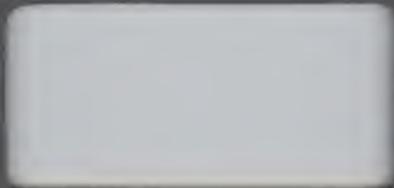


FE-1981  
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**INPUT  
MANAGEMENT PLANNING PROGRAM  
IN  
FIELD SERVICE**



# 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 attention.
- Major Planning - In-depth analysis of major technical issues and recommendations that will assist in the planning of field services.   
FE-1981  
EB1 981  
Lyons, Dave  
AUTHOR  
Third Party Maintenance  
TITLE
- Annual Report - Activities in the field services industry and their effects on future field service programs. Includes technical changes in technical and management requirements and how they will affect the future.
- Annual Presentation - Presentation to previous year's field service executives and research and development program for the first half of each year.
- Inquiry Service - Staff on an as-needed basis to assist with technical requirements. Staffed every day.

#### RESEARCH METHOD

communications and associated

- Research topics discussed with client representatives.
- Research for technical information from universities, industry groups, and vendors.
- Conclusions derived from the analysis 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 BRIEF

THIRD-PARTY MAINTENANCE

MAY 1981



# THIRD-PARTY MAINTENANCE

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## THIRD-PARTY MAINTENANCE

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## I INTRODUCTION

- This brief, part of INPUT's 1981 Field Service Programme, provides maintenance vendors' insights into third-party maintenance (TPM) activities by:
  - Reviewing current activities in the United States and the United Kingdom.
  - Studying the evolution of a typical U.K. TPM vendor.
  - Providing a case study of a user who converted to TPM.
- The brief conveys the pros and cons of TPM as it applies to many situations in Europe and the U.S.
- Major field service (FS) maintenance organisations can have three primary involvements with TPM. TPM can be:
  - A profit opportunity that should be investigated, especially when it can be synergistic with a company's primary activities.
  - A threat to their existing customer base, as it provides users an alternative in instances where they feel they are being overcharged or receiving poor service.

- A cost saving technique when used by manufacturers with existing FS forces to service equipment in remote locations or when there is insufficient equipment installed to justify a FS office.
- The U.K. is currently the most active TPM region in Europe and this brief concentrates on that country.
- TPM companies have been active in the U.S. for some time. Tynshare, has had a maintenance program for DEC 10 users since 1975, but is only now actively marketing this service.
- Some larger FS maintenance organisations are providing TPM services in an attempt to gain control of multivendor sites. If a single FS maintenance vendor can capture a user's total maintenance requirements, the vendor can possibly exercise greater influence over the equipment purchases of that user.
- Many of the major users of DP equipment also have substantial numbers of installed minicomputers. This affords an opportunity for the large mainframe FS organisations to take over maintenance and add to their revenues and profitability.
  - At large sites, resident engineers can take on other equipment maintenance work with little increase in cost.
  - This diversity in activities will also increase the engineers' job satisfaction and interest.
- Distributed data processing is now and will continue to give a boost to the TPM market as the proliferation of new products at dispersed and, quite often, remote locations continues.

## II THIRD-PARTY MAINTENANCE ACTIVITIES

### A. OVERVIEW

- In the U.S., TPM has recently gained in respectability as companies like COMMA (CDC), TRW, and Sorbus have established themselves as key suppliers.
- In Western Europe, however, there has been little TPM activity except for the U.K. where Computer Field Maintenance, DPCE and Mills Associates have been growing rapidly.
- In the U.K.:
  - Present TPM vendors are becoming more aggressive in marketing their services.
  - Large multinationals, like CDC, are entering the TPM market.
  - In the midst of a severe recession, users are investigating all methods to reduce operating costs.
- System houses are seriously considering offering maintenance for the equipment they supply.

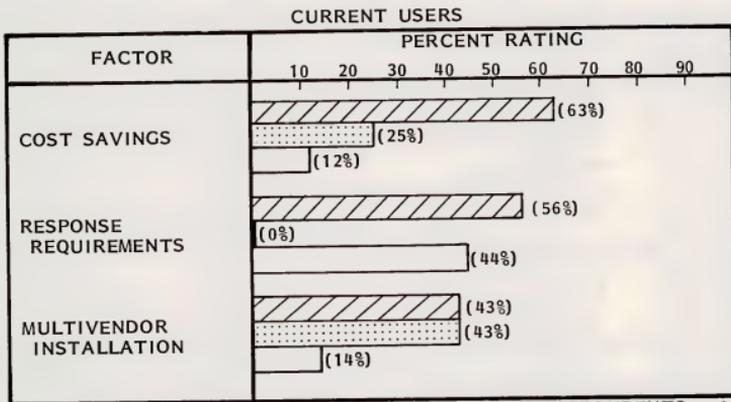
- As these activities grow, TPM will move into the rest of the major European EDP markets, in many instances led by multinationals entering the TPM business.

## B. THE UNITED STATES TPM MARKET

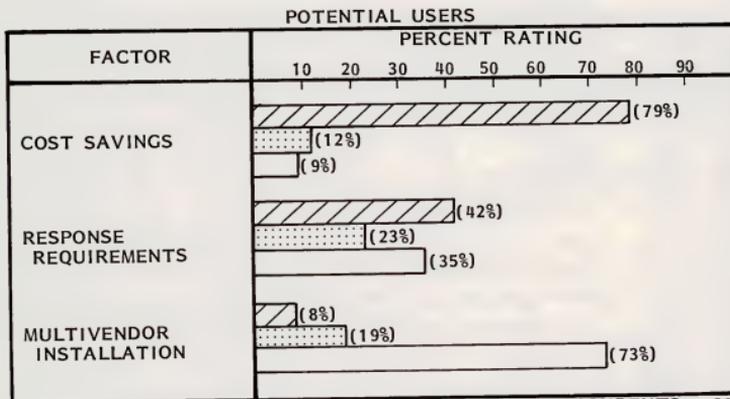
- Six out of the nine U.S. respondents to INPUT's 1980 survey, who use TPM, rated cost savings as the most significant factor in the decision to use a TPM vendor.
  - Current user ratings of reasons for using TPM are shown in Exhibit II-1.
  - Potential U.S. users of TPM overwhelmingly rated potential cost savings as the most significant consideration, as shown in Exhibit II-1. Concern with being a multivendor site was rated very low as compared to those who were already using TPM services.
- Current U.S. TPM users achieve an average savings of 15% on maintenance costs, while potential users expect a much higher savings of 25%. This difference is a limiting factor in the growth of the TPM market in the U.S.
- Thirty-eight percent of all users interviewed were considering or had considered TPM, reflecting the active marketing by U.S. TPM vendors.
- An important development in the U.S. is Indeserv, a national association of local independent service companies.
  - Each of the more than 150 members has a single location in the U.S. and employs an average of three or four engineers.

EXHIBIT II-1

COMPARISON OF CURRENT AND POTENTIAL USERS'  
PERCEPTIONS OF THIRD-PARTY MAINTENANCE



NUMBER OF RESPONDENTS: 9



NUMBER OF RESPONDENTS: 28

[Hatched] - HIGH [Dotted] - MEDIUM [White] - LOW

- Indeserv was founded in 1975, one of the co-founders being an ex-Honeywell maintenance executive responsible for both Honeywell's entry and subsequent exit from TPM activities.
- The association is composed mainly of ex-employees of the major maintenance companies who have decided to establish independent firms in a particular area.
- They concentrate on the lower price end of the market, such as terminals. Obsolete equipment is another area of emphasis for Indeserv members.

#### C. THE UNITED KINGDOM TPM MARKET

- Of the 128 users interviewed in the U.K., 58% expressed a definite interest in using a TPM vendor if the price saving was sufficient and service was equal to or better than that which they currently receive.
- Current TPM users reported an average savings of 22% on maintenance costs as compared to a potential users' expected savings of 17%. These results demonstrate that in the United Kingdom TPM vendors already exceed user expectations, as shown in Exhibit II-2.
- Exhibit II-3 compares the reasons for a change to a TPM vendor as expressed by both potential and current TPM users.
- During INPUT's interview program it became clear that although the potential user gave cost savings as the prime reason for considering a TPM vendor, it was usually poor service that triggered the change to a TPM vendor.

EXHIBIT II-2

COMPARISON OF COST SAVINGS BY  
CURRENT AND POTENTIAL THIRD-PARTY USERS IN THE  
UNITED KINGDOM

COST SAVINGS	CURRENT USERS	POTENTIAL USERS' EXPECTED SAVINGS
AVERAGE	22%	17%
RANGE	5-50	5-35

EXHIBIT II-3

THIRD-PARTY MAINTENANCE PERCEPTIONS  
OF POTENTIAL USERS  
VERSUS CURRENT USER EXPERIENCE

FACTOR	NUMBER OF CURRENT USERS	NUMBER OF POTENTIAL USERS
COST SAVINGS	2	66
DISSATISFACTION WITH MANUFACTURER'S SERVICE	4	39
MULTIVENDOR INSTALLATION	1	7
LONG-TERM SECURITY	1	0
COMPETITION IS HEALTHY	0	4
NO TRADE UNION	0	1
MORE POSITIVE APPROACH TO CUSTOMER RELATIONS	0	1

TOTAL RESPONDENTS = 128

- Once serious considerations of a change began, the user took advantage of the possible cost savings to justify the action.
  - Many vendors think that having only one maintenance supplier on a multivendor site is a major reason for using TPM. However, only one user stated this as a reason for using a TPM service.
  - Further, only seven of the potential users rated a multivendor site as a driving force.
- The majority, 62%, of the users interviewed considered that the manufacturer is the preferred maintenance supplier since:
    - He knows his equipment best.
    - His service is better.
    - He is up to date on techniques.
  - Exhibit II-4 shows non-user reasons for not considering a TPM service. Many of these reasons are due to a lack of knowledge and result from poor marketing by TPM vendors.
  - A hidden reason, which became apparent in the telephone interviews, is the belief of many users that field maintenance is not a profit orientated operation for most vendors. Therefore a TPM vendor must cut corners and reduce service to offer a lower priced service and to make a profit.
  - As equipment manufacturers become more aggressive in pricing maintenance services and demand a return on the investment made, users will instinctively start to look for alternative maintenance sources.

## EXHIBIT 11-4

THIRD-PARTY MAINTENANCE IN THE UNITED KINGDOM:  
NON-USERS' PERCEPTIONS AND REASONS FOR NOT CONSIDERING

FACTOR	PERCENT
HAPPY WITH CURRENT SUPPLIER / BELIEVE HIS SERVICE IS BETTER	30%
MANUFACTURER KNOWS HIS PRODUCT BEST / HAS EXPERTISE, TRAINED ENGINEERS, ETC.	27
BAD EXPERIENCE WITH TPM IN THE PAST	8
LEGALLY IMPOSSIBLE AT PRESENT (RENT / LEASE ARRANGEMENTS WITH MANUFACTURER)	8
TPM IS MORE EXPENSIVE	5
MANUFACTURER IS TOTALLY UP-TO-DATE IMPOSSIBLE FOR TPs	5
TOO RISKY	5
MANUFACTURER'S RESPONSIBILITY	3
REDUCES NEGOTIATING STRENGTH	3
THIRD PARTIES ARE LIABLE TO BE FINANCIALLY INSECURE	3
UNDECIDED	3

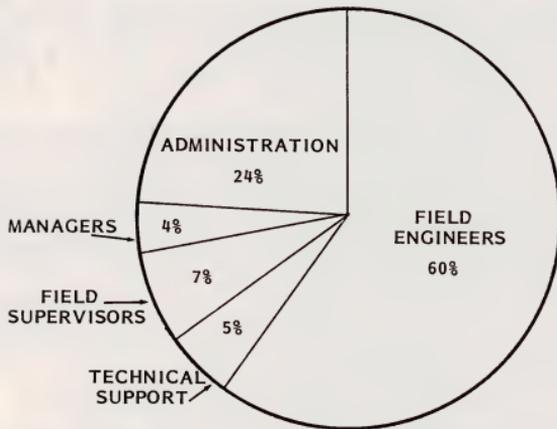
### III EVOLUTION OF A THIRD-PARTY MAINTENANCE VENDOR

#### A. COMPANY BACKGROUND

- This company is a major independent provider of TPM services in the U.K. It services a wide range and variety of products from basic terminals to complete IBM, DEC, ICL and CDC mainframe systems.
- The company started in the TPM business in 1969 by maintaining old and obsolete computer equipment as well as specially built digital based equipment. It has, in very recent years, engaged in an expansion programme by becoming more aggressive and pursuing large, highly profitable sites. Currently at a \$10 million level, it expects to grow to in excess of \$20 million within three years.
- It has reported an investment in spare parts and test equipment that exceeds \$3.5 million.
- Exhibit III-1 shows the distribution of job functions within the company, which has a current employment level of 200 people.
  - It is only recently that a marketing director/salesman was appointed. Until that time, new business opportunities had to approach the company.

EXHIBIT III-1

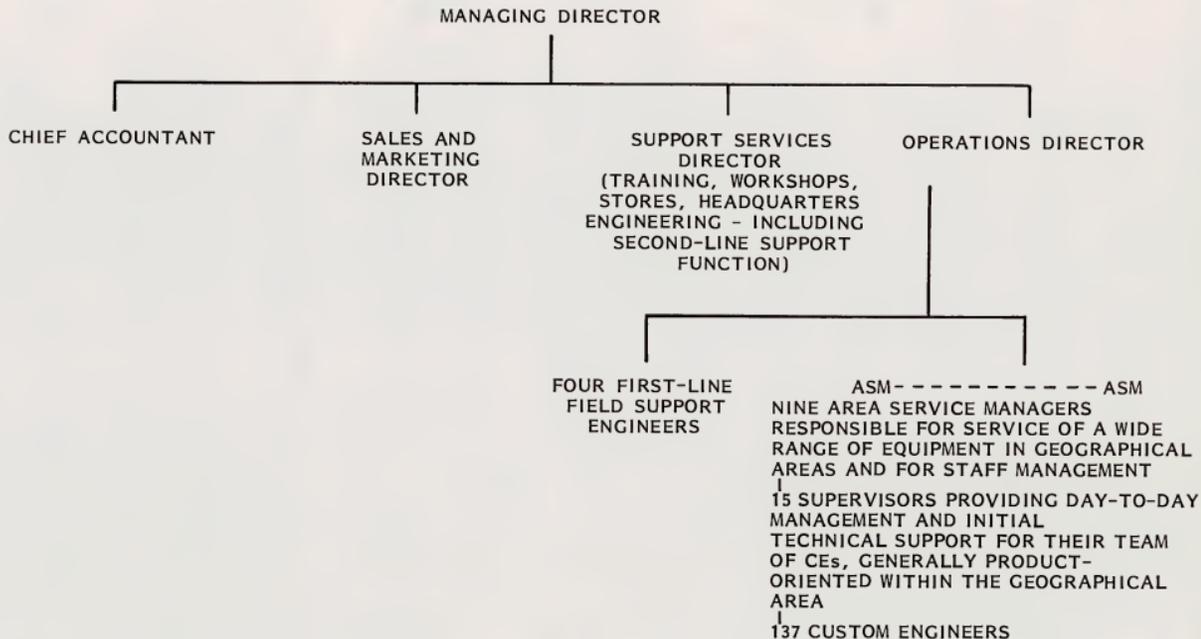
THIRD-PARTY MAINTENANCE  
DISTRIBUTION OF PERSONNEL



- The U.K. is served by 20 field engineering offices plus permanent engineers based at six sites.
  - Over the past 12 months it has lost one permanent site but gained two new ones.
  - Nineteen percent of the staff are located in the headquarters buildings.
- The entire company is treated as a single profit centre with a \$900 thousand profit for 1980 representing less than 10% of turnover. Despite this being well up on the previous year it is not considered adequate and the firm is taking steps to improve productivity.
  - It intends to keep the organisation at its present size over the next 12 months and to increase the utilisation of its engineers.
  - Efficiency is considered the key to improving profits. Its engineers will have to become more versatile and flexible.
- The organisational structure is shown in Exhibit III-2.
  - This organisation is heavily dependent on the nine Area Service Managers (ASM), each having responsibility for a specific geographical area.
  - The operations director, to whom the ASMs report, has nearly 70% of the company reporting to him.
- The attrition rate is high and reached 19% in 1980. However, the company managed to replace these engineers with normal recruiting from competition or from related digital based industries. The Armed Forces is another favoured source of engineers for this TPM vendor.
- The primary reasons for the attrition were:

EXHIBIT III-2

THIRD-PARTY MAINTENANCE VENDOR ORGANISATIONAL CHART



- Dissatisfaction with pay scales.
- Dislike of the move from a traditional on-site/resident status to a mobile/multicustomer position.
- Encouragement of the less competent engineers to leave.
- The work force increased by about 15% in 1979 and, after 1980's consolidation, the company plans to increase its engineering force by 10% in 1981 and 1982 and then 5% per year through 1984.
- These growth rates will be lower than the planned revenue growth rates, for the primary reason of forcing up the overall productivity and thus the profit level.
  - As experience and technical expertise grow, coupled with improving maintenance techniques, the overall productivity of the engineer will increase.
  - Improving mean time between failures and the move towards the exchange of failed units, with repair at workshops or off-line, will also increase the revenue earned per engineer.
- The salaries paid to its engineers were in line with the industry average as determined in INPUT's 1980 Annual Report. Keeping up with salaries and fringe benefits is a constant concern of this TPM vendor.
- The company does have an effective incentive program for field engineers. This program, strongly biased towards 'local' and area performance, takes the form of a bonus derived from growth and profit goals being achieved at the local level.
- The work force is not unionised and there is no activity by engineers to change this state. The TPM vendor considers it essential that his engineers remain

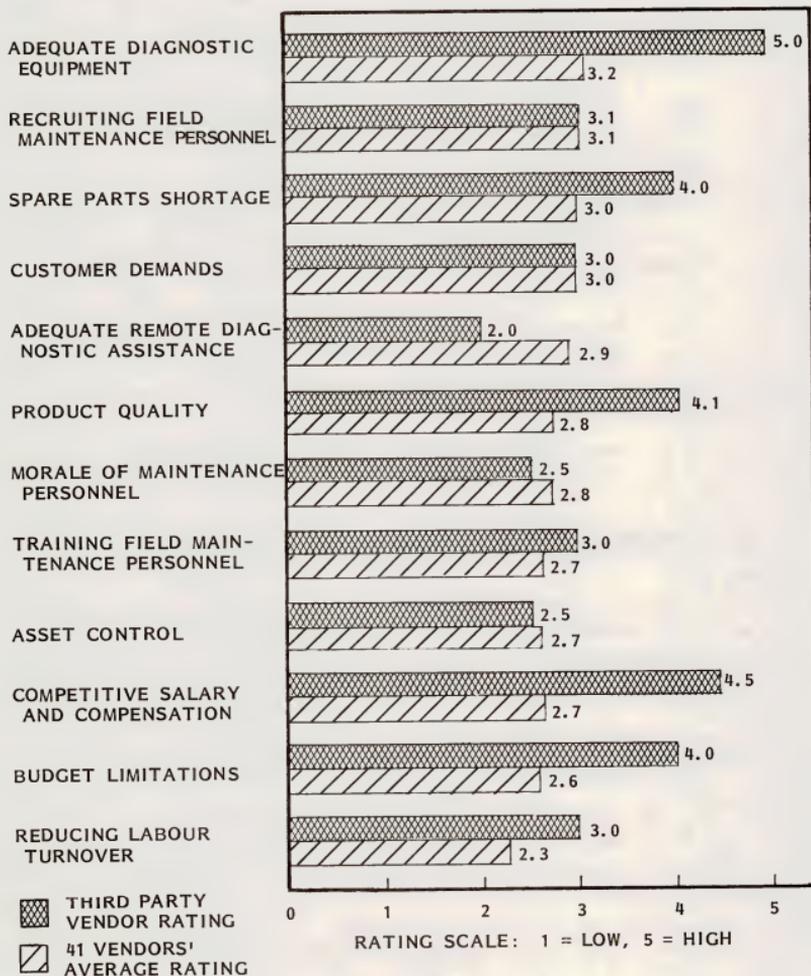
flexible in their demands and will discourage attempts to introduce any form of unionisation.

## B. PROBLEMS ENCOUNTERED

- The problems related by this TPM vendor are compared in Exhibit III-3 to the average response from 41 other European FS vendors.
- Adequate diagnostic equipment is the major problem.
  - This was particularly true of the specialised test equipment needed for disk drives and similar devices. The cost of a head alignment pack is significant and cannot be justified for maintaining only a few units.
  - When the TPM vendor needs to repair this type of equipment he often subcontracts it back to the original vendor, despite the very high costs imposed for this service.
  - The increased use of specialised off-line microbased exercisers will increase the TPM vendor's problems.
- Increasing user interest in Remote Diagnostics was a cause of great concern as this is considered to be both a marketing advantage and a cost effective tool for the original equipment manufacturer.
  - The company plans to introduce some limited Remote Diagnostic capability in 1981, but this will be on a very select set of products.
- Formal escalation procedures at this TPM are considered to be a strong marketing point.

EXHIBIT III-3

THIRD-PARTY VENDOR'S RATINGS OF PROBLEMS RELATING TO  
FIELD SERVICE AS COMPARED TO OTHER VENDORS



- If the equipment is not repaired after the contracted response time or after four hours on-site, senior management is involved.
- This involvement is to get the necessary technical support and to take an active role in the political handling of the client.
- Although the TPM vendor appreciated the attractiveness of this procedure to the client, he has no formal mechanism to ensure all customers are aware or remain aware of the procedure.
- The implementation of Engineering Change Notices (ECN) was another area of concern for the TPM vendor. It was currently receiving top management attention.
  - This is a major problem area for all TPM operations and this TPM vendor stated that it does not do enough, mainly because the information, kits etc. were difficult to obtain.
  - Less than 5% of an engineer's time is spent on ECN work.

### C. SERVICE PROVIDED

- The average number of trouble calls in a month, excluding the resident sites, was over 1,500. Of these, 10% to 15% were repeat calls and between 5% and 15% were no-fault-found calls.
- The average repair and response times are shown in Exhibit III-4 and compared with results from INPUT's 1980 survey.
  - The TPM vendor response times, with the exception of minicomputers, are better than those provided by 'other' maintenance vendors.

EXHIBIT III-4

AVERAGE RESPONSE AND REPAIR TIMES

EQUIPMENT TYPE	AVERAGE RESPONSE TIME (HOURS)		AVERAGE REPAIR TIME (HOURS)	
	OTHER VENDORS	TPM VENDOR	OTHER VENDORS	TPM VENDOR
SMALL BUSINESS MACHINES	4.3	3.5	3.1	3.0
MINICOMPUTERS	4.8	7.0	2.4	3.1
PERIPHERALS	5.1	3.0-4.0	1.7	3.0
TERMINALS	8.6	7.0	1.4	2.0

- However, TPM vendor repair times are longer, only improving on the 'other vendors' time for small business machines.
- The TPM vendor considered mean time to respond as the most important characteristic to a user.
  - Scheduled preventive maintenance and management interest in the user shared second place.
  - Mean time to repair was considered to be of lesser importance.
- The TPM vendor will guarantee same-day service with a maximum four-hour call-out response time.
- It is also expanding into the microcomputer service market which, as background work, improves an engineer's productivity by giving him work in normal nonproductive times.

#### D. SPARES PHILOSOPHY

- This vendor's spare parts are distributed as follows:
  - Fifty-six percent at branch offices.
  - Twenty-seven percent at workshop, training school.
  - Fourteen percent at spares warehouse.
  - Three percent at engineer level.

- The spares held at the workshop (testbeds) and training school (training equipment) are considered critical to those users and can be taken only when all other supplies fail.
- Some sparing is done via the purchase of second-hand equipment but the majority of spares are ordered through each manufacturer's spare parts supply service.
  - In a recent U.K. court case, it was ruled that a manufacturer does not have to supply from existing stock if the spare part is being held as part of his own requirement for servicing a client and that an order can be filled by normal manufacturing process.
  - This was a blow to TPM vendors as it means a manufacturer's spare holding is not available by right. 'By normal manufacturing' can mean many months of delay, even assuming that there will be another manufacturing run of that particular spare part.

#### E. PRICING TRENDS

- Price increases, over the past 12 months, on virtually all services have ranged from 12.5% to 25%.
- The major reason for these increases has been labour costs, closely followed by the rise in price of spare parts.
  - Competitor prices have not increased in line with inflation and these have limited the increases which could be made by the TPM vendor.
- This vendor predicted that price rises of about 20% would occur in the next 12 months.

- A typical 1980 service call cost an average of \$175 and was composed of:
  - Thirty-four percent for stock, support, administration and training.
  - Thirty-three percent for direct labour.
  - Twenty-five percent for travel costs and time.
  - Eight percent for spare parts and material usage.
- The TPM vendor claims to save a user about 20% on a conventional manufacturers' maintenance agreement.

#### F. FUTURE PLANS

- This TPM vendor's goals for the future were to:
  - Provide consistent, faster response.
  - Give a guaranteed fix time which could be achieved by:
    - Improving the performance skills of the engineers.
    - Ensuring the FE had the right part when he diagnosed the problem.
    - Making greater use of an engineer's time by having him fix microcomputers in his 'spare' time.
- The vendor stated, 'Please don't ask me to list the low cost practical methods of meeting these achievements -- if I knew them I'd be busy implementing them rather talking about them!'

- His comments on the future of TPM highlighted many of his concerns:
  - 'The last two years have seen a substantial volume growth and a great product diversification for us; we spent that time getting business and "coping". We are currently reviewing "custom and practice" which has become incident orientated and endorsing or radically changing it according to our needs. We aim to improve our recruitment selection skills, our setting of and achievement of training objectives and our availability of working stock (i.e., shorten our repair loop). We're toying with increasing performance monitors but worried that we may become a bureaucracy'.
- With a more aggressive marketing campaign and an acceptable list of reference users, such as banks, major manufacturers and universities, the company is becoming a force to be reckoned with.



## IV CASE STUDY OF A THIRD-PARTY MAINTENANCE USER

### A. USER DESCRIPTION

- The user is a market leader in on-line reservation, ticketing and scheduling in the transportation industry.
- In 1980 the user spent more than \$2.4 million on maintenance of his computer installation, requiring a seven day, 24 hour, 365 day coverage.
- Due to the very critical nature of the work all equipment is duplicated and, on failure, changeover occurs with a minimum disruption to the system users.
- However when an element of the system is down, to quote a spokesman of the user, "That's when I start worrying, as "Murphy's Law" can come into play with both systems going down together; when that happens we (the company's operation) just stop and confusion reigns!"
- This user now has a large installation with a mix of vendors including IBM, Amdahl, Intel, CCI and other small systems. At the time of moving to TPM the user was wholly an IBM site.

## B. REASONS FOR THE MOVE TO TPM

- The main reasons for the move to TPM were:
  - Dissatisfaction with the performance of IBM's engineers.
  - Annoyance at IBM's unwillingness to provide the coverage and response requested.
  - Increasing maintenance charges.
- Initially the idea was to pressure IBM to improve, but it soon became obvious that the user would in fact benefit by the change by achieving a greater degree of control of the maintenance provided plus a reduction in maintenance charges of 18% to 22% (approximately \$500 thousand).

## C. VENDOR RELATIONS

- The TPM vendor selected was keen to enter the U.K. market having already established itself on IBM systems in the Southern Hemisphere.
- The user, to ensure that it had the TPM vendor's undivided attention, had him agree not take on any other customers for 18 months.
- It was very important to the user that the TPM vendor had established an IBM spares supply system and information links with IBM, ensuring that ECOs would continue to be installed.
- A two-year contract was negotiated with a renewal option for a further five years.

- The user then renegotiated the basic payment scheme, from the normal full coverage for a set price to one with a cost-plus-profit payment formula.
- The motivation behind this change was that the user was replacing his IBM 360 system with the more reliable Amdahl mainframes and yet the TPM vendor wanted to continue charging the same percentage of the mainframe purchase price.
- The user forced the TPM vendor into this change and is now well aware that the TPM vendor is unhappy, despite the assured profit margin.
- This contract allows the user to control both the number of engineers on site plus the degree of spares holding and so ensures a high level of security from an operational point of view. This arrangement also relieves the TPM vendor of some responsibility.

#### D. THE HANDOVER

- IBM, despite losing this important site, cooperated fully in a phased handover.
  - The handover was a confidence building time, with the TPM vendor taking over a part of the system and proving his ability before taking on the next part.
  - The user, operating a real-time system, was very conscious of the dangers involved and used as many safeguards as possible during this delicate period.
- The TPM vendor brought in established management from its overseas operations and recruited local engineers with skills and experience to match the user's site.

- The user, having a very clear concept of what it wanted from its maintenance vendor, carefully controlled the situation. It insisted on reviewing the quality and number of engineers and, in one case, actually rejected an engineer as unsuitable.

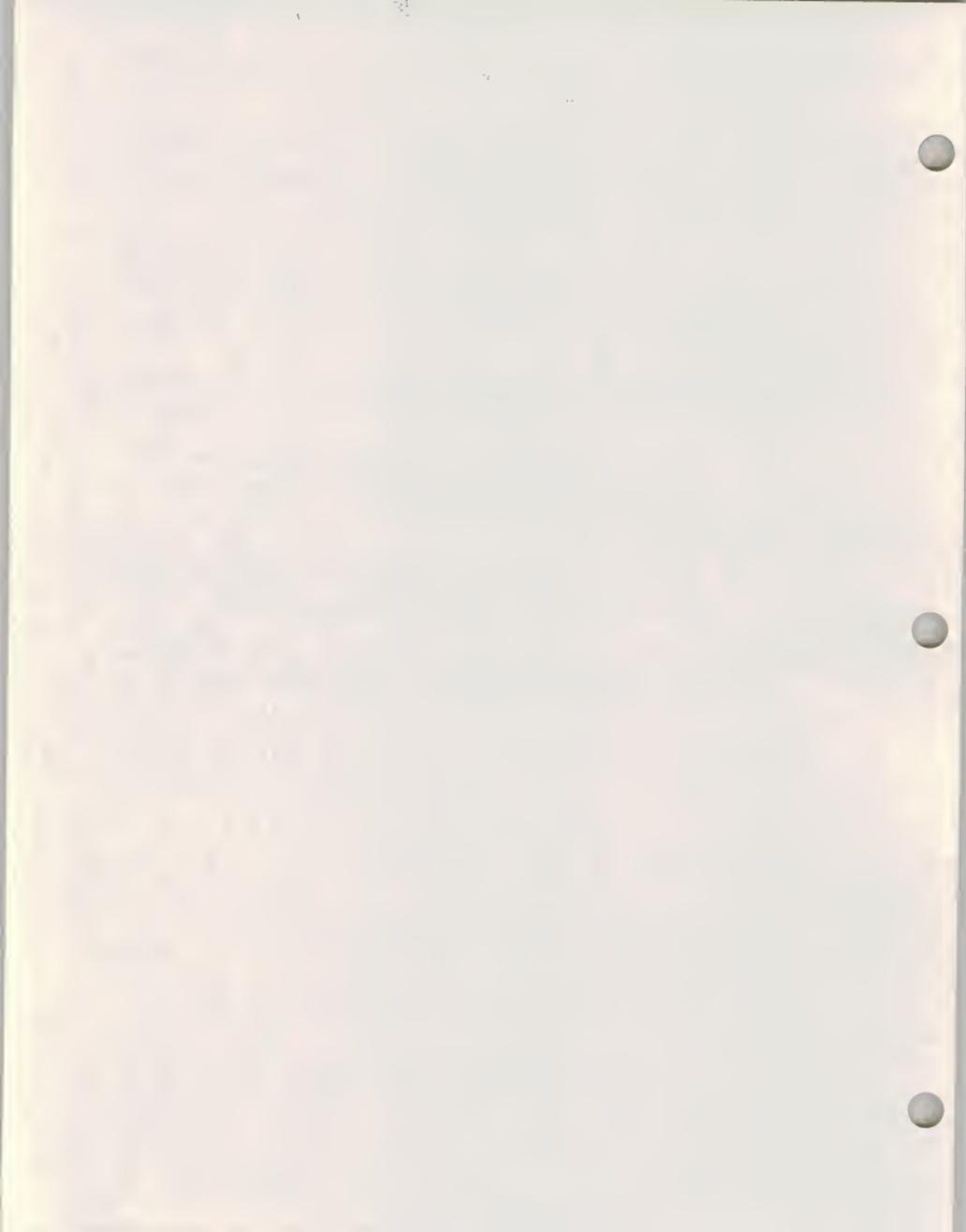
#### E. SPARES CONTROL

- Any new equipment now purchased by the user must have a guaranteed spares and ECO commitment, with total acceptance by the equipment vendor that a third party will be maintaining it from the start.
  - This, in effect, has a direct bearing on the amount being paid to the TPM vendor.
  - The user has said, 'If the equipment salesman can be caught in an over-commitment on spares, even to the extent of including an initial spares kit, we effectively reduce our payment to our TPM vendor'.

#### F. CURRENT CONCERNS

- The vendor still feels justified in his decision to use a TPM vendor for the overall services and his degree of control has been improved. However, the user reports that the TPM vendor is slipping in quality which is causing some concern.
  - There is a high turnover of engineers caused by overstatement of the opportunity for the engineers.
  - The user feels the better engineers are growing restless and dissatisfied with the career opportunities offered by the TPM vendor.

- The TPM vendor is becoming more like IBM was, with a drop-off in attention to detail. For instance, the engineers no longer leave the equipment as clean and tidy as they once did.
- It is the intent of the user to invite others to tender for the maintenance on the completion of the current contract, if only to keep the existing TPM vendor on his toes. IBM, as well as other vendors, will be invited to tender.
- The user admits that the use of a TPM has caused more work for himself than using the original equipment vendor's FS organisation.
  - The main effort has been in monitoring and exercising control of the TPM vendor to ensure no corners are cut and that the equipment is maintained at the correct ECO level.
  - This effort has been deemed worthwhile by the user as it has achieved savings of about 20% while improving the service received.
- The user would recommend TPM to others, provided they had the experience and control mechanism to ensure the TPM vendor performed to contract.



**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:

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**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

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