INPUT

MANAGEMENT PLANNING PROGRAM IN FIELD SERVICE

F-1982
EB3

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:

- Management Issue Reports - 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.
- Planning Support S… an in-depth analysis of major tech… commendations that will assist ir… s in the planning of field service…
- Annual Repo… ctivities in the field services ind… r effects on future field servic… f likely changes in technical a… ur, may affect the future requi…
- Annual Pres… use presentation to field servic… the current year's research ar… es for the research program for… occur in the second half of each…
- Inquiry Ser… rch staff on an as-needed basi… pecial "hot line" is staffed ever… quirements.

RESEARCH METH… ch in computers, communications, a…

- Research t… ssions with client representat…
- Research fo… with users, vendors, universities…
- Conclusions… gement of INPUT's professiona…
- Professiona… e nearly 20 years of experience in data processing and communications, including senior management positions with major vendors and users.

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AUTHOR
JAPAN'S ENTRY INTO EUROPE.
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FIELD SERVICE PROGRAM

FIELD SERVICE BRIEF

JAPAN'S ENTRY INTO EUROPE

AUGUST 1982

JAPAN'S ENTRY INTO EUROPE

CONTENTS

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EXHIBITS

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I INTRODUCTION

- This brief, entitled Japan's Entry into Europe, is part of INPUT's 1982 European Field Service Programme.

- This brief focuses on the activities of Japanese companies in Europe:

  - The extent of penetration of these Japanese companies to date.

  - An assessment of their strategies, tactics, products, marketing, and shortcomings.

  - Conclusions regarding users' receptivity to Japanese equipment in Europe.

- Clients are referred to an earlier brief, entitled User Attitudes Regarding Equipment from Japan, published as part of the 1981 U.S. Field Service Programme.

- Client comments and inquiries on the material contained in this brief are welcome.

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II CHARACTERISTICS OF JAPANESE HIGH TECHNOLOGY

A. STRATEGIES AND TACTICS

- There can be little doubt that Japan poses a real and tangible threat to the European high-technology industry. However, it is important to see the current situation in perspective.

  - Japan has been restricted in its penetration of the information systems market (although it dominates in sale of copiers).

  - Only slightly more than 3% of all systems shipped originate in Japan.

  - The U.S. remains the largest external supplier of minicomputers, microcomputers, terminals, peripherals and mainframes.

- Personal computers, and peripherals associated with these systems, will be the next target for Japanese attack, due in the next three years.

- The Japanese have adopted a backdoor approach to medium and large mainframes, concentrated in IBM plug-compatible units.

  - The joint venture between Siemens and Fujitsu is proving the most active.

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- An estimated 100 Fujitsu Facom systems will be supplied in West Germany during 1982.

- Fujitsu is also hoping for dramatic results from the joint venture with the British company, International Computers Limited (ICL).

  - ICL is marketing the Facom 280, a slightly larger version than Siemens', and the first orders are expected soon.

  - The Fujitsu plant at Numayu near Tokyo is gearing up for a major drive in the delivery of these systems to Europe.

- Hitachi, the other major Japanese IBM plug-compatible mainframe supplier, has had a much slower start, but it has agreements with BASF and Olivetti.

  - BASF has delivered five of the Hitachi M200s.

  - Olivetti has installed a total of six systems.

- These arrangements highlight the current thinking in Japan that favors joint entries.

  - They remove the risk of nationalistic rejection by piggybacking on a domestic vendor's image and market acceptance.

  - They save the cost of setting up marketing support and ancillary operations.

  - They allow an option to move into the front line once the product is established.

  - There is no software exposure.

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- Established engineering support networks of domestic partners meet the field service requirements.

- Fujitsu now has a European headquarters in London with a staff of 12 people; Japanese hold the top three management positions and they intend to keep this arrangement.

- These initial European thrusts by the Japanese can be viewed as relatively weak and lethargic.

  - Japan has many domestic market problems.

  - Growth of the Japanese gross national product is at 3% now, and heading downward.

  - The huge trade surpluses of past years have diminished, cooling the economy and slowing technical development.

- Having already established a major presence in worldwide automobile sales and consumer electronics, the Japanese are expected to invade the high-technology front next.

  - The traditional Japanese tactics, which U.S. and European automobile and consumer electronics firms have experienced, will not fit a more sophisticated high-technology field.

  - Successful Japanese tactics for gaining foreign auto and lesser electronics equipment markets included:

    . Getting a foot in the door with a cut-rate product.

    . Then putting a pricing squeeze on established businesses, thereby reducing earnings and R&D effort.

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- And, while the defender is off guard, introducing a higher-priced product line.

- Realizing the need for coordination in its high-technology export strategies, Japan, through its Ministry of International Trade and Industry, set about to gain a foothold in worldwide high technology.

  - The Japanese government (the sponsor) assembled an international enclave in May 1982 to launch the fifth generation of computer equipment incorporating "artificial intelligence."

  - The government is underwriting 35% of the project and investing 10 years of R&D effort with the hope that other nations may participate.

- Great Britain attended, thought that the idea was a good one and proceeded to launch a "parallel" effort, exploiting weaknesses in the Japanese plan.

  - General Electric Company (GEC), Plessey and ICL are interested in participating.

  - Britain's Department of Industry is investing $430 million.

  - They believe the fifth generation can become a reality in five years, as opposed to the Japanese 10-year plan.

- Nippon Electric Company (NEC), Japan's number three computer maker, has announced its own strategy for leading the world in high technology.

  - NEC's strategy is based on its superiority in communications and integrated circuits.

  - Also, while Fujitsu and Hitachi are setting up joint ventures in Europe and the U.S., NEC intends to develop its own brand identity.

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- So far, the strategy has been successful in personal computers, as NEC leads the Japanese market with a 41% share.

- NEC's goal is to expand exports from 33% to 40% by 1985.

B. PRODUCTS

- Clearly, Japan's major success in high technology to date has been the semiconductor.

  - The Japanese captured about 15% of the market shortly after they began manufacturing a 4K RAM in the mid-1970s.

  - The introduction of a 16K RAM moved this to a 30% share.

  - Japan went into production with the 64K RAM and, by the end of 1981, had captured over 70% of that market.

  - Speculators believe that Japan will easily obtain over 90% of the available 256K RAM market and will, in effect, monopolize the one megabyte RAM market.

- Observers say that this success resulted from price cutting. Exhibit II-1 illustrates what happens to prices when the Japanese enter the market.

  - Until mid-1980 the price of 64K RAM was slightly over $100.

  - By early 1982 the price for the same unit had fallen to nearly $10. At present 64K RAMs can be bought in Europe for $5.

- The Japanese computer products, on the other hand, are limited, at least currently.

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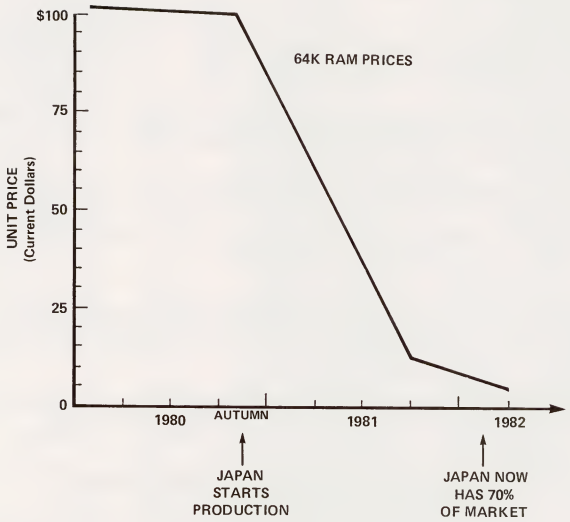
EXHIBIT II-1

JAPAN AND 64K RAMS



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- A sparse variety of product lines is offered.

- The two newest Japanese product announcements do not appear novel or threatening.

- Fujitsu will market its new super computers, Facom VP-200 and VP-100, in competition with Cray Research, Control Data, and the new Univac 1100/90 products.

  . Units, available in the third quarter of 1983, will rent for $270,000 per month with a purchase price of close to $12 million; this is very competitive in price.

  . Fujitsu plans to sell 30 units in Japan and 50 overseas by 1987.

- Nippon personal computers have, so far, been unsuccessful in any major market outside of Japan. This can change very quickly, however.

  . Their personal computers have no significantly different features, and at best these products are only equivalent in price and quality to other models.

  . Their big deficiency is lack of software (like the U.S. manufacturers, until CP/M and VisiCalc came along).

  . However, the real reason why Japanese personal computers have not made inroads in the international markets is that they are struggling to satisfy domestic Japanese needs, and have yet to organise for international competition.

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C. MARKETING

- The usual traits of Japanese marketing, referred to earlier, consist of product emulation and price cutting, at the lower ends of the product spectra first, and with progressively larger products later.

- The major problem with Japanese overseas marketing is the lack of expertise in distribution procedures and techniques.

  - This arises from a confusing system of distribution in Japan.

    - Retailing in Japan is accomplished through a maze of individual family-owned and passed down "cottage" arrangements.

    - No written contracts formally bind wholesaler and retailer.

  - Lately, Japanese executives are reluctant to take on foreign assignments.

    - The main reason is the lack of proper educational opportunities for Japanese children in foreign lands, making it difficult to adjust upon return to Japan.

    - A Japanese employment agency has noted a significant rise in foreign-assigned Japanese businessmen wanting to return to Japan.

D. IMPLICATIONS OF THE TECH-SCAM

- In late June 1982, U.S. federal agents arrested several employees of Hitachi, Mitsubishi, and National Semiconductor (Hitachi's U.S. distributor), for allegedly acquiring IBM trade secrets for $566,000.

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- Some of the individuals have denied any wrongdoing, claiming they thought they were buying information from a legitimate consulting firm, which turned out to be a front for the FBI.

- Hitachi later postponed the marketing of its new supercomputers, citing as one reason the FBI allegations.

- It has been alleged that some sought-after areas of information were copies of IBM's maintenance manuals, describing board level interfaces and software/hardware interfaces.

- This highlights the need for a more stringent policy for field service organizations with respect to manuals and maintenance documents in general. Some vendors already lock maintenance documentation inside the installed unit and assign numbered copies to individuals.

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III EUROPEAN MARKETPLACE

A. THE EUROPEAN MINICOMPUTER MARKET

- The European home market for the minicomputer manufacturers is huge and far from being saturated. European manufacturers, with their technical expertise, should be making large inroads and profits, but they are not.

- The European market is currently swamped by the U.S. manufacturers.

- European manufacturers have been confined to home country marketplaces, allowing the international giants such as Digital Equipment Corporation (DEC) and Hewlett-Packard and smaller concerns such as Data General and Prime to establish a foothold and reputation envied by all.

- Currently, companies like ICL in the U.K., NorskData in Norway, Data Saab in Sweden, Nixdorf Computers in Germany, and Olivetti in Italy are under pressure to retain home markets, let alone expand in Europe and the U.S.

- This situation will be made worse when the Japanese minicomputers arrive.

  - There is little organised opposition.

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- There is muted government support for domestic vendors (and little inclination to protect home markets as the Japanese have done since the beginning of computers in their own country).

- IBM activity in minicomputers is sluggish and ill-defined, offering no real leadership for western nations.

- The Japanese have already established a reputation for reliability, learning to exploit their home consumer reputation.

- This is shown graphically in Exhibit III-1.

B. THE EUROPEAN MAINFRAME MARKET

- Because the Japanese are finding the mainframe business in all western world markets the most difficult to penetrate, they have taken a backdoor approach via established European companies.

- Fujitsu is the classic example, as illustrated in Exhibit III-2.

  - Fujitsu sells directly in Australia, Spain, and the Far East.

  - In the U.S., Fujitsu has a marketing agreement with TRW in the form of a joint venture company; Fujitsu also supplies subassemblies to Amdahl.

  - In Europe, Fujitsu's main suppliers have been via the German giant, Siemens; it has delivered over 100 large systems to date.

  - A supply path via ICL in the U.K. has been agreed upon and Fujitsu Facom systems will arrive by this route.

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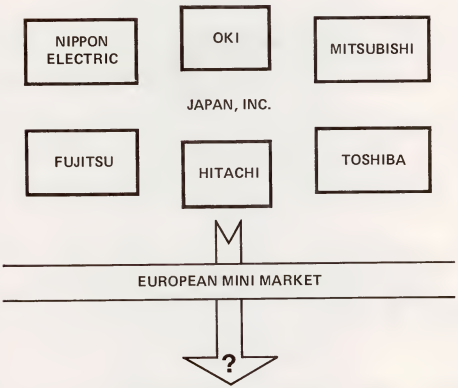
EXHIBIT III-1

JAPAN, INC. AND THE EUROPEAN MARKET



LIMITED HOME PRODUCERS
LESS POLITICALLY CONTROVERSIAL
COMPATIBILITY LESS OF AN ISSUE
SLUGGISH IBM PENETRATION

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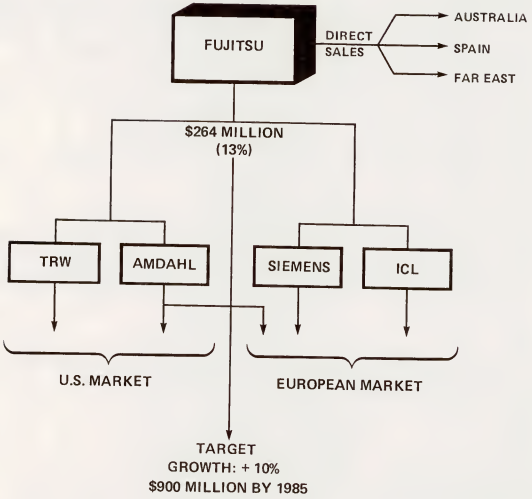
EXHIBIT III-2

FUJITSU WORLD MARKETS



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- Fujitsu is exporting about 13% of its production to the U.S. and Europe, with a value of approximately $264 million. By 1985, Fujitsu plans to have increased this to $900 million.

C. THE EUROPEAN PERSONAL COMPUTER MARKET

- The mid-range computer market is being squeezed in Europe.

- While minicomputers and small business computers markets are expected to continue their growth, personal computers will triple their installed base.

- The small computer market is expected to grow from nearly 400,000 installations in 1980 to almost 900,000 installations by 1985, as shown in Exhibit III-3.

- The recent debut of Japanese personal computers was disappointing. This can be viewed as a boon for U.S. personal computer vendors who until now have concentrated on the domestic U.S. market, leaving distributors in charge of European markets.

- Now the main vendors are acquiring the distributors in all major European markets (U.K., France, West Germany, and Italy) and developing their own direct sales and service organisations. Controlling distribution outlets is the key to success in this market.

- In two years, Japan's opportunity to tie up distributors in Europe with Japanese products will vanish. As U.S. control over the outlets increases, Japanese products will be locked out.

- European efforts to capitalize on this market also appear to have been organised slowly. Europeans suffer from the same problems as the Japanese:

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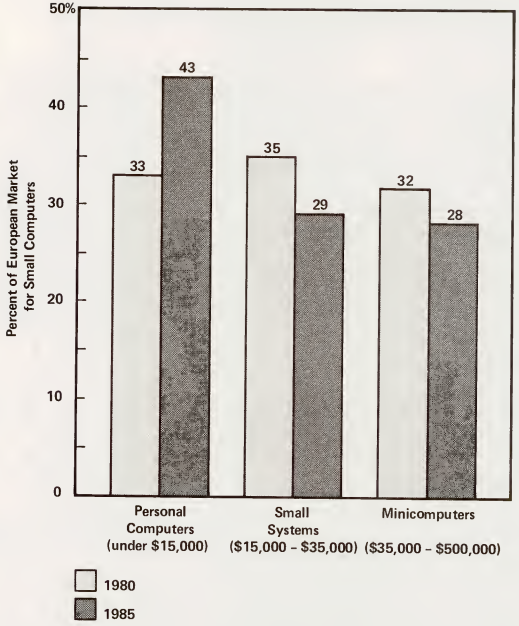
EXHIBIT III-3

WESTERN EUROPE'S SMALL COMPUTER MARKET
(INSTALLATIONS, 1980/1985)



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remoteness from the U.S.-based hotbed of software development (both systems and applications).

- However, the European manufacturers do not appear to have perceived the need for control of the retail outlets and this is now slipping away from them.

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IV SHORTCOMINGS IN THE JAPANESE EFFORT

A. ECONOMIC ILLNESS

- Japan's economy is experiencing the same pressures as other free world nations:
  - Uncontrolled government spending and growing deficits are plaguing Japan.
  - The sagging economy is taking its toll on Japanese efforts in high technology.
- A recently announced decline in exports was the first for Japan in seven years.
  - Exports fell 3.6% in the first half of 1982 to $71 billion.
  - Shipments were hurt by the worldwide recession.
  - Nevertheless, Japan's trade surplus, even in hard times, is still about $12 billion.
    - Japan had a $6 billion surplus with the U.S., its largest trading partner.

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- The Common Market contributed nearly $5 billion to Japan's surplus in trade.

- Japanese economists forecast the GNP growth will be 3% or less, about half of earlier forecasts.
  - This is not enough to absorb the increase in Japan's labor force.
    - The official unemployment rate in Japan is 2%.
    - But many Japanese are "gainfully unemployed," under life employment contracts.

- Japan's largest employer is the government-owned Japanese National Railway (JNR).
  - The JNR deficit accounts for 18% of the Japanese budget.
  - Union problems are worse than any in the free world, including Britain's National Coal Board and British Leyland.

- The Japanese blame their economic ills on other issues and events besides heavy government spending.
  - OPEC.
  - U.S. interest rates.
  - Protectionism against Japanese products.
  - Worldwide recession.

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B. CULTURAL AND BUSINESS PROBLEMS

- Numerous cultural and business problems deter the Japanese from extending their high-technology dominance.
  - Inadequate software is noticeable in all Japanese products.
  - Lack of marketing skills diminishes any technical superiority they might have. (This is why joint ventures are so common with Japanese electronics firms, who have recognized this shortcoming.)
  - Field service and customer service are not well-developed.
  - An international backlash towards Japan's exports exists because other nations are having economic problems.
  - Brand identity is absent from Japanese products.
  - Training and operating instructions are of poor quality. The Japanese have sacrificed quality in documentation in their haste to get products to the marketplace.

C. THE SOFTWARE PROBLEM

- Apart from the problem that the English language presents to Japan, all of their information systems products suffer from the lack of good software.
- Japan's success has been in hardware markets (where human interface was either simple or nonexistent):
  - Consumer products.

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- Electronic components.

- Robotics.

- Plug-compatible hardware.

- This software barrier has been the main impediment to Japanese penetration of the mainframe and minicomputer markets. The Japanese are not likely to overcome it in the near term.

- However, the development of a small number of common, standard operating systems on personal computers has been an open invitation to the Japanese for a product with chip-compatible hardware (e.g., Intel 8086, Motorola 6052, and Zilog Z80).

- Within the next twelve months, the Japanese can be expected to organise their response to the high domestic demand and begin their drive on the U.S. and European markets.

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V USER ATTITUDES CONCERNING JAPANESE PRODUCTS

- A small sample of 18 users of Japanese products was contacted.
  - None of those interviewed expressed any reluctance to purchase Japanese products, or concern about appropriate field service coverage.
  - Most users believed they were obtaining better system availability and high product quality.
  - Over 70% expressed a high level of satisfaction with Japanese products.
- A large proportion of the users expressed concern about the software, but felt they were safe because they had purchased via established European companies. They did not express the same concern about the hardware.
- Typical comments from users were:
  - "The Japanese pay attention to reliability, so field service is not so critical."
  - "I am very happy with the hardware, no problems as yet."
  - "We were worried that being one of the first systems no one would be able to fix it when it failed. So far that has not proved the case."

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- "We bought Japanese manufactured mainframes as they have an established reputation for reliability, more than you can say for some of the competition."

- "The board was not happy in buying a Japanese mainframe but is now happy with its performance."

- "We had some installation problems. The engineer did not seem to know the system, but now it's running A-OK."

- "I would buy Japanese again."

- "If the local supplier can convince us his equipment is reliable I would swap - provided price and performance were the same!"

- Generally, the users INPUT spoke to all had a positive image of Japanese equipment.

  - One exception was in Germany and this complaint was about the time engineers took to respond to problems.

  - Users seem to have little compulsion about staying with a national supplier.

  - Users perceive that Japanese equipment will be more reliable. (A direct result of the consumer industry perception?)

  - Users believe that mainframes manufactured in Japan are more reliable.

- A great many of the users' attitudes were conceptual, based more on feel than fact. Once committed to a Japanese mainframe, the users will rationalize that thay made the correct decision; to quote one user, "It's got to be a good decision, I made it!"

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VI CONCLUSIONS

- Japan has built up an image of unbeatable technical skills that are unique to the nation. While there is a huge value to their excellent manager/worker relations, the basis for their success lies in their control of two old-fashioned western world values: unit labour costs and productivity, as shown in Exhibit VI-1.

- Japan's threat to penetrate and dominate international computer markets, as they did with semiconductors, is overrated momentarily.

  - Obstacles are blocking Japanese efforts.

    - Japan's own domestic needs have absorbed large amounts of effort; little is left, as yet, for international markets.

    - The world's current recession is also hurting Japan's efforts to build international markets.

    - The lack of knowledge in marketing skills, field service, and software is noticeable.

- Europeans and Asians might be moderately more concerned about Japanese penetration into their territories. Japan has more successfully penetrated these areas because it deals through local governments and suppliers to whom it can sell technological superiority.

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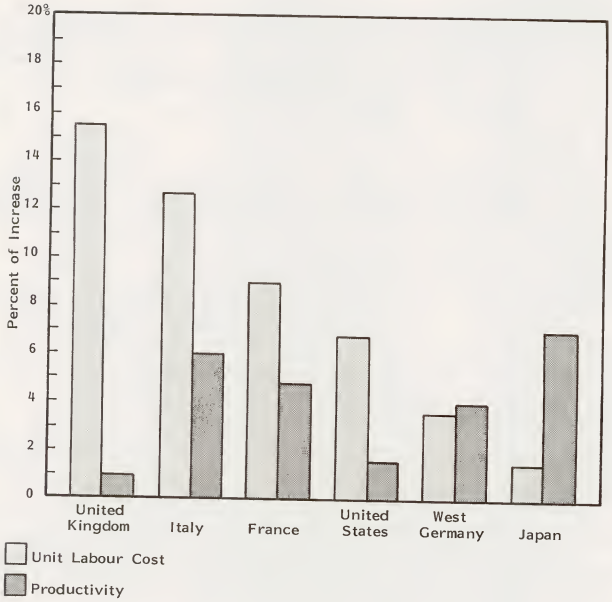
EXHIBIT VI-1

AVERAGE INCREASE OF
PRODUCTIVITY AND LABOUR COST
BY COUNTRY, 1975-1980



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- Japan's current share of the U.S. computer market is minimal, 1% to 2%. Moreover, the Japanese lack a majority share of some of their own home markets. IBM, alone, has nearly 30% of the Japanese mainframe market.

- Despite the shortcomings and problems, the Japanese should be taken very seriously in all computer markets. They have a special knack for addressing major problems and correcting them regardless of how hard the decision may be.

- The threat of Japanese penetration into European markets exists. It just may take longer.

  - Estimates range between five and 10 years for significant European market penetration in high technology by the Japanese.

  - This time frame, later than most had theorized, provides a breather for other free world competitors.

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MANAGEMENT PROGRAMS: Designed for clients with a continuing need for information about a range of subjects in a given area.

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- 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 3,000 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.

- On-Target Marketing - A practical, "how-to-do-it" methodology for more effective marketing problem solving and planning, delivered to clients via workshops and/or consulting services.

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

- Improving the Productivity of Systems and Software Implementation

- User Communication Networks and Needs

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

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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MANAGEMENT PLANNING PROGRAM IN FIELD SERVICE

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RESEARCH M esearch in computers, communicati

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- Resea iews with users, vendors, univer
- Concl he judgement of INPUT's profes
- Profe verage nearly 20 years of exper ncluding senior management positions with major vendors and users.

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FIELD SERVICE PROGRAM

FIELD SERVICE BRIEF

MANAGING MATURE FIELD ENGINEERS

DECEMBER 1982

MANAGING MATURE FIELD ENGINEERS

CONTENTS

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EXHIBITS

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1 INTRODUCTION

A. SCOPE

- This brief, entitled Managing Mature Field Engineers, is part of INPUT's 1982 European Field Service Programme.

- The subject was selected because:

  - A significant proportion of field engineers are approaching or are already in the mature age bracket.

  - The motivation and management methods which contribute to an increase in the productivity of mature field engineers need to be identified.

  - Organisations can control motivation and management to improve productivity and optimise the return on investment of mature engineers - despite the effects of the world-wide recession which has placed many other productivity factors outside their control.

- Aspects of managing mature field engineers include:

  - A current profile of mature field engineers.

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- An assessment of their performance and work attitudes.

- An evaluation of the major motivating and demotivating factors.

- The influence of economic and technological changes on job content and career structures.

- Managerial strategies currently employed to develop the role of the mature engineer in the organisation.

- Conclusions regarding the managerial formula required to achieve high results from a mature workforce.

- It is very important to note that the source of data used in developing this report was the mature engineer's management and not the mature engineer himself.

- Clients are referred to an earlier INPUT report entitled Productivity and Motivation in Field Services published as part of the 1981 European Field Service Programme.

- Clients' comments and enquiries on the material contained in this brief are welcome.

B. METHODOLOGY

- Research included 11 interviews with major computer and data processing equipment vendors during October and November 1982.

- The interviews were conducted with field service managers and directors, normally the country or European manager.

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- The number of interviews by type of company were as follows:
  - Four large manufacturing companies.
  - Three distributors.
  - Two small manufacturing companies.
  - Two third-party maintenance companies.
- Vendors interviewed by country break down as follows:
  - Two in France.
  - Two in West Germany.
  - Two in Holland.
  - One in Sweden.
  - Two in Switzerland.
  - Two in the United Kingdom.
- A copy of the questionnaire is presented in the Appendix.

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II EXECUTIVE SUMMARY

A. THE MATURE FIELD ENGINEER

- Over one-third of European field engineers are over 35 years old.
  - Twelve percent of them are 40 years of age or older.
  - Most mature field engineers, those 40 and older, are considered valuable assets and resources to the companies for which they work.
- Mature engineers are valuable for their superior experience, skills, loyalty, and performance.
  - Fifty-nine percent of mature field engineers are trained in hardware as well as software.
  - Half of the mature engineers have worked for their respective firms for over 15 years.
  - Over 50% of mature engineers have received at least four types of formal education including:
    - Primary and secondary schooling.

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- Technical training.
- Company training.

- The mature field engineer has been through a lot:
  - Technical changes: vacuum tubes to microprocessors.
  - Customer pressures: demands for less and less downtime.
  - Company pressures: demands for more and more productivity.

- Because of the unusually accelerated growth of the industry and the associated demands on senior field engineers, career expectancy for a senior engineer is only 32 years, almost 25% fewer years than other occupations.

- As will be discussed more thoroughly in Chapter 3, less than half (46%) of any field engineer's time, regardless of his age, is spent on productive matters, including trouble-shooting, repair, and preventive maintenance activities.
  - The remainder of the time (54%) is spent waiting for calls, travelling, or attending to administrative issues.
  - This affects older field engineers more severely than younger engineers.
    - Older employees are anxious to contribute but can't as much as they would like.
    - They are interested in establishing a work ethic legacy.
    - Resulting frustration accounts for mature engineers' being less motivated than younger field technicians.

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- Another source of frustration for mature engineers is that shrinking hardware sales have resulted in stabilisation of management requirements for field service.

  - Consequently, the demand has subsided for new field offices and more first-level, district, or territory field service managers.

  - Many mature field engineers would make capable managers, but the market place simply hasn't allowed expansion or career movement.

- The companies and managers of mature field engineers are therefore obliged to be particularly sensitive to special problems.

  - 'Golden handcuff' philosophies notwithstanding, companies and managers with mature field engineer employees should be sensitive to their frustrations, understand them, and deal with them. ('Golden handcuffs' are defined as pressures and incentives for long-term employees to stay with the same firm because of pensions and other benefits of seniority.)

  - Mature field engineers will respond to management challenges more readily than their younger counterparts but must continuously be recognised as strong team members.

- Sections B and C following discuss:

  - Relationships between performance, work attitudes, motivation, and dedication.

  - Alternative career opportunities for mature field engineers.

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B. PERFORMANCE, WORK ATTITUDES, MOTIVATION, AND DEDICATION OF MATURE FIELD ENGINEERS

- European field service managers have a high regard for older engineers.
  - Engineers who are 40 and older are more dedicated, perform better, and have better work attitudes than their younger peers, as shown in Exhibits II-1, II-2, and II-3.
  - This loyalty and contribution to the field service organisation reflect:
    - A resiliency by mature field engineers to accept their work environment and function well within it despite pressures and changes.
    - Field service management's ability to train, educate, and communicate with engineers in the earlier stages of their careers.
    - This combination of the engineers' general willingness and the field service organisation's management skills indicates a healthy environment for the mature engineer.
- As younger engineers, 40 years old and under, are not considered as dedicated and able as their senior peers, they have a greater desire to succeed, as shown in Exhibit II-4.
  - This is natural since the general proportion of opportunities diminishes with increasing age.
  - Older, established engineers are less competitive owing to the realities of their service careers.

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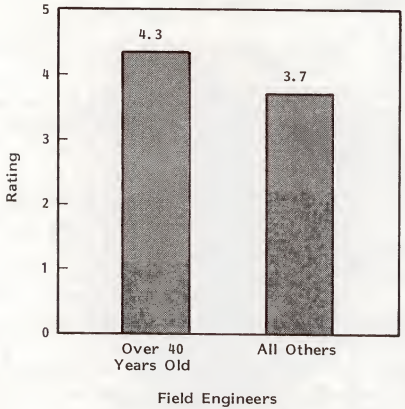
EXHIBIT II-1

DEDICATION OF SENIOR FIELD ENGINEERS
VERSUS YOUNGER FIELD ENGINEERS



Rating: 1 = Low, 5 = High

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EXHIBIT II-2

PERFORMANCE OF SENIOR FIELD ENGINEERS
VERSUS YOUNGER FIELD ENGINEERS

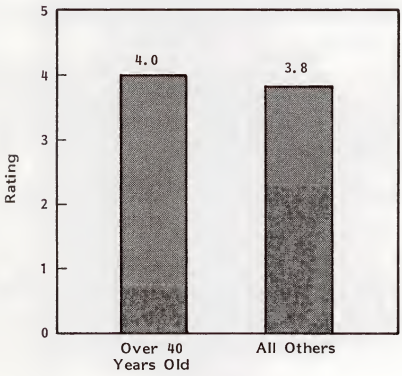

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EXHIBIT II-3

WORK ATTITUDES OF SENIOR FIELD ENGINEERS
VERSUS YOUNGER FIELD ENGINEERS

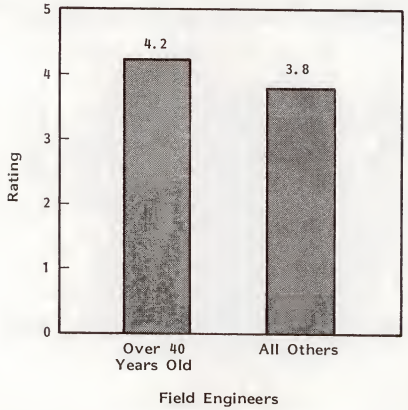

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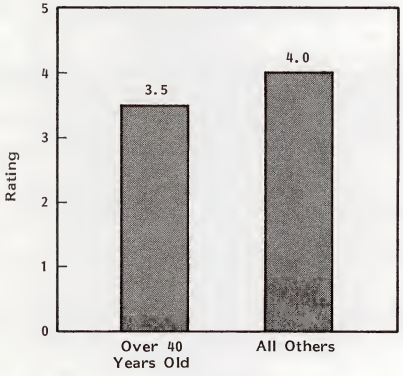
EXHIBIT II-4

MOTIVATION OF SENIOR FIELD ENGINEERS
VERSUS YOUNGER FIELD ENGINEERS



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- The smaller chance for career 'success' limits senior engineers' motivational attributes.

  . 'Success' for mature engineers is transformed from promotions and more pay to pride in workmanship and job satisfaction.

  . Older service engineers are interested in remaining with their firms as long as they can contribute, despite being less motivated than younger engineers.

C. ALTERNATIVE CAREER PATHS FOR MATURE FIELD ENGINEERS

- The mature field engineer is a valuable asset to a company.

- In order to exploit this worth and at the same time stimulate the mature field engineer for the remaining 10 to 15 years of his career, management needs to focus on the possible career alternatives.

  - In many instances, the best option may be to adopt a laissez-faire attitude, allowing the mature engineer to do what he is currently doing with a minimum of change.

  - A sense of 'battle fatigue' may have resulted from growing pains, i.e., internal politics and numerous organisational changes, which foster an attitude of the less change the better.

  - The important change regarding this attitude rests with management. Management must change to become more sensitive to and communicative with senior field engineers.

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- Another alternative is to provide the mature field engineer with job enrichment opportunities such as software training and support. Other options include in-house repair work with fewer pressures (an eight-to-five job).

  - Job enrichment opportunities are summarised in Exhibit II-5 and discussed in detail in Chapter 4.

- Career changes represent a third method of handling mature field engineers in the most propitious manner. Some of the possible career changes include:

  - Teaching.

  - Account management.

  - Direct or indirect sales.

  - Network coordination.

  - Technical and logistics support.

- Potential career changes are discussed in more detail in Chapter 3.

D. RECOMMENDATIONS

- Field service management must be reminded about the well trained, loyal, and able part of their work force - mature engineers over 40 years of age.

  - This human resource represents a considerable investment.

  - Programs to increase the productivity and utilisation of mature engineers should be developed.

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EXHIBIT II-5

JOB ENRICHMENT OPPORTUNITIES

SOFTWARE	SUPPORT	OTHER
• Develop software skills. • Develop more sophisticated software skills. • Develop application software skills.	• Develop in more sophisticated support areas. • Network coordination (managerial). • Customer support via - Major account responsibility. - Call dispatch. - Indirect sales. - Add-on equipment and software.	• More FEs to work in the repair shop (as an alternative to travel if desired). • Education and guidance.

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- The field service organisation will benefit from increased output.

- The mature employee will benefit because he can sense his increased worth and contribution.

- Management techniques in response to social needs of mature engineers should include:

  - Effective supervision of planning, leadership, control, and adapting training and development to the most motivating aspects of specific jobs.

  - Establishment of a company reputation of job security and fairness. A company's professional reputation is highly valued by employees. In fact, one large established company in the sample traded on this to compensate for below-average salary.

  - Effective policies for the selection and development of staff.

  - Provision for adequate facilities and good environmental conditions.

- Supervisors can rectify the detrimental effects of poor communications by paying attention to feedback, giving constructive criticism, and corresponding with mature field engineers. Only when communications are satisfactory will employees express their difficulties. If the problems are resolved, the individual will experience a sense of accomplishment, and performance will improve.

- Companies can improve upon demotivating factors by improving supervisory techniques and personnel skills. (These are especially important for the field engineer who has been promoted to field service manager, for a good engineer is not automatically a good manager.)

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III THE FIELD SERVICE WORK FORCE

A. DEMOGRAPHIC DEFINITION

- This section presents a profile of field engineers which includes details of age, education, software and hardware qualifications, length of service, salary, and the field engineer's role in organisations.

- Most field engineers are 20 to 40 years old.

- Twelve percent are 40 plus, as seen in Exhibit III-1. It is the large, most established companies who have the highest proportionate quantity of mature field engineers.

- The percentage of mature field engineers in the work force is a real and tangible concern to the established companies, but it does not constitute a problem for the majority of companies in the sample.

- However, when the 35-and-above age groups are added together, it is noticeable that a significant percentage (35%) of field engineers are in or approaching the 'mature' age bracket.

- Indeed, the discussions on motivation revealed that field engineer managers placed increasing emphasis on motivation once a substantial percentage of their work force moved into the 35-plus age category.

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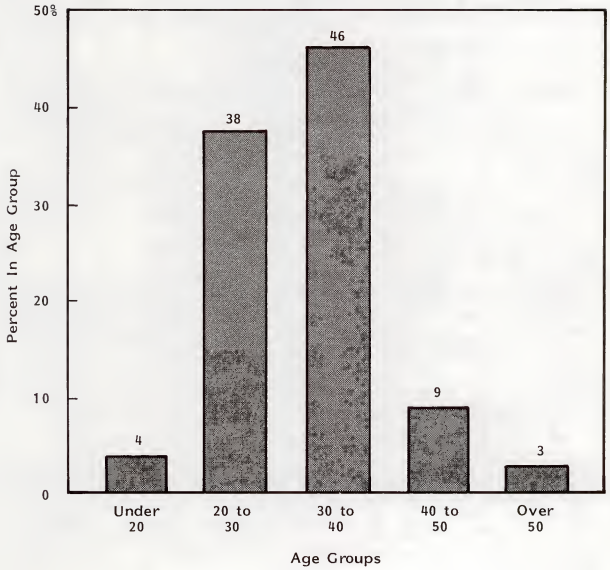
EXHIBIT III-1

AGES OF FIELD ENGINEERS



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B. PROFILE OF FIELD ENGINEERS

1. EDUCATION

- In all countries but Scandinavia, field engineers have been educated at secondary school level before proceeding to technical college or university. In Scandinavia, some field engineers do not complete secondary school education before going to college.

- Sixty-eight percent of mature engineers hold diplomas in engineering, mechanical engineering, and electronics from technical schools, as shown in Exhibit III-2.

- Eighteen percent have been educated at universities and hold degrees in electronics, engineering (some including software), and economics. Those holding economics degrees are at senior management levels.

- In the U.K., 11% of field engineers have served in the military, and in France 100% are military trained. Military training is considered beneficial and advantageous for field engineers if it includes basic electronics schooling.

- All engineers receive company training, usually in-house. The alternatives are training provided by a parent company and outside specialist companies for special curricula.

  - One company allocates 8% of its field engineers' time to training.

  - Mature field engineers generally meet the educational standards of their management.

- The inclusion of behavioural training in the field service training program by one respondent company underlines the growing awareness of field service managers of the need for effective customer relations.

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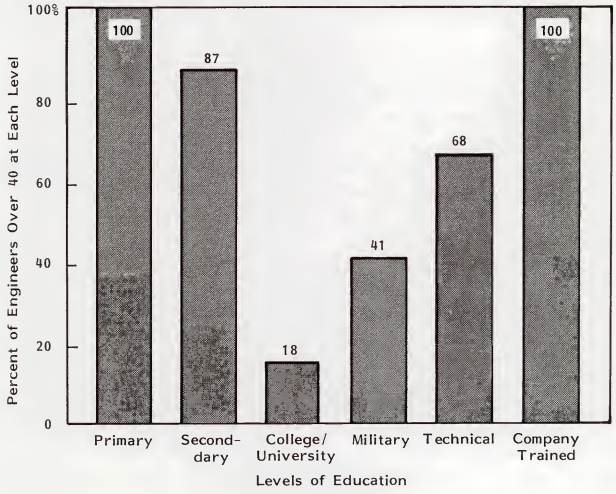
EXHIBIT III-2

LEVEL OF EDUCATION OF FIELD ENGINEERS
OVER 40 YEARS OF AGE



SOURCE: Vendor Interviews

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- When college/university and technical school figures are taken together, a total of 86% of the mature field engineer work force is shown to have education beyond secondary school.

2. SOFTWARE AND HARDWARE QUALIFICATIONS

- Forty-eight percent of field engineers are only trained in hardware, as shown in Exhibit III-3.

- Only 16% have specialist software training and these are generally at the highest technician levels. It is not intended that the software trained engineers should replace programmers at any stage.

- Thirty-six percent of engineers are both hardware- and software-trained. They have gained the software skills mainly through company training.

- Software training is becoming more established as a vital element of company training for two reasons:

  - It enlarges field engineer skills to keep pace with the dynamics of new technology, i.e., board and firmware repairs.

  - It enlarges field engineer skills to maintain productivity when technology developments render some of the traditional hardware skills obsolete.

3. SALARY

- Salary is not only a function of qualification, length of service, or age. The strongest salary influence is the rate offered by competitive companies for similar skill levels.

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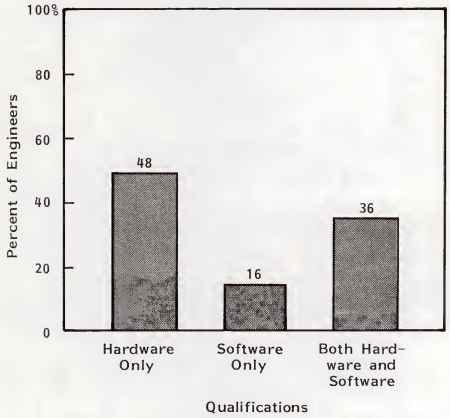
EXHIBIT III-3

HARDWARE- AND SOFTWARE-TRAINED FIELD ENGINEERS
OVER 40 YEARS OF AGE



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- In the long run, as can be seen in Exhibit III-4, salaries of mature field engineers, while reflecting increases over length of service, begin to diminish in amount of increases.

- Some companies feel they can promote the benefits of job security and their company reputation to compensate for below average salaries.

4. AVERAGE LENGTH OF SERVICE

- There is a wide variance in the average length of service of mature engineers, ranging from 3 to 30 years, depending on the age of the company, as shown in Exhibit III-5.

- Half of the mature engineers fall in the 3- to 8-year service range while the other half are in the 8- to 30-range, which include the larger established companies that adopt a parental attitude towards their work force.

- What is considered a stable period of employment varies from 5 to 30 years, again dependent on the age of the company.

- One respondent remarked that a field engineer will be in the industry for up to 32 years, which suggests a shorter working life than other professions.

- West German companies have reacted to economic pressures by adopting a 'Stay or Leave' policy after 28 years of age, and a forced retirement policy after 40 years of age if the employee on the job is marginal.

5. THE FIELD ENGINEER IN THE ORGANISATION

- Research in the 1981 INPUT report entitled Productivity and Motivation in Field Services revealed that the productivity and motivation of field engineers require special attention because a field engineer uses more time on non-productive activity than the average employee, regardless of age.

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EXHIBIT III-4

FIELD ENGINEERS' ANNUAL SALARIES BY AGE GROUP

CURRENCY		RATE*	UNDER 30	UNDER 40	OVER 40
U.K.	Pound	£1.0	£6.5-11.2	£11.4-17.9	£11.5-21.2
U.S.	Dollar	$1.65	$10.6-18.5	$18.8-30.0	$19.0-35.0**
German	Mark	4.28 DM	27.6-48.0 DM**	48.8-76.8 DM	49.3-90.8 DM
Swedish	Krone	12.49 SKr	80.5-140.1 SKr	142.6-224.0 SKr	143.8-264.9 SKr
Dutch	Guilder	4.66 Fls.	30.0-52.3 Fls.	53.2-83.6 Fls.	53.7-98.9 Fls.
Swiss	Franc	3.68 SwF	23.7-41.3 SwF	42.0-66.0 SwF**	42.4-78.1 SwF
French	Franc	12.09 Fr	78.0-135.6 Fr	1,38.0-216.8 Fr	139.2-256.5 Fr

* Exchange rates based on Pound Sterling 11/11/82

** Reference points from which other categories are converted

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EXHIBIT III-5

LENGTH OF SERVICE OF FIELD ENGINEERS
OVER 40 YEARS OF AGE
AMONG RESPONDENT COMPANIES

Range:	3 to 30 Years
Median:	8 Years
Mean:	13 Years

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- An analysis of time spent by a field engineer during an average week is illustrated in Exhibit III-6.

  - Thirteen percent of an engineer's week is spent on nonproductive activity such as waiting for people or materials.

  - Twenty-seven percent of an engineer's time is spent travelling.

  - Thus from the standpoint of revenue, 40% of an engineer's time is lost.

- It can be assumed that this figure is on the conservative side and understates the nonproductive time.

- Of the remaining 60% of available time, only 46% is actually spent generating revenue by:

  - Repairing the equipment (30%).

  - Performing preventive maintenance (16%).

- The remaining 14% of an engineer's time is spent on administration, engineering changes, and other duties such as meetings, training, and personnel.

- It is sobering to deduce that out of every eight engineers employed, one is normally doing nothing.

- The priority given to management of mature field engineers should not be based on the analysis of unproductive time alone. It must be considered in the light of current macro and micro economics and the unique problems of mature field engineers.

- Following are some of the problems which have a greater effect on mature field engineers than on the younger staff; therefore they may be defined as more challenging in the management of mature field engineers:

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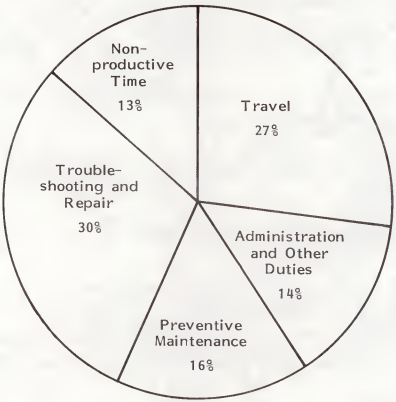
EXHIBIT III-6

WORK TIME ALLOCATIONS
FOR FIELD ENGINEERS



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- Skill obsolescence due to the trend towards more software-based equipment.

- Reduced desire to learn due to the natural decline in motivation. Mature field engineers will need longer to learn new skills than younger staff unless they can be assured of tangible results.

- Early retirement caused by economic pressures on companies.

- Redundancy caused by economic pressures on companies.

- Unfulfilled expectations of mature field engineers is a significant problem created by limited promotional opportunities within a company because of economic conditions or shortcomings in the engineer, or both.

  - The cold, hard facts of life are that, once passed over several times by younger management candidates, older service engineers become stigmatised.

  - When economic conditions improve, younger field engineers will be promoted in greater relative numbers.

- When the work time allocations and the problems faced by mature field engineers are weighed together, it is apparent that the management of mature field engineers is of paramount importance. Today the nature of the work and the age of the work force make the field service organisation more vulnerable to economic and technical pressures than other parts of the organisation.

- Furthermore, field service is becoming more significant as a revenue earner due to declining hardware costs/revenue.

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- Chapter IV aims to provide insight into and practical solutions of the difficulties facing field service managers today.

C. FACTORS AFFECTING MATURE FIELD ENGINEERS

1. PERFORMANCE

- In the 20-and-under age bracket, performance is fair to average due to the relatively high percentage of time spent on training, as shown in Exhibit III-7.

- In the 20-to-30 age bracket, performance ranged from average to very good.

- In the 30-to-50 age bracket, performance results are consistently very good to excellent for small and medium companies.

- In the 30-to-50 age brackets, performance is excellent at 30-to-40 years, tailing off to very good, average, and fair at 40 plus for larger companies. This accounts for the fluctuation shown.

- One large company noted a variable range of performance after 40 due to the presence of some older 'free-wheelers,' or those still physically reporting to work but who are mentally retired.

- In evaluating performance, respondents noted that the range of performance levels widens with the increases in the number of employees.

- Overall performance is consistently good at 30-to-40 years, with a variation in the 40 plus brackets depending on the size of the company and whether there are free-wheelers in the work force. Free-wheelers may be less noticed in companies with a large work force.

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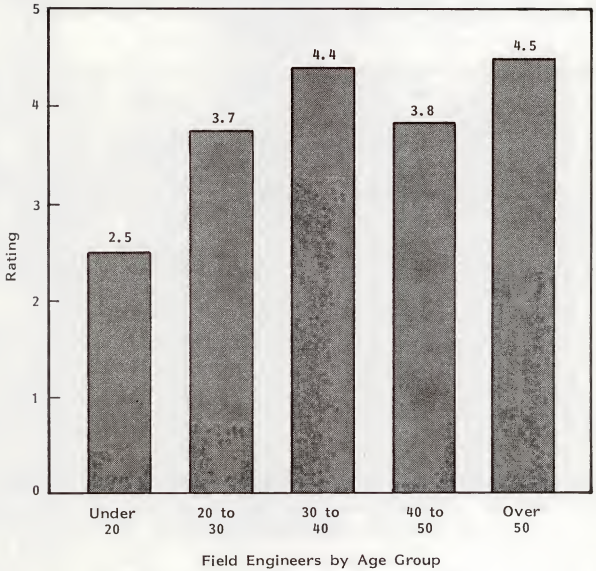
EXHIBIT III-7

PERFORMANCE OF FIELD ENGINEERS
BY AGE GROUP



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- The highest performance rate appears in the over-50 age bracket and highlights the point that mature field engineers are better performers than younger ones.

2. WORK ATTITUDES

- In the under-20-to-30-age brackets, ratings were average to good, as shown in Exhibit III-8.

- The most positive ratings appear in the 30-40 and over 50 age groups with the highest rating in the over 50 group.

- A slight decline in work attitude occurs in the 40-50 age bracket.

- These results closely mirror those regarding performance, and one might again attribute the fluctuation to company size and the presence of free-wheelers.

- One large established company cited more positive work attitudes at the under-20 end of the scale with a steady decline in rating from good to fair with increasing age.

- Overall, the over-40 age groups have a considerably higher rating in work attitude than all other age groups.

3. MOTIVATION

- There is a wide variance in the individual respondents' motivation ratings. Motivation appears to be more cyclical than performance, work attitude, and dedication, as shown in Exhibit III-9.

  - Teenagers are likely to be the most motivated because of having the first job experience.

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EXHIBIT III-8

WORK ATTITUDES OF FIELD ENGINEERS
BY AGE GROUP

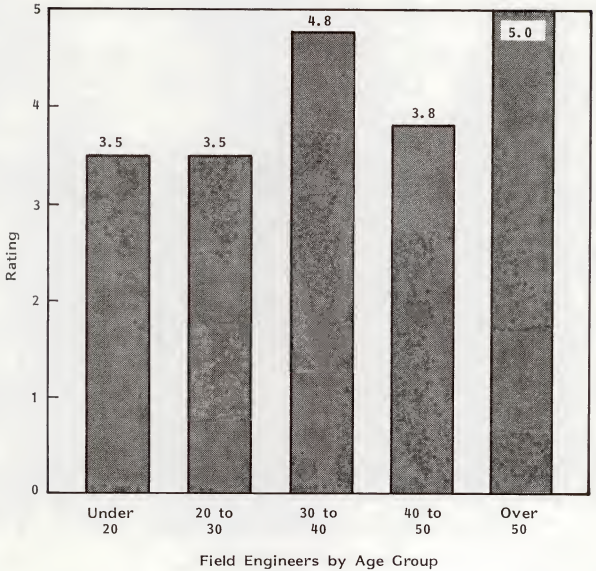

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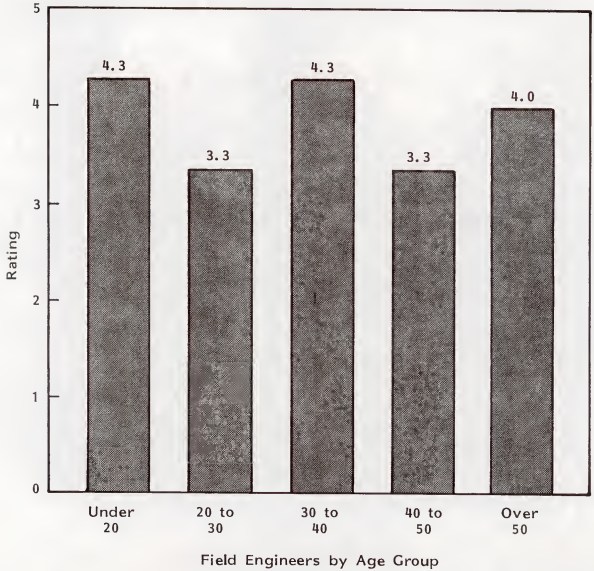
EXHIBIT III-9

MOTIVATION OF FIELD ENGINEERS
BY AGE GROUP



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- People in their 20s tend to work for selfish reasons to provide themselves with a more material life style.

- Thirty to forty year olds are more interested in getting management attention and promotions.

- Forty to fifty is midlife crisis time as people realize they aren't going to be promoted.

- Over fifty is the time people usually discover themselves and reconcile idealism with reality.

- Exhibit III-9 highlights motivation as the key area where mature field engineers differ from the rest of the work force; INPUT addresses this issue in its 1981 report, Productivity and Motivation in Field Service.

4. DEDICATION

- Mature field engineers in the over-50 category show the highest level of dedication, as shown in Exhibit III-10.

- Dedication levels are equal for the under-20 and 40-to-50 age brackets with a small improvement in the 30-to-40 age group.

- The lowest rating occurs in the 20-to-30 category, which is above average.

- Overall, mature field engineer groups (40 plus) are more dedicated than the others.

- It is interesting that despite lower motivation ratings, the mature engineers are very dedicated to their work. They tend to have positive attitudes despite the demotivating/depressing effect of job insecurity.

- Factors which affect dedication ratings are:

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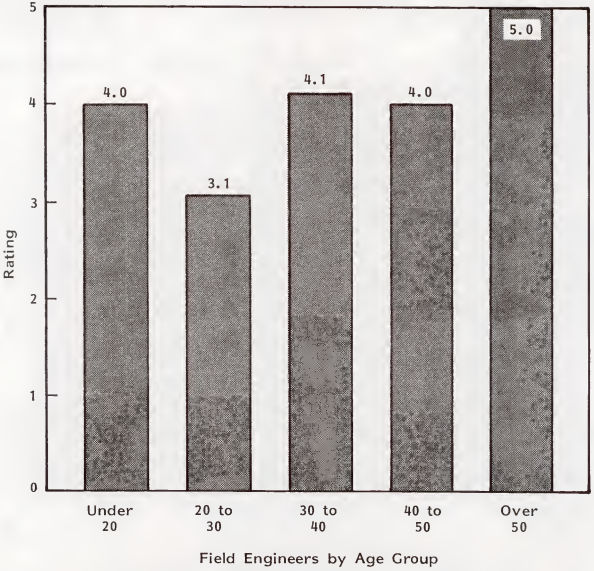
EXHIBIT III-10

DEDICATION OF FIELD ENGINEERS
BY AGE GROUP



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- Performance: for the 30-plus age groups dedication depends on the level of performance. Good performers tend to be very dedicated and vice versa.

- Financial rewards: a large company recording a wide variance in dedication at all age levels noted that this possibly reflects the company transition from the traditional financial reward structure which was oriented towards dedication.

D. MOTIVATORS AND DEMOTIVATORS

I. INTRODUCTION

- A field service manager cannot carry out his function, i.e., to effectively get things done through people, unless he fully understands the nature of motivation.

- Motivation is the key to achieving company and individual goals, which include the following:

  - The realisation of individual potential.

  - Increased job satisfaction.

  - Achieving field service organisation goals:

    . Fast response.

    . Efficient repairs.

    . Timely deliveries.

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- . Increased number of calls.
- . Increased time spent on preventive maintenance.

- Achieving corporate goals:
  - . Increased revenue.
  - . Increased profit.
  - . Reduction in turnover.

- Field service managers must learn to motivate to ensure that productivity keeps pace with growth and performance expectations.

- Motivation is of critical concern in the field service organisation due to its currently labour-intensive nature and the relatively high level of control which a field engineer has over his work, especially when working at remote sites.

- Motivation is directly connected with staff productivity, goal achievement, rewards, and subsequent need satisfaction.
  - This appears to be a self-perpetuating cycle. It is difficult to exactly determine causes of motivation or demotivation due to the inter-dependence of these areas.

- Reward, stimulation, deprivation, and good interpersonal relationships have been cited by many field service managers as major motivation factors. Yet these do not fully explain the many facets of motivation.

- The following analysis of top motivators and demotivators is designed to provide insight into some of these unexplained facets.

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- INPUT recognises that the hierarchy of motivation is general and dynamic and does not give insight into how to motivate people.

  - The categorisation is simply intended to show how certain motivation factors might relate to certain need satisfaction.

2. MOTIVATING FACTORS

- The most important motivating factors in the INPUT survey are:

  - Salary and rate of salary increase.

  - Benefits: car, pension, medical insurance, loans, holidays.

- These are factors which if inadequate as motivators will act as demotivating factors.

- In this sample, however, the corresponding demotivational effects of salary and benefits were less than the motivational effects.

- Emphasis on the motivational effects of benefits possibly reflects the tendency for benefits to be used to compensate for lack of salary increases, since they do not cost the company as much as salary increases. This is a major consideration in the current economic recession.

- A summary of motivating and demotivating factors is included in Exhibit III-11 and a summary of psychological factors is shown in Exhibit III-12.

3. JOB SECURITY

- Job security is a significant factor, as shown in Exhibit III-13. If it is not present or is reduced there is a dramatic lowering of morale leading to reduced productivity.

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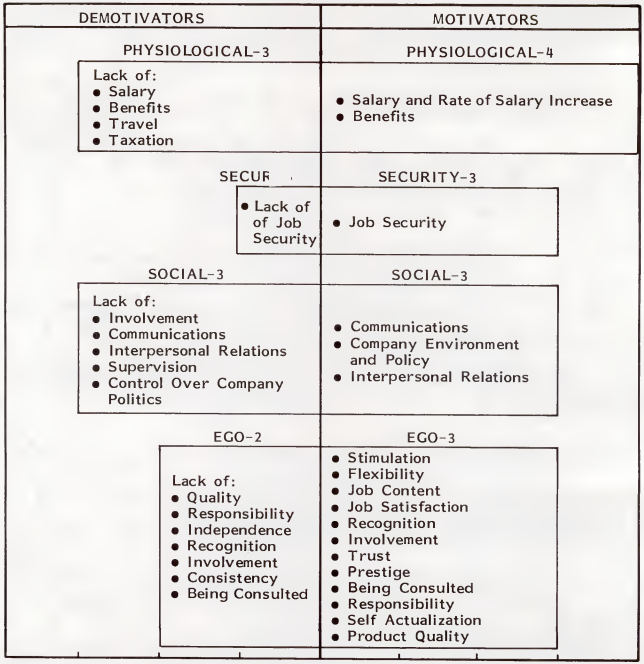
EXHIBIT III-11

MOTIVATORS AND DEMOTIVATORS FOR FIELD ENGINEERS
OVER 40 YEARS OF AGE BY FACTOR



4 = Important

0 = Not Important

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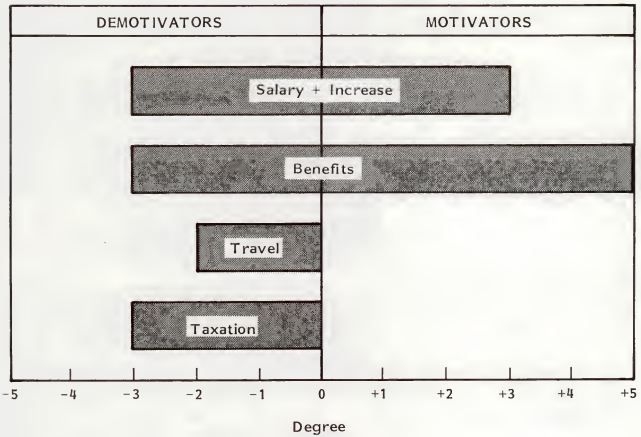
EXHIBIT III-12

MOTIVATORS AND DEMOTIVATORS FOR FIELD ENGINEERS
OVER 40 YEARS OF AGE -

PSYCHOLOGICAL FACTORS



5 = Important

0 = Not Important

Below the zero line is the antithesis of the factor.

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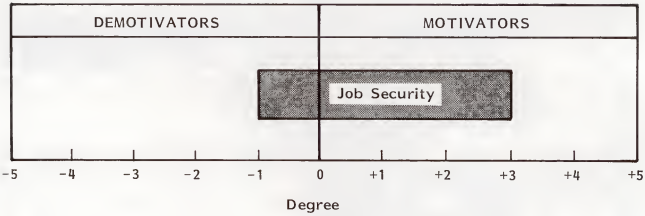
EXHIBIT III-13

MOTIVATORS AND DEMOTIVATORS FOR FIELD ENGINEERS
OVER 40 YEARS OF AGE -

SECURITY FACTORS



5 = Important
0 = Not Important

Below the zero line is the antithesis of the factor.

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- In a healthy economic climate, the effect of insecurity is that the most effective workers leave and the less effective stay on in the hope that the company will survive because they are aware of the difficulty in getting equivalent jobs elsewhere.

- The reaction of staying on is more pronounced and reflects the unavailability of jobs in the market rather than the ineffectiveness of mature field engineers. The problem is particularly acute for mature field engineers because it is more difficult for them to find jobs than it is for younger engineers.

- It is possible that job insecurity is having a reverse effect on mature field engineers and makes them more determined to work harder and hold their jobs.

- This possibly contributes further to performance, motivation, work attitude, and dedication. Mature field engineers show lower motivation than younger engineers but compensate with higher levels of dedication and more positive work attitudes and achieve higher performance.

- Job security is usually outside company control unless the company adopts a rapid hire and fire policy.

4. INTERPERSONAL RELATIONS, COMMUNICATIONS, AND COMPANY ENVIRONMENT AND POLICY

- Social factors in motivation and demotivation are shown in Exhibit III-14.

- The lack of these factors is usually more demotivating than motivating, but in INPUT's results the demotivating and motivating effects are rated equally.

- Interpersonal relations and good communications are considered more important than company environment and can compensate for inadequacies in policy and facilities. Support roles of colleagues and superiors are clearly important, for example.

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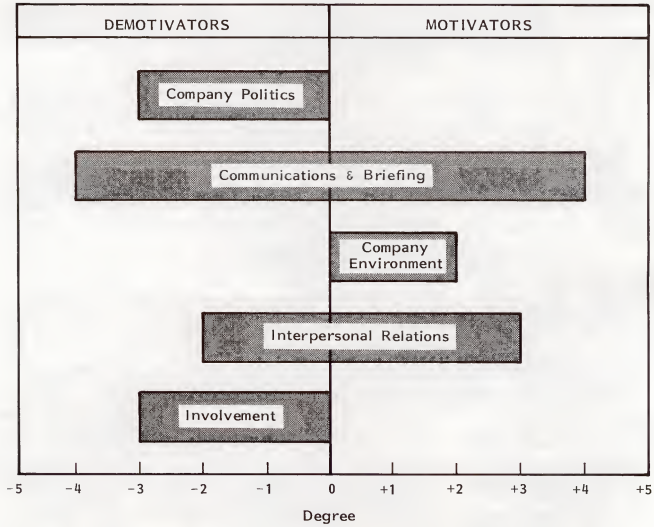
EXHIBIT III-14

MOTIVATORS AND DEMOTIVATORS FOR FIELD ENGINEERS
OVER 40 YEARS OF AGE -

SOCIAL FACTORS



* 5 = Important
  0 = Not Important

Below the zero line is the antithesis of the factor except for 'Company Politics'.

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5. JOB FLEXIBILITY, JOB SATISFACTION, JOB ENRICHMENT, PRODUCT STIMULATION, RESPONSIBILITY, AND INDEPENDENCE

- The above, known as ego factors, are rated equally with job security, good communications, company environment and interpersonal relations and are considered fairly important motivators. Exhibit III-15 describes the relative importance of ego factors as motivators/demotivators.

- Job flexibility is rated most important and is highest of all motivating factors.

- Job satisfaction rates second, followed by product stimulation and job content.

- Responsibility and independence have minimal motivating effect.

  - They differ from the preceding factors in that two factors - job interest and responsibility - are defined by Herzberg in Work and the Nature of Man as motivating rather than hygiene factors. Indeed, the other factors fit loosely into these two areas.

  - On the other hand, motivating factors were subject to management control and could lead to substantial productivity increases if used correctly.

- All of the factors generally relate to ego needs (self-esteem and respect), which are among the most complex.

- The motivating emphasis here is on high job interest, challenge, and how the job is conducted, all of which provide ample scope for management to develop techniques to increase productivity.

- The most widely used management approach is job enrichment, whereby factors missing in the job are added. These, in turn, enhance the contribution of the job to overall company operations. These include:

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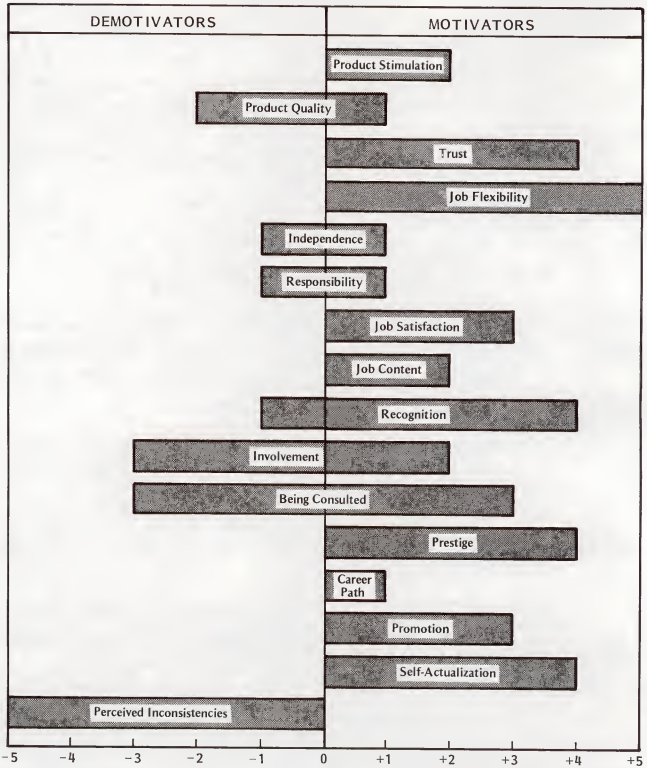
EXHIBIT III-15

MOTIVATORS AND DEMOTIVATORS FOR FIELD ENGINEERS
OVER 40 YEARS OF AGE -

EGO FACTORS



5 = Important
0 = Not Important

Below the zero line is the antithesis of the factor except for 'Perceived Inconsistencies'.

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- Training programs to increase skills, enlarge the job, and keep up to date with technology developments.

- Increased responsibility. For example, some companies are encouraging field engineers to incorporate service functions such as account handling, dispatch services, and customer contacts into their work.

- Two aspects of customer contact are stressed:

  - First-line preventive maintenance.

  - Add-on applications.

- The mature field engineers' communication skills are highly valued in functions with a high degree of customer contact.

- It is essential that job enrichment techniques for mature engineers are implemented immediately to capitalise on the higher standards of quality and commitment which mature field engineers maintain compared with younger staff. It is also essential to capitalise on their usually excellent customer communications skills by developing their customer support functions as opposed to technical support functions.

- These changes are critical to the protection of European markets from the Japanese, who are certain to have high quality standards, and could possibly make inroads in the consumer electronics industry within the next five years.

- Although there is a lot of scope in this area, the problem facing mature field engineers is that (eventually) the supply of these extra functions will be greater than the demand, and new opportunities must be found.

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6. RECOGNITION, INVOLVEMENT, BEING CONSULTED, TRUST, AND PRESTIGE

- Recognition, involvement, being consulted, trust, and prestige received the same rating as job content and the other preceding factors.

- Recognition and involvement are strongly emphasised. Recognition is a powerful motivator for all levels of workers - from managerial to unskilled.

- These generally relate to the results of a job well done and relate to 'respect'.

- These differ from the preceding factors in that recognition and prestige relate loosely to the status factor.

- They are not necessarily strong motivators but could be optimised by the use of sensitive supervisory techniques.

- Management must allow mature field engineers to have recognition and autonomy.

7. CAREER PATHS, PROMOTION, AND SELF-ACTUALISATION

- Career paths, promotion, and self-actualisation received the same rating as the preceding factors.

- In the sample, career paths and career structure are rated highly as motivators. They offer wide scope for motivation techniques because they are totally dependent upon management.

- There is a need to develop technical and managerial ability alike to provide field engineers with challenging career paths and overcome the demoralising effects of deskilling.

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- In the current economic climate, when promotion and corresponding salary increases are not possible (see Chapter 4), job enrichment becomes a major motivating technique. For example, field engineers' jobs can be enriched to include more support in sales functions with rewards based on results.

- It should be noted that career paths are not mentioned in the sample as demotivators, but efforts must be made to ensure that frustration or demotivation does not bar achievement because of them.

8. DEMOTIVATING FACTORS

- Salary, benefits, and taxation are rated as important demotivators in the sample. This substantiates Herzberg's view that they are significant demotivators when absent or inadequate.

- The inadequacy of salary and benefits reflects the impact of the economic recession.

- It is difficult to resolve this demotivating effect, for a salary increase does not necessarily motivate the mature field engineer.

- The principal problem is the eroding effect of taxes. When a particular salary level is reached, the consequential increase in the tax rate cancels its benefit.

- The French have restrictive policies concerning salary and expense reimbursement.

- Travel expense reimbursement is not considered an important motivator and may be cut back eventually due to the growth of remote diagnostics. Meanwhile, travel will not be a significant demotivator as long as job insecurity motivates mature field engineers to do anything necessary to hold on to their jobs.

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- More imagination is required to devise bonus and incentive schemes. One respondent has enlarged the field engineer job to include indirect sales and has introduced competition for field engineers similar to that in sales departments.

- The introduction of profit sharing and stock purchase could serve a dual function to motivate field engineers and to increase/refuel capital investment in the company.

9. COMMUNICATIONS, INVOLVEMENT, COMPANY POLITICS, INTERPERSONAL RELATIONSHIPS, AND SUPERVISION

- Communications, involvement, company politics, interpersonal relationships, and supervision are rated equal in importance with salary benefits, tax considerations, and travel.

- Communications rate highest, followed by involvement, company politics, and interpersonal relationships.

- Supervisors can rectify the detrimental effects of poor communications by paying attention to feedback, giving constructive criticism, and corresponding with field engineers. Only when communications are satisfactory will employees express their difficulties. If problems are resolved, the individual will experience a sense of accomplishment, and performance will improve.

- Companies can limit all the above demotivating factors by improving supervisory techniques and personnel skills. (These are especially important for the field engineer who has been promoted to field service manager, for a good engineer is not automatically a good manager.)

- Introduction or improvement of grievance procedures help combat the demotivating effects of the sense of isolation and lack of control over company politics experienced by field engineers who spend much of their time out in the field.

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10. CONSISTENCY, BEING CONSULTED, INVOLVEMENT, PRODUCT QUALITY, INDEPENDENCE, RESPONSIBILITY, AND RECOGNITION

- Perceived inconsistencies is the factor with the highest rating (5) of all demotivating factors.

- Consultation and involvement are rated second most important and are considered to be of average importance.

- Product quality is rated as fairly important.

- Lack of independence, responsibility, and recognition are not very important demotivators. They are more important as motivators.

- Apparent fairness and democratic participation depend on management and reflect the success of certain management techniques.

- There is clearly a great deal of room for improving field service management techniques.

- It is natural that field engineers are demotivated by inferior quality products, and it is understandable if they feel that lack of respect in the market place for such products is also directed at them.

- Readers should be cautioned, again, that the motivating and demotivating factors are as reported by field service managers and not the mature field engineers themselves.

- Many of the findings of this research are consistent with organisational behaviour as studied and written about in much greater detail. A few of such readings include:

  - A. H. Maslow, 'A Theory of Human Motivation', Psychological Review, volume 40, 1943.

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- F. Herzberg, Work and the Nature of Man, 1966.

- G. N. Parkinson, Parkinson's Law, 1957.

- T. Leary, Interpersonal Diagnosis of Personality, 1957.

- D. McGregor, The Human Side of Enterprise, 1960.

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IV CAREER ALTERNATIVES

A. INTRODUCTION

- The significant effects of the economic recession are:
  - Job insecurity and concern about the position of the company in the market place.
  - Unfulfilled expectations in the area of career structure. Companies are blocked from promoting mature field engineers to district or territory managers because of lack of growth at these levels.
  - Unsatisfactory rewards, which include salary and benefits. Some companies do not have the ability to pay and others are prevented from paying more by restrictive wage and expense reimbursement policies. Such restrictive policies are the case in France and are of concern because they are serious demotivators. Some French companies fear they will reduce performance and productivity levels.
- Although the above factors must be considered, it is worthwhile to note that the computer market is still growing and has a better chance of surviving the recession than many other industries.

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- With this in mind, it is possible that more effective motivation of mature field engineers will lead to more positive and conscientious work attitudes. One would hope that this would improve performance, and reduce redundancies.

- Job enrichment is a significant management technique for countering the demotivating effects of the recession and exploiting the motivating effects of working in a growth industry.

B. JOB ENRICHMENT

- Those companies which do not consider job enrichment important are those in the enviable position of being very well prepared for technology developments.

  - They point out that their mature field engineers have depth skills in board repair and software and that deskilling is not as far advanced in Europe as in the U.S.

  - For these companies, board swapping overcomes the concern of skills obsolescence for mature field engineers.

  - These well-prepared companies find that mature engineers have an advantage over younger ones because their extensive experience makes them adaptable.

- Companies for which job enrichment is of greater concern are those without fully developed board repair techniques.

  - One company mentioned that job enrichment is a natural result of company expansion into new product areas.

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- One company also remarked that it takes mature field engineers longer than young engineers to learn new skills.

- They feel that the mature field engineers learn more slowly due to their age.

- Whatever the company's stage in board repair and software development, job enrichment is still important to improve their productivity.

1. SOFTWARE

- Software training is considered the most important area for job enrichment. This reflects the findings in the INPUT report, Productivity and Motivation in Field Services, which records that:

  - By the end of 1981 more than two-thirds of vendors would be supporting system software.

  - By the end of 1983 only one-third of vendors will support applications software.

- Therefore, the emphasis on software training is technology-driven. Field engineers will have to be trained so that their software skills are as unbeatable as their hardware skills.

- Applications software skills are not quite as important as basic software skills. Companies are starting to train specialist groups for applications software, however.

2. SUPPORT

- In the support areas there is a movement away from field engineer involvement in technical support towards service-oriented support with an emphasis on interrelations.

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- The opportunities arise in the following areas:

  - Major account responsibility with emphasis on customer contact and field engineering becoming its own revenue centre rather than remaining under the umbrella of hardware sales.

  - Indirect sales of add-on equipment and software.

    . One company is promoting sales competition among field engineers. This helps to overcome some of the perceived inconsistencies which are stressed as highly important demotivators by introducing a reward system for field engineers similar to that in the sales department.

  - Call dispatch where mature field engineers' client communications skill is optimised. This area is extremely important for client contact and developing a good field service reputation. It also complements field engineer involvement in sales/marketing. A good track record here should make a worthwhile contribution to field engineer sales and bonuses.

3. OTHER POSSIBILITIES FOR JOB ENRICHMENT

- In education and guidance the experience and knowledge of mature field engineers are used to train younger field engineers. It is debatable whether it is better to use specialist training companies or in-house personnel. One large, established company in the sample insists on using outside sources. However, the field engineer's in-depth knowledge of company products, policies, and procedures can be incorporated usefully in training programs. One company first teaches the mature field engineers about new products and then educates the remaining field engineers.

- Repair shop work can be an alternative to extensive travel. It is possible that mature field engineers begin to suffer from "battle fatigue" after long years of

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service and do not have the same enthusiasm or capacity for extensive (stressful) travel that they once had.

- This alternative is job-enriching in that it reduces time wasted in travelling and should increase mature field engineer productivity.

- The job enrichment opportunities outlined here do not follow the trend towards the deskilling of field engineer work which has occurred in the U.S.

- Altogether, the sample companies have a positive attitude towards the value and role of mature field engineers in the work force.

- There is an element of deskilling caused in the areas of board swapping and preventive maintenance, but the interest in enlarging the roles of mature field engineers to incorporate software and support functions indicates that companies are anxious to benefit from the experience and skills of mature field engineers.

- In fact one company insisted that preventive maintenance and board swapping be carried out by young technical college graduates in order to release mature field engineers to deal with more complex problems and to supplement their software and telecomm/datacomm skills.

- However, it is likely that the deskilling problem will also be applicable to the entire work force if the economy is not revitalised. The lack of specific training programmes for mature field engineers (apart from those covering software and new product training) shows that mature field engineers do not differ greatly from the rest of the work force. One hundred percent of the sample did not feel training programmes were even necessary for mature field engineers.

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C. CAREER CHANGES

- No dramatic changes are foreseen in job content for mature field engineers, and consequently there will be few changes in career structure.

- Most companies reiterated their comments on job enrichment for mature field engineers. They stressed the development of more software skills and more involvement with software.

- Other areas of job enrichment include technical support and a trend towards customer support in accounts handling, remote diagnostics, indirect sales, and call dispatch as well as towards education and managerial activities such as network coordination.

- All of these are now considered equally valid, important, and effective methods of enriching mature field engineer jobs.

- Currently most companies are at the experimental stage with job enrichment. Until there is definite agreement about the inclusion of these functions/ elements in the work conducted by mature field engineers, little attempt will be made to formulate new career paths for them.

- Opportunities for new career structures exist in the areas of logistics training and technical support, a development towards more specialisation, and the addition of territory management.

- Throughout this evolution of the mature field engineer function, none of the companies expects to reduce the number of mature field engineers in its work force by introducing early retirement or redundancies.

- Two companies expect a small percentage of their mature field engineers to move to other companies in the industry.

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APPENDIX: QUESTIONNAIRE

MANAGING MATURE FIELD ENGINEERS

1. Could you please help us to build a profile of field engineering staff by providing the following details on staffing and salary?

Age	% Staff	Salary From	Salary To	Average Salary	Comments
< 20					
20-30					
30-40					
40-50					
> 50					

2. What is the level of education of field engineers over 40 years?

Type of School	% Educated at each lvl.	Av. Qualifications held (Specify)	Comment
a) Primary			
b) Secondary			
c) College/ University			
d) Technical College			
e) Military			
f) Other-			
g) Company Training			

3. What percentage of your senior engineering staff (i.e, over 40 years) are software and hardware qualified?

% Hardware qualified.	% Software qualified.	Hardware & Software qualified.	Comment

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4. What is the average length of service for service engineers over 40 years old.

_____

_____

_____

5. In order to evaluate the performance of your senior field engineers, please rate the following subjectively.

Age	Perf.	Work Attitude	Motivation	Dedication	Comment
< 20					
20-30					
30-40					
40-50					
> 50					
	1 Poor 5 Excel.	1 Low 5 High	1 Low 5 High	1 Low 5 High	

6. What do you think are the top 5 motivators and demotivators in the 40 plus category.

Motivators	Rating	Comment	Demotivators	Rating	Comment

PROMPT: a) Salary/working environ, company benefits (BUPA, Flexitime, Pension)/communication, feedback, interpersonal relationships, competitiveness/self-esteem, career challenge, work content, responsibility, achievement, training, job satisfaction, prestige, status, recognition, advancement.

b) Co. politics, technical supervision, salary, interpersonal relationships (customer contact) working conditions (travel).

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7. a) Has the harsh economy had an effect on senior service personnel.

YES
NO

b) If Yes - what is the effect:

_____
_____
_____
_____

c) Is this effect distinct from that on younger field workers.

YES
NO

If Yes - why:

_____
_____
_____
_____

8. How have the radical changes in technology, e.g. board swapping strategy, affected the position and job content of senior field engineers.

_____
_____
_____
_____

9. a) Are there job enrichment programs for senior field engineers.

YES
NO

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9. b) If Yes - what are they. (e.g, types of training):

_____
_____
_____
_____

10. Are there logical and practical changes to be made in the work conducted by mature field engineers - such as having a senior engineer direct his work toward teaching, repair work, software, or other cross-training.

_____
_____
_____
_____

11. How doe you foresee the position of mature field engineers over the next 5 years?

a) Staying basically where they are? _____
_____

b) Becoming redundant? _____
_____

c) Taking early retirement? _____
_____

d) Other (Specify) _____
_____
_____
_____

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12. Are there any issues which we have not addressed in this discussion that you feel are relevant to managing mature field engineers?

_____
_____
_____
_____
_____

13. Are there any points that you would like to highlight?

_____
_____
_____
_____
_____

THANK YOU.

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- 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.

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- Improving the Productivity of Systems and Software Implementation

- User Communication Networks and Needs

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

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

F-1982

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:

- Management Issue Reports - 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.
- Planning Support Studies - Three reports that will present an in-depth analysis of major technical or management issues. They make recommendations that will assist in the ...ves in the planning of field service
- Annual Rep... activities in the field services in... ...eir effects on future field servi... ...of likely changes in technical ... ...cur, may affect the future req...
- Annual Pr... ...ouse presentation to field serv... ...the current year's research ... ...nes for the research program f... ...occur in the second half of ea...
- Inquiry Se... ...earch staff on an as-needed ba... ...special "hot line" is staffed ev... ...requirements.

RESEARCH MET... ...rch in computers, communications,...

- Research ... ...cussions with client represent...
- Research ... ...s with users, vendors, universiti...
- Conclusio... ...udgement of INPUT's professior...
- Professior... ...ge nearly 20 years of experienc... ...ding senior manage-ment posi...

F-1982
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AUTHOR

SERVICING REMOTE CUSTOMERS COMPETITIVELY

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FIELD SERVICE PROGRAM

FIELD SERVICE BRIEF

SERVICING REMOTE CUSTOMERS COMPETITIVELY

DECEMBER 1982

SERVICING REMOTE CUSTOMERS COMPETITIVELY

CONTENTS

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EXHIBITS

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1 INTRODUCTION

- This report is part of INPUT's 1982 European Field Service Planning Information Programme. It is produced for use by clients of that programme who are concerned about the problems of servicing remote customers and are interested in determining the most cost-effective solutions to these problems.

- This report analyses the ways in which different vendors service remote customers. Their approaches to the problems vary considerably according to whether they are:

  - Well established or new entrants to the market.

  - Suppliers of large mainframes, small business systems, or both.

- Exhibit 1-1 is a profile of the respondents to the survey in terms of annual revenue.

A. METHODOLOGY

- Remote service is herein defined as service required more than 50 miles from a service centre.

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EXHIBIT I-1

ANNUAL FIELD SERVICE REVENUE OF
RESPONDENT COMPANIES

VENDOR	MILLIONS				FORECAST ANNUAL GROWTH RATE 1982-1985 (percent)
	U.S. DOLLARS	POUNDS STERLING	FRENCH FRANCS	DEUTSCHE MARKS	
A	$6.4	£4.0	46.40 Fr	16.40 DM	29%
B	8.8	5.5	63.80	22.55	35
C	0.6	0.38	4.40	1.60	50
D	160.0	100.00	1,160.00	410.00	0.3
E	10.4	6.5	75.4	26.65	20
F	37.0	23.125	268.25	94.80	7
G	25.0	15.6	180.96	63.96	25

Pound Sterling = U.S. $1.6
= DM 4.1
= FF 11.6

SOURCE: Vendor Interviews

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- The information presented in this report is based upon eight personal and two telephone interviews with senior field service management in the U.K., France, and Sweden. Several respondents in the U.K. were also able to provide useful comparative data on remote service practices in other European countries.

- The interviews were based on a questionnaire which is contained in the Appendix.

B. SCOPE

- The importance of remote service is examined as a proportion of total field service and its value:

  - As a marketing tool.

  - As a means of maintaining and increasing customer satisfaction.

  - As a profit earner.

- A description of the methods and techniques adopted by a cross-section of vendors to provide remote service is provided with outlines of the major problems and opportunities perceived by vendors.

- Courses of action which certain vendors will take to reduce the costs of remote service and improve its efficiency are analysed.

- Three case studies demonstrating the different approaches which vendors have adopted in providing remote service provide further insight into competitive remote service.

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II IMPORTANCE OF REMOTE SERVICE

A. CRITICAL MASS

- Remote service is most costly to those vendors who have introduced new products within the last three years.

- As sales increase, machine densities and revenues in particular areas reach levels which justify the establishment of a service centre.

- However, many companies put field engineers in remote locations to satisfy customer demands, regardless of cost or revenue considerations.

- In this study, only 40% of field service vendors consider remote service to be greater than 5% of their total service, as shown in Exhibit II-1.

- Although there is some variation, vendors report that it becomes feasible to establish a service centre when there is sufficient work to occupy three engineers. Typically, i.e., for medium-sized installations, each engineer will have responsibility for maintaining six to twelve installations. With the exception of the large mainframe suppliers, most vendors therefore find that a service centre becomes viable in an area where they have in excess of 30 installations.

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EXHIBIT II-1

REMOTE SERVICE AS
PERCENT OF TOTAL SERVICE

PERCENT OF SERVICE	NUMBER OF VENDORS
Less than 5%	6
5% to 30%	1
31% to 60%	2
Over 60%	1
TOTAL	10

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- In seven of the ten cases investigated, the costs of servicing remote customers, i.e., installations over 50 miles from a service centre, accounted for less than 10% of total field service costs. In the other three cases, servicing remote customers accounted for over 50% of total field service costs.

- The additional variable costs of servicing remote customers are almost entirely made up of travel expenses and time. Depending on distance, remote service costs 30% to 60% more than servicing customers within a 50-mile radius of a service centre. Exhibit II-2 shows the linear relationship of cost and remote installations.

- Remote service costs can be described as fixed and variable. Fixed costs mainly involve the employment of more engineers. One respondent commented: "If all my users were within 50 miles of our support centres, I would need 30% fewer engineers".

- The provision of remote service is considered to be important, as shown in Exhibit II-3.

  - As a marketing advantage.

  - To ensure customer satisfaction.

  - To improve corporate image.

- No respondents view remote service as an important source of profit.

B. RESPONSE TIME

- All vendors claim to respond within four hours to calls received from customers within 50 miles of a service centre, as is shown in Exhibit II-4. The

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EXHIBIT II-2

IMPACT OF REMOTE SERVICE
ON TOTAL FIELD SERVICE COSTS

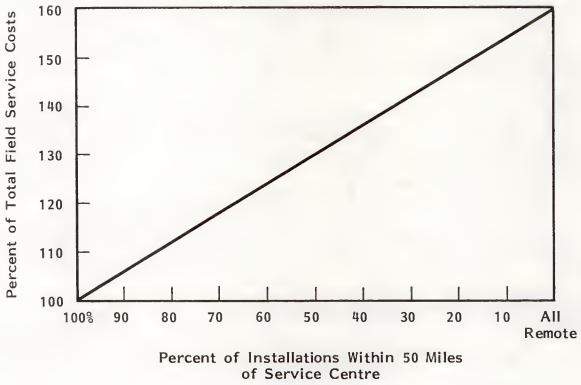

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EXHIBIT II-3

IMPORTANCE OF REMOTE SERVICE

IMPORTANCE	NUMBER OF RESPONDENTS		
	NEGLIGIBLE IMPORTANCE	AVERAGE IMPORTANCE	GREAT IMPORTANCE
As a Marketing Advantage	-	3	3
For Customers' Satisfaction	-	2	4
For Corporate Image	-	3	3
As a Profit Contributor	4	2	-

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EXHIBIT II-4

RESPONSE TIME

RESPONSE TIME TO CUSTOMERS	NUMBER OF RESPONDENTS	
	WITHIN SERVICE AREA	REMOTE
Less than 1 hour *	2	2
1 to 2 hours	3	-
2 to 4 hours	3	-
4 to 8 hours	1	5
Over 8 hours	-	2

* Includes one important supplier of mainframes who has two on-site engineers at each installation.

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response time to remote customers varies between four and eight hours depending on:

- Contractual agreement.
- Size of equipment.
- Geographical location.

- For very remote installations, e.g., offshore rigs or islands, the vendor guarantees that an engineer will reach an airport or helipad within an agreed period. The customer then assumes responsibility for transportation to the installation.

- Clearly, the high cost of servicing remote customers is a major incentive to minimize the number of repeat calls which result from wrong diagnosis, lack of spares, or lack of expertise.
  - In this context, it is interesting to compare two leading vendors, each with annual field service revenues in excess of U.S. $20 million in the U.K.
  - Vendor A's remote customers account for less than 3% of the total. In 50% of all cases, a repeat call is necessary.
  - Vendor B's remote customers account for 35% of the total. The incidence of repeat calls is less than 5% of the total.

C. CONTROL

- Controlling remote service does not present any special problems, however, "normal" problems become more expensive to solve, particularly if repeat calls are involved.

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- Vendors with a wide range of products have cross-trained engineers to the extent that it is impossible for an individual to have high-level expertise in all areas; it is also difficult to provide an adequate and portable kit of spares. In Chapter III the steps being taken to resolve this situation are reviewed.

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III PROVISIONS FOR SERVICING REMOTE CUSTOMERS

A. FULL-TIME ENGINEERS

- All respondents stated that field service, including remote service, is provided by engineers who are full-time employees of the company. The exceptions, which are negligible in the total context, include:

  - Situations where a fault involves another supplier's equipment which has been incorporated into the vendor's system, e.g., a disk or peripheral.

  - First-line servicing of small systems by appointed dealers.

  - Third-party maintenance carried out by appointed contractors in Ireland and, to a lesser extent, in the Channel Isles and remote areas of Scotland.

- In every case, vendors are firmly opposed to using third-party maintenance whether they be contractors, dealers, or franchisees. The reasons given include:

  - "Third parties are not willing to invest in spares. We would maintain and finance inventories which they would draw on".

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- "When they learned the business, they would then be able to offer enhancements, sell further equipment and in effect start competing with us".

- "It would jeopardize our customer base. The standards of service would decline and our image would suffer".

- "We would actively discourage third-party maintenance. We don't like subsidizing inventories nor are we willing to pass on our expertise in remote diagnostics etc., which has cost us millions to develop".

- "We have all the facilities to provide good service and our objective is to increase service revenues, not to give them away".

- "It would be completely against our philosophy which is to provide total support. If possible, we would like to extend our service to cover other manufacturer's equipment, where appropriate".

- This explicit desire to retain and develop internal field services, even in remote areas, is again a confirmation of the recognition of its importance in marketing.

B. CUSTOMER ASSISTED MAINTENANCE

- It is the vendors of large systems who have progressed furthest in developing methods by which customers can assist in diagnosing and fixing faults. The main incentive is to reduce costs. Other vendors are either working towards remote diagnosis and customer assistance maintenance or encouraging return for repair with back-up from resilient or redundant equipment. Although the attractions are obvious there are several obstacles to customer maintenance, including:

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- The need for user education.

- If the user is not able to fix, the vendor is likely to receive even more blame for the fault.

- Regular and continuous contact is essential in maintaining a comfortable relationship. If the only occasion when a user contacted the service centres was when the problem had exceeded the user's ability to solve it, the relationship would be jeopardized.

- From the views expressed by respondents, one may deduce that the trend will be towards customer assisted diagnosis rather than first-time maintenance. For smaller systems, users will increasingly diagnose swap boards and return for repair.

C. ON-SITE SPARES AND KITS

- Attitudes and policies vary towards supplying and charging for spares and kits. The following comments were made:

  - "We don't usually provide users with spares".

  - "We keep a comprehensive range of spares at our regional centres and the engineers travel with a full kit. Users do not often ask to hold spares but, if they do, we have to charge a premium to cover amortization costs".

  - "We encourage users to hold resilient or redundant spares so that in the event of a fault, they can return the equipment to us for repair. We don't charge a premium for redundant spares".

  - "We supply spares and kits to users but don't charge a premium".

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D. REMOTE DIAGNOSTICS

- The vendors interviewed are at different stages in exploiting the advantages of remote diagnosis. They understand the advantages, particularly for remote customers, but take a realistic view of the limitations.

  - "Although remote diagnosis is useful, we find that 80% of faults concern peripherals and these still need an engineer's visit to rectify so cost savings are not all that great".

- Three respondents explained that they are able to diagnose faults in remote locations from a central support centre via telephone. This is usually confined to large systems. On small systems the cost of the supplementary hardware is not justifiable.

- An additional obstacle to remote diagnosis is security. Users such as banks, financial institutions, and military establishments are understandably sensitive about access to their systems. Here the solution will probably be to swap/return for repair.

E. TRENDS IN SERVICING REMOTE INSTALLATIONS

- First it should be reemphasized that in Western Europe, particularly Northern Europe, the number and proportion of remote installations will fall and the impact on total service costs is more likely to lessen than increase.

  - However, it is becoming increasingly difficult to implement price increaseass for service, and vendors recognise that profits will largely be derived from cost reductions.

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- The main trends will be towards:
  - . Remote diagnosis.
  - . Return for repair.
  - . Modular equipment exchange/board swaps.
- This is shown in Exhibit III-1.

- Remote diagnosis is more applicable to large-scale systems.
- Return for repair is more popular for small equipment and components.

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EXHIBIT III-1

TRENDS

REMOTE SERVICE STRATEGY	NUMBER OF RESPONDENTS
Remote Diagnosis	5
Return for Repair	3
Equipment Exchange	1
Board Swaps	1
Customer Assisted Maintenance	4

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IV CASE STUDIES

A. LARGE MAINFRAME MANUFACTURER

- This vendor has almost 200 mainframe installations in Western Europe.
- Annual field service revenues are approximately U.S. $30 million and these are expected to grow at an average rate of more than 25% per annum in the next three years.
- Over 90% of field service revenues are derived from maintenance contracts.
- Field service organisation includes:
  - Field service engineers on call 24 hours per day, seven days a week (on-site).
  - Integrated diagnostics in each system.
  - Support centres in Europe and the U.S.
- Each installation has two engineers assigned to it, cross-trained to provide hardware and software support.

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- Each system contains a minicomputer which monitors functions during operations and controls the system during diagnostics through an operator console and a video display unit (VDU).

- When a problem occurs, the minicomputer examines the logic point circuits and displays the results. The field engineers use this to isolate and fix the fault.

- If the fault is serious and it cannot be immediately rectified by the engineers, the system is connected through a teleprocessing network to a regional support centre. Each of these centres is staffed by high-level technical specialists who assist the field engineers to diagnose and solve the problem.

- If appropriate, the system can be connected to one of the U.S. support centres and additional assistance obtained. Thus maximum response time, even from the U.S., is one hour.

- This company offers "total support" to the extent that it diagnoses all faults, even those arising from other suppliers' software.

- In France, the company has successfully introduced a direct support service which involves the customer in linking his system directly to the support centre. In 40% of cases, these calls result in total solution of the problem with no field engineer involvement. In the other cases, an engineer is dispatched immediately.

B. LEADING VENDOR OF WIDE RANGE OF SYSTEMS

- This vendor derives annual revenue exceeding U.S. $35 million from field services.

- Over 90% of field service revenue is accounted for by maintenance contracts.

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- About 35% of service is provided for remote customers.

- Remote service costs account for 50% of total field service costs.

- In large installations, the company encourages users to provide accommodation for field engineers and their spares. The user benefits from on-site service facilities and the vendor may use these engineers to service other local users.

- Maintenance support centres serve a number of districts. Each centre is staffed by one coordinator and four product specialists during prime shift. Cover outside prime shift is provided by two product specialists.

- Remote diagnosis is carried out when calls are received at the maintenance support centre. The centre advises the field engineer of the nature and location of the problem within 30 minutes. Local response times vary from two hours (premium maintenance contracts), to four hours for mainframe installations. On small systems, response is within eight hours.

- In less than 5% of cases, visits to remote users need to be repeated. Even this is considered to be too high by the vendor. If a user has systems at a number of locations and a particular piece of equipment is giving problems, the vendor encourages the user to exchange the problem piece with identical but trouble-free equipment at a location close to a support centre.

- Users do not currently undertake or assist in maintenance. In future, the vendor will encourage customer diagnosis, board swapping, and return for repair.

- The main obstacle to customer assisted maintenance is the need for reassurance. Users still feel more comfortable if the vendor installs, maintains, and repairs the equipment and, in most cases, they are willing to pay for this service. In future, as labour and travel costs increase, especially in relation to hardware, users will recognise the cost benefits of first-line fixing.

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C. SUPPLIER OF MEDIUM AND SMALL BUSINESS SYSTEMS

- Total field service revenues amount to U.S. $650,000 and are growing at 50% per annum.
- Over 50% of field service is carried out for users more than 50 miles from a support centre.
- Over 60% of field service costs are accounted for by remote service.
- As market penetration increases, more support centres will be established; a minimum of approximately 25 installations is required before a centre becomes justifiable.
- Response times are within one hour to local users and a maximum of four hours to remote users. National average is less than three hours.
- About 15% of engineers' calls need to be repeated either because of wrong diagnosis or wrong spares.
- In future, the vendor seeks to reduce costs of remote service by introducing some form of modular equipment exchange with the user shipping the faulty equipment to a repair centre.

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APPENDIX

REMOTE SERVICE - Vendor Questionnaire

I. Importance

1. Remote service is herein defined as service required more than 100 miles from a service center.

   i) What proportion of your service is carried out for remote customers?

   _____

   _____

   ii) What proportion of your total field service costs are accounted for by remote customers?

   _____

   _____

   iii) On a scale of 1 to 5, where 1 = No Importance and 5 = critically important and essential, please give us your estimate of the importance of remote service:

   A. As a Marketing Advantage _____

   B. For customer satisifaction _____

   C. For corporate image _____

   D. Others that you can think of _____

   E. As a profit earner _____

2. i) What criteria do you use in deciding whether to set up service centers i.e. machine density?

   _____

   _____

   _____

   _____

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2. ii) What is the approximate machine to man ratio (in each region)?

_____

_____

_____

II. Methods

3. What methods do you use to provide remote service?

* In-House engineers _____
* Outside contractors _____
* Distributors _____
* Franchises _____
* Others (specify) _____

4. If not used - have you considered or do you now use or plan to use third-party maintenance for remote service?

_____

_____

Why or why not? _____

_____

5. Have you considered or do you now use or plan to use franchises for remote service? (This means that you would sell the right to service your remote customers to an independent service entrepreneur whom you would train and to whom you would provide spare parts and documentation all at a fee. The franchisee would be responisible for the service and the cost of service).

_____

_____

_____

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6. If your firm uses distributors to market your firm's products, to what extent do they provide service:

   Overall? _____

   In remote locations? _____

   For warranty? _____

7. Have you considered or do you now use or plan to use a customer assisted maintenance program whereby the customer helps in diagnosing and fixing machine problems?

   _____

   _____

   _____

   Please explain why or why not. _____

   _____

8. What extra premiums do you charge for on-site spare parts or kits?

   _____

   _____

9. How do you carry out remote diagnosis?

   _____

   _____

   _____

III. Trends

10. What new methods do you foresee for providing remote service in the future?

   _____

   _____

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11. Currently, what is your response time for:

    i) Customers within a 100 mile radius of a repair center?

    _____

    _____

    ii) Customers beyond 100 miles from a repair center?

    _____

    _____

12. What percentage of your remote service calls are repeat calls?

    _____

    _____

    Why is this? _____

    _____

13. To what extent is the effectiveness of your overall service activity impacted by remote service requirements?

    _____

    _____

    Looking out 3 years, what improvements or changes do you foresee?

    _____

    _____

14. Do you find it hard to control your remote service?

    _____

    _____

    How can this be improved? (Control) _____

    _____

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- User Communication Networks and Needs

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

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- 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.

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