRY SECTOR	BUDGET PER EDP EMPLOYEE ($ THOUSANDS)	
	COMPANY SIZE (ANNUAL SALES OR ASSETS)	
	UNDER $250 MILLION	OVER $250 MILLION
DISCRETE MANUFACTURING	$48.6	$60.8
PROCESS MANUFACTURING	35.1	56.3
TRANSPORTATION	31.3	65.7
UTILITIES	58.5	63.0
BANKING/FINANCE	30.5	32.4
INSURANCE	40.7	32.2
EDUCATION	35.3	-
DISTRIBUTION	47.0	48.4
GOVERNMENT	27.5	57.5
SERVICES AND OTHER	61.1	51.9

SOURCE: 1981 INPUT USER PANEL SURVEY

INFORMATION SYSTEMS DIRECTOR QUESTIONNAIRE

CATALOG NO. U A 8 1 _ _ _

A. GENERAL INFORMATION

1. Are you responding for a subsidiary, division, or agency? ☐ Yes ☐ No If no, please skip to Question 4.
2. Is the primary responsibility of your subsidiary/division/agency the provision of data processing services to the rest of the organization? ☐ Yes ☐ No
3. Please supply the following data for your subsidiary/division/agency only. SIC code (if known)_____
   Primary business or activity of your organization/agency _____
   Annual revenues ($ million)_____ or Assets ($ million)_____ or Budget ($ million)_____
   Annual selling, general, and administrative (SG&A) expenses ($ million)_____
   Total number of employees_____ Number of EDP employees_____
4. Please supply the following data for your entire organization.
   Primary business or activity of your organization_____ SIC code (if known)_____
   Annual revenues ($ million)_____ or Assets ($ million)_____ or total budget authority ($ million)_____
   Annual SG&A expenses ($ million)_____ Total number of employees_____ Number of EDP employees_____
   Is your EDP organization considered ☐ a cost center, or ☐ a profit center? Typical programmer/analyst chargeback $_____/hr.
   Do you allocate costs by: ☐ Size of user ☐ Usage of resources ☐ Transaction volume ☐ Other?

B. EDP ORGANIZATION

5. Please indicate the number of EDP employees by position for your subsidiary/division/agency (if applicable) and for your entire organization (if known), as well as the number of positions you are authorized to fill this year, according to the following classification:

POSITION	YOUR SUBSIDIARY/DIVISION/AGENCY				TOTAL ORGANIZATION			
	Staffed		Open		Staffed		Open	
	EDP Budget	End-user Budget	EDP Budget	End-user Budget	EDP Budget	End-user Budget	EDP Budget	End-user Budget
Managers								
Non-management supervisory								
Communications specialists								
Programmer/analysts								
Analysts								
Programmers								
Documenters, technical writers								
Technical support personnel								
Other support personnel								
Operations personnel								
Data entry personnel								
Other (specify)								

6. What best describes the organization of your EDP department (i.e., are you organized in separate development and maintenance groups, by line of business, by DP function, etc.)?
   Your subsidiary/division/agency_____
   Parent organization_____
7. A major problem facing EDP management is the increasing shortage of skilled personnel. What specific steps has your organization taken to insure a satisfactory retention rate for key EDP employees?_____
8. What steps have you taken to purge less than satisfactory performers?_____
9. What specific personnel trend do you see affecting your organization the most, either favorably or unfavorably, over the next five years?_____

C. EDP PROBLEMS

10. What are the most significant problems you face in 1981? (Rank the top five in order of priority: 1 through 5, 1 being most important, 2 second, etc., and indicate whether you have a plan in place to address the problem.)

CATEGORY	PRIORITY RANKING		PLAN IN PLACE	
	Last Year	This Year	Yes	No
Long-range business objectives			☐	☐
Long-range EDP objectives			☐	☐
Relations with management			☐	☐
Relations with end-users			☐	☐
Data center operations			☐	☐
Project planning			☐	☐
Project scheduling – estimating			☐	☐
Project scheduling – priorities			☐	☐
System development specifications			☐	☐
EDP budget			☐	☐
Personnel recruiting			☐	☐
Personnel training			☐	☐
Personnel retention			☐	☐
Personnel productivity			☐	☐
Hardware capacity (CPU)			☐	☐
Hardware capacity (disk)			☐	☐
Hardware maintenance			☐	☐
Systems software			☐	☐
Network facilities			☐	☐
Other (specify)_____			☐	☐
_____			☐	☐

D. EDP PLANS

11. What are your primary objectives and priorities for the next three years? (Rank the top five in order of priority: 1 through 5, 1 being most important, 2 second, etc., for each of the three years.)

CATEGORY	PRIORITY RANKING		
	1981	1982	1983
Develop new on-line systems			
Modify existing on-line systems			
Develop new data base systems			
Modify existing data base systems			
Develop new DDP network			
Modify existing DDP network			
Install word processing			
Integrate word and data processing			
Develop long-range EDP plan			
Revise long-range EDP plan			
Integrate long-range EDP plan with business plan			
Improve EDP personnel productivity			
Measure EDP personnel productivity			
Convert hardware system			
Convert operating system			
Develop new batch applications			
Integrate batch applications			
Improve end-user relations			
Other (specify)			

E. EDP APPLICATIONS

12. The reverse side of the cover sheet accompanying this questionnaire is a representative, but by no means exhaustive, list of applications that the 1980 User Panel respondents cited among their top five applications development priorities for 1980. Using this list as a guide, please indicate the five most important applications development priorities for your organization in 1981.

Priority	Code or Name of Application	Estimated Cost to Develop	Estimated Annual Cost To Run	Estimated Payback Period (months)	Developed In-house	Purchased	TO RUN AT CENTRAL SITE		TO RUN AT REMOTE SITE			
							Batch	On-line	Batch (Stand-Alone)	Batch (Summary Data Transmitted to Central Site)	On-Line	Number of Sites
1					☐	☐	☐	☐	☐	☐	☐	☐
2					☐	☐	☐	☐	☐	☐	☐	☐
3					☐	☐	☐	☐	☐	☐	☐	☐
4					☐	☐	☐	☐	☐	☐	☐	☐
5					☐	☐	☐	☐	☐	☐	☐	☐

13. What is the approximate number of new development application systems for which you are responsible?_____

	TYPICALLY	RANGE	
		MINIMUM	MAXIMUM
Size of system (number of separate programs)			
Size of program (number of lines of source code)			
Duration of system implementation effort (elapsed number of months)			
Staffing requirements to develop (work - months) per system			

Number of programs under active maintenance_____
Approximate total lines of code under active maintenance_____
Staffing requirements to maintain (work - months per year) per system_____

14. What is the most significant industry event that affected your applications development in the last twelve months?_____

15. What research or information would be most helpful to your development or planning efforts?_____

16. Did you, or do you ever plan to, integrate word processing with data processing? ☐Done ☐Plan to do ☐Will not do ☐Undecided
Did you,or do you ever plan to, integrate CAD/CAM with data processing? ☐Done ☐Plan to do ☐Will not do ☐Undecided

F. EDP BUDGET

17. What is your total EDP budget for 1981? $_____,_____,000. 18. What was it in 1980? $_____,_____,000.
19. By how much will your budget change from 1981 to 1982? ☐Increase +_____% ☐Decrease -_____% ☐No change
What inflation rate is included in the above percentage?_____%
20. Please categorize how your 1981 EDP budget will be spent and how this breaks down between central and remote sites. Also indicate how much you expect specific categories to increase or decrease in 1982.

CATEGORIES	Not Included in EDP Budget	1981 TOTAL BUDGET			ANTICIPATED PERCENT OF CHANGE IN 1982		
		Amount	Percent Central	Percent Remote	Increase	Decrease	Percent
Personnel salaries	☐	$_____,_____,000	%	%	☐	☐	%
EDP personnel training	☐	$_____,_____,000	%	%	☐	☐	%
Non-EDP personnel training	☐	$_____,_____,000	%	%	☐	☐	%
Mainframe processors: central	☐	$_____,_____,000	%	%	☐	☐	%
Mainframe processors: remote	☐	$_____,_____,000	%	%	☐	☐	%
Peripherals: central	☐	$_____,_____,000	%	%	☐	☐	%
Peripherals: remote	☐	$_____,_____,000	%	%	☐	☐	%
Minicomputers	☐	$_____,_____,000	%	%	☐	☐	%
Microcomputers/personal computers	☐	$_____,_____,000	%	%	☐	☐	%
Terminals	☐	$_____,_____,000	%	%	☐	☐	%
Communications hardware & software	☐	$_____,_____,000	%	%	☐	☐	%
Network expense (line cost only)	☐	$_____,_____,000	%	%	☐	☐	%
Other software (purchase or lease)	☐	$_____,_____,000	%	%	☐	☐	%
Vendor maintenance (hardware & software)	☐	$_____,_____,000	%	%	☐	☐	%
Third party maintenance (hardware & software)	☐	$_____,_____,000	%	%	☐	☐	%
Outside processing services	☐	$_____,_____,000	%	%	☐	☐	%
Data security	☐	$_____,_____,000	%	%	☐	☐	%
Disaster planning/contingency	☐	$_____,_____,000	%	%	☐	☐	%
Supplies & other	☐	$_____,_____,000	%	%	☐	☐	%

21. What is your estimate of the annual amount of those items you marked as not included above $_____,_____,000

22. Are any of the expenditures in your budget for turnkey systems which combine hardware and applications software on a "ready-to-use" basis? ☐ Yes ☐ No If yes, how much is allocated for such systems? $_____,_____,000

G. EDP HARDWARE

23. Please indicate the number of systems installed and on order for central and remote sites.

VENDOR AND MODEL NUMBER	INSTALLED				ON ORDER				System(s) to be Replaced (if any)
	Total Now		To be Removed/ Replaced This Year		Total		To be Installed This Year		
	Central Site	Remote Site	Central Site	Remote Site	Central Site	Remote Site	Central Site	Remote Site	
IBM SYSTEMS									
3081									
3033 MP									
3033 AP									
3033 UP									
3033 N									
3032									
3031 AP									
3031 UP									
370/158-168 MP									
370/158-168 AP									
370/158-168 UP									
4341 Model Group 2									
4341 Model Group 1									
4331 Model Group 2									
4331 Model Group 1									
8100									
Other System/370									
System/360									
Series/1									
System/3									
System/32, 34									
System/38									
5100, 5110, 5120									
AMDAHL SYSTEMS									
580									
470 V/8									
470 V/7									
470 V/7-A									
470 V/7-B									
470 V/6									
BURROUGHS									
B 6900									
B 6800-7800									
B 6700-7700									
B 2900-3900									
B 2800/3800/4800									
Other Burroughs									
CONTROL DATA									
3000 Series									
Cyber 170 700 Series									
Omega/480									
Other CDC									
DATA GENERAL									
MV/8000									
Eclipse									
Other Data General									

VENDOR AND MODEL NUMBER	INSTALLED				ON ORDER				System(s) to be Replaced (if any)
	Total Now		To be Removed/ Replaced This Year		Total		To be Installed This Year		
	Central Site	Remote Site	Central Site	Remote Site	Central Site	Remote Site	Central Site	Remote Site	
DIGITAL EQUIPMENT									
DEC System 10									
DEC System 20									
VAX 11/780									
VAX 11/750									
Large PDP-11									
Other DEC									
HONEYWELL									
DPS/8									
DPS/6									
DPS/4									
Series 60 Level 66/68									
Series 60 Level 64									
Series 60 Level 62									
Series 60 Level 6									
Other Honeywell									
NCR									
8400–8500									
8200									
Other NCR									
SPERRY UNIVAC									
11/82-84									
1100/81									
1100/42-44									
1100/41									
1100/60									
Series 90/80									
Series 90/70									
Series 90/60									
System 80									
BC-7									
Other UNIVAC									
OTHER MANUFACTURERS									
Vendor / Model									

24. Is your EDP system a telecommunications system? ☐ Yes ☐ No If no, do you anticipate going on-line within the next three years? ☐ Yes ☐ No If no, skip to Question 29.
25. What types of equipment do/will you use to interface the network with the CPU(s)? ☐ Hard-wired controller(s) Model(s)_____ ☐ Programmable front-end communications processor(s) Model(s)_____
26. What types of network interface equipment do you plan to install in the future?_____
27. How many locations in your organization presently have computers linked to others by telecommunications lines?_____ By how many will this number increase by yearend 1981?_____ by yearend 1982?_____
28. In what year did/will your telecommunications system become operational?_____
29. What operating system(s) are you presently using?_____

30. What network control program(s) are you presently using?_____

31. If you are an IBM user and are not currently using MVS or DOS/VSE, when do you anticipate converting to ☐ MVS: 198_____ and/or ☐ DOS/VSE? 198_____

32. Please indicate the number of the following that you have installed or are planning to install.

PRODUCT TYPE	INSTALLED				PLANNED				
	Total Now		To be Removed/ Replaced in 1981		To be Installed				
					1981		1982		After 1982
	Central Site	Remote Sites	Central Site	Remote Sites	Central Site	Remote Sites	Central Site	Remote Sites	
A. Minicomputers/microcomputers/small business systems/personal computers: a. Priced at $1,500 or less									
b. Priced at $1,501 – $15,000									
c. Priced at $15,001 – $150,000									
d. Priced at $150,001 +									
B. Intelligent terminals or terminal cluster controllers									
C. Non-intelligent terminals									

33. Please indicate the reasons for selecting the hardware (i.e., non-mainframe computers, end-user equipment) listed in Question 32.

CRITERION	IMPORTANCE					BY 1985, WILL THE IMPORTANCE OF THIS CRITERION		
	Not Important	Of Some Importance	Important	Very Important	Most Important	Increase	Decrease	Stay the Same
Price of hardware	☐	☐	☐	☐	☐	☐	☐	☐
Price of maintenance	☐	☐	☐	☐	☐	☐	☐	☐
Availability of software	☐	☐	☐	☐	☐	☐	☐	☐
Reliability of hardware	☐	☐	☐	☐	☐	☐	☐	☐
Quality of maintenance	☐	☐	☐	☐	☐	☐	☐	☐
Compatibility with currently installed hardware	☐	☐	☐	☐	☐	☐	☐	☐
Hardware features	☐	☐	☐	☐	☐	☐	☐	☐
Estimated uptime	☐	☐	☐	☐	☐	☐	☐	☐
Quality of sales effort	☐	☐	☐	☐	☐	☐	☐	☐
Reputation of manufacturer	☐	☐	☐	☐	☐	☐	☐	☐

H. OUTSIDE COMPUTER SERVICES AND EXPENDITURES

34. Does your company purchase outside computer services that are not under the control of the EDP organization? ☐ Yes ☐ No

35. If yes, what are the approximate annual expenditures for these services in 1980 $_____,_____, 000, 1981 $_____,_____, 000, and 1982 $_____,_____, 000?

36. Who purchases these outside services?

☐ Finance _____% ☐ Engineering _____%
☐ Corporate _____% ☐ Operations/Manufacturing _____%
☐ Personnel _____% ☐ Marketing/Sales _____%
☐ R&D _____% ☐ Other _____ _____%

37. Do you plan to replace these services with in-house alternatives? ☐ Yes ☐ No 38. If yes, when, and which? _____

39. If no, what would prevent or hinder their implementation in-house? _____

40. Do you provide computer services to others outside your organization? ☐ Yes ☐ No

41. If yes, please specify:

- ☐ Sale of computer-based resources
  - ☐ Batch mode – Average number of hours per week _____ hr./wk.
  - ☐ On-line mode – Average number of hours per week _____ hr./wk.
  - ☐ Raw power (customer supplies programs and data)
  - ☐ Processing (your programs, customer supplies data)
  - ☐ Access to or use of your proprietary data base(s)
- ☐ Retainer for use of your system(s) as backup for customer's system(s)
- ☐ Sale of programs developed in-house
- ☐ Rental or lease of programs developed in-house

I. UTILIZATION ISSUES

42. What percent of your computer resources are used for:

Production runs	_____%
New applications development	_____%
Maintenance of existing programs	_____%
Enhancement/upgrade of existing programs	_____%
Other (specify)_____	_____%

43. What percent of your applications programmers are assigned to:

	1980	1981	1982
New program development	_____%	_____%	_____%
Maintenance of existing programs	_____%	_____%	_____%
Enhancement/upgrade of existing programs	_____%	_____%	_____%
Production/user support, troubleshooting	_____%	_____%	_____%
Other	_____%	_____%	_____%

44. Do you have a dedicated applications development computer? ☐ Yes ☐ No

45. What measures are you taking to reduce the time and costs associated with program development? _____

46. What level of improvement (measured in terms of shortening the development cycle) do you estimate these measures will provide? ☐ 1 – 10% ☐ 11 – 20% ☐ 21 – 50% ☐ 51 – 75% ☐ More than 75%
How much do you need? ☐ 1 – 10% ☐ 11 – 20% ☐ 21 – 50% ☐ 51 – 75% ☐ More than 75%

47. What is the total number of 8-hour shifts per week (maximum 21 per CPU) that you have your systems operating?_____

48. Of these, how many are primarily batch mode shifts?_____

49. What operating system(s) do you use when in batch mode?_____

50. How many shifts do you run primarily or substantially in on-line mode?_____

51. What operating system(s) do you use when in on-line mode?_____

52. How many end-user stations do you support directly in on-line mode ☐ full-time (or nearly)_____ ☐ occasionally_____

J. EQUIPMENT FROM JAPAN

53. If Japanese equipment manufacturers were to market computer and related products directly in the United States, would you consider purchasing these products? ☐ Yes ☐ No

54. If Japanese equipment manufacturers were to market these products through United States distributors, would you consider acquiring these products? ☐ Yes ☐ No

55. Do you currently use Japanese computer products? ☐ Yes ☐ No

56. If yes, which products (manufacturer and model no.)?_____

57. What other Japanese computer products are you likely to acquire within the next two years?_____

58. What are your opinions with respect to Japanese computer equipment in the following areas:

PRODUCT TYPE	We Have Now	Plan to Purchase	No Plans	RELIABILITY					PRICE/PERFORMANCE					MAINTENANCE				
				Poor	Fair	Good	Very Good	No Opinion	Poor	Fair	Good	Very Good	No Opinion	Poor	Fair	Good	Very Good	No Opinion
Mainframes	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Minicomputers	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Printers	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other peripherals	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Terminals	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Word processing equipment	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Software	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

K. OFFICE OF THE FUTURE ISSUES

59. Please check which of the office automation and communications services listed below are currently being used or planned and indicate whether the EDP department has management responsibility for them.

CATEGORY	STATUS/PLANS					EDP RESPONSIBILITY/PLANS				
	Using It Now	In 1981-1983	In 1984-1986	No Plans	Don't Know	EDP Responsibility Now	In 1981-1983	In 1984-1986	No Plans	Don't Know
Intra-company electronic mail	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Communicating word processors	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Video conferencing – freeze frame	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Video conferencing – full motion	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Sub-minute facsimile	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Intra-building wideband facilities	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Intra-city wideband facilities	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Dedicated satellite earth station	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Computerized PBX	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Automatic network management systems	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Worldwide data communications networks	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Private packet transmission (X.25)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

L. QUESTIONNAIRE FOLLOW-UP

60. Would you be willing to discuss any of the issues covered in this questionnaire in further detail with a member of INPUT's professional staff? ☐ I want to discuss, or ☐ I am willing to discuss _____
_____ ☐ I do not wish, or have no reason, to pursue any issue further.

61. What topics or questions would you like to see included in future questionnaires, if you could receive a statistical summary of the responses? _____
_____
_____

THANK YOU FOR YOUR PARTICIPATION. YOUR GIFT WILL BE SENT SHORTLY.

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- Productivity Improvement, 1980-1983: Survival Strategies for EDP Executives
- Opportunities in Communications Services for Digital Information: A Study of User Networks and Needs
- Improving the Productivity of Engineering and Manufacturing Using CAD/CAM
- CAD/CAM System and Service Market Opportunities

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- Analysis of the opportunities and problems associated with field service capabilities for CAD/CAM systems.
- Analysis of the market potential for third-party maintenance.
- 1981 ADAPSO Survey of the Computer Services Industry.
- Evaluation of the current status and future trends of software terms and conditions.
- Analysis and forecast of user self-maintenance for a vendor's line of equipment.

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INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

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F-1981

W. Smith BR4
AUTHOR

User Attitudes Regarding Equip-
TITLE

- hat will present an in-depth analysis
  . They make recommendations that
  olicy alternatives in the planning of

- he year's major activities in the field
  trends and their effects on future
  vided of likely changes in technical
  ey occur, may affect the future

- s an annual in-house presentation to
  the results of the previous year's
  trategic guidelines for the research
  entations will occur in the first half

- vith INPUT research staff on an as-
  and visits. A special "hot line" is
  dling of client requirements.

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- ional interviews with users, vendors,
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FIELD SERVICE PROGRAM

FIELD SERVICE BRIEF

USER ATTITUDES REGARDING EQUIPMENT FROM JAPAN

OCTOBER 1981

USER ATTITUDES REGARDING EQUIPMENT FROM JAPAN

CONTENTS

USER ATTITUDES REGARDING EQUIPMENT
FROM JAPAN

EXHIBITS

I INTRODUCTION

- This brief is part of INPUT's 1981 Field Service Program (FSP).
- This brief will provide clients with an early reading of the attitudes of users in the United States toward information processing equipment from Japan.
  - To date, penetration by Japanese companies into other than narrow slices of the U.S. information processing industry has been small.
  - The success of the Japanese in penetrating the automobile, consumer electronics, copier, and printer markets makes an assessment of their strength in total information processing a priority management task.
  - An understanding of the Japanese capability to compete is an element in the planning process for field service management, and this brief is designed to contribute to this understanding.
- The new data in this brief comes from over 200 managers of large information processing centers. The data provides insight into how "preconditioned" these potential buyers are to the purchase of Japanese manufactured equipment.
- The purpose of this brief is twofold:
  - First, to present a profile of current user opinion of Japanese products. This is included in the following chapter.

- Second, to present an overview of current developments and product lines from Japan. This is included in the later chapters.

- Data was gathered via INPUT's 1981 Survey of Information Systems Directors. The survey was mailed in the second quarter, and results were tabulated in August.

  - The respondents manage the larger EDP installations, and represent a major portion of the current U.S. installed base. Also, they tend to be the target of marketing efforts by multiple vendors, and therefore are informed about product and service alternatives. Backup data regarding budgets of the respondent sample is included in Appendix A, so that readers of this brief can judge the data with a good knowledge of its source.

  - The questions asked regarding equipment from Japan were part of a much larger questionnaire. The total questionnaire is included in Appendix B. Clients may use the inquiry service portion of the Field Service Program to obtain data from other sections of the questionnaire.

- The second part of this brief is a discussion and analysis of Japanese activities, including comments on strengths and weaknesses. A summary of the activities of major Japanese companies concludes the brief; this part is derived largely from material in INPUT's library, and is intended to put the subject of the potential threat from Japan in a concise perspective for client review.

- Client comment and inquiry on the material in this brief are welcome.

II RECEPTIVITY OF USERS TO JAPANESE EQUIPMENT

A. THE JAPANESE THREAT IN PERSPECTIVE

- The large amount of publicity given to the threat of Japanese producers' gaining a major share of the U.S. computer market distorts some basic facts:

  - Japan's success to date has been restricted to market segments where competitive pricing and reliability are crucial, and where the marketing channel is relatively simple.

  - For those companies in the path of a Japanese offensive - Centronics is an example in the case of printers - the effect can be catastrophic. Centronics is estimated to have lost half of its market share to Japanese producers.

  - Personal computers appear to be the next target of the Japanese, with the major unknown being the level of available software. Japanese producers have already regained a major share of the market in Japan.

- In reality, however, the Japanese have made little penetration in computer mainframe and memory markets, the controlling segment of the dominant EDP installations.

- Most available estimates place Japan's share of the U.S. computer market at under 10% in 1985, perhaps reaching 20% by 1990.

- The strengths Japan brings to the market include meticulous planning, very competitive pricing, high reliability, and a willingness to wait for profitability over a longer period than most of its U.S. competitors.

- The weaknesses which retard market dominance by Japan include an estimated five-year lag in software, unproven service capability, and inadequate channels of distribution.

- The challenge to U.S. vendors is to optimize their strengths in services and software, and to target their products based on a superior knowledge of the total needs of the U.S. user.

- For field service management, Japanese competition is particularly relevant because field service provides U.S. producers with a current edge, and it is important that this edge be maintained if U.S. producers are to retain market share.

B. RESULTS OF THE USER SURVEY

- A striking result of the user survey, as presented in Exhibit II-1, is that not a single respondent of the 208 stated that he would not buy Japanese equipment. This indicates that virtually all buyers will at least consider the Japanese-produced alternative.

  - Of the alternative distribution channels, respondents tended to prefer distributors (62.5% affirmative) to direct from manufacturer (54.3% affirmative). (The total of over 100% is a result of some respondents indicating they would buy from both channels.) Possibly the distributor conveys more of an image of local presence, giving this channel the

EXHIBIT II-1

CURRENT USER ATTITUDES TOWARD PURCHASE
OF JAPANESE EQUIPMENT

USER INDUSTRY SECTOR	ATTITUDE REGARDING JAPANESE EQUIPMENT					
	NUMBER OF RE-SPON-DENTS	NOW USING	WOULD BUY		WON'T BUY	NO RE-SPONSE
			DIRECT	FROM U.S. DIS-TRIBU-TORS		
Discrete Manufacturing	44	3	23	29	0	2
Process Manufacturing	32	2	17	20	0	1
Banking and Brokerage	13	0	7	9	0	1
Insurance	13	0	6	8	0	0
Transportation	4	0	4	4	0	0
Distribution	16	0	6	9	0	1
Utilities	10	2	6	7	0	1
Education	16	3	10	11	0	2
Government	21	0	18	17	0	1
Services and Other	39	2	16	16	0	2
Total	208	12	113	130	0	11
Percent of Total*	100%	6%	54%	63%	0	5%

*INDIVIDUAL RESPONSES ADD UP TO MORE THAN 100% BECAUSE OF MULTIPLE RESPONSES PER RESPONDENT

edge. In comparison, U.S. producers primarily use direct sales forces to reach the U.S. information equipment buyer.

- Responses are fairly uniform across industry sectors.

  . The distribution sector showed the lowest willingness (37.5% affirmative) to buy direct from Japanese manufacturers. This sector is made up largely of local, small firms, perhaps a cause for a less venturesome procurement posture.

  . Interestingly, the government sector had the highest willingness to buy direct from Japanese manufacturers (an 85.7% affirmative response). Obviously there is little "Buy American" sentiment among the government respondents, although government policies may retard respondents from acting on their willingness to buy Japanese.

  . The major sectors from the standpoint of size of EDP expenditures, manufacturing and banking, were solidly willing to buy Japanese poducts.

  . From the survey result, it is clear that no protection is forthcoming for U.S. manufacturers due to a negative attitude regarding Japanese equipment in any particular industry sector; all sectors are receptive to Japanese equipment.

- The current penetration of Japanese equipment among respondents is quite low, as shown in Exhibit II-2.

  - Only seven installations had Japanese equipment installed - only 3% of the sample. Six percent planned to install Japanese equipment. The current situation evidently is that users are receptive, but have not yet made purchase decisions.

EXHIBIT II-2

PLANS OF RESPONDING USERS FOR
BUYING JAPANESE EQUIPMENT

TYPE OF EQUIPMENT / SOFTWARE	NUMBER OF RESPONSES		
	HAVE IN-STALLED	PLAN TO PURCHASE	NO PLANS
Mainframes	3	2	145
Minicomputers	0	1	139
Printers	1	3	138
Other Peripherals	2	2	141
Terminals	0	2	140
Word Processing Equipment	1	4	122
Software	0	1	142
Total	7	15	-

- Only two respondents out of a total of 208 indicated that they intend to buy Japanese manufactured mainframes.

- The success of Japanese manufacturers in certain OEM markets, notably printers, is not reflected directly in these figures because the identity of the component part often is not known to the user; therefore the amount of Japanese equipment installed is greater than indicated because some users are unaware of the origin of some parts of a system.

- Responses to the question of which Japanese computer products are currently in use in the installations surveyed were the following:

  - Hitachi (five mentions, one each of the Intel AS-6, the National NAS-6, the NAS 7000, a "NASCO mainframe and tape drives (7420)," and "Hitachi tape units").

  - Fujitsu tape drives.

  - NEC (three mentions, all for printers).

- Responses to the question concerning what Japanese computer products are likely to be acquired within the next two years were the following:

  - Audio-video equipment.

  - Printers, terminals, minis.

  - CPU memory.

  - DATACOM 300 teleprinter.

  - PCM equipment.

- CRTs, printers.
- CPU, DASD.
- More tape and CPU.
- Terminals.
- "We have too much trouble getting maintenance on other than IBM equipment."
- NEC ASTRA.
- Media, terminals.
- Microprocessors.
- Fujitsu Winchester disk drives.
- Telecommunications equipment, word processing equipment.
- Terminals, other standalone components such as minis.
- Marketed through NAS.
- Character printers.
- Tape drives.

- Given that the current penetration of Japanese equipment in U.S. markets is low, and that users are willing to consider purchasing Japanese equipment, a key question becomes, "What are users' preconceptions about Japanese equipment - are they leaning toward, or away from, purchase?" The survey addressed this question by asking the respondent to rate each Japanese

equipment category as poor, fair, good, or very good on the issues of reliability, price/performance, and maintenance. The results are presented in Exhibit II-3.

- It is significant that most respondents did not give an opinion, in that over 70% did not rate the equipment/software categories; this is evidence that most opinions are still forming. However, those who did respond give an indication of the emerging shape of opinion, and therefore are worthy of analysis.

- Particularly on computers and minicomputers, respondents had positive images of reliability.

- Consistent with earlier comments regarding Japan's penetration of the printer market with lower priced products, price/performance is the current dominant impression among respondents regarding printers. The same profile applies to word processors. As will be discussed later, word processors may be the next target market for Japanese producers.

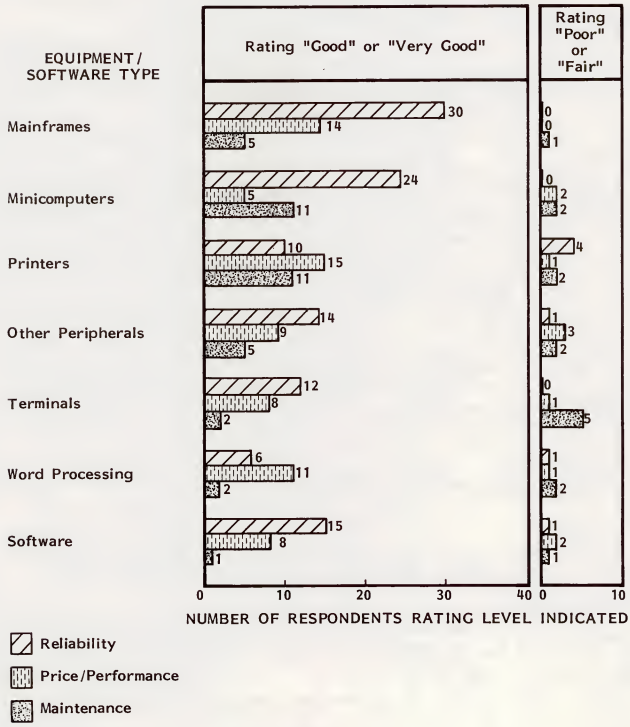
- The ratings for software significantly lag those for mainframes, reflecting the perceived lag in software development in Japan - a lag the Japanese are working to eliminate.

- The low level of "good" and "very good" mentions for price/performance for minicomputers reflects the competitiveness of U.S. manufacturers.

  . Not only are the traditional manufacturers such as Digital Equipment, Hewlett-Packard, and Data General perceived to be competitive, but IBM with its 4300 announcement in 1979 proved again that U.S. manufacturers can in fact develop equipment with excellent price/performance characteristics relative to Japanese offerings.

EXHIBIT II-3

RESPONDENTS' RATING OF JAPANESE EQUIPMENT/SOFTWARE



- Observers in Japan reported that the IBM 4300 announcement took Japanese manufacturers by surprise in terms of price/performance - perhaps a desire by IBM for a surprise is a reason for its aggressive pricing on this mid-range product line. Actually, the stock price of Fujitsu dropped nearly 4% on the day of the 4300 announcement.

- The small number of "poor" or "fair" ratings shown on Exhibit II-3 is in itself a message - to the extent users have a preconception about Japanese equipment, it tends to be a positive preconception.

  - The ratio of "good" and "very good" mentions for maintenance compared to the ratio of "poor" and "fair" mentions is 37:12. This ratio is similar to the satisfaction levels users in other INPUT surveys express regarding maintenance of U.S. equipment, with 60% expressing a "high" level of satisfaction. At this point, Japanese and U.S. producers are equal on average with regard to user satisfaction with maintenance.

  - The relatively high level of "poor" and "fair" ratings for terminal maintenance is an indicator that adequate field engineering coverage is not yet in place.

C. THE FULL IMPACT IS YET TO COME

- While the Japanese companies bring significant resources to the U.S. market, none have yet made a sizable penetration in the computer equipment area:

  - Other than Fujitsu, the Japanese companies tend to be conglomerates, with a secondary interest in computers. This configuration has not been successful for U.S. companies, with General Electric and RCA being two examples; both had unsuccessful ventures into computers in the

1960s and 1970s, even though they had been successful in consumer electronics, communications, and related markets.

- The advantage which U.S. companies have in understanding the applications from a user viewpoint will be a growing, rather than diminishing, factor. The success of the Japanese companies will depend in large measure on their ability to gain applications understanding.

- The willingness of U.S. users to consider purchase of Japanese equipment, as shown in the survey in the beginning of this chapter, adds to the strength of the Japanese producers. If these producers overcome their weaknesses - software, applications knowledge, field service, and distribution - they can expect to find willing buyers.

- It may well be that the Japanese producers will be a greater threat in the latter half of the decade when they can bring their total capability in data processing, text processing, video, satellite communications, and low-cost manufacturing, to bear on the applications mix of the late 1980s.

III THE OVERALL JAPANESE COMPUTER INDUSTRY EFFORT

A. GOVERNMENT-INDUSTRY COOPERATION

- An understanding of the Japanese effort must start with their concept of government-industry cooperation. In this case, basic research money comes from the Ministry of International Trade and Industry (MITI). MITI has pledged more than $300 million to be spent in this decade to develop a "super-computer" plus a "fifth generation" computer and a new family of computer building blocks.

  - One hundred fifty million dollars is for the "supercomputer," targeted to be 66 times faster than America's Cray 1.

  - A portion of the remainder will be spent on a "fifth generation" machine which will be designed to have artificial intelligence. As such, it will be able to solve problems it has not been directly instructed to solve in its software. If this is successful, the machine will be functioning more in the fashion of a human brain.

  - A third program involves development of semiconductor devices which will function in extreme environments such as inside nuclear reactors or in outer space.

- While the success of these projects cannot be certain, the success of the MITI sponsored VLSI program in the 1976-1979 period lends credence to their potential.

- Japanese companies often cooperate with each other, or with companies in other countries.

  - Typical of an all-Japanese agreement is a recent agreement between Toshiba and Ishikawajima-Harima Heavy Industries (IHI) to exchange in-house electronics expertise. This agreement is in addition to an existing six-man intercompany committee (presidents and vice presidents) which has existed between the two giant companies.

  - Nippon Electric Co. (NEC) plans to implement a technological exchange program with the Soviet Union's National Science and Technology Committee (NSTC) regarding small computer systems.

  - Fujitsu has had an agreement with Siemens of West Germany which includes Siemens' marketing of Fujitsu mainframes. More recently Fujitsu completed an agreement and set up a company with TRW, a development which will be discussed in more detail in the next chapter.

- Joint activities extend beyond hardware manufacturing.

  - Management Information Science International, a Japanese software development firm, formed a joint venture with a New York consulting group to provide bilingual DP expertise.

  - Fuyo Data Processing and Systems Development Ltd., part of a group headed by Fuji Bank, is actively seeking joint ventures with U.S. firms interested in Japanese software markets.

- While cooperation is a characteristic, Japanese firms also compete aggressively in the marketplace. Some MITI projects, notably solar and

nuclear power, were considered by some to be not successful because companies participating in the research became less cooperative as the commercial potential became apparent. The computer related projects could encounter similar difficulties.

- Joint ventures are not solely a Japanese activity. Control Data Corporation is a prime example of a U.S. company which has successfully participated in joint ventures (with NCR, Honeywell, and ICL, among others). The point is that the Japanese use such ventures, plus government funding, to do research and development on a massive scale, rather than on an exception basis.

B. JAPAN'S CURRENT AND NEAR-TERM U.S. MARKETS

1. PRINTERS

- While the serious threat to large computer markets in the U.S. may be several years off, the impact of Japanese printers has already been felt.

  - Concentrating on the under $2,500 market, Japanese producers such as Fujitsu, NEC, Ricoh, Okidata, Shinshu Seiki, and C. Itoh are offering printers at prices of up to 25% less than U.S. produced models.

  - In addition to a price advantage, the printers often are perceived to have higher quality and reliability.

- American producers such as Anadex, Centronics, and Integral Data Systems are either abandoning the lower priced markets, or fighting back with arguments of better print quality, better service, or more features.

- One U.S. manufacturer, Tally Corp. (acquired in 1979 by Mannesmann, a German firm) is retaliating by emulating the Japanese in setting up low-cost production facilities and imposing strict quality control.

- The message for U.S. vendors, however, is that the Japanese manufacturers were able to target a market segment and achieve over 20% penetration in some areas in a period of only two to three years.

2. PERSONAL COMPUTERS

- Much recent publicity has centered on the personal computer market where names such as NEC, Panasonic, Hitachi, Sharp, Casio, Sord Computer Systems, and AI Electronics are appearing against Apple, Radio Shack, and Commodore.

- Some significant differences exist, however, between the printer and personal computer markets.

  - Software, a U.S. advantage, is important in personal computers.

  - U.S. producers have recently been joined by products from IBM and Xerox, two companies with ultimate staying power.

  - Distribution channels are crucial in personal computers, and the U.S. producers are more established in this area.

- The outcome of the fight in personal computers will give insight into the probable outcome in later fights for market share among larger computers. The personal computer market is a solution-oriented, relatively unstructured market rather than the hardware dominated, structured printer market. It will be a test of the Japanese ability to adapt to the new conditions.

3. WORD PROCESSORS

- More recently, the Japanese have entered the U.S. word processing markets.

  - Toshiba made the first Japanese announcement of an English language word processor, in July of this year.

- The product, the EW-100, is priced at an average of $8,600; company plans include signing up at least 100 dealers by year-end.

- Ricoh expects to soon add a low-cost word processor to its existing offerings of printers, copiers, and cameras.

- Sony has begun shipping a portable electronic keyboard called a typecorder, priced in the $1,450-2,500 range. Sony will use over 200 dealers and some direct sales in selected markets. Later in the year Sony anticipates adding a more expensive standalone word processor which will be sold by 30 dealers.

- Fujitsu has to date invested most heavily in the U.S. word processing market.

  - In April 1980 Fujitsu acquired the word processor development department from DPF, Inc. Called Word Machine, the word processor has now been installed in test locations.

  - Some difficulties in development have been encountered, which Fujitsu claims have been overcome.

- The inherent tie of word processing to language can be a major obstacle to the Japanese. Also, they lack experience in keyboard based typing systems. This, combined with the same obstacles as apply to personal computers (software, distribution, and service), may cause the Japanese to have a difficult time achieving early market penetration. Product quality and reliability can be expected to be the cornerstone of the Japanese effort.

C. JAPANESE SOFTWARE

- Due to differences in languages and business practices, software developed in the Japanese market is not exportable to the U.S. This fact, combined with

Japan's lag in the level of software expertise versus the U.S.'s increases the size of the barrier which software represents in Japan's entry into U.S. computer markets.

- MITI, discussed earlier in terms of funding hardware research, has sponsored research aimed at automating the production of software. The so-called Program Productivity Development System (PPDS) is yet to go commercial, although it has been demonstrated to the public.

  - One goal is to write programs that are machine independent.

  - Another is to increase programmer productivity by building a total system which includes syntax checkers, flowchart generators, automatic documentation production aids, and cross-checking of variables.

- Prior to the PPDS project, the government loaned almost $3.0 million to fund the development of salable software packages.

  - Sale of the packages has been hindered by the tendency of Japanese users not to use packaged software.

- All indications to date are that the Japanese will put heavy emphasis on software, but that becoming competitive with the U.S. in software will be a far more difficult task than becoming competitive in hardware.

IV ACTIVITIES OF KEY JAPANESE COMPANIES

- This section will discuss a range of Japanese companies in terms of their current and potential activities in the United States.
  - The focus is on computer activities.
  - In the long term, however, a discussion of Japanese activities will have to expand to include all information processing. Japanese firms are very active in related equipment such as PABX, facsimile, copiers, and word processing. Office automation is a definite target. Japan is already taking a leading position in video conferencing.

A. FUJITSU LTD.

- Fujitsu is generally recognized as the leading Japanese computer manufacturer in terms of size and commitment to the industry. Compared to some other firms which are giant conglomerates, over 70% of Fujitsu's revenues come from computer activities.
  - In 1979 Fujitsu overtook IBM as the largest EDP supplier in Japan.
  - Fujitsu has had a major investment in Amdahl, estimated at 30%.

- Fujitsu also has an agreement with Memorex on memory.

B. TRW-FUJITSU COMPANY (TFC)

- Formed in May 1980, TFC represents Fujitsu's major thrust into the U.S. market. Characteristics of the joint venture company are:
  - Fujitsu owns 51% and TRW owns 49%.
  - Fujitsu is primarily responsible for supplying the hardware; TRW supplies the marketing, service, and applications software.
  - The board of directors initially consists of six TRW and seven Fujitsu executives.
- Product announcements have followed the sequence forecast in the press coverage given to the startup of the company.
  - This is an indication that TRW and Fujitsu have been able to implement their plan to date.
  - In January 1981, a point of sale (POS) terminal, the TFC 7880 was announced at the National Retail Merchants Convention. Features include optional plasma display, magnetic stripe credit card reader, and data entry capability for OCR Wand readers. Sale price is in the $5,300 range.
- The TFC 8500, a 16-bit minicomputer, was introduced in March 1981. It is targeted for distributed as well as standalone environments.

- Because of unusually dense circuit boards, major components are estimated to have a mean time between failures of 10,000 hours, according to some outside sources.

- The product literature for the TFC 8500 emphasizes characteristics which capitalize on user attitudes documented earlier in this brief. Examples are:

  . "The expansion economy you've always wanted."

  . "The quality and reliability you deserve."

  . "Technology you can depend on."

- Press reports indicate that initial marketing is through third-party software houses but that TRW-produced software will be available for 1982 customer shipments.

- In June 1981, an offering to the banking industry, the TFC 5200 Bank Transaction System was unveiled at the American Banking Association Automation Conference. The system includes a branch processor and up to 24 video display terminals for managers, tellers, and customers.

  - The hardware is from Fujitsu, the applications software from TRW.

  - The software includes teller functions, administrative functions, and customer inquiry into balances; it was developed by TRW's Systems Development Group in San Diego.

- Most recently, TFC announced the TFC 3450 family of information systems.

  - A desktop computer, it is targeted at financial planning, general accounting, word processing, and scientific or engineering applications.

- It is a 16-bit machine with prices in the $6,000-10,000 range depending on configuration and quantities ordered.

- Called the Affinity 16, it will also be serviced by TRW's customer service division. Press releases describe that division as "a nationwide network of over 200 service centers staffed by more than 3,000 employees."

- Obviously, TRW's Customer Service Division is viewed by TFC as a major advantage in overcoming the field service deficiency perceived by many users relative to Japanese manufactured equipment.

C. HITACHI, LTD.

- A diversified manufacturing company, sometimes called the "GE of Japan," Hitachi's revenues are approximately evenly distributed between:

  - Communications and electronics equipment.

  - Electric utility apparatus.

  - Industrial machinery.

  - Wire, cable, chemicals, other products.

- Hitachi's main product focus is its large and mid-range H, M, and L series computers.

- The major U.S. marketing thrust is a marketing agreement with National Advanced Systems Corp.

- National Advanced Systems replaced Hitachi's previous U.S. marketing arm, Itel.

- Hitachi has a similar agreement in Europe with Olivetti Computers, SPA. Evidently Hitachi is not yet ready to make the direct commitment in the U.S. evidenced by Fujitsu.

D. NIPPON ELECTRIC CO., LTD. (NEC)

- With a basic focus on communications, NEC produces over 14,000 products ranging from satellite communications systems, through data processing and industrial electronic systems, to electron devices and finally consumer electronics.

- In late 1980, NEC announced the Acos 1000, a large computer intended to compete with the large IBM offerings, although it is not IBM compatible (Fujitsu and Hitachi offerings tend to be "near compatible" with the larger IBM offerings).

  - Target markets for the Acos 1000 include universities, research laboratories, and major business concerns.

  - Initial buyers are expected to be in Japan.

- NEC's main U.S. thrust has been in the small business computer market.

  - Its Astra series of small business computers was introduced in the U.S. in early 1979 by its U.S. subsidiary, NEC Information Systems, Inc. (NECIS).

  - At announcement time, NEC contended that the company had spent three years designing the system for the U.S. market.

- NECIS uses a network of dealers for distribution.

- A more recent report estimates that NEC, although the most successful Japanese entry in the U.S. overall computer market, still has less than a 1% market share. A major limitation is software, which NECIS is attempting to solve by working with software companies and OEMs.

E. TOSHIBA CORP.

- From a beginning in 1890 as a small manufacturer of electric light bulbs, Toshiba today produces power and transportation equipment, communications equipment, industrial equipment, and consumer products in addition to computers and office machines.

  - Toshiba produces 16K chips in its Sunnyvale, California, facility. Recently it announced that it would ship chips to Japan, enabling it to stamp "made in U.S.A." on each chip.

  - Toshiba is concentrating on personal computers, small business systems, and word processors in the U.S. market.

  - To date, Toshiba has a direct sales force in the Los Angeles area and plans a nationwide dealer network. It is also opening two retail stores in southern California.

F. MITSUBISHI ELECTRIC CO., LTD.

- Mitsubishi's ties to the United States date back at least to 1923 when a technical agreement was signed with Westinghouse Electric International. This was expanded to a technical exchange agreement in 1966. Today,

Mitsubishi produces a range of products similar in many ways to those of NEC, Hitachi, and Toshiba. These include heavy industrial equipment, motors, communications equipment, components, and consumer products, in addition to computer products.

- Mitsubishi began selling its Melcom 80 Series of small office computers in early 1979, through Melcom Business Systems, a sales subsidiary in Los Angeles. The initial thrust was on direct sales via a 20-man sales force.

  - Initial forecasts by Mitsubishi projected a 10% share of the West Coast market by 1982. This forecast is now viewed as overly optimistic.

  - Current marketing is direct in the Los Angeles area, and through dealers in other areas. As of mid-1981, eastward coverage had reached Denver.

  - Dealers are responsible for maintenance, perhaps a reason geographical coverage is moving slowly.

EXHIBIT A-1

EDP BUDGET GROWTH

INDUSTRY SECTOR	AVERAGE 1980 BUDGET ($ MILLION)	ACTUAL INCREASE (PERCENT)	AVERAGE 1981 BUDGET ($ MILLION)	EXPECTED INCREASE (PERCENT)	AVERAGE 1982 BUDGET ($ MILLION)	INCREASE 1981-1982 ($ MILLION)
DISCRETE MANUFACTURING	$10.07	+19.1%	$11.99	+16.9%	$14.02	$2.03
PROCESS MANUFACTURING	6.51	+16.6	7.59	+14.5	8.69	1.10
TRANSPORTATION	9.92	+ 8.1	10.72	+ 9.2	11.71	0.99
UTILITIES	39.78	+21.2	48.23	+15.8	55.86	7.63
BANKING/FINANCE	2.21	+17.2	2.59	+17.0	. 3.03	0.44

SOURCE: 1981 INPUT USER PANEL SURVEY

(Continued)

EXHIBIT A-1 (CONT.)

EDP BUDGET GROWTH

INDUSTRY SECTOR	AVERAGE 1980 BUDGET ($ MILLION)	ACTUAL INCREASE (PERCENT)	AVERAGE 1981 BUDGET ($ MILLION)	EXPECTED INCREASE (PERCENT)	AVERAGE 1982 BUDGET ($ MILLION)	INCREASE 1981-1982 ($ MILLION)
INSURANCE	$2.51	+14.7%	$2.87	+11.8%	$3.21	$0.34
EDUCATION	2.37	+ 5.5	2.50	+ 6.4	2.66	0.16
DISTRIBUTION	4.61	+11.5	5.14	+12.3	5.77	0.63
GOVERNMENT	3.21	+10.6	3.55	+11.3	3.95	0.40
SERVICES & OTHER	4.01	+12.7	4.52	+11.9	5.06	0.54
AVERAGE FOR ALL SECTORS	$6.67	+16.7%	$7.79	+14.8%	$8.94	$1.05

SOURCE: 1981 INPUT USER PANEL SURVEY

EXHIBIT A-2

CHANGES IN EDP BUDGETS FOR RESPONDENTS IN ALL INDUSTRY SECTORS

BUDGET CATEGORY	1981 AVERAGE BUDGET ($ 000)	1981 PERCENT REPORTING	1982 AVERAGE BUDGET ($ 000)	1981-1982 PERCENT CHANGE
SALARIES	$3,457.9	87.1%	$3,881.7	+12.3%
EDP TRAINING	35.8	63.3	38.7	+ 8.1
NON-EDP TRAINING	26.7	12.1	29.3	+ 9.7
CENTRAL SITE MAINFRAMES	973.0	71.4	1,108.9	+14.0
CENTRAL SITE PERIPHERALS	400.6	52.2	426.2	+ 6.4

SOURCE: 1981 INPUT USER PANEL SURVEY

(Continued)

EXHIBIT A-2 (CONT.)

CHANGES IN EDP BUDGETS FOR
RESPONDENTS IN ALL INDUSTRY SECTORS

BUDGET CATEGORY	1981 AVERAGE BUDGET ($ 000)	1981 PERCENT REPORTING	1982 AVERAGE BUDGET ($ 000)	1981-1982 PERCENT CHANGE
REMOTE SITE MAINFRAMES	$1,015.2	11.6%	$1,207.1	+18.9%
REMOTE SITE PERIPHERALS	203.8	15.2	212.4	+ 4.2
MINICOMPUTERS	687.1	24.1	833.4	+21.3
MICROCOMPUTERS/ PERSONAL COMPUTERS	9.8	6.7	18.1	+84.7

SOURCE: 1981 INPUT USER PANEL SURVEY

(Continued)

EXHIBIT A-2 (CONT.)

CHANGES IN EDP BUDGETS FOR
RESPONDENTS IN ALL INDUSTRY SECTORS

BUDGET CATEGORY	1981 AVERAGE BUDGET ($ 000)	1981 PERCENT REPORTING	1982 AVERAGE BUDGET ($ 000)	1981-1982 PERCENT CHANGE
TERMINALS	$ 473.9	60.3%	$ 521.4	+10.0%
COMMUNICATIONS HARDWARE AND SOFTWARE	263.6	48.7	295.6	+12.1
NETWORK EXPENSE	1,218.2	44.2	1,354.1	+11.2
OTHER SOFTWARE	205.0	55.4	241.6	+17.9

SOURCE: 1981 INPUT USER PANEL SURVEY

(Continued)

CHANGES IN EDP BUDGETS FOR RESPONDENTS IN ALL INDUSTRY SECTORS

BUDGET CATEGORY	1981 AVERAGE BUDGET ($ 000)	1981 PERCENT REPORTING	1982 AVERAGE BUDGET ($ 000)	1981-1982 PERCENT CHANGE
VENDOR MAINTENANCE	$ 895.6	62.5%	$1,003.7	+12.1%
THIRD-PARTY MAINTENANCE	104.6	16.1	111.1	+ 6.2
OUTSIDE SERVICES	365.2	28.6	398.6	+ 9.1
DATA SECURITY	81.7	15.6	70.5	- 13.7
DISASTER PLANNING	20.5	13.4	20.9	+ 2.0
SUPPLIES AND OTHER	784.2	77.7	867.1	+10.6

SOURCE: 1981 INPUT USER PANEL SURVEY

EXHIBIT A-3

RATIO OF EDP EMPLOYEES VERSUS
TOTAL COMPANY EMPLOYEES

INDUSTRY SECTOR	NUMBER OF EDP EMPLOYEES PER 100 COMPANY EMPLOYEES	
	COMPANY SIZE (ANNUAL SALES OR ASSETS)	
	UNDER $250 MILLION	OVER $250 MILLION
DISCRETE MANUFACTURING	2.0	1.3
PROCESS MANUFACTURING	1.5	1.8
TRANSPORTATION	0.6	2.5
UTILITIES	5.3	1.8
BANKING/FINANCE	9.6	2.0
INSURANCE	8.5	8.7
EDUCATION	1.5	0.4
DISTRIBUTION	1.2	0.8
GOVERNMENT	1.9	-
SERVICES AND OTHER	5.9	1.6

SOURCE: 1981 INPUT USER PANEL SURVEY

EXHIBIT A-4

BUDGET PER EDP EMPLOYEE

INDUSTRY SECTOR	BUDGET PER EDP EMPLOYEE ($ THOUSANDS)	
	COMPANY SIZE (ANNUAL SALES OR ASSETS)	
	UNDER $250 MILLION	OVER $250 MILLION
DISCRETE MANUFACTURING	$48.6	$60.8
PROCESS MANUFACTURING	35.1	56.3
TRANSPORTATION	31.3	65.7
UTILITIES	58.5	63.0
BANKING/FINANCE	30.5	32.4
INSURANCE	40.7	32.2
EDUCATION	35.3	-
DISTRIBUTION	47.0	48.4
GOVERNMENT	27.5	57.5
SERVICES AND OTHER	61.1	51.9

SOURCE: 1981 INPUT USER PANEL SURVEY

INFORMATION SYSTEMS DIRECTOR QUESTIONNAIRE

CATALOG NO. U A 8 1 | | | |

A. GENERAL INFORMATION

1. Are you responding for a subsidiary, division, or agency? ☐ Yes ☐ No If no, please skip to Question 4.
2. Is the primary responsibility of your subsidiary/division/agency the provision of data processing services to the rest of the organization? ☐ Yes ☐ No
3. Please supply the following data for your subsidiary/division/agency only. SIC code (if known)_____
   Primary business or activity of your organization/agency _____
   Annual revenues ($ million)_____ or Assets ($ million)_____ or Budget ($ million)_____
   Annual selling, general, and administrative (SG&A) expenses ($ million)_____
   Total number of employees_____ Number of EDP employees_____
4. Please supply the following data for your entire organization.
   Primary business or activity of your organization_____ SIC code (if known)_____
   Annual revenues ($ million)_____ or Assets ($ million)_____ or total budget authority ($ million)_____
   Annual SG&A expenses ($ million)_____ Total number of employees_____ Number of EDP employees_____
   Is your EDP organization considered ☐ a cost center, or ☐ a profit center? Typical programmer/analyst chargeback $_____/hr.
   Do you allocate costs by: ☐ Size of user ☐ Usage of resources ☐ Transaction volume ☐ Other?

B. EDP ORGANIZATION

5. Please indicate the number of EDP employees by position for your subsidiary/division/agency (if applicable) and for your entire organization (if known), as well as the number of positions you are authorized to fill this year, according to the following classification:

POSITION	YOUR SUBSIDIARY/DIVISION/AGENCY				TOTAL ORGANIZATION			
	Staffed		Open		Staffed		Open	
	EDP Budget	End-user Budget	EDP Budget	End-user Budget	EDP Budget	End-user Budget	EDP Budget	End-user Budget
Managers								
Non-management supervisory								
Communications specialists								
Programmer/analysts								
Analysts								
Programmers								
Documenters, technical writers								
Technical support personnel								
Other support personnel								
Operations personnel								
Data entry personnel								
Other (specify)								

6. What best describes the organization of your EDP department (i.e., are you organized in separate development and maintenance groups, by line of business, by DP function, etc.)?
   Your subsidiary/division/agency_____
   Parent organization_____
7. A major problem facing EDP management is the increasing shortage of skilled personnel. What specific steps has your organization taken to insure a satisfactory retention rate for key EDP employees?_____
8. What steps have you taken to purge less than satisfactory performers?_____
   What specific personnel trend do you see affecting your organization the most, either favorably or unfavorably, over the next five years?_____

C. EDP PROBLEMS

10. What are the most significant problems you face in 1981? (Rank the top five in order of priority: 1 through 5, 1 being most important, 2 second, etc., and indicate whether you have a plan in place to address the problem.)

CATEGORY	PRIORITY RANKING		PLAN IN PLACE	
	Last Year	This Year	Yes	No
Long-range business objectives			☐	☐
Long-range EDP objectives			☐	☐
Relations with management			☐	☐
Relations with end-users			☐	☐
Data center operations			☐	☐
Project planning			☐	☐
Project scheduling – estimating			☐	☐
Project scheduling – priorities			☐	☐
System development specifications			☐	☐
EDP budget			☐	☐
Personnel recruiting			☐	☐
Personnel training			☐	☐
Personnel retention			☐	☐
Personnel productivity			☐	☐
Hardware capacity (CPU)			☐	☐
Hardware capacity (disk)			☐	☐
Hardware maintenance			☐	☐
Systems software			☐	☐
Network facilities			☐	☐
Other (specify)_____			☐	☐
_____			☐	☐

D. EDP PLANS

11. What are your primary objectives and priorities for the next three years? (Rank the top five in order of priority: 1 through 5, 1 being most important, 2 second, etc., for each of the three years.)

CATEGORY	PRIORITY RANKING		
	1981	1982	1983
Develop new on-line systems			
Modify existing on-line systems			
Develop new data base systems			
Modify existing data base systems			
Develop new DDP network			
Modify existing DDP network			
Install word processing			
Integrate word and data processing			
Develop long-range EDP plan			
Revise long-range EDP plan			
Integrate long-range EDP plan with business plan			
Improve EDP personnel productivity			
Measure EDP personnel productivity			
Convert hardware system			
Convert operating system			
Develop new batch applications			
Integrate batch applications			
Improve end-user relations			
Other (specify)			

E. EDP APPLICATIONS

12. The reverse side of the cover sheet accompanying this questionnaire is a representative, but by no means exhaustive, list of applications that the 1980 User Panel respondents cited among their top five applications development priorities for 1980. Using this list as a guide, please indicate the five most important applications development priorities for your organization in 1981.

Priority	Code or Name of Application	Estimated Cost to Develop	Estimated Annual Cost To Run	Estimated Payback Period (months)	Developed In-house	Purchased	TO RUN AT CENTRAL SITE		TO RUN AT REMOTE SITE			
							Batch	On-line	Batch (Stand-Alone)	Batch (Summary Data Transmitted to Central Site)	On-Line	Number of Sites
1					☐	☐	☐	☐	☐	☐	☐	☐
2					☐	☐	☐	☐	☐	☐	☐	☐
3					☐	☐	☐	☐	☐	☐	☐	☐
4					☐	☐	☐	☐	☐	☐	☐	☐
5					☐	☐	☐	☐	☐	☐	☐	☐

13. What is the approximate number of new development application systems for which you are responsible?_____

	TYPICALLY	RANGE	
		MINIMUM	MAXIMUM
Size of system (number of separate programs)			
Size of program (number of lines of source code)			
Duration of system implementation effort (elapsed number of months)			
Staffing requirements to develop (work - months) per system			

Number of programs under active maintenance_____
Approximate total lines of code under active maintenance_____
Staffing requirements to maintain (work - months per year) per system_____

14. What is the most significant industry event that affected your applications development in the last twelve months?_____

15. What research or information would be most helpful to your development or planning efforts?_____

16. Did you, or do you ever plan to, integrate word processing with data processing? ☐Done ☐Plan to do ☐Will not do ☐Undecided
Did you,or do you ever plan to, integrate CAD/CAM with data processing? ☐Done ☐Plan to do ☐Will not do ☐Undecided

F. EDP BUDGET

17. What is your total EDP budget for 1981? $_____,_____,000. 18. What was it in 1980? $_____,_____,000.
19. By how much will your budget change from 1981 to 1982? ☐Increase +_____% ☐Decrease -_____% ☐No change
What inflation rate is included in the above percentage? _____%
20. Please categorize how your 1981 EDP budget will be spent and how this breaks down between central and remote sites. Also indicate how much you expect specific categories to increase or decrease in 1982.

CATEGORIES	Not Included in EDP Budget	1981 TOTAL BUDGET			ANTICIPATED PERCENT OF CHANGE IN 1982		
		Amount	Percent Central	Percent Remote	Increase	Decrease	Percent
Personnel salaries	☐	$_____,_____,000	%	%	☐	☐	%
EDP personnel training	☐	$_____,_____,000	%	%	☐	☐	%
Non-EDP personnel training	☐	$_____,_____,000	%	%	☐	☐	%
Mainframe processors: central	☐	$_____,_____,000	%	%	☐	☐	%
Mainframe processors: remote	☐	$_____,_____,000	%	%	☐	☐	%
Peripherals: central	☐	$_____,_____,000	%	%	☐	☐	%
Peripherals: remote	☐	$_____,_____,000	%	%	☐	☐	%
Minicomputers	☐	$_____,_____,000	%	%	☐	☐	%
Microcomputers/personal computers	☐	$_____,_____,000	%	%	☐	☐	%
Terminals	☐	$_____,_____,000	%	%	☐	☐	%
Communications hardware & software	☐	$_____,_____,000	%	%	☐	☐	%
Network expense (line cost only)	☐	$_____,_____,000	%	%	☐	☐	%
Other software (purchase or lease)	☐	$_____,_____,000	%	%	☐	☐	%
Vendor maintenance (hardware & software)	☐	$_____,_____,000	%	%	☐	☐	%
Third party maintenance (hardware & software)	☐	$_____,_____,000	%	%	☐	☐	%
Outside processing services	☐	$_____,_____,000	%	%	☐	☐	%
Data security	☐	$_____,_____,000	%	%	☐	☐	%
Disaster planning/contingency	☐	$_____,_____,000	%	%	☐	☐	%
Supplies & other	☐	$_____,_____,000	%	%	☐	☐	%

21. What is your estimate of the annual amount of those items you marked as not included above $_____,_____,000

22. Are any of the expenditures in your budget for turnkey systems which combine hardware and applications software on a "ready-to-use" basis? ☐ Yes ☐ No If yes, how much is allocated for such systems? $_____,_____,000

G. EDP HARDWARE

23. Please indicate the number of systems installed and on order for central and remote sites.

VENDOR AND MODEL NUMBER	INSTALLED				ON ORDER				
	Total Now		To be Removed/ Replaced This Year		Total		To be Installed This Year		System(s) to be Replaced (if any)
	Central Site	Remote Site	Central Site	Remote Site	Central Site	Remote Site	Central Site	Remote Site	
IBM SYSTEMS									
3081									
3033 MP									
3033 AP									
3033 UP									
3033 N									
3032									
3031 AP									
3031 UP									
370/158-168 MP									
370/158-168 AP									
370/158-168 UP									
4341 Model Group 2									
4341 Model Group 1									
4331 Model Group 2									
4331 Model Group 1									
8100									
Other System/370									
System/360									
Series/1									
System/3									
System/32, 34									
System/38									
5100, 5110, 5120									
AMDAHL SYSTEMS									
580									
470 V/8									
470 V/7									
470 V/7-A									
470 V/7-B									
470 V/6									
BURROUGHS									
B 6900									
B 6800-7800									
B 6700-7700									
B 2900-3900									
B 2800/3800/4800									
Other Burroughs									
CONTROL DATA									
3000 Series									
Cyber 170 700 Series									
Omega/480									
Other CDC									
DATA GENERAL									
MV/8000									
Eclipse									
Other Data General									

VENDOR AND MODEL NUMBER	INSTALLED				ON ORDER				System(s) to be Replaced (if any)
	Total Now		To be Removed/ Replaced This Year		Total		To be Installed This Year		
	Central Site	Remote Site	Central Site	Remote Site	Central Site	Remote Site	Central Site	Remote Site	
DIGITAL EQUIPMENT									
DEC System 10									
DEC System 20									
VAX 11/780									
VAX 11/750									
Large PDP-11									
Other DEC									
HONEYWELL									
DPS/8									
DPS/6									
DPS/4									
Series 60 Level 66/68									
Series 60 Level 64									
Series 60 Level 62									
Series 60 Level 6									
Other Honeywell									
NCR									
8400-8500									
8200									
Other NCR									
SPERRY UNIVAC									
11/82-84									
1100/81									
1100/42-44									
1100/41									
1100/60									
Series 90/80									
Series 90/70									
Series 90/60									
System 80									
BC-7									
Other UNIVAC									
OTHER MANUFACTURERS									
Vendor / Model									

24. Is your EDP system a telecommunications system? ☐ Yes ☐ No If no, do you anticipate going on-line within the next three years? ☐ Yes ☐ No If no, skip to Question 29.
25. What types of equipment do/will you use to interface the network with the CPU(s)? ☐ Hard-wired controller(s) Model(s)_____ ☐ Programmable front-end communications processor(s) Model(s)_____
26. What types of network interface equipment do you plan to install in the future?_____
27. How many locations in your organization presently have computers linked to others by telecommunications lines?_____ By how many will this number increase by yearend 1981?_____ by yearend 1982?_____
28. In what year did/will your telecommunications system become operational?_____
29. What operating system(s) are you presently using?_____

30. What network control program(s) are you presently using?_____

31. If you are an IBM user and are not currently using MVS or DOS/VSE, when do you anticipate converting to ☐ MVS: 198_____ and/or ☐ DOS/VSE? 198_____

32. Please indicate the number of the following that you have installed or are planning to install.

PRODUCT TYPE	INSTALLED				PLANNED				
	Total Now		To be Removed/ Replaced in 1981		To be Installed				
					1981		1982		After 1982
	Central Site	Remote Sites	Central Site	Remote Sites	Central Site	Remote Sites	Central Site	Remote Sites	
A. Minicomputers/microcomputers/small business systems/personal computers: a. Priced at $1,500 or less									
b. Priced at $1,501 – $15,000									
c. Priced at $15,001 – $150,000									
d. Priced at $150,001 +									
B. Intelligent terminals or terminal cluster controllers									
C. Non-intelligent terminals									

33. Please indicate the reasons for selecting the hardware (i.e., non-mainframe computers, end-user equipment) listed in Question 32.

CRITERION	IMPORTANCE					BY 1985, WILL THE IMPORTANCE OF THIS CRITERION		
	Not Important	Of Some Importance	Important	Very Important	Most Important	Increase	Decrease	Stay the Same
Price of hardware	☐	☐	☐	☐	☐	☐	☐	☐
Price of maintenance	☐	☐	☐	☐	☐	☐	☐	☐
Availability of software	☐	☐	☐	☐	☐	☐	☐	☐
Reliability of hardware	☐	☐	☐	☐	☐	☐	☐	☐
Quality of maintenance	☐	☐	☐	☐	☐	☐	☐	☐
Compatibility with currently installed hardware	☐	☐	☐	☐	☐	☐	☐	☐
Hardware features	☐	☐	☐	☐	☐	☐	☐	☐
Estimated uptime	☐	☐	☐	☐	☐	☐	☐	☐
Quality of sales effort	☐	☐	☐	☐	☐	☐	☐	☐
Reputation of manufacturer	☐	☐	☐	☐	☐	☐	☐	☐

H. OUTSIDE COMPUTER SERVICES AND EXPENDITURES

34. Does your company purchase outside computer services that are not under the control of the EDP organization? ☐ Yes ☐ No

35. If yes, what are the approximate annual expenditures for these services in 1980 $_____,_____, 000,
1981 $_____,_____, 000, and 1982 $_____,_____, 000?

36. Who purchases these outside services?

☐ Finance _____% ☐ Engineering _____%
☐ Corporate _____% ☐ Operations/Manufacturing _____%
☐ Personnel _____% ☐ Marketing/Sales _____%
☐ R&D _____% ☐ Other_____ _____%

37. Do you plan to replace these services with in-house alternatives? ☐ Yes ☐ No 38. If yes, when, and which? _____

39. If no, what would prevent or hinder their implementation in-house?_____

40. Do you provide computer services to others outside your organization? ☐ Yes ☐ No

41. If yes, please specify:

- ☐ Sale of computer-based resources
  - ☐ Batch mode — Average number of hours per week _____ hr./wk.
  - ☐ On-line mode — Average number of hours per week _____ hr./wk.
  - ☐ Raw power (customer supplies programs and data)
  - ☐ Processing (your programs, customer supplies data)
  - ☐ Access to or use of your proprietary data base(s)
- ☐ Retainer for use of your system(s) as backup for customer's system(s)
- ☐ Sale of programs developed in-house
- ☐ Rental or lease of programs developed in-house

I. UTILIZATION ISSUES

42. What percent of your computer resources are used for:

Production runs	_____%
New applications development	_____%
Maintenance of existing programs	_____%
Enhancement/upgrade of existing programs	_____%
Other (specify)_____	_____%

43. What percent of your applications programmers are assigned to:

	1980	1981	1982
New program development	_____%	_____%	_____%
Maintenance of existing programs	_____%	_____%	_____%
Enhancement/upgrade of existing programs	_____%	_____%	_____%
Production/user support, troubleshooting	_____%	_____%	_____%
Other	_____%	_____%	_____%

44. Do you have a dedicated applications development computer? ☐ Yes ☐ No

45. What measures are you taking to reduce the time and costs associated with program development? _____

46. What level of improvement (measured in terms of shortening the development cycle) do you estimate these measures will provide? ☐ 1 – 10% ☐ 11 – 20% ☐ 21 – 50% ☐ 51 – 75% ☐ More than 75%
How much do you need? ☐ 1 – 10% ☐ 11 – 20% ☐ 21 – 50% ☐ 51 – 75% ☐ More than 75%

47. What is the total number of 8-hour shifts per week (maximum 21 per CPU) that you have your systems operating? _____

48. Of these, how many are primarily batch mode shifts? _____

49. What operating system(s) do you use when in batch mode? _____

50. How many shifts do you run primarily or substantially in on-line mode? _____

51. What operating system(s) do you use when in on-line mode? _____

52. How many end-user stations do you support directly in on-line mode ☐ full-time (or nearly) _____ ☐ occasionally _____

J. EQUIPMENT FROM JAPAN

53. If Japanese equipment manufacturers were to market computer and related products directly in the United States, would you consider purchasing these products? ☐ Yes ☐ No

54. If Japanese equipment manufacturers were to market these products through United States distributors, would you consider acquiring these products? ☐ Yes ☐ No

55. Do you currently use Japanese computer products? ☐ Yes ☐ No

56. If yes, which products (manufacturer and model no.)? _____

57. What other Japanese computer products are you likely to acquire within the next two years? _____

58. What are your opinions with respect to Japanese computer equipment in the following areas:

PRODUCT TYPE	We Have Now	Plan to Purchase	No Plans	RELIABILITY					PRICE/PERFORMANCE					MAINTENANCE				
				Poor	Fair	Good	Very Good	No Opinion	Poor	Fair	Good	Very Good	No Opinion	Poor	Fair	Good	Very Good	No Opinion
Mainframes	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Minicomputers	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Printers	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other peripherals	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Terminals	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Word processing equipment	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Software	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

K. OFFICE OF THE FUTURE ISSUES

59. Please check which of the office automation and communications services listed below are currently being used or planned and indicate whether the EDP department has management responsibility for them.

CATEGORY	STATUS/PLANS					EDP RESPONSIBILITY/PLANS				
	Using It Now	In 1981-1983	In 1984-1986	No Plans	Don't Know	EDP Responsibility Now	In 1981-1983	In 1984-1986	No Plans	Don't Know
Intra-company electronic mail	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Communicating word processors	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Video conferencing – freeze frame	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Video conferencing – full motion	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Sub-minute facsimile	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Intra-building wideband facilities	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Intra-city wideband facilities	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Dedicated satellite earth station	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Computerized PBX	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Automatic network management systems	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Worldwide data communications networks	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Private packet transmission (X.25)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

L. QUESTIONNAIRE FOLLOW-UP

60. Would you be willing to discuss any of the issues covered in this questionnaire in further detail with a member of INPUT's professional staff? ☐ I want to discuss, or ☐ I am willing to discuss _____
_____ ☐ I do not wish, or have no reason, to pursue any issue further.

61. What topics or questions would you like to see included in future questionnaires, if you could receive a statistical summary of the responses? _____
_____
_____

THANK YOU FOR YOUR PARTICIPATION. YOUR GIFT WILL BE SENT SHORTLY.

SUBSCRIPTION PROGRAMS: Designed for clients with a continuing need for information about a range of subjects in a given area. All subscription programs are fixed-fee and run on a calendar-year basis:

- Management Planning Program in Information Systems - Provides managers of large computer/communications facilities with timely and accurate information on developments which affect today's decisions and plans for the future.

- Management Planning Program for the Information Services Industry - Provides market forecasts and business information to software and processing services companies to support planning and product decisions.

- Company Analysis and Monitoring Program for the Information Services Industry - Provides immediate access to detailed information on over 2,500 companies offering turnkey systems, software and processing services in the U.S. and Canada.

- Management Planning Program in Field Service - Provides senior field service managers in the U.S. and in Europe with basic information and data to support their planning and operational decisions.

MULTICLIENT STUDIES: Research shared by a group of sponsors on topics for which there is a need for in-depth "one-time" information and analysis. A multiclient study typically has a budget of over $200,000, yet the cost to an individual client is usually less than $30,000. Recent studies specified by clients include:

- Selling Personal Computers to Large Corporations

- Productivity Improvement, 1980-1983: Survival Strategies for EDP Executives

- Opportunities in Communications Services for Digital Information: A Study of User Networks and Needs

- Improving the Productivity of Engineering and Manufacturing Using CAD/CAM

- CAD/CAM System and Service Market Opportunities

CUSTOM STUDIES: Custom studies are sponsored by a single client on a proprietary basis and are used to answer specific questions or to address unique problems. Fees are a function of the extent of the research work. Examples of recent assignments include:

- Determination of the U.S. market for small computer systems in 1985.

- Analysis of the opportunities and problems associated with field service capabilities for CAD/CAM systems.

- Analysis of the market potential for third-party maintenance.

- 1981 ADAPSO Survey of the Computer Services Industry.

- Evaluation of the current status and future trends of software terms and conditions.

- Analysis and forecast of user self-maintenance for a vendor's line of equipment.

ABOUT INPUT

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff members analyze and interpret the research data, then develop recommendations and innovative ideas to meet clients' needs. Clients receive reports, presentations, access to data on which analyses are based, and continuous consulting.

Many of INPUT's professional staff members have nearly 20 years experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed in 1974, INPUT has become a leading international consulting firm. Clients include over 100 of the world's largest and most technically advanced companies.

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