

INPUT

**MANAGEMENT
PLANNING PROGRAM
IN
FIELD SERVICE**

MANAGEMENT PLANNING PROGRAM
IN FIELD SERVICE

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

DESCRIPTION: Clients of this program receive management planning services each year:

- Management Reports: Analyze important new technical and specific information areas. Reports focus on field service or management.
- Planning Services: Present an in-depth analysis of major networks and field service recommendations that will assist field service executives in the planning of field service activities in the field.
- Annual Reports: Analyze the effects of field service activities on their future technical and financial requirements. Reports of likely changes in field service requirements, may affect the future requirements of the field.
- Annual Presentations: Present a presentation to field service executives on the current year's research and recommendations for the research program for the second half of each year.
- Inquiry Services: Provide research staff on an as-needed basis. A special "hot line" is staffed every time requirements.

RESEARCH METHODS: Research in computers, communications, and other areas.

- Research to determine client requirements through discussions with client representatives.
- Research for industry trends through discussions with users, vendors, universities, industry associations, and other analysts.
- Conclusions derived from the research are based on the judgement of INPUT's professional staff.
- Professional staff members supporting this program average nearly 20 years of experience in data processing and communications, including senior management positions with major vendors and users.

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FIELD SERVICE PROGRAM

FIELD SERVICE BRIEF

NETWORKS AND FIELD SERVICE

JUNE 1983

NETWORKS AND FIELD SERVICE

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NETWORKS AND FIELD SERVICE

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I INTRODUCTION

A. PURPOSE

- This brief is produced by INPUT Ltd. as part of the Field Service Program - Europe.
- The topic, "Networks and Field Service," was chosen by INPUT's clients as a current subject of interest.
- The purpose of the report is twofold:
 - To provide field service managers with definitions and descriptions of networks because of their inevitable impact upon field service.
 - To describe the maintenance issues and opportunities important to maintainers of networks.
- This report, then, constitutes a reference digest for field service managers for networks.

B. SCOPE

- The scope of this report includes:
 - The definition, growth rate, and use of networks.
 - Elements of a network.
 - Types of networks.
 - Network maintenance.
- Readers are encouraged to contact INPUT to contribute their comments or criticisms of this report.

II COMMUNICATIONS NETWORKS

A. GROWTH OF NETWORKS

- Although there are currently few European networks, a dramatic proliferation of new installations is expected in the next five years.
 - There are 5,000 network connections now, but the number is expected to increase six to seven times by 1985.
 - Approximately one-half million connections are expected by 1986.
- The tremendous growth rate results from significant progress by major vendors of network equipment and software to define networking standards, particularly with regard to local area networks (LANs).
 - The focus on standards incorporate CSMA/CD (carrier sense multiple access with collision detection) technology, which allows many non-IBM combatants to put their oars in the water.
 - The thrust towards automated offices and factories provides a good incentive for network vendors and merchants.
- The rapid and dramatic growth of networks will certainly have an impact on field services of the future.

B. DEFINITION OF A NETWORK

- Several categories of networks exist. A brief definition of each follows:
 - Voice Network: Multiple (10 or more) voice-switching nodes (PBXs) interconnected by dedicated lines. (Definition based on method of connection.)
 - Data Network: Multiple data communication devices (terminals, computers, etc.) interconnected by communication lines to a data processing system at another location. (Definition based on products at the end points.)
 - Message Network: Multiple message communication devices (printers, CRTs) interconnected by communication lines to each other, with or without an intermediate message switch. (Definition based on products at the end points.)
 - Facsimile (FAX) Network: Multiple facsimile devices interconnected by communication lines to each other. (Definition based on products at the end points.)
 - Electronic Mail Network: Multiple message communication devices (printers, CRTs) interconnected to each other by communications lines and a message management system. (Definition based on method of connection.)

C. THE ELEMENTS OF A NETWORK

- A communications network, voice or data, is made up of a number of reasonably distinct elements. These elements are shown in Exhibit II-1.
 - Network nodes are the network switches in the voice networks and the computer front end in the data networks.
 - Other networks for message, facsimile, or electronic mail tend to implement various combinations of these same elements.

D. VOICE NETWORKS

1. NETWORK SWITCHING

- Most companies use the public-switched, long-distance network provided by the telephone carriers. A few use some form of dedicated tandem dial (the network-switching element). Some have a network with private, long-distance transmission (PBX tie lines) but without the network-switching element.
- The type of network implemented is somewhat influenced by the number of locations of the company but is more strongly influenced by the number of employees.

2. PBX

- The number of PBXs is related very closely to the number of locations in a company.

EXHIBIT II-1

NETWORK ELEMENTS
FOR VOICE AND DATA NETWORKS

VOICE NETWORK	DATA NETWORK
-	Computer/Front End
Long-Distance Transmission	Long-Distance Transmission
Network Switching	Data Switching (MUX, Concentrator, etc.)
Local Transmission	Local Transmission
PBX	Modems
Inside Wiring	Inside Wiring
Telephone Instruments	Terminals

- According to an INPUT survey in the United States, the average number is 0.33 PBXs per location.
- PBX installations vary by industry. For example, U.S. banks have only 0.23 PBXs per location. The reason for this low ratio is that many city banks use a single Centrex to cover multiple branch locations. This cannot be done conveniently with most PBX equipment.
- AT&T and the independent telephone companies have an estimated 65% share of the large company PBX market, or about 40,000 systems. The interconnect industry has about a 35% share, or 20,000 customers.

E. DATA NETWORKS

1. TYPES OF NETWORKS

- Most companies with data networks have at least one on-line network used for interactive processing. The others have only RJE networks. In most cases, companies with two or more networks have at least one RJE network.
- In almost every case the network configuration is mixed dial-up and dedicated lines.

2. TERMINALS

- The average Fortune 500/50 company in the U.S. has almost 2,000 terminals installed on the company's data networks. This more than doubles the number of terminals estimated in INPUT's 1978 study, Value-Added Network Services. The annual average growth rate (AAGR) for total terminals is about 30%.

F. MESSAGE NETWORKS

- Most large companies have at least one message network with two or more terminals, while a few have an independent message-switching system (or service, in three cases).
- The major application for message networks, even some of the medium to large networks, is external company access, often international.
- Companies with extensive intracompany networks were the ones most likely to change to another system.

G. FACSIMILE NETWORKS

- The applications for facsimile show that a majority of its uses are for distinct operational communications. These include transactions, drawings, and reports.
- There are some indications that intercompany communication applications such as drawings, contracts, etc., are beginning to be sent via facsimile in significant volumes.

H. INTERCOMPANY COMMUNICATION APPLICATION

- The majority of the communications between a large company and its customers or suppliers are very heavily implemented by the use of voice or mail techniques.

1. INTERCOMPANY MESSAGE COMMUNICATION APPLICATIONS

- These applications are generally handled on the Telex/TWX network.
 - While some of these applications consist of orders and transaction inquiries between companies, the majority of the domestic applications center around communications between manufacturers and their transportation suppliers, particularly railroads or public warehouses.
 - A very high percentage of the intercompany message applications are in the international trade area.

2. INTERCOMPANY DATA COMMUNICATION APPLICATIONS

- In this area there are two distinct levels of data communication system implementation.
 - One of these, although limited, is interconnecting the data processing systems of manufacturers and their customers or suppliers. There are a number of such cases between very large companies, e.g., within the food and automobile industries.
 - Many companies have a limited set of computer interconnections with their suppliers or with their customers. The major limitation here appears to be compatibility between these large systems, particularly at the batch transmission level.
- A much more common intercompany data communication means is the provision of terminal-based services between a company and its network of dealers or distributors.

- Primary examples are the networks established by auto companies and heavy equipment manufacturers for communications with their franchised dealers. These communications are often characterized by information services to these dealers above and beyond the simple transmission of transactions. Such additional services include, for example, inventory control systems, financial management tools, and customer service analysis tools.

- Examples in other industries include the travel agency terminals connected to airline reservation and ticketing systems, correspondent bank terminals, and insurance agent terminals connected to the parent organization.

I. NETWORK INTEGRATION

- Integration of multiple data networks is prevalent among large companies.
 - There is a reduction in numbers of both distinct networks and central data processing sites.

 - While the selection of an appropriate solution is still open to considerable debate (SNA versus distributed versus packet, etc.), users' desire to reduce the absolute number of networks, as well as their redundancy, is very strong.

- The integration of message networks with data networks is more a matter of direct conversion from one to the other.

- The external message networks for intercompany and international applications have, in a few companies, become special Telex or TWX ports on the data network, and the messages are prepared as a part of the data systems and forwarded to the appropriate external service.

- The integration of facsimile networks with data networks is rare and is usually based on use of facsimile as a receive-only terminal from a data system.
- Systems or data processing organizations usually have the responsibility for the implementation of office automation functions. Given that this is the case, the long-term expectation is that electronic mail will indeed become a subset of the data networks but with special I/O equipment and with some amount of special software and data base management tools.
- In the long term, the integration of voice and data possesses by far the largest potential for major economic and functional improvements. The overall integration of voice and data is certainly a long way off but it is even more certainly coming.
- This future voice/data integration will not simply happen. It will evolve. It will grow from a number of different sources or points of integration. Many of these points are already visible, as in the use of the companies' voice networks for implementing some parts of data networks and the growing digitization of the voice network itself.
- One of the key points of integration between voice and data is that of organization. At the present time relatively few large organizations have a single individual responsible for both voice and data communications.
 - While it is true that in many organizations the voice communication manager and the data communication manager ultimately report to the same senior information executive, network integration will not occur at that level.
 - It will occur at the level of a working communication manager responsible for both voice and data networks.

- It will occur in organizations where this responsibility is not only centralized but unified in a single, technically qualified individual.

J. NETWORK STANDARDS

- Standards are agreed upon methods of building or operating a system and are as complex as the systems they describe.
- Standards are developed by a complex set of organizations including governments, international organizations, industry associations, individual vendors, and users.
- In the communications area, users or user organizations are not nearly as active as in areas such as computer languages.
 - The main reasons appear to be expertise, time, and money. Most users have only enough communications expertise in-house to maintain current systems and implement the next application, often with vendor assistance.
 - User technical personnel usually concentrate on immediate problems and short-range development. A five-year plan may reference X.25 or local networks, but the time to learn them in detail is when the user starts to evaluate a product.
 - Money is a major consideration for most users. Having "excess" technical personnel with time to participate in standards development is expensive, as is the travel to frequent standards committee meetings.
- In England, the Department of Industry has recently recommended government expenditure of nearly \$4 million to derive standards for local area networks.

III LOCAL AREA NETWORKS (LAN)

A. THE EMERGENCE OF LOCAL NETWORKS

- Local area networks are one of the newest ways to address the longstanding need to share information processing and data storage resources at the end-user level. Vendors who have devised hardware solutions to meet this need offer end users an apparently simple, low-cost way to avoid the perceived slowness of information systems departments.
- Timesharing, an early attempt to solve this problem, included the technique of communication with a more or less remotely located computer over links provided by the common carriers (or private equivalents), the only technology for data transmission readily available during the 1960s and 1970s.
- The phenomenal growth of the microprocessor industry provides real alternatives to the use of timesharing by incorporating intelligence directly in a variety of sophisticated office systems equipment including:
 - Word processors.
 - Copiers.
 - Computerized telephone systems.

- Facsimile transmitters.
- Personal/small computers.
- The growth of this equipment promises to be explosive, as shown in Exhibit III-1.
- Much of this equipment has been obtained and installed directly by individual departmental units to meet particular problems. Often there is little coordination or forward planning involved; for example:
 - Different units of a department may order incompatible word processors from different manufacturers.
 - Quantitative output from a department's small computers may be manually reinput to word processors or vice versa.
 - Word processing output may be sent by facsimile device to another organizational unit where it is re-entered into office systems equipment.
- As advanced office systems become more widespread and critical to an organization's business, the operational interdependence of the different pieces of equipment becomes increasingly important.
 - Users of office systems want their devices to be able to "talk" to one another, at least within the same organizational unit.
 - Vendors are beginning to respond to this need. But it should also be recognized that vendors have their own, somewhat different, agenda:
 - They want to make it attractive to buy more office systems equipment.

EXHIBIT III-1

RELATIVE GROWTH IN SELECTED OFFICE SYSTEMS EQUIPMENT

OFFICE SYSTEM	1980-1985 GROWTH (percent)
Word Processing	400%
Copiers	100
Computerized Telephone Services	400
Image Processing	
Facsimile	200
Microfilm	100
Personal Computers (In Large Corporations)	600

SOURCE: INPUT Estimates - United States

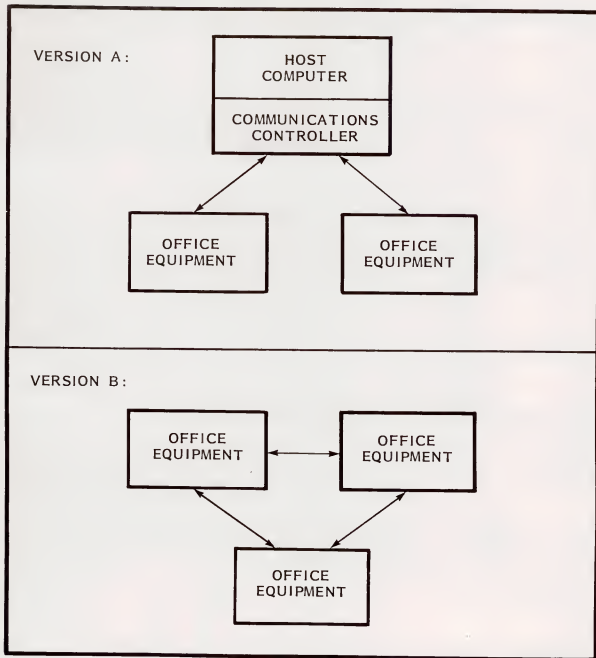
- If possible, each vendor would like to arrange things so that his equipment is the most attractive (or, better still, the only feasible alternative).
- In the last several years, contrasting techniques have been proposed for linking office systems together. In essence there are two conceptual approaches, as illustrated in Exhibit III-2.
 - Version A is the "host computer" approach wherein a central controller, usually a traditional mainframe or minicomputer, serves as the link between different pieces of office equipment. IBM has the chief example of this approach, using a variety of computing equipment, communication protocols, and software.
 - The "peer level" approach in Version B has different pieces of office equipment communicating directly with each other, as in the Datapoint Attached Resource Computer (ARC), WangNet, Ethernet, systems.

B. PLANNING CONSIDERATIONS

- Regardless of whether the processing of information uses computing or micro-processor-based equipment such as intelligent copiers and word processors, the need to share information remains essential to business operations. End-user acceptance of computer-based products for handling information has led to the use of digital communications to facilitate information sharing.
- Enforceable conceptual and architectural standards do not exist outside of the mainframe/common carrier environment. Therefore, in the process of developing local area networks, vendors and users alike have devised communi-

EXHIBIT III-2

ALTERNATIVE INTERCONNECTION APPROACHES



cations conventions and protocols optimized for the particular products or applications involved.

- Uncoordinated local area networks can have a serious adverse effect on plans for orderly development of corporate computer-based networks. If local area networks come into being without the knowledge of or improperly coordinated with the information systems department, forecasts of data processing equipment and software requirements to support integration of corporate systems will be inaccurate at best.
- Conversely, the planned and coordinated use of local area networks can considerably enhance the availability of information and reduce the overall information resource costs to the organization. The key words are "planning" and "coordination."
- The terminology employed in local area networking can be troublesome because a great deal of it has been borrowed from other disciplines; unless terms are clearly defined, a discussion can be extremely confusing.
 - For example, the suffix "-net" is used in the names of proprietary local area network systems such as Ethernet and WangNet. But Digital Equipment Corporation's DECnet refers to the set of program products that support common carrier interconnection between DEC processors and are definitely not local area network candidates.
 - As another example, to the telephone companies the expression "local loop" refers to the wired connection between a telephone and a central office switch. Local area network vendors, however, may use the term "local loop" to describe a ring topology network configuration, as discussed in Section C, following.

C. KEY CONCEPTS

- Local area networks have evolved in response to a need to share information and resources among a variety of devices used in the office, including small desk-top computers, data storage devices, plain paper copiers, and printers.
 - A realistic example of a local area network would be a brokerage office where each stockbroker is supplied with a personal computer. Attachment of high-capacity disk drives and letter-quality printers to each computer may not be cost justifiable, but sharing of such resources makes sense. A local area network could be configured to allow all the brokers' computers to share one or two disk drives and a printer. Client portfolio data could be stored on disk, together with pricing information, so that all brokers on the network could access their clients' portfolios to execute portfolio valuations on their own computers. Exhibit III-3 is a schematic diagram of such a network.
 - Another example is a number of interconnected word processors equipped with dot matrix printers for the preparation of document drafts. When final copies are desired, the finished drafts are spooled to a microprocessor or minicomputer on the network that drives a heavy-duty letter-quality printer. This station may be devoted exclusively to production of print-quality documents from data transmitted to it by all other stations, as illustrated in Exhibit III-4.
- A major distinguishing characteristic of local area networks is that the data path connecting the devices on the network is not provided by a common carrier.
 - The data paths used in these networks are cables (usually twisted wire pair or coaxial, but flat cables and fiber optics appear to offer substantial promise), radio, or infrared light links.

EXHIBIT III-3

SCHEMATIC DIAGRAM OF ONE TYPE OF LOCAL AREA NETWORK
(COMPUTERS SHARING DISK DRIVE AND PRINTER RESOURCES)

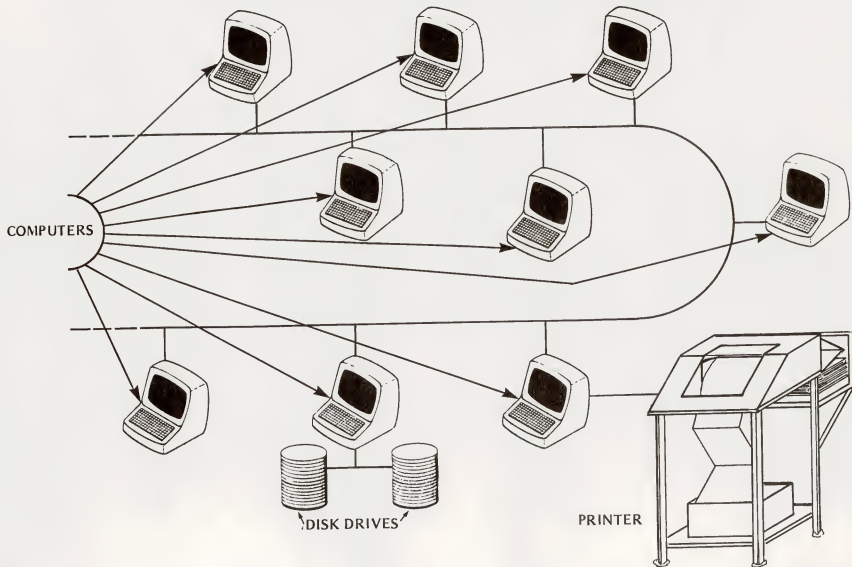
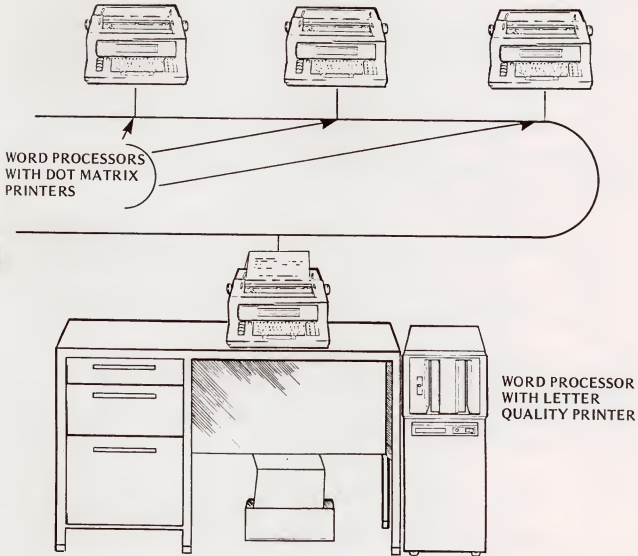


EXHIBIT III-4

LOCAL AREA NETWORK OF WORD PROCESSORS



- Currently, data paths employed in local area networks can support transmission speeds of up to 50 million bits per second (50 Mbps), but their range is limited to a maximum of 15 kilometers (9.4 miles). Typical usage is a more modest 1-10 Mbps, at ranges less than 4,000 feet, i.e., within a single building or plant site.
- Another characteristic of local area network systems is that all stations on the network have equal access to the data path at any time. This contrasts with traditional data communications, where a connection between two stations (e.g., a terminal and a host computer) is rendered exclusive for the duration of the transmission by some mechanism such as software control on a leased line, or the common carrier's switching system in a point-to-point connection. This characteristic has produced novel approaches to the development of local network protocols that are incompatible with traditional forms and with each other.
- It is beyond the scope of this report to even attempt to present a comprehensive survey of local area network systems as new variants are announced almost daily. Examination of a number of systems, however, is warranted by their unusual market and technical attributes.
 - Ethernet, developed by Xerox, represents the baseband technology. The Institute of Electrical and Electronics Engineers (IEEE) has adopted a specification almost identical to Ethernet as a local area network standard.
 - Datapoint's Attached Resource Computer (ARC) system, introduced in 1977, has the largest installed base, with about 2,000 users to date, and integrates directly with Datapoint's digital PABX. It also uses baseband technology.

- Wang Laboratories' WangNet, announced in June 1981, is important because of Wang's spectacular rise to a preeminent position in computer-based word processing systems and because it represents the broadband technology. It, too, can interface directly to a digital PABX, although Wang does not yet offer such equipment.

D. LOCAL AREA NETWORK COMPONENTS

- Logically, a local area network system has three components:
 - A transmission medium.
 - Network interfaces.
 - Network stations.
- In the following discussion, the term "transmission medium" (or "medium") refers to the physical connection over which data and related control signals are physically conveyed from one device to another by some form of energy - usually direct electric current, but sometimes lightwaves or microwaves may be used.
- Topology is the delineation of a surface. With reference to networks, the topology of a network refers to the abstraction that describes how network components are connected to each other. Common topologies are star, ring, and bus, all illustrated in the next section.
- A major criterion employed in the selection of a transmission medium is bandwidth because the greater the bandwidth the more traffic can be supported. Additionally, the greater the bandwidth the lower the bit error rate, and consequently less frequent retransmissions are required for error recovery.

- Coaxial cable is a popular medium because it can sustain a very high data transfer rate over several miles without signal regeneration, and it is readily available from electronic distributors.
 - Some vendors have standardized on RG-59/U 75-ohm coaxial cable, which is the type of cable commonly used to link TV sets with a master antenna, while others use the larger half-inch diameter CATV cable. CATV cable has a seamless aluminum shield that meets fire codes without being run through conduits. Both types of cable, as well as related hardware such as connectors, are in common use and have proven high reliability. Either a single or double cable configuration may be required.
 - Ethernet requires a special type of double-shielded coaxial cable.
- Fiber optics can be used in some topologies but not in others because the connections for fiber optics network interfaces are not as simple as for coaxial cable. As explained later, this makes a difference in structuring the network. Fiber optic cables are not much more expensive than coaxial cable but can carry a bandwidth of 400 Mbps to 1 Gbps and are not susceptible to random electrical noise.
- Noncoherent infrared light links and microwave radio can be used when there is a requirement for high bandwidth line-of-sight transmission in a network segment between locations separated by short distances, such as two buildings within a mile of each other.
- High bandwidth transmission over twisted pair (i.e., telephone) wire has been achieved over distances of several hundred feet in a nonhostile environment, but is more commonly restricted to rates that do not exceed 9,600 bps per pair.

- Two methods of transmission used in local area networks are time division multiplexing (TDM) and frequency division multiplexing (FDM).
- TDM is, essentially, timesharing of the line. Within the context of local area networks, it is usually associated with baseband transmission, where the frequency spectrum generated starts at zero hertz (0 Hz).
- FDM utilizes a central carrier frequency which is modulated to transmit data (broadband transmission). Each network station utilizes a different carrier frequency for signaling in exactly the same way that many radio and television systems convey signals simultaneously without interfering with each other. In fact, network stations are miniature broadcasters operating at radio frequencies (RF).
- Network interfaces have two logical functions. One is to interface with the transmission medium, and the other is to interface with the network station.
- Physical interfaces with coaxial cable are easily accomplished with devices called "taps," developed by the CATV industry.
- While taps easily achieve an electrical connection, fiber optic cable requires special connectors that require severing the cable segment. Transmission of signals over fiber optic cable employs visible light frequencies, rather than electrical current. Before a fiber optic cable segment can be inserted, all transmission on the network must be halted to avoid loss of data.
- Attachment of a device to a broadband network requires the use of a modem to tune the device to its assigned frequency. The modem might be either a fixed frequency modem or, when circuits are switched, a "frequency-agile" modem which tunes a device to the frequency of the circuit that is assigned for the duration of a switched connection.

- Interfaces with the network stations are electronic circuit boards, chips, or separate devices that vary according to the device being connected to the network. A single station interface may attach to one or more stations.
- Network stations can include computers, terminals, copiers, disk drives, word processors, and printers, as shown in Exhibit III-5.

E. LOCAL AREA NETWORK OPERATION AND CONTROL

- Unlike traditional data communications, which evolved from the combination of computers and common carrier transmission facilities, local area networks tend to be designed without central control.
 - Star network configurations, schematically depicted in Exhibit III-6, are typical of many traditional telecommunications systems. This topology undoubtedly evolved from the concept of telephone central office networks. Connection between any two terminals in such a network requires routing transmissions through the central control node.
 - Local area networks, on the other hand, tend to employ ring or bus topologies, which permit station-to-station connection without requiring a central node. These topologies are shown in Exhibits III-7 and III-8.
 - Ring networks, sometimes known as Cambridge Rings because of initial development efforts at Cambridge University in England, employ a closed loop around which traffic flows in one direction.
 - Bus topologies allow traffic to flow in either direction, sometimes resulting in collisions.

EXHIBIT III-5

LOCAL AREA NETWORK INTERFACES

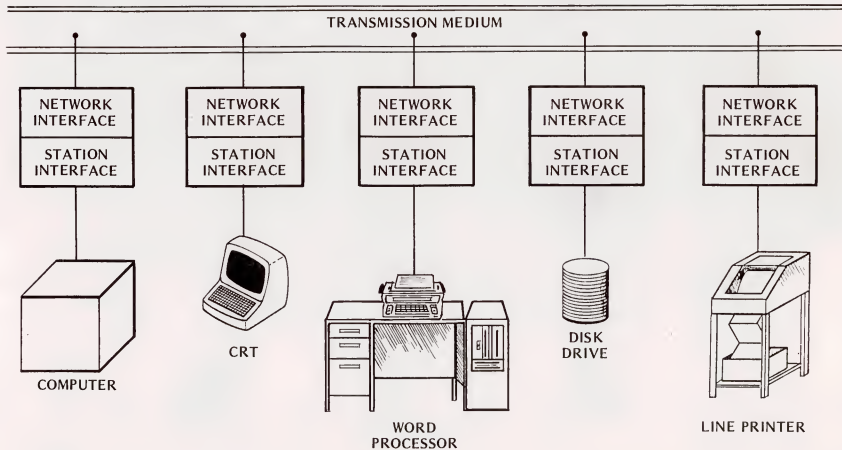


EXHIBIT III-6

STAR NETWORK TOPOLOGY

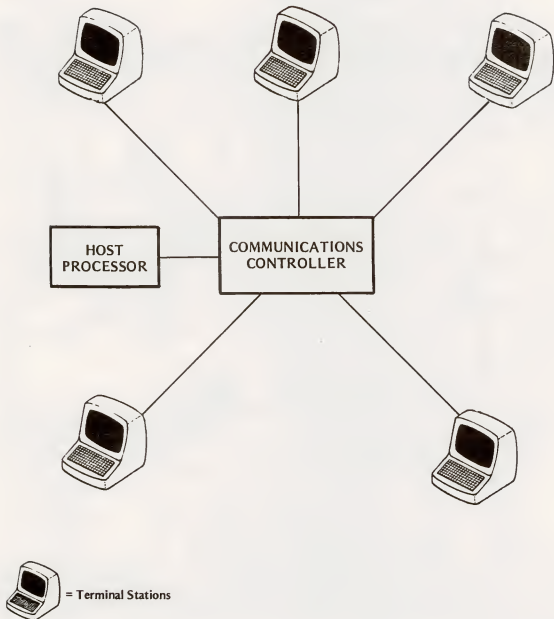
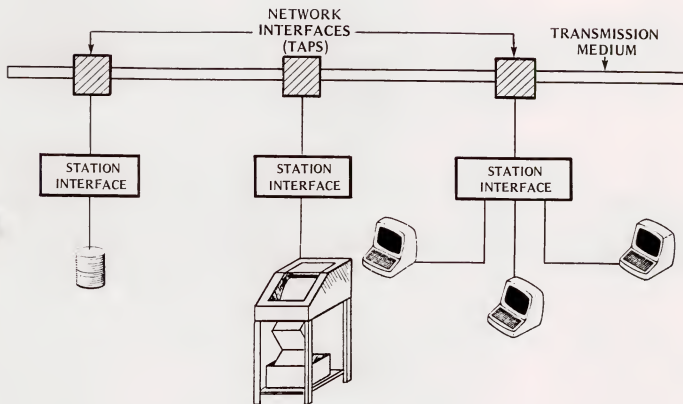


EXHIBIT III-7

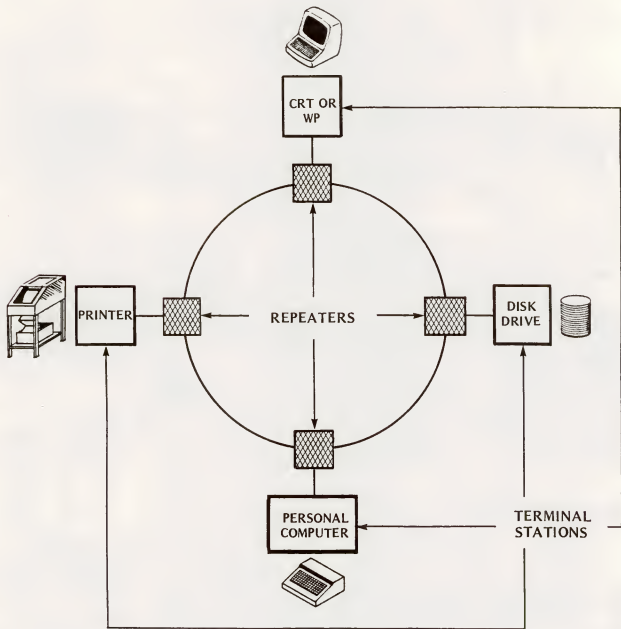
BUS NETWORK



= Terminal Stations (e.g., CRTs or word processors).

EXHIBIT III-8

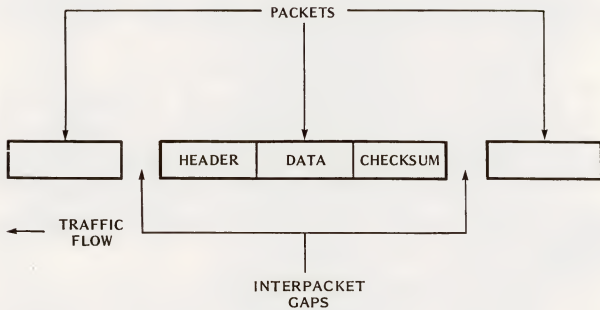
RING NETWORK



- In both ring and bus networks, since there is no central control mechanism to route traffic, all stations must monitor all traffic to identify messages directed at them.
 - Thus, network control in ring and bus networks is distributed among the attached stations.
 - Data security can, therefore, be a potential problem.
- Protocols developed for ring and bus networks involve the use of packets, or frames, of data generally formatted, as shown in Exhibit III-9.
 - The packet header portion contains information such as source and destination identification, message type, and other control information. Header length varies with the system.
 - The checksum portion, generally 16 or 32 bits, provides a mechanism for prima facie detection of transmission errors, comparable to cyclical redundancy check bits in data records stored on magnetic media.
 - For a variety of reasons, including line utilization efficiency, total frame or packet size (header, data, and checksum) is limited to a certain maximum number of bits that varies with the implementation, from approximately 1,100 bits to around 12,000 bits.
- As depicted earlier in Exhibit III-8, network interfaces in a ring network are repeaters, or signal regenerators, that retransmit frames to the next station on the loop.
 - This permits the use of a control mechanism involving empty frames that are circulated around the loop.

EXHIBIT III-9

GENERALIZED PACKET LAYOUT



- When a station has something to transmit, the first available empty frame is filled with data and the header is modified appropriately.
- The destination station copies the data frame and marks the header with an acknowledgment bit. When the frame returns to the sending station, it can be examined to determine whether the acknowledgment bit has been set. If it has, the sending station recognizes that the destination station has received the transmission and consequently marks the frame to indicate that it is now ready for reuse. This technique prevents immediate reuse of a frame, thus avoiding the likelihood that one station will monopolize the line.
- Another form of control employed in ring networks involves the use of a short message called a "token." When a station wishes to transmit, it waits until it detects the token, alters the token, then transmits a message frame, after which it recreates and transmits the token.
 - . The distinction between a token and an empty frame is that an empty frame can be converted to a data frame, whereas a token is merely a signal indicating when data frames may be inserted into the transmission stream. Thus, where empty frames are used there is a fixed number of packets circulating around the ring, while in a token-passing scheme the number of packets is variable.
- In a bus network, on the other hand, traffic can flow in either direction. It is, therefore, possible for packets to collide, and in fact they sometimes do. However, the extremely high transmission speeds and short distances involved mean that the individual packets are on the line for extremely short periods of time thereby considerably reducing the likelihood of collisions.

- When collisions do occur, the transmitting stations try again. To prevent a recurrence of a collision, various techniques are used to delay retransmission by randomizing the delay time, in an effort to avoid simultaneous re-initiation of transmissions.
 - The effectiveness of this technique is suggested by statistics gathered during a test of a prototype bus system. This system supported 120 stations, transmitting 2.2 million packets per 24-hour period over a 3-Mbps bus. Collisions during the test period occurred only 0.03% of the time.
 - Over the period, 99.18% of transmissions succeeded on the first try, and in only 0.79% of the time was it necessary for a station to defer transmission because the line was in use.
- This technique relies on Xerox's patented control method known as carrier sense multiple access with collision detection (CSMA/CD). This method requires each station to sense for carrier signals to determine if a transmission is in progress through a "listen-while-talk" capability - the ability of a station to listen to its own transmissions while they are being sent. A message that is colliding with another will sound garbled, and when this is detected the transmitting station ceases transmitting at once. The station times out for a randomly generated number of time intervals and then attempts to retransmit.
- Some network vendors omit the collision detection feature entirely, citing the very low incidence of collisions that occur under normal load conditions since collision detection hardware and the patent license add considerably to total network equipment costs. The risk involved in omission of this feature is that network efficiency can drop markedly under heavy load conditions.

F. OTHER LOCAL AREA NETWORK CONSIDERATIONS

- Bus networks employing coaxial cables are the easiest networks to reconfigure since stations can be attached or detached using cable taps even when transmission is in progress.
- Adding or removing a station in a ring network requires stopping transmission in order that the related repeater can be inserted or removed by disconnecting and reconnecting two repeaters.
- Fiber optics probably will find readier application in ring networks because of the segmented nature of the ring connections. The physics of fiber optics suggests that the optical equivalent of cable taps is unlikely to become commercially available in the near future.

IV NETWORK MAINTENANCE

A. OVERVIEW

- The incredible growth of networks expected within the next five years will seriously affect field service.
 - As standards are adopted, compatible and interchangeable hardware and software combinations and permutations will stretch the imagination.
 - Networks already do and will increasingly incorporate a variety of hardware.
- Users will be conservative in designing highly reliable networks because of enormous liabilities associated with downtime.
 - Network maintenance will become a key factor in users' network planning and implementation.
 - Dealing provincially with each manufacturer's service is not what the user wants.
 - He will either seek maintenance from a single vendor (many independent maintenance organizations are offering multiproduct service) or train his own staff to provide first-level maintenance support.

- A brief discussion of network maintenance functions follows.

B. DIAGNOSTICS

- Diagnostics within a communications network are complicated by the inevitable involvement of more than one supplier.
 - Communications networks can involve different vendors for:
 - Current loop teletype circuits.
 - Voice frequency telephone circuits.
 - Low-speed modems to intelligent terminals and modems.
 - Multiplexers.
 - High-speed switched digital circuits.
 - Microwave, fibre-optic, and satellite communication lines.
 - Notwithstanding maintenance responsibility ending at the appropriate interface, the prudent maintenance organization will have to know the network to help isolate its own problems.
 - Learning how the networks operate will pay off when a service call is required for one of several maintenance vendors, including such things as:
 - Interface control signal status during data transfer.

- Protocol sequence from beginning to end.
 - Normal response times.
 - Normal error recovery sequence identification.
- New network hardware includes built-in maintainability enhancements to signal potential problems before they become real ones.
- When a failure or degradation is detected by network monitoring, it usually requires some further diagnosis to pinpoint the cause of the problem and enable it to be corrected. This diagnostic process includes some optimum combination of test equipment, testing procedures, and the use of data available from other network sources.
 - Analog test equipment, designed to measure the characteristics of voice and analog data communication channels, has been available for many years. It is usually operated by carrier personnel and only rarely by user personnel. As users get more involved in the control of their own networks, some ability to use this kind of test equipment will be necessary in order to manage the maintenance performance of the vendors or, in some cases, to actually perform corrective actions on the increasing array of customer-owned communication equipment.
 - Digital test equipment, such as line content monitors, has become available in recent years. In both of these cases, the use of the test equipment requires a relatively sophisticated communication technician, which, as noted earlier, is in relatively short supply. Thus there is an increasing requirement for the automation of these kinds of tests.
- Not only automation but also remote test control are necessary capabilities in order to perform diagnostic testing on a communication network without

sending technicians to the remote site. This means that equipment must be connected at the remote site with sufficient intelligence to be able to perform certain tests on its own and to be put into various test and test-reporting modes. Such equipment is becoming increasingly available.

C. FAILURE REPORTING

- When any part of a network system goes down, there is a need for human communication between operators in various parts of the system to report the failure.
 - This points to a continuing need for speech links within a data network.
 - Terminal operators need to have an established (voice) link with the central processor operating staff.
 - Some companies have used numbers for this purpose.
- Because of the confusion resulting from multiple suppliers, a central failure-reporting and follow-up coordinating function will prove to be worthwhile.

D. NETWORK PERFORMANCE

I. STANDARDS

- Particularly for purposes of guiding the network operator, a set of standards needs to be established for the networks. These standards should indicate conditions that would generate different types of corrective actions and specify the normal corrective action.

- These standards include, for example, some things that are deceptively clear, such as the definition of a failure.
- Some of these operating standards are in fact implemented in network control software, whereby corrective action is automatically taken at specified levels or at specified incidents within the network.

2. MEASUREMENTS

- In addition to monitoring the various elements of the network for their performance, the overall performance of the network needs to be measured, recorded, and later analyzed. The network measurements made here include such things as response times, transaction delays, terminal or buffer queue lengths, etc.
- Another key performance measurement is the level of user satisfaction. This can sometimes be measured indirectly by factors such as call-holding times. For example, a very short call-holding time may be an indication that users were unhappy with the quality of the line and disconnected in order to replace the call on a different line.
- In both voice and data networks, traffic volume is one of the best measurements of network performance. Traffic measurement in both data and voice networks has generally tended to be a relatively crude operation. Finer measures of traffic now becoming available in voice and data communication products will provide information for both immediate corrective action on the network and long-term adjustments to the configuration and equipment of the network.
- An examination of the various failure incidents and other occurrences within the network can point to a need for making some changes (perhaps in equipment or vendors), and it may also indicate the possibility of obtaining rebates

from vendors for capabilities not actually provided, such as circuits unused due to poor circuit performance.

3. ANALYSES

- On a long-term (that is, month-to-month) basis, most companies find that these performance analyses reveal a need to make changes in the network configuration. This includes adding lines, adding higher-speed lines, changing routines from one node to another, establishing high-traffic trunks to bypass intermediate nodes, etc.
- Longer term adjustment to the network in order to obtain maximum utilization of this expensive corporate capability recognizes that use of the network is a continually changing process.

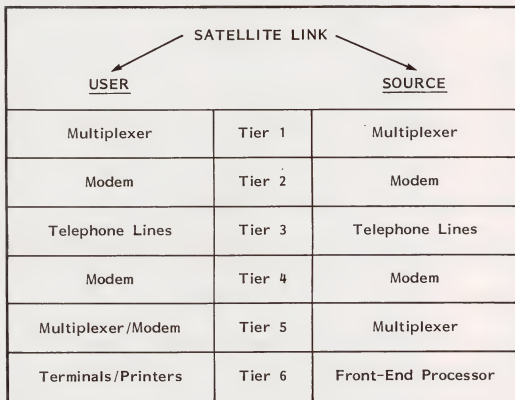
E. DATA COMMUNICATIONS SERVICE

1. INTERFACES

- The importance of data communications to an actual or would-be network maintainer cannot be overemphasized. INPUT's 1982 Annual Report - Field Service in Europe noted that data communications service was an important issue last year.
- Data communication networks comprise tiers similar to advanced protocols such as SDLC/SNA, HOLC, X.25, and DDCMP, as illustrated in Exhibit IV-1. These tiers are simply further extensions of the layers of protocol.

EXHIBIT IV-1

DATA COMMUNICATION NETWORK TIERS



- Testing and servicing the data communications network should be approached as a logical sequence, beginning with the most basic elements and escalating to higher tiers within the circuit.
 - Communication must first be accomplished, tier to tier, before higher levels are tested.
 - Once point-to-point verification has been established, two methods of testing the quality of that circuit are used: distortion analysis and error rate analysis.

2. DISTORTION ANALYSIS

- Distortion analysis testers examine the data stream and measure the displacement of data transitions in terms of nominal transmission units. Distortion results when all of the data bits in one state, either mark or space, are uniformly longer or shorter than the norm specified.
- Distortion measurements are more critical in asynchronous circuits since there is no reference check provided by the circuit. Depending upon the hardware, reliable communications are still possible at distortions up to 30%.
- Distortion analysis can be performed during actual operation, allowing users to test without disrupting the circuit.

3. ERROR RATE ANALYSIS

- While distortion analysis provides qualitative information of the circuit, error rate analysis involves circuit reliability. As with distortion analysis, error rate tests examine the data stream. A known data stream is used for a reference, usually "the quick brown fox . . ." message.

- If a message is too long or too random, generating it and testing for errors become impractical. A new technique utilizing a shift register to generate a pseudo-random sequence has been developed resulting in two types of tests: PRN (Pseudo Random Noise) and BERT (Bit/Block Error Rate Test).

- The simplest approach is then to transmit a continuous bit stream comprising the given pattern and checking it at the opposite end. Several measurements are possible using error rate analysis:
 - Bit errors per specified bit.

 - Blocks of bits.

 - Errored seconds.

4. PROTOCOL ANALYSIS

- Protocol testers decipher protocols and detect errors. These test instruments provide an intelligent window into the network by automatically checking for errors and displaying only a portion of the entire data stream (that which is critical). This is similar to free running and triggered sweeps on oscilloscopes.

- Further protocol analysis, in addition to displaying data and checking for errors and protocol violations, provides for protocol control information. Instead of bit-by-bit, byte-by-byte decoding manually and sorting out control information, users can concentrate on specific information in an easy-to-read format.

- Protocol analyzers on the market today provide a greater understanding of networks and function as real-time troubleshooting aids as well as training aids.

5. EMULATION

- Host and terminal emulation is vital in data communication servicing and testing.
 - In many cases, the emulation functions are available as standard or optional features of other test gear including data and protocol analyzers.
 - Emulators are useful as initial installation tools as well as troubleshooting aids.
- Emulators are sometimes better than the actual units, for testing.
 - It is difficult to force certain error conditions without an emulator.
 - Forcing system components to exercise error recovery algorithms enhances system reliability.

F. NETWORK MANAGEMENT

- As user networks become more complex, larger, more expensive and, most of all, more critical to the operations of the company, a great need arises for managing and controlling them. In addition to the growing magnitude of the problem, the situation is exacerbated by the decline in availability of technical personnel qualified to manage communication networks.
- This section of the report examines the requirement for the performance of management functions in both voice and data networks and the present methods by which users are performing this function. A summary of the types of operations performed by network management is shown in Exhibit IV-2.

NETWORK MANAGEMENT OPERATIONS

- COMPONENT SUBSTITUTION
 - Modems, Circuits, MUX Channels
 - Local or Remote
 - Component Simulation

- COMPONENT TESTS
 - Analog: Phase Jitter, S/N Ratio, Envelope Delay
 - Digital: Bit/Byte/Block Error Rate, Error Trap, EIA Interface

- TEST CONTROL
 - Loopback
 - Data Collection
 - Data Analysis

- NETWORK MONITORING
 - Component Monitoring, Line Failure
 - System Monitoring, Terminal Queue Length, Response Time

- NETWORK MANAGEMENT
 - Reconfiguration
 - Cost Control
 - User Satisfaction

- INPUT has organized users' comments on network management so that they represent a composite of the perceived needs of major network users for performing the various functions required in managing a network.

I. NETWORK MONITORING

- Various components of the network may degrade or fail at random. The objective of the network monitoring function is to detect that degradation or failure before it affects network operations.
 - The detection may be a GO/NO-GO test; e.g., the component is working or it is not working.
 - The detections may be a more sophisticated measurement to determine whether some performance parameter of the network component has dropped below a predetermined threshold and is probably going to cause a failure in the near future.
 - Many performance factors in communications elements, particularly in transmission channels, tend to degrade before they become completely unusable.
- Network monitoring is a process that, to be effective, must be performed continually or at very short intervals. This implies not only an automated monitoring system but also a test procedure that can be conducted with minimal interference to the ongoing data communications operations.
- While network monitoring may seem to be an obvious requirement, it is for most users a relatively recent consideration. Generally, network performance has been controlled in the past by initiating action only in the case of failures.

- In some cases, particularly in voice networks, failures may in fact go unnoticed for extended periods of time. For example, in a trunk group, a failed or seriously degraded circuit may continue undetected for days because, either by manual or automatic means, other trunks in the group serve the traffic requirement.
- With a network monitoring approach, all trunks would be tested periodically, and the defective trunk would be corrected or replaced. If not, credit for out-of-service condition could be obtained from the carrier.

2. REMOTE TEST CONTROL

- Not only automation but also remote test control are necessary capabilities in order to perform diagnostic testing on a communication network without sending technicians to the remote site. This means that equipment must be connected at the remote site with sufficient intelligence to be able to perform certain tests on its own and to be put into various test and test-reporting modes. Such equipment is becoming increasingly available.

3. NETWORK CONTROL

- After a failure or potential failure has been detected and diagnosed by the monitoring and test systems, some action must be taken to correct the situation. This is the network control process.
- Operational control of the network takes two general forms. One is the immediate corrective action that can be undertaken by the operator or by the system itself, and the other is the control of the actual maintenance and restoral activities of user and/or vendor personnel.
- In many cases, there are immediate actions or adjustments that the operator of the communication network can take to eliminate, or at least reduce, the effect of a failure within the network. These actions include such things as

switching in spare modems or spare lines, rerouting lines through other paths, imposing reduced flow controls, etc. Many of these control actions can be performed automatically by some of the more sophisticated systems.

- Regardless of the immediate corrections or adjustments that can be made by the operator or the system, a failure or degradation usually means that something needs to be fixed or replaced within the network.

- A complete network management system will include a maintenance control system with the following elements:
 - A definitive diagnostic system to assure that the problem is in fact real, well-defined, and located in order to eliminate false call-outs.

 - A system for buffering the immediate impact of the problem by modem switching, rerouting, etc., so that maintenance is not performed in a panic but can be scheduled to at least some degree.

 - A reporting and record-keeping system that controls the status of various outages.

 - The changes originate both from external influences such as the ultimate users of the network and their requirements and from changes within the network.

- A continuing examination of the volume and type of traffic transiting the network can often indicate areas for optimization either by changes in the network or by changes in the controls applied to the users.
 - A point made elsewhere in this report is the decline in actual use of the network, which often occurs as a result of billing back usage to the originating departments.

- The simple existence of information available to end users as well as the responsibility of paying for their own use often create a reevaluation of the need for many different types of users.

G. TRENDS AND OPPORTUNITIES

- Companies planning to or currently using networks are strongly considering self-maintenance for various components of the network as well as the whole network.
 - One factor motivating companies to look into self-maintenance is the absence of an overall, single maintenance provider.
 - The extra effort involved in training and building a service resource is worth it to some who are getting annoyed and frustrated with service firms, "finger pointing," or blaming others' equipment and/or service.
 - Another reason companies consider self-maintenance is the increase in available maintenance aids, either built into the hardware/software or separate testers.
 - Most firms operating networks directly employ technical personnel who know enough about the system that the incremental training for maintenance is relatively small and justified.
 - Aside from the fact that the manufacturers are available to help troubleshoot and fix problems on an ad hoc basis (in support of the users own maintenance), there are other advantages to user self-maintenance, including:

- User service personnel on-site, ready to provide service immediately (versus one-two vendor response).
 - Lower costs of service. Self-maintenance can be considerably cheaper than manufacturers' monthly contracted service.
- Because of the imminent and dramatic increased growth in networks, users are forcing vendors to become more familiar with network components and operations even if the equipment is from several different suppliers.
 - As mentioned earlier, the principal maintainers will have to learn other elements in the system to be capable of diagnosing the correct problem when there is a problem.
 - More mainframe maintenance groups are discovering data communications is a complicated but integral relative of data processing and are taking steps to increase their knowledge of it.
 - Likewise, data communications and peripheral/terminal maintainers are learning more about central system operations and service.
- Generally, as a trend, there is inertia and resistance from principal maintainers to actually assume the responsibility for service on equipment not built or marketed by them.
 - This is understandable because of potential conflicts of interest and competitive issues.
 - However, the demand for sole source, hybrid maintenance is currently being exploited by third-party or independent maintenance groups, who don't have an axe to grind or feel marketing pressures connected with certain hardware/software products.

- Without a doubt one of the biggest opportunities for today's service organization is in helping the network user reduce the number of service interfaces within a network, thereby enhancing efficiency and control. This opportunity, available to both manufacturers and independent service groups, exists in two different areas:
 - One way to take advantage of the need for single-source maintenance is to develop a resource to manage network maintenance. The user would then perceive one maintainer or service manager. That service manager could, in turn, subcontract service on unfamiliar products back to their original manufacturer's or agent's service. This would be worth a premium to the network user.
 - Another way of capitalizing on this would be for the principal maintainer (or any other maintainer in the network, for that matter) to actually learn the other products and take over their first level, for an additional fee of course.
- Communications networks involving satellite and telephone links, etc., as well as local area networks are definitely strong influences in the information processing service markets. It will pay the existing service firm to continue appraisal of network developments regardless of whether its interest is active or passive.

APPENDIX A: DEFINITIONS

A. VOICE-SWITCHING CONCEPTS

1. PBX (PRIVATE BRANCH EXCHANGE)

- Private Branch Exchange. A private voice-switching system serving an organization and located on its premises. On a PBX, calls can be made between stations on the premises and to and from external networks such as the public telephone network or other company locations.

2. CBX (COMPUTERIZED BRANCH EXCHANGE)

- This is a term generally used in the industry to describe a stored program, computer-driven PBX. The fact that a PBX is controlled by a computer does not necessarily mean that the switching is performed by digital technology. In the Dimension PBX, for example, the switching is of amplitude-modulated or analog pulses.

3. CENTREX

- A service for customers, functionally equivalent to a PBX, in which the switching functions are performed in a telephone company central office.

4. TANDEM SWITCHING

- A tandem switch interconnects trunk lines (that is, lines between switches). Often, in newer kinds of PBX equipment, tandem-switching capability and PBX-switching capability are combined. A key difference between a PBX and tandem switch is the amount of traffic handled on an incoming line. On a PBX, the amount of traffic from an individual station is relatively small, on the order of 20 minutes per day. On a trunk line from another switch, the traffic may be several times that volume.

5. ETS (ELECTRONIC TANDEM SWITCHING)

ETN (ELECTRONIC TANDEM NETWORK)

- ETN is a name given by Bell to their modern, private, tandem-switching system provided for medium to large customers. It is a network in which PBXs are interconnected by private lines through a tandem switch. The ETS or electronic tandem switch may be on AT&T premises in the form of ES Centrex Systems or it may be located on the customer's premises in the form of a Dimension PBX.

6. KEY SET

- A Key Set is an arrangement of telephone stations located on a customer's premises that allows any station to connect through outside lines to the Bell network. It does not allow communications between stations on the premises except by means of a separate intercom system often associated with the Key Set.

7. ACD (AUTOMATIC CALL DISTRIBUTOR)

- The ACD automatically distributes incoming calls evenly to operator or attendant positions. Without an automatic call distributor, the first answering position in a group would receive calls continually whereas the last position

would only receive calls when all other positions were busy. The AT&T version is called the Uniform Call Distributor. This capability is commonly required by large answering applications such as reservation centers.

8. SPACE DIVISION SWITCHING

- Space division switching is a method for switching circuits in which each connection through the switch takes a physically separate path. Basic electromechanical switches, such as step-by-step or cross-bar, are space division.

9. TIME DIVISION SWITCHING

- Time division switching is a process of switching time division multiplexed circuits by shifting the data from one time slot on an incoming line to a different time slot on an outgoing line. Most new digital switching systems operate with this kind of a process as opposed to a space division switching method. The form of the actual switching should not be confused with the stored program computer, which can be used to control either type of switch.

10. DID (DIRECT INWARD DIALING)

- Direct inward dialing is a method where each station on a PBX can be addressed by incoming callers as a unique station number. DID was originally available only on Centrex.

11. AIOD (AUTOMATIC IDENTIFIED OUTWARD DIALING)

- Automatic identified outward dialing is a process whereby a station on a PBX can originate calls into the public telephone network and have them identified to the individual station.

12. PEG COUNT

- A peg count is a count of all calls offered to a trunk group, usually measured by the hour. As applied to units of common control switching systems, peg count or carried peg count means the number of calls actually handled during a one-hour period.

B. VOICE TRANSMISSION CONCEPTS

1. TRUNK

- The trunk is a communication channel between two switching systems. It may also include lines between a subscriber location and a telephone company central office. These latter kinds of trunk lines are referred to as local loops.

2. TRUNK GROUP

- A number of trunks used interchangeably between a pair of switches constitutes a trunk group.

3. IMT (INTER MACHINE TRUNK)

- An inter machine trunk is a trunk connecting two tandem-switching systems.

4. DIAL-REPEATING TIE LINES

- Dial-repeating tie lines are PBX tie trunks used for interconnecting PBX equipment. They are capable of handling PBX station-signaling information without attendant assistance.

5. CO TRUNK (CENTRAL OFFICE TRUNK)

- The central office trunk is a channel connecting a PBX to the central office of the telephone company. It is often termed a local loop.

6. FX (FOREIGN EXCHANGE)

- The FX is a connection between a user location and a remote public telephone exchange whereby the user can send or receive calls as though he were a subscriber in that foreign exchange. The line between the foreign exchange and the user location is a private line.

7. HYBRID OR HYBRID COIL

- This is an electrical circuit used to couple four-wire circuits to two-wire circuits. The telephone set is a four-wire device. The local line that connects the telephone to the telephone switching system is normally a two-wire circuit. A hybrid is used to couple the telephone into a two-wire local loop. It is at the hybrid where echoes that need to be suppressed on long-distance circuits are generated.

8. T-CARRIER

- The T-carrier is a hierarchy of digital systems designed to carry speech and other signals in digital form. They are designated T1, T2, and T4. A T1 carrier operates at 1.544 megabits. A T2 operates at 6.312 megabits, and a T4 operates at 274 megabits. The Bell System is the primary user of T-Carrier systems and has about 100 million voice circuit miles of such facilities in place. This represents approximately one-half million T-Carrier circuits.

9. ECHO SUPPRESSION

- Echo suppression is a process for deliberately inserting loss in the opposite direction of speech transmission for suppressing echoes of the transmitter's voice as reflected from the destination. In the public telephone network, echo suppressors are used on circuits longer than 1,850 miles. Echo suppression becomes a critical problem in two areas of communications:
 - The first is in the use of telephone networks for full duplex data communications in which the echo suppressor will effectively eliminate one direction of transmission. To eliminate this effect, special signaling is built into modems designed for use on the telephone network. This signaling removes the echo suppressors from the transmission path.
 - Secondly, on satellite channels where the transmission delay is approximately one-quarter second, an inadequate level of echo suppression on a voice conversation can result in an echo that is very pronounced and disturbing to the speaker.

10. COMPANDOR

- This is an abbreviation for compressor-expander. Comping is a process that compresses the higher amplitude parts and expands the lower amplitude parts of a signal on the transmitting end and then reverses the process on the receiving end. It is a process that usually precedes modulation in order to improve the signal-to-noise ratio on a transmittal signal without greatly increasing the required bandwidth.

11. TASI (TIME ASSIGNMENT SPEECH INTERPOLATION)
DSI (DIGITAL SPEECH INTERPOLATION)

- These are processes whereby multiple voice conversations can be transmitted over a reduced number of lines by using the gaps in typical voice conversations. Normally only one speaker at a time is transmitting, which cuts the amount of traffic in half. In addition, most speakers have some fraction of time between words or phrases. TASI and now, more efficiently, DSI take advantage of these gaps to place one voice conversation on about 45% of the otherwise required bandwidth.

12. IN-BAND SIGNALING

- In-band signaling uses the same path as a message, and the signaling frequencies are in the same range as those used for basic communications. The alternative method is out-of-band signaling. The Common Control Interoffice Signaling System is a method of out-of-band signaling.

13. E&M SIGNALING

- E&M signaling is a telephone signaling arrangement characterized by the use of separate paths for signaling and voice signals. The M lead (derived from mouth) transmits ground or battery to the distant end. The E lead (derived from ear) receives either a grounded or open condition.

14. TIP AND RING

- Tip and ring are the two conductors associated with a two-wire cable pair. The terms tip and ring are derived from the physical characteristics of an operator's plug on a manual switchboard.

C. PUBLIC-SWITCHED TELEPHONE CONCEPTS

1. CO (CENTRAL OFFICE)

- CO is a telephone company building or switching center that is the initial location at which subscriber lines or PBX trunks are transferred into the telephone company system.

2. CLASS 5 OFFICE

- A local central office that serves as the network entry point for subscriber lines is a class 5 office, also called an end office. Other offices, classes 1, 2, 3, and 4, are toll offices or tandem offices in a telephone network.

3. NPA (NUMBERING PLAN AREA)

- The area code system by which telephone directory numbers are subgrouped geographically is a numbering plan area. A three-digit, NO/IX or NXX code is assigned to each NPA where:

- N = any digit 2 through 9.

- O/I = 0 or 1.

- X = any digit 0 through 9.

4. SERVICE CODE

- A code, typically of the N11 series such as 411 (directory assistance) and 911 (emergency), that defines a connection for a service rather than for a customer.

5. CCIS (COMMON-CHANNEL INTEROFFICE SIGNALING)

- This is a system being implemented on the public telephone network whereby the signaling information, such as dial information, is transmitted separately from the actual voice circuit connection. This dial information is sent to a common database, which then translates the information into instructions to the network switching equipment to establish the appropriate connection.
- In addition to reducing the call set-up and dialing information time, CCIS opens many opportunities for new services. One possibility is the translation of a number as dialed into a different number, depending on the status of the location being dialed or the origin of the call.

D. DATA TRANSMISSION CONCEPTS

1. MODULATION

- Modulation is a process of converting signals into frequencies to more efficiently transmit them over the transmission circuits. It often is related to the conversion of digital data pulses to transmission frequencies.

2. FM (FREQUENCY MODULATION)

- This technique, the same one used in FM broadcasting, is used extensively to place voice signals onto a transmission media such as a wire or a radio channel or microwave beam.

3. MODEM (OR DATASET)

- Modem is a contraction of the words "modulator" and "demodulator," signifying an equipment unit that performs both of these functions. A modem also

performs other line interfacing functions. Hence dataset is in fact a more appropriate term.

4. FSK (FREQUENCY SHIFT KEYING)

- FSK is a modulation technique for transmitting digital information with two or possibly more discrete states. Each of the discrete states is represented by an associated frequency. The most common form is binary FSK, which uses two frequencies to represent the two states. Most basic low-speed modems use FSK modulation.

5. PSK (PHASE SHIFT KEYING)

- PSK is a modulation technique for transmitting digital information in which that information is conveyed by selecting discrete phase changes of the carrier signal.

6. PAM (PULSE AMPLITUDE MODULATION)

- PAS is a technique of breaking up a continuous analog signal into individual pulses, the amplitude of each pulse representing a sample of the analog signal at a particular point in time. The analog signal is usually sampled at a rate of two or more times the highest frequency. In voice communications, the normal frequency range for voice is four kilohertz, therefore the sample is at either 8,000 or 16,000 pulses per second. It is these PAM signals that are switched by the ESS and by the Dimension equipment of AT&T.

7. PCM (PULSE CODE MODULATION)

- In the PCM technique the analog signal is converted to pulses as before, but the individual pulses are no longer left in their amplitude form, they are measured and converted into a digital representation or code. PCM is used in most digital transmission systems, particularly the T-Carrier series of AT&T.

8. DELTA MODULATION

- This is another technique in which the signal is not directly converted to a digital code but, rather, changes in the signal are encoded from one sample time to the next.

9. QAM (QUADRATURE AMPLITUDE MODULATION)

- Quadrature amplitude modulation is a modulation system in which two independent signals are impressed on carriers of the same frequency that are 90 degrees out of phase with one another.

10. MUX (MULTIPLEXING)

- This is a technique in which multiple channels of communication are combined so they can be transmitted on a single physical channel.

11. FDM (FREQUENCY DIVISION MULTIPLEXING)

- This multiplexing technique uses frequency modulation to place communication channels at different frequencies within the same physical transmission path.

12. TDM (TIME DIVISION MULTIPLEXING)

- This technique uses some form of pulse modulation to place pulses from multiple channels sequentially onto a transmission path. T-Carrier is a time division multiplexing transmission system.

13. REVERSE CHANNEL OR SECONDARY CHANNEL

- Reverse channel or secondary channel is a feature of certain data sets or modems that allows simultaneous transmission (usually of control or pacing information and usually at lower speeds than the primary channel) from the receiver to the transmitter over a basically half-duplex data transmission channel.

14. EIA (ELECTRONIC INDUSTRIES ASSOCIATION) INTERFACE

- This is a set of standard signals and signal characteristics specified by the Electronic Industries Association. This terminology usually refers to the RS-232 C interface previously referred to in this report. The RS-232 C has been replaced on an interim basis by the RS-449 interface and more recently by the X.21 interface.

15. DUV (DATA UNDER VOICE)

- DUV is an arrangement for transmitting 1.544 megabyte per second data streams in the bandwidth available underneath the portion of the microwave radio beam used for voice channels. DUV is the primary long-haul transmission facility used for Dataphone Digital Service.

16. ERROR RATE

- A measure of the performance of a digital transmission system. It can be specified as a bit error rate or as a byte error rate (the probability of an error per byte transmitted or the accumulated number of byte errors in a period of time) or as a block error rate (the probability of one or more errors in a specified length block of bytes) or in other forms such as percent error-free seconds.

17. ARQ (AUTOMATIC REPEAT REQUEST)

- Automatic Repeat Request is a system for controlling data transmissions based on requesting retransmission upon detection of an error. There are two basic classes of ARQ systems: stop-and-wait ARQ and continuous ARQ.
 - In the stop-and-wait ARQ method, a block is not transmitted until the positive acknowledgment is received from the preceding block.
 - In the continuous ARQ, blocks are continuously transmitted until the receipt of a negative acknowledgment, at which time the transmitter will either repeat the specific block defined as in error or will go back to that block and repeat it and all subsequent blocks. The first method is called selective repeat ARQ and the second method is called Go-Back-n ARQ. IBM's Bi Synch transmission method is a stop-and-wait ARQ. SDLC is Go-Back-n ARQ.

18. TDMA (TIME DIVISION MULTIPLE ACCESS)

- Time Division Multiple Access is a method for sharing a multipoint or broadcast channel among users at different geographic locations by allocating different time slots to different users. This type of system is to be used by SBS in their planned satellite communications service.

19. CODEC (CODER-DECODER)

- This is a device used to convert analog signals, such as voice, into digital form for transmission over a digital medium. This is the reverse process of a modem, which converts digital signals into analog form for transmission over an analog medium. At present a Codec is a relatively expensive unit that is shared at a common carrier location or at a PBX.

E. COMMUNICATION SYSTEM CONCEPTS

1. CONCENTRATOR

- The concentrator is a switching system that allows a small number of trunk lines to be served by a large number of subscriber lines.

2. MESSAGE SWITCHING

- Message switching is a process of receiving a message, storing it and then retransmitting it. This term is often used interchangeably with store-and-forward switching.

3. FAST-CIRCUIT SWITCHING

- This is a form of switching for interactive traffic in which a circuit is established for the duration of a session. The technique is somewhat analogous to TASI as used for circuits.

4. ALTERNATE ROUTING

- Alternate routing is a predefined "other" route used for particular situations, especially circuit failures.

5. ADAPTIVE ROUTING

- Adaptive routing is a system for routing connections that is automatically adjusted to changes in the network such as circuit failures or high traffic delays.

6. MULTIPOINT CIRCUIT

- This is a single circuit connecting three or more locations.

7. POLLING

- Polling is a multipoint circuit control mechanism whereby a center calls each station on the circuit in turn to ask if there is any information to be transmitted.

8. SELECTION

- Selection is a process of controlling a multipoint line whereby the station to receive information is addressed uniquely, and data is transmitted on the circuit and recognized only by the selected station.

9. TECHNICAL CONTROL CENTER

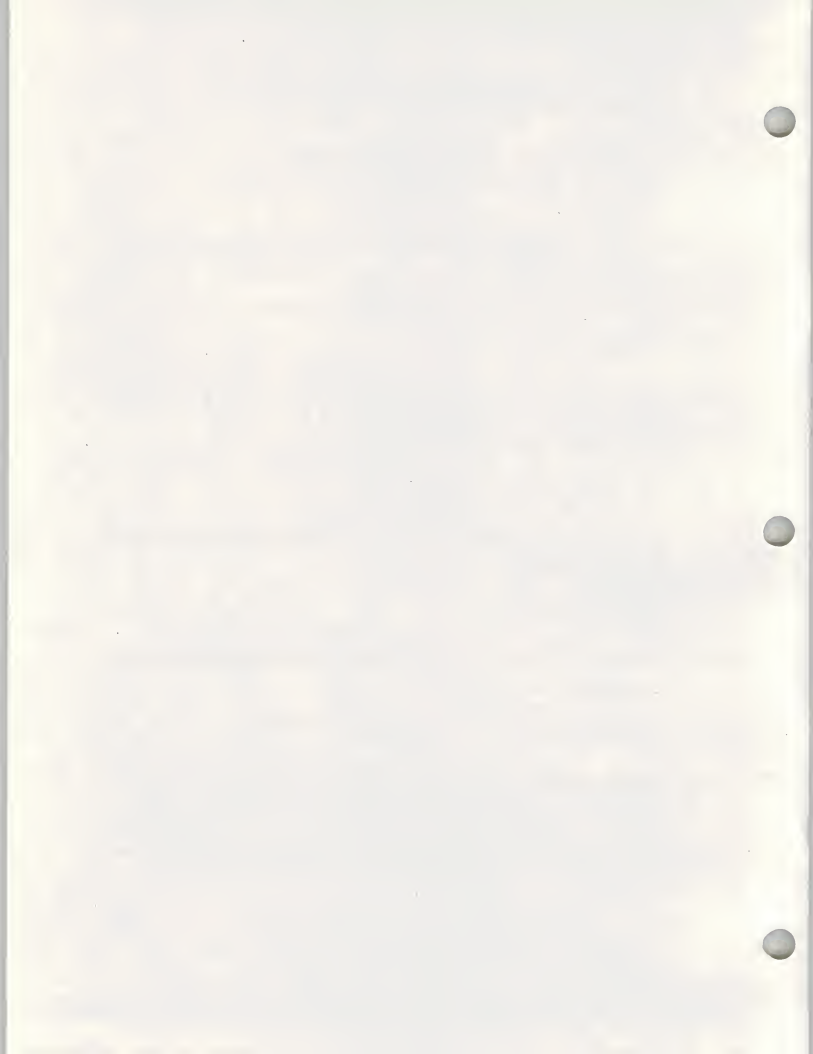
- The technical control center is a facility for the diagnosis and control of the transmission network.

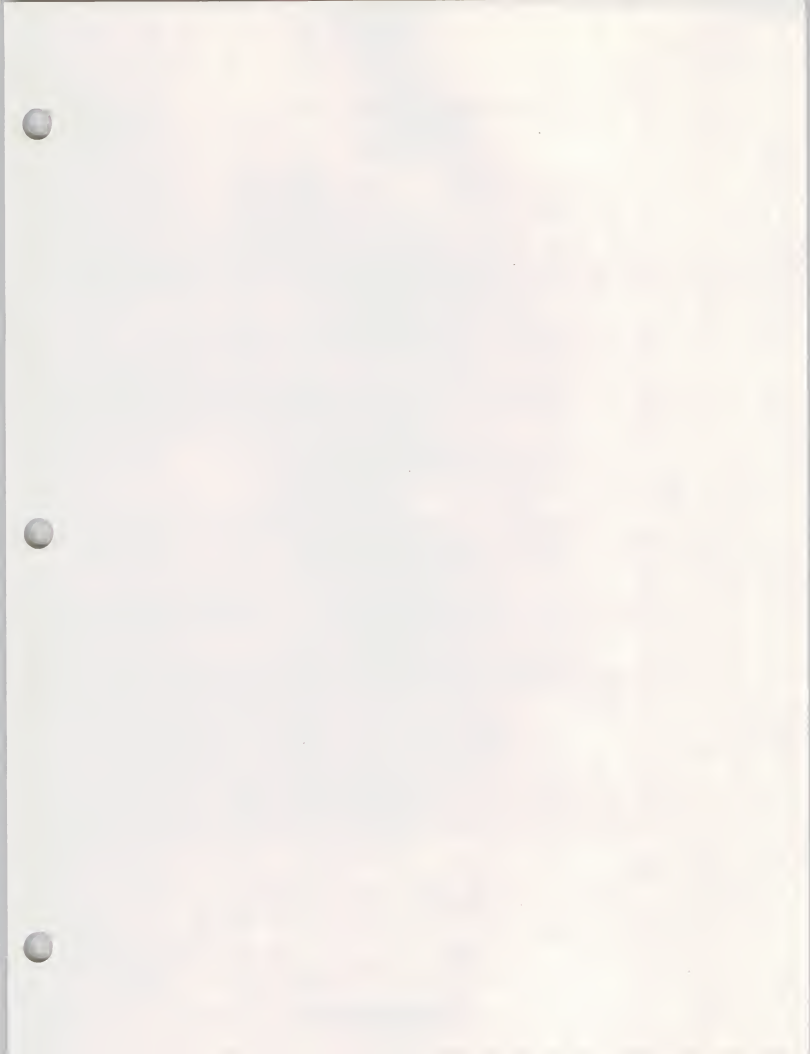
10. TWO TIER TARIFFS

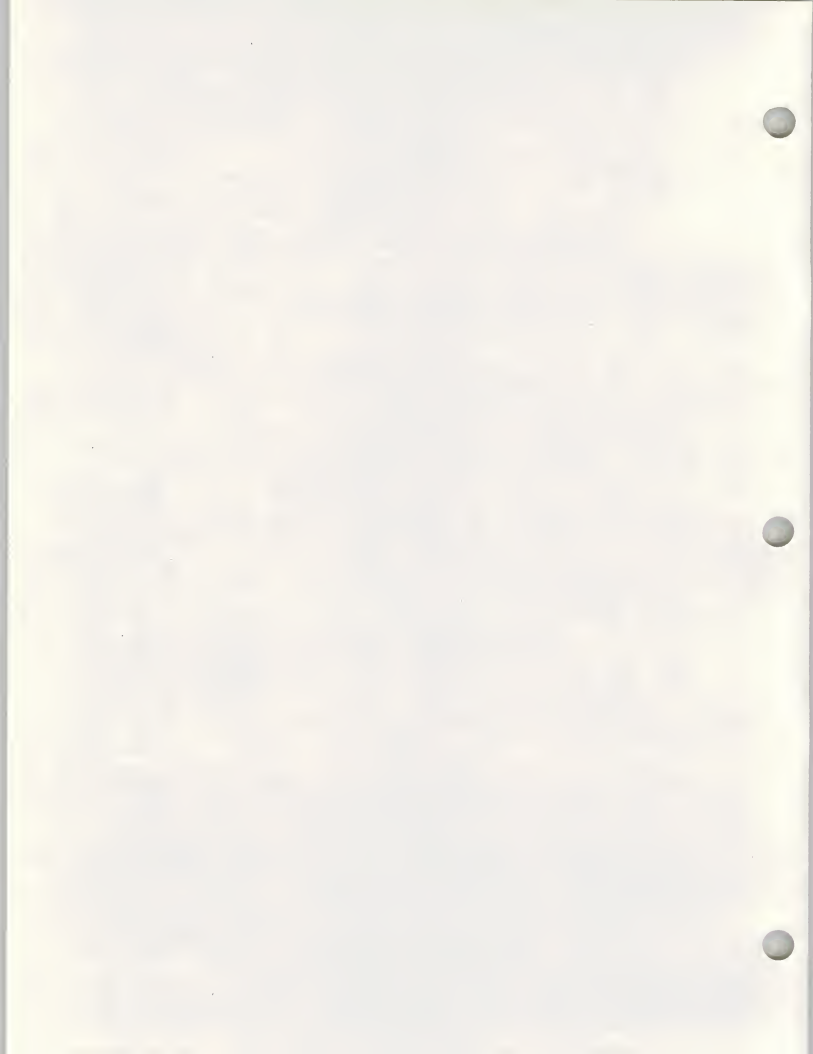
- This is a tariff structure providing for a decrease in monthly equipment charges after a contracted period.

11. SERVICE TARIFFS

- These are tariffs filed primarily on the basis of value of service provided and secondarily on the cost of the serving vehicle. For example, local exchange rates are usually based on the number of telephones in the exchange area rather than on the type of switching system serving the particular exchange area.







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

- Management Planning Program in Information Systems - Provides managers of large computer/communications facilities with timely and accurate information on developments which affect today's decisions and plans for the future.
- Management Planning Program for the Information Services Industry - Provides market forecasts and business information to software and processing services companies to support planning and product decisions.
- Company Analysis and Monitoring Program for the Information Services Industry - Provides immediate access to detailed information on over 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.
- 1982 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 planning services firm. Clients include over 100 of the world's largest and most technically advanced companies.

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Planning Services for Management

INPUT
MANAGEMENT
PLANNING PROGRAM
IN
FIELD SERVICE

**MANAGEMENT PLANNING PROGRAM
IN FIELD SERVICE**

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

DESCRIPTION: Client field services each year:

- **Management Issues:** Technical and managerial specific issues. F-1983 EBQ. An important new technical area. Reports focus on management.
- **Planning Support:** Will assist in field services. TITLE: Quality Mix in Field Service. AUTHOR: [Redacted]. An in-depth analysis of recommendations that gives in the planning of
- **Annual Research:** Field services, field service technical, future research. F-1983 EBQ. Activities in the field of their effects on future of likely changes in occur, may affect the
- **Annual Presentation:** Field service research program half of each year. In-house presentation to of the current year's lines for the research will occur in the second
- **Inquiry Service:** Needed by staffed executives. Research staff on an as-special "hot line" is requirements.

RESEARCH METHODS: Research in computers, communications, and

- Research representation: Discussions with client
- Research contacts: Interviews with users, vendors, universities, industry associations, and other analysts.
- Conclusions derived from the research are based on the judgement of INPUT's professional staff.
- Professional staff members supporting this program average nearly 20 years of experience in data processing and communications, including senior management positions with major vendors and users.

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

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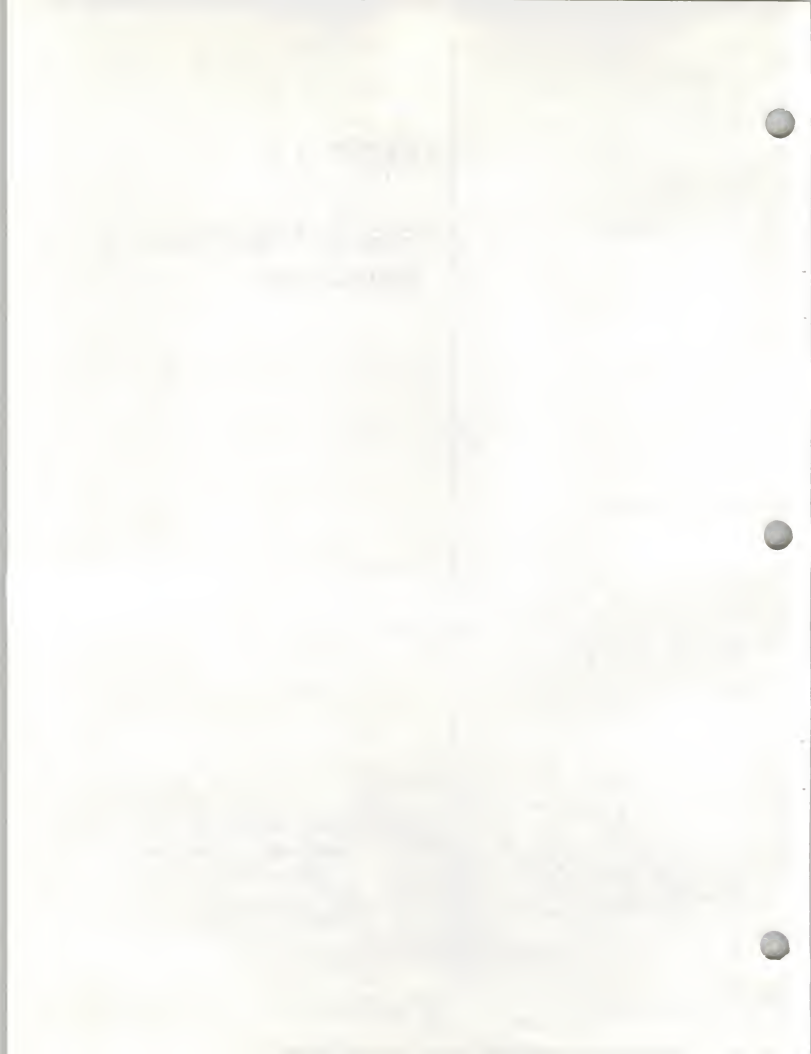
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FIELD SERVICE PROGRAM

FIELD SERVICE BRIEF

THE QUALITY MIX IN
FIELD SERVICE

AUGUST 1983



THE QUALITY MIX IN FIELD SERVICE

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THE QUALITY MIX IN FIELD SERVICE

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I INTRODUCTION

A. PURPOSE

- This brief, entitled The Quality Mix in Field Service, is part of a series of briefs and issue reports written by INPUT Ltd. for the 1983 Field Service Programme-Europe.
- The subject, "quality assurance," was chosen by INPUT's clients as an important one for review and analysis.
- Users are becoming less tolerant of the lack of quality in information products because, in some cases, it affects their businesses and careers. As vendors have become more aware of this, their focus on quality has sharpened.
 - The issue of quality in tangible and intangible hardware and software products is quickly becoming another criterion for product differentiation and, consequently, a new selection or buying consideration for information processing products.
 - Machines are supposed to be reliable and workable. There are certain standards and expectations for various types of equipment.
- Manufacturers or maintainers of information processing equipment are well aware of various mean-time-between-failure statistics for standalone units as well as for system components.

- A few years ago an acceptable level of equipment performance was at or around 90% uptime for computer users. Now it is generally above 95% and is heading for 100%.
 - Would we be satisfied to fly in an airplane or own an automobile that was nonfunctional for 5% to 10% of the time?
 - Obviously not, and the impact of a system that is down is much greater now than it used to be in terms of assets and personnel.
- Thankfully, product quality has been enhanced with better component parts and software engineering, as has service quality using better techniques.

B. SCOPE

- This report addresses service quality rather than product quality: the two differ significantly in concept and meaning.
 - Quality of products is largely related to the functionality of the product or equipment, or to intangibles such as software.
 - Quality of service is a more abstract term than product quality since service is more people oriented than product oriented.
- Product quality control relies heavily on measuring and monitoring various functions by employing statistics, standards, and sampling. The aim of product quality control is to prevent unacceptable equipment devices and products from reaching the user. It therefore normally takes place at the manufacturer's plant or factory.

- But service quality applies after the product has reached the field and is in the user's possession.

- Chapter IV explores the meaning of service quality with respect to parameters previously employed by INPUT to measure end users' and vendors' attitudes about it. These constitute the quality mix and include:
 - Overall quality of service.
 - Quality of field engineers.
 - Quality of service management.
 - Availability of spare parts.
 - Software support capacity.
 - Preventive maintenance.
 - Remote diagnostics.
 - Quality of information and communication.
 - Value of service compared to price.
 - Quality of marketing and sales.
 - Product reliability.
 - Serviceability.
 - Repeat calls.

- These parameters are used to describe the quality of service that have been incorporated into INPUT's Field Service Annual Report-Europe for the past three years. The discussion in this brief will represent a preview of more comprehensive information to be included in the 1983 field service annual report.
- The vendors' perception of quality in terms of the 13 parameters mentioned above is also presented in Chapter IV. Specific, quantitative data from 29 information systems vendors is included.
- One of the links between service quality and product quality is open communication between field and factory about equipment failures in the field. This is an important aspect of quality assurance that transcends organizational boundaries. The field quality audit is an important means of fulfilling the quality communications link since most product failures occur at or shortly after installation.

C. METHODOLOGY

- Research for The Quality Mix In Field Service was obtained primarily through past and current INPUT surveys of customers' and vendors' attitudes and through INPUT and other business libraries. Data for exhibits showing user perceptions of vendor quality of service was taken from INPUT's 1982 Field Service Annual Survey. The vendor perception of quality data is derived from the 1983 Annual Questionnaire and includes vendors representing most European computer market constituencies, as shown in Exhibit I-1.
- As is always the case, INPUT Ltd. welcomes comments on its reports. You are invited to correspond with:

EXHIBIT I-1

VENDOR RESPONDENTS: PERCEPTION OF QUALITY

	TPM Firms	-	-	5	1	1	-	7	
Manufacturers		2	3	11	3	2	1	22	1
Principal Service									
Large		Modcomp CDC	CDC ICL Honeywell CFM	Nixdorf				7	6
Small		Philips Sweden Ericsson	Float Pt Thorn BASE Hamilton	MAI	Philips Thijssen	Computer- vision Italy		10	7
Peripherals and Terminals			MSI	CTS Digidata TSS	Vollwood	Raytheon		6	3
Office Products				Wang American- Monitor Racal Halycon	Pitney Bowes			5	5
Micros				Multi Computer				1	1
Total		2	3	16	4	3	1	29	22

- Keith Hocking, Managing Director
INPUT LTD.
35 Picadilly
London, W1
England

- Furthermore, INPUT Ltd. always appreciates hearing about other topics of interest to field service business management.

II EXECUTIVE SUMMARY

A. CONCLUSIONS

- There are finite definitions for describing quality as it pertains to products. Product quality control, usually performed in the factory before shipment, has evolved from a small idea by American Bell Telephone Company in 1924 to a currently sophisticated statistical measurement and control system with standards, principles, requirements, and sampling techniques.
- Service quality is, on the other hand, a different and less tangible phenomenon, void of standards, definitions, and techniques. In this and previous reports, INPUT Ltd. has focused on better understanding it.
- This attempt to classify service quality results in the service quality mix. The service quality mix includes, for purposes of discussion, 13 different facets:
 - Overall quality of service.
 - Quality of field engineers.
 - Quality of service management.
 - Availability of spare parts.

- Software support capability.
 - Preventive maintenance effectiveness.
 - Remote diagnostics.
 - Quality of information and communications.
 - Value of service compared to price.
 - Quality of marketing and sales.
 - Product reliability.
 - Serviceability
 - Repeat calls.
- These quality-of-service parameters were used for the 1983 INPUT Field Service Users' Survey. Exhibit II-1 shows the survey format.
 - INPUT is pleased to report that over 700 European users responded to this survey compared to 175 in 1982. Data is still being analyzed and will be included as part of the 1983 Field Service Annual Report.
 - Vendor data for 1983 has been tabulated and analyzed for this report and Exhibit II-2, a summary, shows a definite concern and involvement with service quality.
 - Service managers are beginning to develop better service rather than more service in response to the unequivocal demand in the user marketplace.

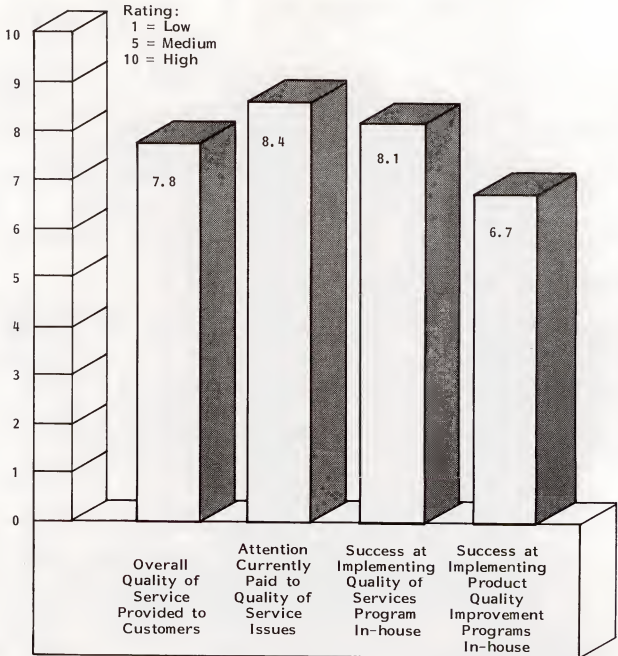
EXHIBIT II-1

1983 INPUT FIELD SERVICE SURVEY - USERS

Product Classification	Examples	Manufacturer of Your Equipment	Servicer of Your Equipment and Software (if different from Mfr.)	QUALITY OF SERVICE													
				1 = Low	5 = Average	10 = Excellent											
				Overall quality of service	Quality of engineers	Quality of service technicians	Availability of service equipment	Software support	Availability of spare parts	Responsiveness	Technical assistance	Remote diagnosis	Quality of information communication	Value of service contracts	Quality of service compared to other companies	Quality of training & seminars	Product reliability
Large Systems	IBM 308X BUR 6800 HCN DP27 LNI 9050 DEC-10																
Small Systems	IBM 8100 BUR 8800 HCN CP26 H-P 3000 NCR 8200																
Peripherals and Terminals	Self explanatory																
Data Communications	Modems Multiplexers Tech Control																
O F F I C E P R O D U C T S	Personal Computer	Self explanatory															
	Word Proc.	Self explanatory															
	Work Stations	Self explanatory															
	PBAX	Self explanatory															
	Copier Fax	Self explanatory															
	Other																
S O F T W A R E	System	Self explanatory															
	Applic.	Self explanatory															

EXHIBIT II-2

VENDORS' EVALUATION OF THE QUALITY OF SERVICE THEY PROVIDE
(AVERAGE SCORES)



SOURCE: INPUT Survey

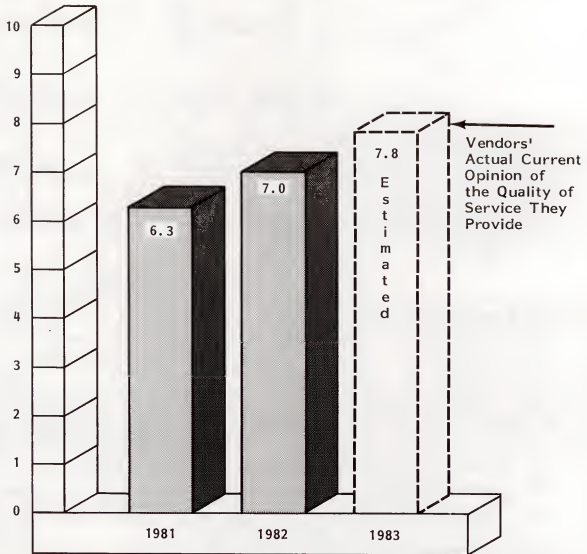
- Fortunately, users and vendors present no surprises for each other in terms of service quality. Exhibit II-3 shows that independent evaluations, users' evaluations of vendors, and vendors' evaluations of themselves are very close.
- One of the most measurable and prominent ingredients in the quality mix is repeat calls. Repeat calls can ruin an otherwise satisfactory image of service quality. Vendors are displeased with the number of repeat calls they make.
 - The average number of repeat calls as a percent of total service calls is 9.5%.
 - Vendors believe that repeat calls ideally should be 1.1% of total service calls.
 - The excess can mean extra costs and can spoil overall service quality.
- Overall, vendors are adequately keeping pace with users' demands for better quality.

B. RECOMMENDATIONS

- Vendors should establish better definitions for describing service quality. INPUT provides a broad definition of a quality mix, but this should be used to identify the specific, objective, and measurable aspects of service quality. Relative scales of expression of service quality (such as 1 to 10) are sufficient now, but more distinction will be needed within the next three years because users are pushing for higher quality of service.
- Vendors, again, must take up the challenge to do a better and more persuasive job in selling their ideas outside the service structure. The wealth of products failure data in field service archives that never gets back to designers, engi-

EXHIBIT II-3

RANKINGS OF OVERALL QUALITY OF SERVICE
BY EUROPEAN USERS



SOURCE: INPUT Survey

neers, and manufacturers is appalling. Programs are needed for providing this critical information for engineers et al to make use of it for quality enhancements.

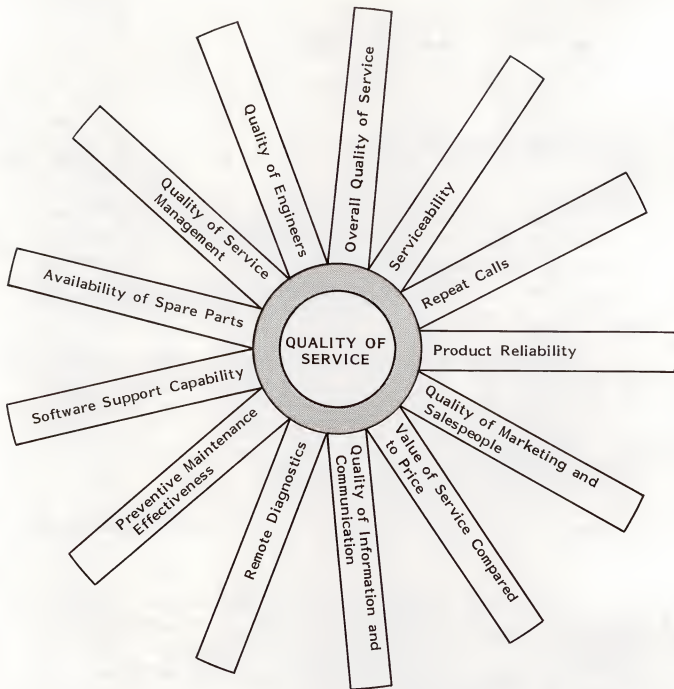
- One example for integrating service quality and product quality objectives is an installation quality audit that could be performed selectively. The object would be to physically check equipment and software as it is unpacked and installed at the customer site to determine whether it in fact does what it is supposed to do.
 - Other aspects of such an audit would be to check quantities and sizes of cables and accessories as well as the correct model numbers of delivered goods.
 - Results of the audit, when given to manufacturing, scheduling, and shipping, should improve quality and lower costs for the vendor.

III THE MEANING OF QUALITY IN SERVICE

A. OVERALL QUALITY OF SERVICE

- Overall quality of service is, like most other parameters in service quality, a subjective assessment. INPUT traditionally uses a scale of 1 to 10 where 10 is very good, 5 is average, and 1 is very bad. The appropriate grade selected by the user or vendor expresses the respondent's view of overall quality. The simple relationship of quality parameters to service is shown in Exhibit III-1.
- Overall quality is a separate parameter and stands alone despite the fact that logically it could be valued by the average of all the other 12 scores relating to service quality.
 - It is the evaluator's first impression of overall quality and encompasses a "one-shot" impression.
 - Its value may be biased by the evaluator's most recent maintenance problem, or lack thereof.
 - For example, if at a given moment a user is requested to provide his opinion of service quality and his system is down and the service engineer has not yet diagnosed the cause of the problem, an otherwise higher score may be lowered in the respondent's mind because of the interruption.

EXHIBIT III-1
QUALITY OF SERVICE MIX



- The lack of a definition for service quality is understandable since both terms, quality and service, are loosely defined. Quality has no set, agreed-upon definition within or outside the context of service.

- Service is also a complex concept with various meanings, a few of which are described below:
 - In one sense, service may connote the absence of a need for service attention. This definition is more passive than others.

 - Another view of service may simply be the perceived responsiveness of the servicer, quantitatively and qualitatively. Again, qualitative responsiveness is subjective, but it encompasses how the response is carried out - continuously, efficiently, intelligently, professionally, etc.

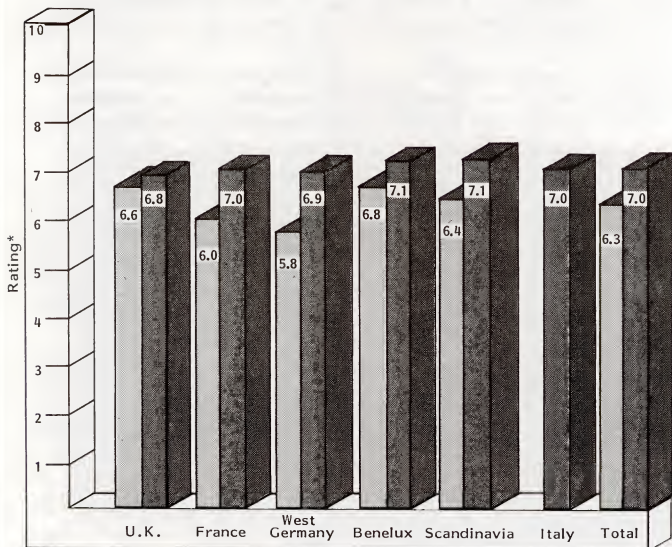
 - Quantitative responsiveness is more tangible: it refers to the time it takes the serviceman to show up or phone in to solve the problem.

 - The concept of service also reflects the overall confidence the user has in the vendor. The relationship between a user of service and a provider of service may become important. Repeated visits by the same competent engineer to a single user helps establish a special personal relationship and develops confidence.

- Exhibit III-2 provides an analysis of European users' views of overall quality of service.

EXHIBIT III-2

USERS' RATINGS OF THE OVERALL QUALITY OF MAINTENANCE



* 1 = Poor
 5 = Average
 10 = Excellent

□ = 1981
 ■ = 1982

SOURCE: INPUT Survey

B. QUALITY OF FIELD ENGINEERS

- Service quality depends on the relationship between the individual(s) representing the customer and the individual(s) representing the maintainer. The maintenance organization's representative or agent is the service organization in the eyes of the user.

- It is important for the service provider to fully understand that the customer perceives the engineer to be a number of different things, not just a mechanical or electrical fixer. These impressions include:
 - A technical expert.
 - A nice person.
 - The company.
 - Problem solver.
 - Advisor.
 - Consultant.
 - A professional.
 - Sympathetic.
 - Resource broker.
 - Dedicated.

- Trustworthy.
- Instructor.
- These impressions and perceptions of the service engineer place extraordinary pressures on him. They also provide him with powerful or potentially powerful persuasive attributes.
 - In earlier INPUT studies, research from America showed that users act upon more than one quarter of the suggestions or recommendations they receive from service engineers.
 - With this multifaceted talent, a service engineer can have a very significant impact on service quality.
- There is a paradox developing as the role of field engineer changes. As service providers tend to displace repairs off-site to repair centres, the requirement for all-around engineers on site is superseded by a less skillful board swapper or delivery man who receives instruction from a more capable technical source located at central dispatch or support centres.
- Retracting this valuable user asset in exchange for a less skilled employee may not affect quality perception as much in smaller, minicomputer and microcomputer market segments. Large-system users might not appreciate being transferred to service personnel with fewer skills.
- Service vendors who are sensitive to their customers' dependence on a particular person for service, will carefully review that any changes in on-site personnel.
 - One approach is for the known technician to keep in touch, even to make an occasional telephone call following a service incident.

- Also, vendors making changes in on-site personnel are wise to correspond with the user about these changes.
- Communication with the engineer is also an important management function. A lack of communication with engineers will quickly transform them into users' employees who are paid by the vendor. This does not produce quality assurance.
- Users' assessments of the quality of engineers, by European country, are presented in Exhibit III-3.

C. QUALITY OF SERVICE MANAGEMENT

- The principal link between the maintenance vendor and the customer is the engineer, as described earlier. But the organization behind the engineer is gradually showing up as another important factor in service quality.
- A short time ago it could be generally stated that the customer was more concerned with the individual service engineer than with the whole group because the remedial or preventive service required to keep systems up depended on him. Now, with trends to more centralized responsibility, users look at their service representatives with a more critical view of the company that stands behind them. In one instance, a new field engineer who was improperly trained was dispatched to a site, entered, announced himself, and after an uncomfortable pause, asked the user to identify his company's equipment! This lack of training stands out as an example of why customers become concerned with the quality of service management.
- The service manager is still the man in the middle as illustrated in Exhibit III-4.

EXHIBIT III-3

USERS' RATINGS OF THE QUALITY OF ENGINEERS

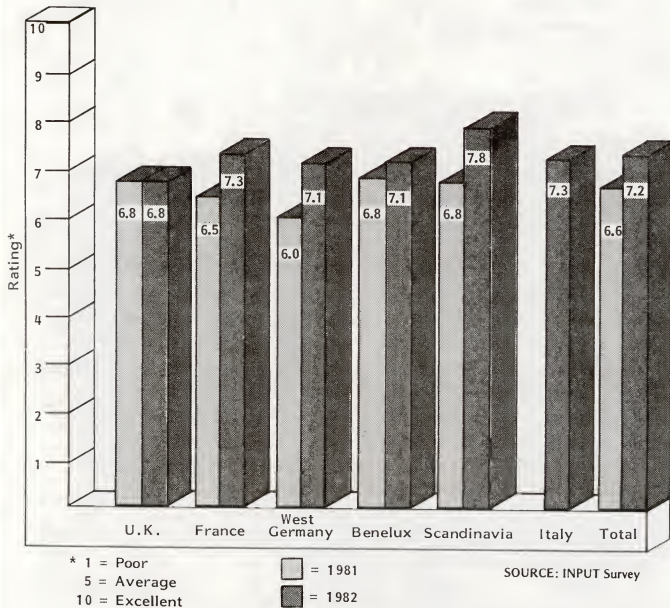
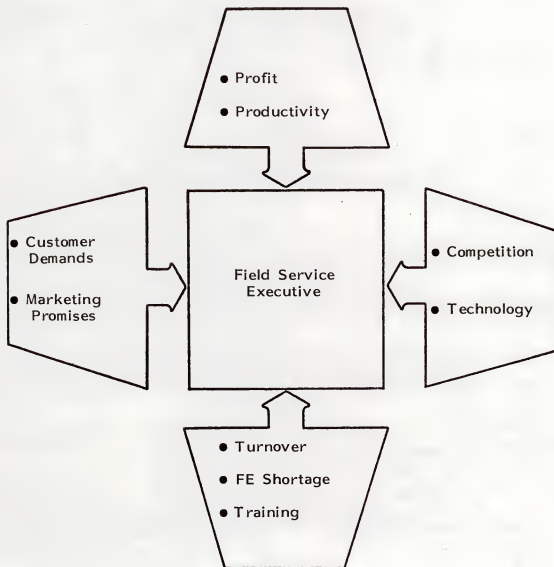


EXHIBIT III-4

THE FIELD SERVICE EXECUTIVE - MAN IN THE MIDDLE



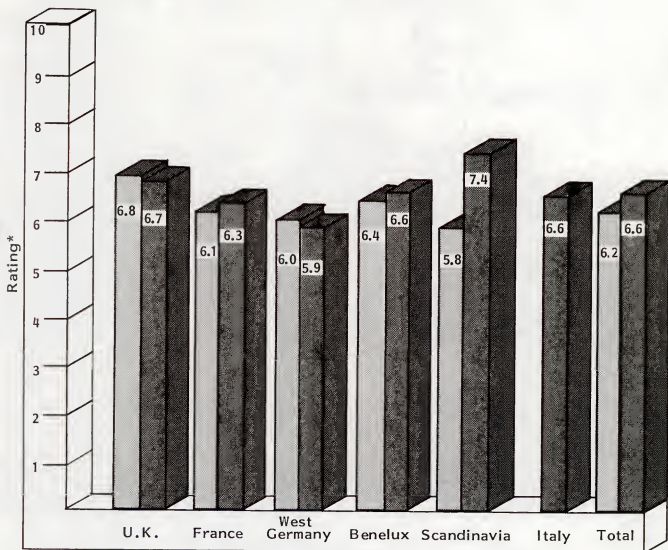
- In the ever-changing world of information processing products and services, the field service manager needs to retain a perspective. One of the new, important roles the service manager can perform is the role of communicator which is discussed in section H, Quality of Information and Communication.
- The quality of engineer managers, as rated by European users, is shown in Exhibit III-5.

D. AVAILABILITY OF SPARE PARTS

- A field service executive in the U.S., who is now retired, once cautioned that a "perfect" service organization would "go broke in a hurry." He considered perfection to be unlimited spare parts backup and engineer resources to go along with them.
- Service, after all, is nothing more than combining the optimum amounts of parts and labor to gain and sustain customer satisfaction. This is a simple formula but a challenging one to the best of service managers.
- Just as customers are critical of service management, they are also critical of stoppages caused by delayed or unavailable spare parts. To them, a delay in obtaining a needed spare part is analogous to a delay in an operating room where the heart transplant patient waits on the operating table, chest cavity open, while his doctor informs him (through the anesthetic) that he is trying to find a donor for the new heart.
- The spare parts pipeline, a significant element in service quality, will, as other parameters, be strained as demands for better service and quality continue.

EXHIBIT III-5

USERS' RATINGS OF THE QUALITY OF ENGINEER MANAGERS



* 1 = Poor
 5 = Average
 10 = Excellent

□ = 1981
 ■ = 1982

SOURCE: INPUT Survey

- This puts an especially difficult burden on the service provider as the parts management or logistics operation continues to deal with fewer, more concentrated, but much more expensive parts.
- Because customers are now keenly aware of parts shortages, service providers should monitor the supply of parts to minimize inordinate stoppages.
- European users' ratings of the availability of spare parts is shown in Exhibit III-6.

E. SOFTWARE SUPPORT CAPABILITY

- Software maintenance and support have assumed a critical element of the service quality mix. Almost all programming work requests from users are for maintenance activities (including enhancements). Sometimes, of course, only a new system can get the user out of a particular dead end, but it is a maintenance problem until the painful and usually expensive decision is made to implement a new system. In the U.S. software service companies provide better software maintenance than hardware companies, as shown in Exhibit III-7. There is no reason to think that this perception is any different in Europe.
- In spite of the importance and visibility of maintenance functions, maintenance is a stepchild in most user information systems departments.
 - New system development receives the lion's share of management attention.
 - Maintenance is too often a question of fire fighting.

EXHIBIT III-6

USERS' RATINGS OF THE AVAILABILITY OF SPARE PARTS

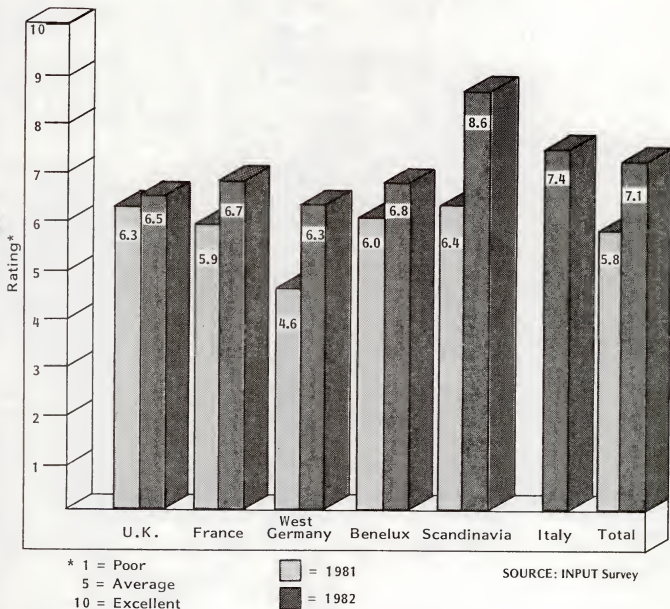
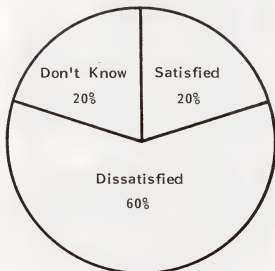


EXHIBIT III-7

CUSTOMER SATISFACTION WITH VENDOR SOFTWARE MAINTENANCE



Software Companies



Hardware Companies

Percent of Companies Perceiving
Their Customers as Satisfied
or Dissatisfied

SOURCE: INPUT Survey (U.S. Data)

- There is usually no maintenance staffing philosophy: maintenance is more often than not staffed by trainees, marginal performers, and those exiled to Siberia.
- The only career path open to superior performers is out of maintenance.
- If anything, maintenance is more demanding than new development, but the tools and management support provided are rarely adequate.
- Some authorities believe that the amount of maintenance needed will decrease. They see this occurring because:
 - User-developed systems will expand in number and importance. The personal computer explosion is one aspect of this; the information centre is another.
 - Software packages will penetrate even more deeply into most organizations. Newer packages will be more flexible and easier to use.
 - Software will be of higher quality as software productivity tools are more widely used.
- There is little doubt that these three trends are all occurring and will have many beneficial effects. However, user maintenance tasks and associated resources required will not diminish appreciably and will probably continue to grow.
 - User-developed systems largely serve needs that are considered low priority in IS prioritization processes. Consequently, the core development and maintenance workload is not going to go away. Equally important, even user-developed systems have to be maintained by someone. Some software packages do relieve IS departments of much,

if not all, maintenance burdens. However, there are key exceptions to this.

- Very inexpensive packages, most notably those for personal computers, cannot provide much in the way of support or modifications.
- Similar problems exist on the other end of the spectrum. Large, industry-oriented packages must often make compromises that result in packages that are both hard to install and hard to maintain. Consequently, some organizations (e.g., in insurance or banking industries) purchase large software systems to use only as a framework. After tailoring, these will require in-house maintenance as much as a custom-developed system does.

F. PREVENTIVE MAINTENANCE EFFECTIVENESS

- The debate continues as users cannot agree about the importance of preventive maintenance in their systems. For those that believe preventive maintenance is still essential, it becomes an important facet of quality of service.
- Early returns from the 1983 Annual Field Service User Survey indicate that about half of all users do not consider preventive maintenance significantly important in their operations.
- Of the group that are positively inclined towards preventive maintenance, about one-third think it is only important for printers.
- Also, those users who think preventive maintenance is a key factor in service quality are irritated when it interrupts their systems' productivity. Scheduled

preventive maintenance is desired by users, but vendors are now reluctant to make special preventive service calls because of the expense. Vendors prefer to perform preventive maintenance in conjunction with a corrective maintenance service call.

- Continued improvements in large systems' operating software have taken into account preventive maintenance to the extent that some subroutines when activated either by the customer or service representative, can examine the system and produce a list of parts and components that are likely to be the next cause of failure.
- Preventive maintenance, in terms of extra costs to vendors and extra downtime to users, will always be an unwanted but nevertheless meaningful part of service quality.

G. REMOTE DIAGNOSTICS

- Remote diagnostics were recognized by European service vendors in the 1982 INPUT Annual Field Service Survey as a major project for 1983. Remote diagnosis is an essential factor in the strategy to transfer field repairs and the required expertise to perform them to an off-site repair centre.
- While still relatively new in terms of vendor capability and user acceptance, remote diagnostics can be a strong contributor to the overall perception of service quality. The customer must be informed about the benefits of remote diagnostics before he will readily accept the concept. Field service groups with remote diagnostic resources are urged to communicate to their customers the procedures and benefits of remote diagnostics as an effective service tool.

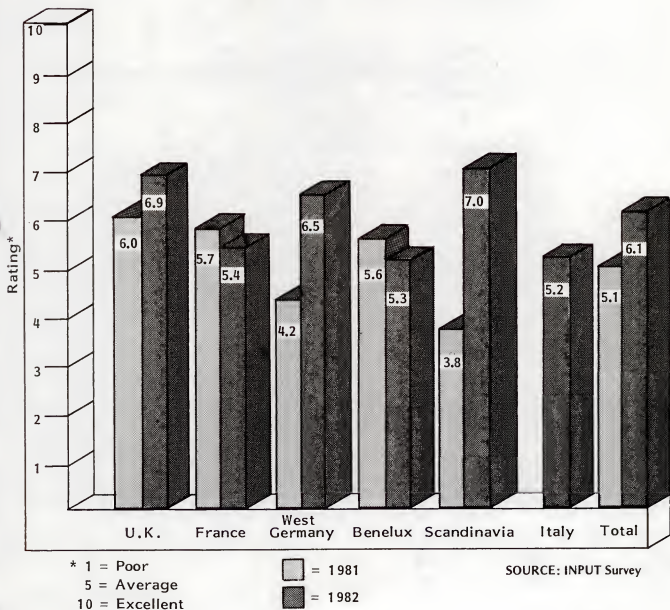
- As an important ingredient of service quality, the implementation of remote diagnostics deserves a user training session in larger installations. Familiarizing users in newer service techniques is the subject of another INPUT 1983 European Field Service Brief entitled, Developing User Acceptance for New Service Techniques.
- A summary of users' ratings of remote diagnostics is shown in Exhibit III-8.

H. QUALITY OF INFORMATION AND COMMUNICATION

- Lack of communication has been the major cause of misunderstanding throughout history, and certainly the information processing industry is not exempt from this. Sales and marketing groups are particularly vulnerable to information and communication quality as prospects and customers depend on it to make heavy financial commitments for equipment.
- The nature of information and communication in a post-sales environment is different. After the customer has made his commitment to buy, lease, or rent a product he depends on, the manufacturer or independent service group to help him protect and optimize the investment is crucial.
 - The information and communication by field service should develop in terms of a supportive link to the customer.
 - This channel can be an important one for the preservation and enhancement of service quality as perceived by the user.
- Existing examples of service-oriented information and communication exchanges include separate field service sessions at user group meetings. This forum can add beneficially to the user-vendor relationship through general presentations of technical or business interest as well as through hospitality

EXHIBIT III-8

USERS' RATINGS OF REMOTE DIAGNOSTICS



rooms that offer users and vendors the chance to communicate informally. Other examples include:

- Vendor publications in the form of newsletters, magazines, or press releases that involve interesting updates on technical, administrative, or organizational achievements.
- Dispatch centres where user and vendor usually meet each other over the telephone in various degrees of crisis.
 - The sound of a familiar voice at the dispatch centre can ease the caller's anxiety if previously good communication channels have been developed.
 - Users recently have made a strong point of the importance of a personal touch in their dealings with service.
- Regular or as-needed technical updates or field changes.
- One approach to improving the quality of information and communication by service vendors is the establishment of regularly set meetings between the customer and the vendor with the frequency depending on the size of the user's business. This accomplishes at least three objectives.
 - It places the vendor face to face with the user, developing a much stronger relationship. The user feels the vendor really cares.
 - Service managers are given a chance to improve the quality of their own lot in such meetings by just being there, listening and responding.
 - Provided there isn't a service call at the time of the meeting, the atmosphere should be a more friendly than critical one, for more creative planning and discussion.

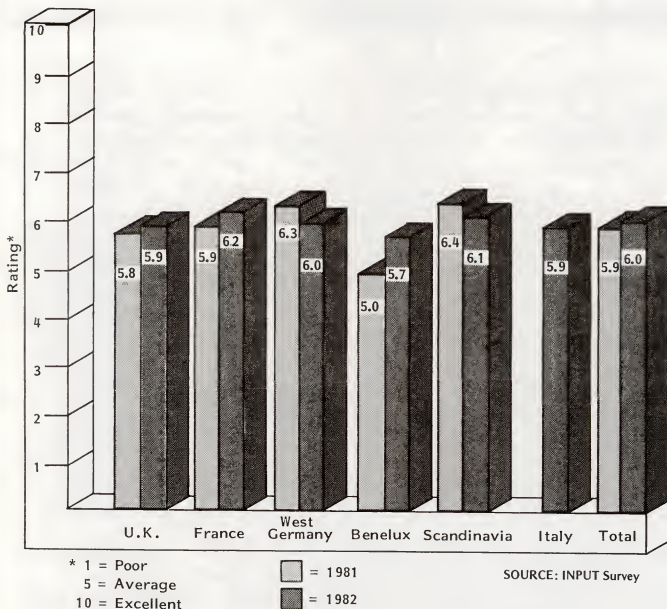
- Active rather than reactive forms of communication and information will enhance the service quality image.
- Quality of information ratings from European users are summarized in Exhibit III-9.

I. VALUE OF SERVICE COMPARED TO PRICE

- INPUT has stressed the changing nature of service prices for the past year, noting the current trend toward more elasticity in maintenance prices as compared to inelastic prices earlier. The developments creating more elasticity in service prices include the establishment of more competition for service, more reliable equipment and software, and other service options now open to users, including self-maintenance.
 - The establishment of more competition in service markets is derived from, and manifested by, independent or third-party maintenance organizations seeking a place in a very profitable and growing business area.
 - More reliable equipment, from chips to major assemblies, has obviated the need for as much service as older, more traditional equipment required.
 - Other service options are being sought by users as they become increasingly aware of the high cost of service.
- Users perceive that maintenance prices are too high. Freer competition for service emerged after a long period where no choices for service were offered, and it was mandatory to accept price increases because of this lack of choice. Sensitivity to maintenance prices will increase over time.

EXHIBIT III-9

USERS' RATINGS OF THE QUALITY OF INFORMATION



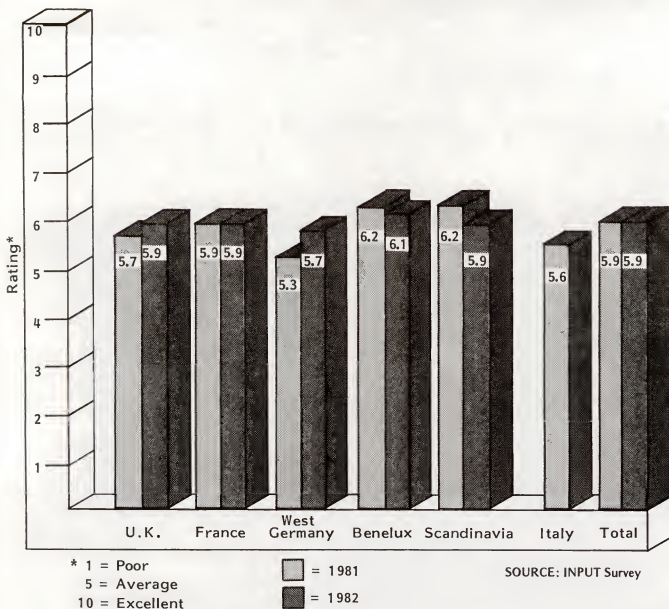
- The value of service is also under scrutiny by users as there is less and less evidence of its tangibility as remote diagnostics, board-swapping, and off-site repairs take place.
- The customer must be indoctrinated so that his perception of the value of service is its absence. This involves thinking about an insurance policy where there are few benefits unless there is a major disaster.
- The comparison between service pricing and value is becoming a key measurement of service quality.
- Customer evaluation of this important facet of quality are shown in Exhibit III-10.

J. QUALITY OF MARKETING AND SALES

- While the quality of marketing and sales organizations may not seem directly applicable to understanding and measuring service quality, it indirectly contributes to the user's impression of service quality.
 - Marketing and sales refer primarily to the selling and promoting organization(s) outside of field service.
 - In cases where service is marketed and sold by the service organization, the function represents an equally important aspect of service quality.
- Since marketing and sales are traditionally viewed by both users and vendors as the principal customer interface - their understanding of customer problems and issues and their attention thereto - become important quality factors.

EXHIBIT III-10

USERS' RATINGS OF THE VALUE OF MAINTENANCE COMPARED TO PRICE



- The inclusion of marketing and sales as a factor of service quality points out the need for the service group to develop and improve its relationship with the marketing and sales personnel. One way to achieve this is through better information and communication, already discussed.
- Quality of marketing and sales is a new parameter of service quality that has been included for the first time in INPUT's 1983 Annual Field Service Survey.
- Preliminary analysis shows that users generally rate overall service and the service engineer higher than they rate marketing and sales.

K. PRODUCT RELIABILITY

- Reliability can be defined as the expectation that an item will perform its required function. The expectation exists over the useful life of the item, with the warranty period expected to cover any quality control problems in the production of the item, and replacement to occur sometime during the wear-out period.
 - The performance concerns the overall mission, or operating conditions, within which the item is expected to perform its required function.
 - Most users do not have formal performance measurement systems and rely on subjective evaluation.
- Users equate "item" with "system" and are interested primarily in "system availability." The design/production arms of the vendor equate "item" with "product" and are interested primarily in "product reliability." The field service arm of the vendor also equates "item" with "product," and is interested primarily in "maintainability."

- Traditionally, reliability is expressed as MTBF of item/product/system, maintainability, as MTTR (mean time to repair of item/product/system), and availability, as uptime (a function of MTBF and MTTR of item/product/system).
- ARM (availability, reliability, maintainability) features are complex to understand, particularly as the marketplace integrates computer, office, and communications components to create information-handling systems.
- For the vendor, the key to understanding quality and reliability considerations lies in placing ARM concepts in proper focus.

L. OTHER QUALITY CONSIDERATIONS

I. SERVICEABILITY

- Serviceability means the perceived time it takes to respond to a service problem and to correct it, in the eyes of a user. Traditional perceptions of response time are giving way to newer techniques such as remote diagnosis and central dispatch.
 - Traditionally, users counted the time elapsed between placing the phone call for help and having someone show up, on-site, to begin fixing the problem.
 - More recently, response time consists of one or more telephone contacts from the vendor probing for verbal symptoms and perhaps even a direct dial-up connection from a remote service centre.

- These intermediate telephone responses to the problem contribute to the customer's impression of responsiveness.
- Repair time has also been conceptually improved as remote diagnostics and support centre resources become more available to troubleshoot leaving the installation of a fix as the major on-site activity.
- As viewed by users, the problem of spare parts is one unfortunate carry-over from the previous on-site diagnosis and repair strategy.
 - Despite improved, faster techniques for fault-finding, users still think they have to wait too long for a spare part replacement.
 - Not having the correct spare part replacement at the time of the initial call by the service technician doubles the cost as the serviceman has to make a return visit with the part.
 - A serviceability goal of 90% should be considered. This means that for 90% of all corrective maintenance calls the service technician will have the right part with him the first time.
 - Another spares problem perceived by users is the incidence of defective spare parts, those that are either new or repaired but don't work when they are installed as a fix.
 - This problem is corrected simply by increasing the quality control inspection and test of the part before leaving the factory.

2. REPEAT CALLS

- Repeat calls are those where the first service visit does not close the problem either because it is an intermittent one or because a spare part had to be retrieved.

- This is one of the less subjective parameters of quality, one which users can measure. Repeat calls are, therefore, very important in the quality mix because customers are generally intolerant of multiple efforts to fix the same problem. If repeat calls are a problem, the inflicted user is bound to have a negative perception of quality, overall.
- In Chapter IV of this report, vendors describe their incidences of repeat calls and the standards they believe should be acceptable.

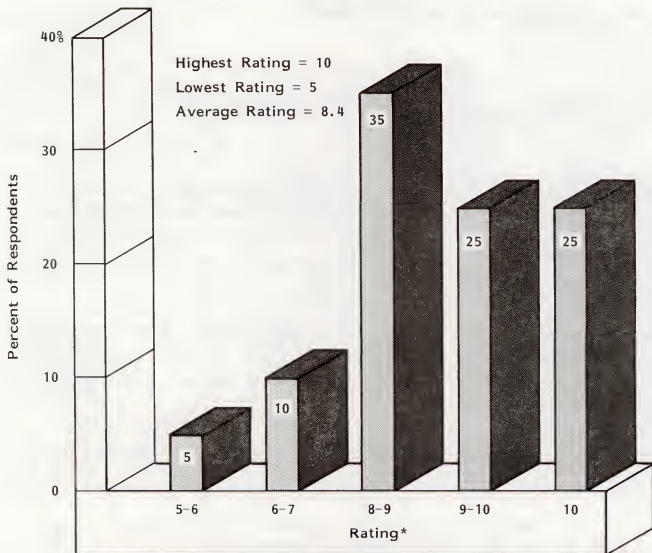
IV VENDORS' PERCEPTIONS OF QUALITY

A. ATTENTION NOW PAID TO QUALITY OF SERVICE

- The information systems marketplace demands higher levels of quality as the systems users make heavier economic investments and take more risks. Field service quality is part of this demand and, although it is subjective and somewhat difficult to measure, vendors are responding to the increased demand for field service quality.
- Exhibit IV-1 shows that 85% of the vendor respondents to the 1983 Field Service Annual Survey are putting a high priority on service quality. Fifty percent are ranking service quality at the top of the list of service management attention required.
 - None of the respondents ranks the subject of service quality below 5, or average in terms of attention required.
 - The largest group, 35%, rate the attention needed for quality of service at between 8 to 9 on the scale of 1 to 10, where 10 is high.
 - The average rating is 8.4.
- As product and service quality become more significant in the marketplace, it is not surprising that field service managers are spending much of their time

EXHIBIT IV-1

ATTENTION NOW PAID TO SERVICE QUALITY
BY SERVICE VENDORS



* 1 = Low
5 = Medium
10 = High

SOURCE: INPUT Survey

thinking about quality of service. To assign lower priorities to the subject of service quality would be a mistake if customers knew about it.

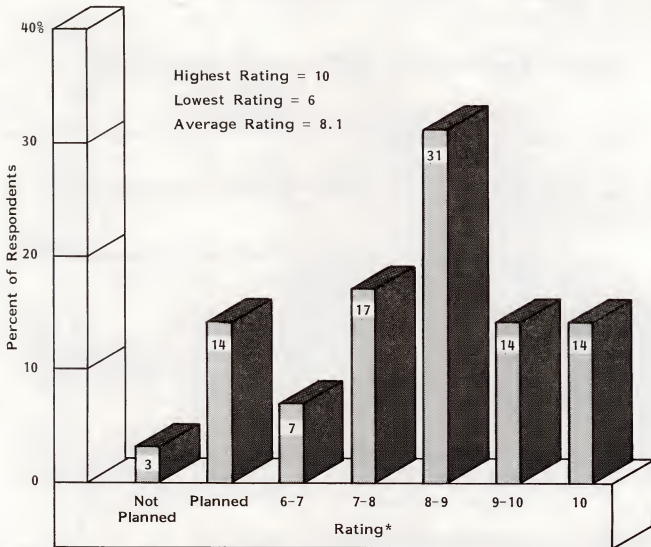
- This data and the remainder for the vendor section of this report are taken from the 1983 INPUT Annual Field Service Survey and represent 29 European field service vendors. Responses are for the period June and July 1983.

B. SUCCESSFUL IMPLEMENTATION OF SERVICE QUALITY PROGRAMS

- Vendors paid a relatively high degree of attention to service quality in 1982 and consequently evaluate their implementation of it as a success, as shown in Exhibit IV-2. Over half the respondents evaluate their success above 8 on a scale of 1 to 10.
- All service vendors who implemented quality of service programs in 1982 believe that their success was above average, as scores ranged between 6 and 10 with the average at 8.1.
- Of the 17% of field service vendors who did not implement service quality plans in 1982, 14% plan to do so in 1983. Only 3% have no plans for implementing quality programs.
- Vendors' service quality programs vary in description but are primarily aimed at delivering service better than before through enhancing one or more elements in the service quality mix described earlier in this report.

EXHIBIT IV-2

SUCCESSFUL IMPLEMENTATION OF SERVICE QUALITY PROGRAMS
BY SERVICE VENDORS



* 1 = Low
5 = Medium
10 = High

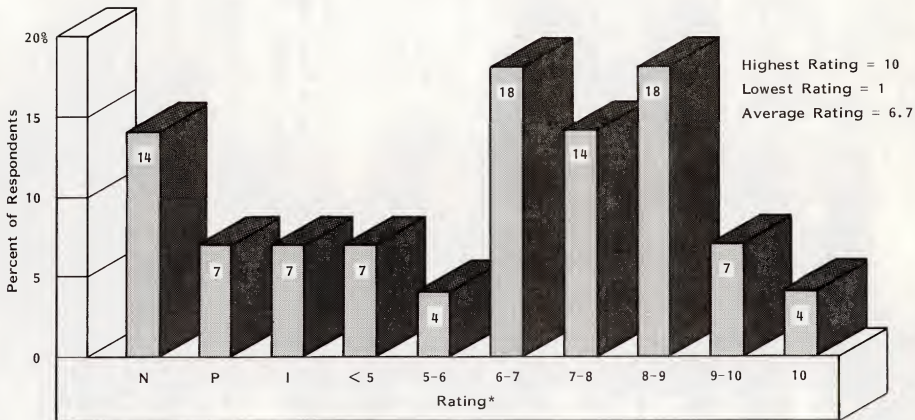
SOURCE: INPUT Survey

C. IMPROVING PRODUCT QUALITY

- Because of its top priority within field service and its successful implementation, quality appears to be alive and well within the service structure. The picture changes, however, when it comes to improvement of product quality. This is illustrated in Exhibit IV-3.
- While a healthy majority (65%) of service vendors rate their efforts to improve product quality above average, there are 7% who rate themselves below average and another 2.8% who haven't tried to improve product quality at all.
- This is disappointing, but unfortunately typical, of a number of service vendors who have difficulty selling themselves and their ideas outside the service structure. This problem has been exposed and discussed in INPUT's 1981 and 1982 field service annual reports.
- Of the 28% of respondents making no effort to improve product quality, half (14%) have plans to improve product quality or have already made attempts, although the results are still unknown.
- The other 14% who don't have plans to try to improve product quality can be considered delinquent in their responsibilities to the manufacturer because there is no better source for product information than field service.
- Manufacturers are as much to blame as service groups because they know, or should know, that the best data base for actual product performance is in field service.
- Even independent maintenance firms, such as third-party maintainers or dealers and distributors, can provide critical feedback to manufacturers for product quality enhancements.

EXHIBIT IV-3

IMPROVEMENT OF PRODUCT QUALITY EFFORTS BY SERVICE VENDORS



* 1 = Low N = Not Planned
 5 = Medium P = Planned
 10 = High I = Implemented but No Data

SOURCE: INPUT Survey

- o Perhaps the reluctance in communicating important failure data back to manufacturing sources is due to a conscious or subconscious anxiety by service groups that too many product quality enhancements could result in a reduced requirement for service.

D. ASSESSMENT

I. REPEAT CALLS

- Repeat service calls indicate poor service quality, and they are measurable. Enough of them can destroy an otherwise satisfactory quality image. Too many service calls on the same problem or unit indicate a number of deficiencies.
 - One deficiency may be that the correct part isn't with the service technician at the time of the first call. This can result from:
 - An insufficient level of spares.
 - A wrong diagnosis, i.e., the right part may have been drawn by the engineer and taken to the site for what turns out to be the wrong problem.
 - Another problem causing repeat calls may be that the engineer didn't correctly fix the problem. This, too, can occur for different reasons:
 - The engineer is not trained well enough.
 - He may not have made a proper diagnosis.

- . He may have been given the wrong guidance from a supporting office.
- Aside from these problems the product may simply be a bad one, that is, a "lemon."
- The nature of repeat calls is such that sometimes it is difficult to determine the true relationship between previous faults and successive ones even though they may all manifest themselves in the same general way.
- Companies providing service are not happy with their current repeat call experience, as shown in Exhibit IV-4. The average experience for repeat calls is 9.5%, while the average target is 1.1%. This difference of 8.4% represents an expensive problem for vendors. It also detracts from customers' perceptions of quality.
- A startling result of the survey is that vendors' actual experience in repeat calls varies so widely - from two-tenths of 1% to as high as 30%. More surprising is that the servicer with the 30% rate of repeat calls is a large, well-known, multinational, European-based company.
 - Experience with repeat calls varies by product segment.
 - Generally, the higher repeat call rates refer to software problems.
 - Office products, including word processing machines, work stations and personal computers, are the next greatest source of repeat calls, followed by large and small systems.

2. OVERALL QUALITY - VENDOR SELF-IMAGE

- Notwithstanding attention to quality of service and efforts to improve it, vendors rate themselves relatively low on current quality. Exhibit IV-5 points out this characteristic.

EXHIBIT IV-4

REPEAT SERVICE CALLS AS A PERCENT OF TOTAL SERVICE CALLS

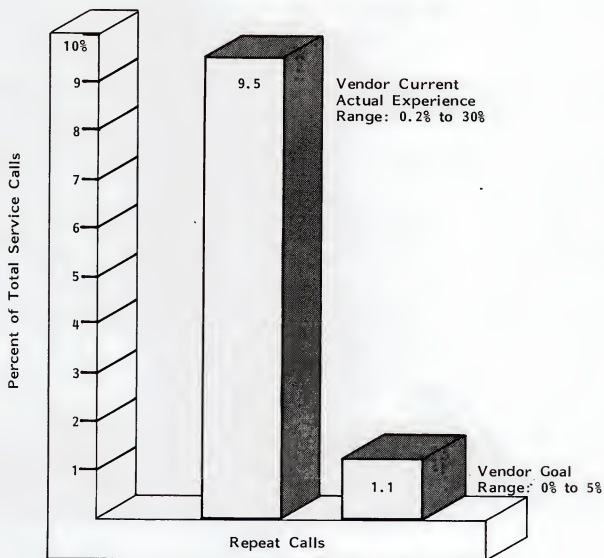
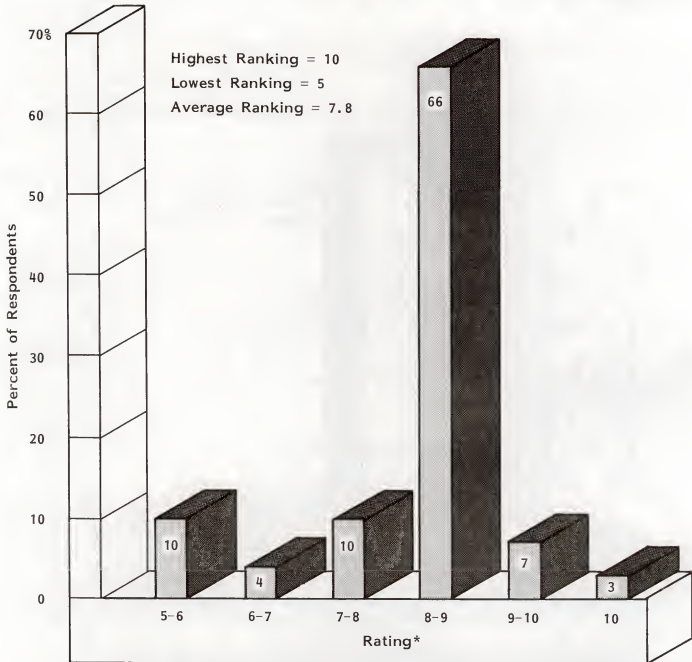


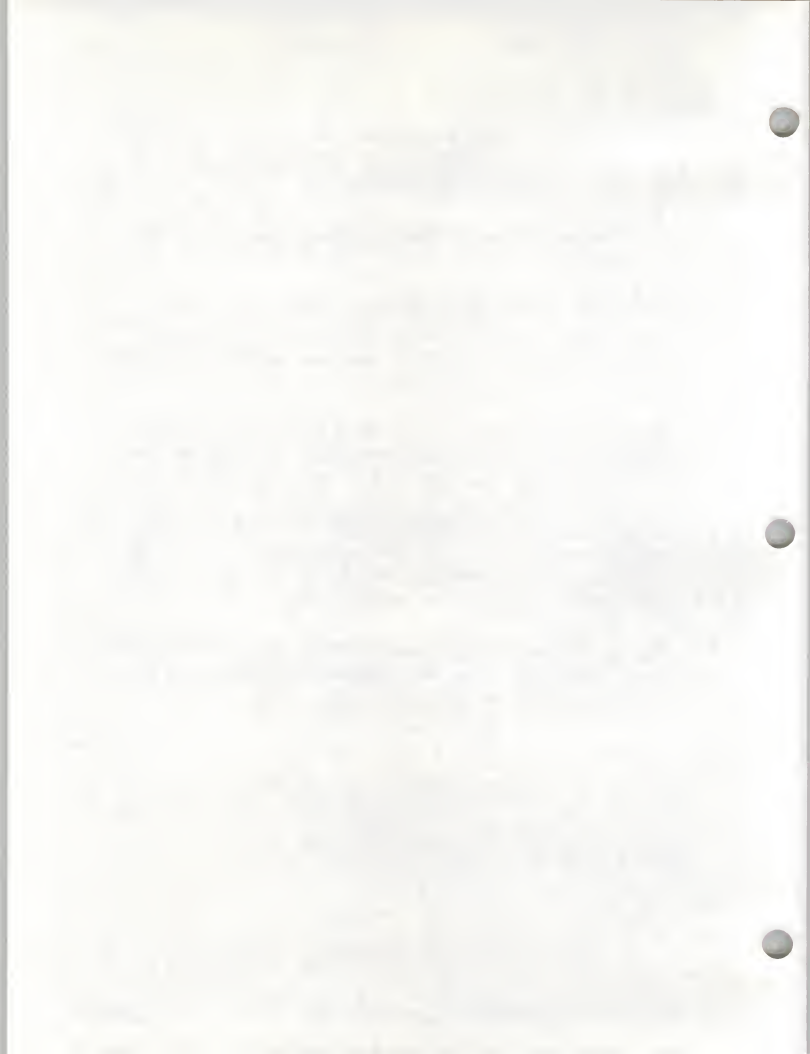
EXHIBIT IV-5
OVERALL QUALITY SELF-ASSESSMENT
BY SERVICE VENDORS

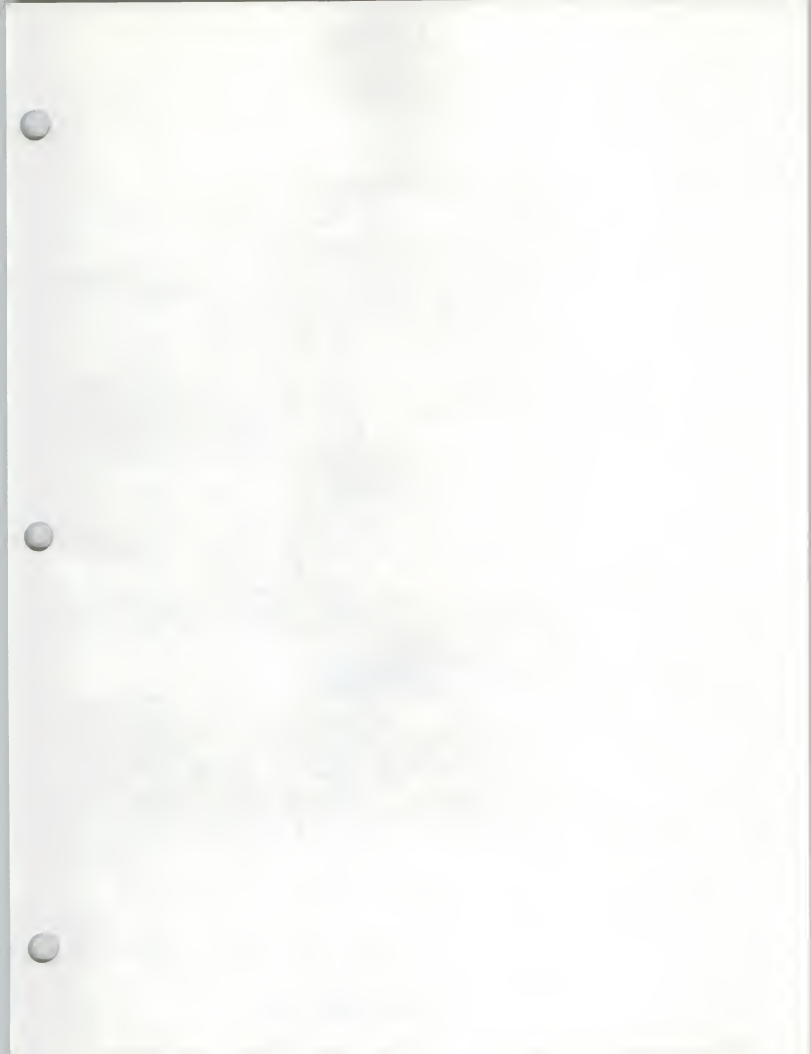


* 1 = Low
5 = Medium
10 = High

SOURCE: INPUT Survey

- Only 76% of the vendors view themselves as being good to excellent in quality, whereas (as pointed out earlier) 85% are making quality a top priority in their management endeavors.
- The other 24% rate themselves as producing average, or slightly above average, service quality.
- These results, however, do coincide and are consistent with vendors' own ratings of successful implementation of quality of service programs last year, which means that some of the plans for improving service quality are too new to appraise.
- Overall, the self-image of service quality is optimistically healthy at an average rating of 7.8. This score is only 0.8 apart from what users rated overall quality of service for Europe in 1982, which was 7.0 (see Exhibit II-3).
- The 1983 INPUT Field Service Annual Report will provide a current user assessment of vendor quality of service, which should prove interesting. Not all user data has been tabulated and analyzed yet, but the prediction is for at least a moderate increase in quality compared to 1982.
- The net result of the analysis between users' and vendors' perceptions of service quality is that, while vendor expectations are increasing each year, vendors are responding adequately to this need.







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

- Management Planning Program in Information Systems - Provides managers of large computer/communications facilities with timely and accurate information on developments which affect today's decisions and plans for the future.
- Management Planning Program for the Information Services Industry - Provides market forecasts and business information to software and processing services companies to support planning and product decisions.
- Company Analysis and Monitoring Program for the Information Services Industry - Provides immediate access to detailed information on over 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.
- 1982 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 planning services firm. Clients include over 100 of the world's largest and most technically advanced companies.

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INPUT

Planning Services for Management

INPUT
MANAGEMENT
PLANNING PROGRAM
IN
FIELD SERVICE

**MANAGEMENT PLANNING PROGRAM
IN FIELD SERVICE**

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

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

- 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 - An in-depth analysis of major technical and management issues that will assist in the planning of field services. F-EBR 1983
- Annual Report - Opportunities for Field Service Franchising activities in the field services industry. The report discusses the effects on future field service planning and the likely changes in technical and management requirements that may affect the future requirements of the industry. F-EBR 1983
- Annual Presentation - A presentation to field service executives on the current year's research and development program for the second half of each year.
- Inquiry Service - A staff on an as-needed basis to provide special "hot line" services to clients.

RESEARCH METHOD
communications, and

- Research topics discussed with client representatives
- Research for the program with users, vendors, universities, and other organizations
- Conclusions developed from the program of INPUT's professional staff
- Professional staff members supporting this program average nearly 20 years of experience in data processing and communications, including senior management positions with major vendors and users.

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FIELD SERVICE PROGRAM

FIELD SERVICE BRIEF

OPPORTUNITIES FOR
FIELD SERVICE FRANCHISING

DECEMBER 1983



OPPORTUNITIES FOR FIELD SERVICE FRANCHISING

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OPPORTUNITIES FOR FIELD SERVICE FRANCHISING

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I INTRODUCTION

- This brief is included as part of INPUT's Field Service Programme for Europe. INPUT feels that franchising could help client field service organisations address the need for alternative revenue sources and increased productivity. The franchising of field service, in a specific sense, also addresses the critical field service requirement of creativity in marketing.
- Sales from franchising now account for 32% of all U.S. retail sales. There are thought to be some 250,000 business format franchises now in operation in the U.S.
- The cult of owning your own business is perhaps more strongly established in the U.S. than in some other countries, but there are very good reasons why franchising can be expected to become more popular in Europe. Some of these reasons have to do with the fact that setting up one's own business may be the only alternative to unemployment, though curiously enough, a recent survey by the British Franchise Association shows that only 8% of franchise owners come from the ranks of the redundant. However, clearly the uncertainty of the job market and the difficulty of even getting a foothold in it attracts many to franchising.
- Franchising seems ideal for those with little experience of running their own business because it operates in a way that takes some of the sting and isolation out of going at it absolutely alone. The most compelling reason of all, however, for the growth of franchising is its success. As many as 90% of all new businesses fail, whereas 90% of new franchises succeed.

- The fact that franchises are sometimes said to succeed because the franchisor will pull out all the stops to prevent the franchise from failing is actually an argument in franchising's favour. It helps to be able to turn to someone who will not only be there to advise you, but who has an interest in your success because any failure reflects on the whole operation. No wonder that when regular employment diminishes, franchising looks like an attractive alternative for someone with money to invest and an interest in running his or her own business.

- However, while franchising eliminates some of the more costly and at times disastrous bumps in the learning curve of working for oneself, it is not an easy way to riches either. Furthermore, there are dangers as well as advantages in some of the compromises franchising offers between self-employment and working for someone else. Prospective franchisees can be exploited by unscrupulous operators who tend to emerge whenever there are inexperienced people around with money to invest in business ventures. Even though some of the less-savoury versions, or rather perversions, of franchising (e.g., pyramid selling), are now subject to legislation, it is still quite possible for an unscrupulous franchisor to stay within the law and give the franchisee very little in return for his fee.

- Nevertheless franchising is an industry with very rapid growth. In the U.K., since 1978, franchised outlets have more than doubled to over 4,000. Annual sales from the U.K. are growing at a rate of about 300 million pounds per year.

- This report offers the reader a general explanation of franchising. Areas covered are: the definition of franchises, types of contracts, and the advantages and disadvantages of franchising.

- The data is from consumer-oriented products and services since it is this area that has been most successful.

- Similarities between the field servicing of sophisticated electronic gear and the operation of hamburger restaurants may seem few, but nevertheless there are principles in common.
- The present study is largely oriented towards the franchisee or prospective franchisee (the person(s) who operate(s) the franchise). The franchisor is the party who owns the rights to the franchise and assigns the right to the franchisee under a franchise contract.
- The relationship of franchising to field service operations is discussed in conceptual terms. Examples of the projected impact on field service are illustrated.
- Readers are encouraged to comment on the content, applicability, and presentation of the material in this report.

II THE CONCEPT OF FIELD SERVICE FRANCHISES

A. WHAT FRANCHISING MEANS

I. DEFINITION OF A FRANCHISE

- The following formal definition of a franchise has been made by the British Franchise Association:

- A franchise is a contractual license granted by one person (the franchisor) to another person (the franchisee) that:
 - Permits or requires the franchisee to carry on during the period of the franchise a particular business under or using a specified name that belongs to or is associated with the franchisor.
 - Entitles the franchisor to exercise during the period of the franchise continuing control over the manner in which the franchisee carries on the given business.
 - Obliges the franchisor to provide the franchisee with assistance in carrying on the franchised business, (assistance with organisation training, merchandising, management, etc.)

- Requires the franchisee periodically during the period of the franchise to pay to the franchisor sums of money in consideration for the franchise or for goods or services provided by the franchisor to the franchisee.
 - Is not a transaction between a holding company and its subsidiary, between subsidiaries of the same holding company, or between an individual and a company controlled by that individual.
- The last clause establishes the important distinction between a franchise and an agency. Although this official definition is certainly useful, it does not mention a number of aspects that are important from the point of view of the franchisee: it does not indicate that an initial fee is usually paid by the franchisee, nor does it stress that the subject of the franchise should be a tried-and-tested commercial operation.
 - Furthermore, the above definition does not mention that the business, once set up, is the property of the franchisor, nor does it warn the franchisee of the degree of control he may be subject to under the second clause. The definition also gives no indication of the extent of the backup services that the franchisee might reasonably expect to get for his money. In other words, the definition is not an adequate measure against which to check the franchise contract.

2. FORMS OF FRANCHISING

- Franchising is most commonly associated with such well-known names as Wimpy, Prontaprint, and Kentucky Fried Chicken. There are, however, other forms of franchising and it is important to be clear about distinctions.

- The term "franchise" covers a wide variety of arrangements under which the owner of a product, a process, a service, or even just a name having certain connotations (e.g., that of a sportsman) licenses another to make or use something in exchange for some form of payment. This payment can be either direct, in the form of a fee and royalty, or indirect, in the form of an obligation to buy a service or product in which the licence holder has some kind of commercial interest.

- A familiar example of the indirect arrangement is the "tied" pub, wherein the licensee has to obtain his supplies from a particular brewery. This type of arrangement, by the way, has been around for some 150 years.

- Various types of relationships between licensee and licensor that are also described as franchises (but can be quite different) are described as follows:
 - A distributorship for a particular product, such as a make of car. This arrangement is also sometimes referred to as an agency, but there is a fundamental difference between an agency and a distributorship.
 - An agent acts on behalf of a principal even though the agent is not employed by the principal, and even though the agent may have an agency for the products and services of more than one principal, what the agent does, says, or represents to third parties is binding on the principal in question as if principal and agent were employer and employee.
 - A distributorship, however, is an arrangement whereby vendor and purchaser, are legally independent except that the purchaser, in exchange for certain exclusive territorial rights, backed up by the vendor's advertising, promotion, and possibly training of the staff, will be expected to hold adequate stock and maintain the premises in a way that reflects well on the vendor's product or service.

- A licence to manufacture a certain product within a certain territory and over a given period of time, have access to any secret process this involves, and use the licensor's brand name in exchange for a royalty on sales.
 - . This arrangement resembles a distributorship. Licensor and licensee are independent of each other, except that, in order to preserve the good name of his product, the licensor will no doubt insist that the licensee complies with certain specifications as regards content and quality.
 - . Manufacturing licenses are often found in industry and a well-known recent example is the Rank Organisation's licence to produce the photocopying devices pioneered by the Xerox Corporation.

- The use of a celebrity name to enhance the sales appeal of a product and to guarantee, at least by implication, its quality.
 - . The most common example is the endorsement by a sports personality of equipment associated with activity and bearing his name, in return for a royalty payment by the manufacturer.
 - . In the thirties there were attempts to capitalise on movie stars' names in a similar way - an early poster associating Ronald Reagan with a brand of cigarettes has been much reprinted since he became prominent in politics - but sportsmen and women have perhaps been more ready and able to cash in on the advertising spin-off from their media coverage.
 - . A name can be franchised to validate a product, particularly if there appears to be a direct connection. For instance, Arnold Palmer golf clubs.

- The use of a trademark. Here a widely recognised product, rather than the name of an individual, is exploited commercially for a fee and subject to certain licensing conditions. A recent example which may be familiar is Rubik's cube, always shown with the symbol "TM" beside it.

- Although all these forms of franchising continue to flourish, it could be said that business format franchising has emerged as the dominant and certainly the most rapidly expanding mode. This is because business format franchising meets present commercial needs.

3. HISTORY OF FRANCHISING

- Distributorship franchises were first applied to Singer Sewing machines after the American Civil War, when the U.S. began to emerge as a vast market, but when long-distance communications were still too poor to make centralised distribution effective.

- The concept of franchising was then picked up by the motor car industry, though the problem there was somewhat different. In the case of automobiles it was not so much a problem of finding a mass market, but more one of establishing outlets to provide display space, back-up service, and of course, to sell the actual cars. The manufacturers could not afford to set up distribution outlets and finance stock, as well as make the cars.

- The success of these varieties of franchising encouraged numerous imitators from the twenties to the fifties, during which time the trend was to nationalise small, locally based manufacturing units into national and even multi-national entities.

- This conglomeration, however, did cause problems of sales and distribution. Local industries, aware of local market conditions, were shown in many cases

to have been rather more successful in sales and distribution than were "faceless corporations" located a long way distant.

- Franchised distribution and licensing were developed as methods of recreating the virtues of local industry. From the franchisor's point of view these arrangements turned out to have another advantage as well, they eliminated the need for total control of a costly national (and in the post-war period, international) network of salespeople and warehouses.
- Franchisors found that their franchisees were usually more dedicated to the interests of the franchisor (in whose success they stood to share) than many a salaried employee would have been.
- The above dedication was found even in cases where the franchisee was also trading in goods and services other than those for which he held a franchise. Distributorship franchises were successful because they were often arrangements that placed no great obligation on the franchisor and instead gave much freedom to the franchisee.

4. BUSINESS FORMAT FRANCHISING

- Business format franchising incorporates elements from all these earlier ideas and combines them in a way that is particularly suited to current circumstances and economic conditions.
 - Such a franchise is a license for a specific period of time to trade in a defined geographic area under the franchisor's name and a license to use any associated trademark or logo.
 - What is franchised is an activity, usually some form of service, that has already been tried elsewhere and shown to work.

- The franchisor provides the entire business concept (usually called the "blueprint"), which must be followed by the franchisee. In fast food, for instance, the ingredients of any "secret" recipe are strictly laid down, as are the specifications for the surroundings. The blueprint is generally set out in an operating manual, which is given to the franchisee when negotiations are completed.
- The franchisor educates the franchisee in how to conduct business in accordance with the blueprint.
- The franchisor also provides backup services to ensure that the franchise operates successfully. Backup should certainly cover advertising and promotion of the franchise's name in general and may also cover local promotion. The franchisor might also provide ongoing general business advice, help in raising finances, assistance with negotiating leases and obtaining planning permissions, aid for site selection and development, building plans and specifications, delivery of a standardized accounting system - in other words, help with virtually everything connected with setting up a new business.
- In exchange for the business blueprint and other franchisor services, the franchisee is expected to make an initial investment in the business and to pay a royalty to the franchisor that is based on turnover or profits. The franchisee might also be obligated to buy some or all goods and equipment from sources nominated by the franchisor.
- The participation of the franchisor in setting up the business does not mean that the franchisor owns it. The business belongs to the franchisee and the franchisee is free to dispose of it, though he will probably have to give the franchisor first refusal and will have to obtain the franchisor's approval of any new owner (if the franchisor does not want to buy the business back).

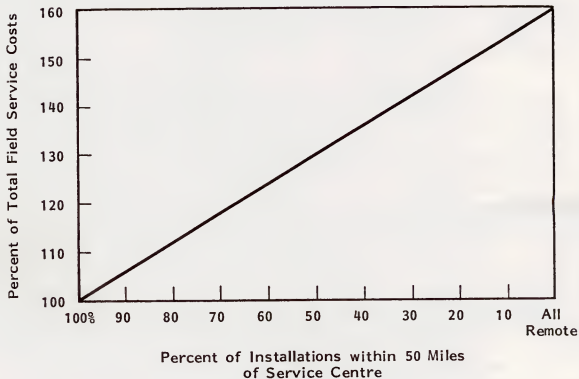
B. APPLICATION TO FIELD SERVICE

I. BACKGROUND

- Employing engineers in areas where there is not enough equipment density to support them is a costly proposition.
 - Exhibit II-1 shows that as more service requirements fall beyond a 50-mile radius of a service centre, the increase of service costs is dramatic.
 - The high cost of remote service is due to:
 - Extraordinarily high travel and living expenses that are incurred by travelling to and from the site.
 - Unusually low utilisation or "hands-on" time because of travel and the wide spacing of the equipment that needs servicing.
 - Repeat calls or long wait times owing to the scarcity of spare parts in remote areas.
- In a previous INPUT survey, remote service (greater than 50 miles from a service centre) represented between 5% and 60% of all service and between 10% and 50% of total field service costs.
- One respondent commented: "If all my users were within 50 miles of our support centres, I would need 30% fewer engineers."
- Nevertheless many companies put field engineers in remote locations to satisfy customer demands, regardless of cost or revenue considerations.

EXHIBIT II-1

IMPACT OF REMOTE SERVICE
ON TOTAL FIELD SERVICE COSTS



SOURCE: INPUT Survey

- Remote service is most costly for newer products sold in areas where similar equipment is scarce. The demand for better remote service will increase as microcomputer-based products are marketed beyond urban areas.

2. THE CONCEPT

- The concept of field service franchising involves (but is not necessarily restricted to) operating remote service through franchisees in lieu of full-time employees.
- For an agreed amount (a fixed-sum royalty or rate), the field service vendor would sell off the remote service business to an entrepreneurial engineer or engineers. This person(s) might at the present time be an employee of the field service firm.
 - The newly created franchisee would assume the risk associated with the business but would receive most of the revenues created from current and future business.
 - Depending on the circumstances, the franchisee also could assume any other business opportunities that were related to his work and in his territory.
 - The franchisee could also benefit from the service firm's (franchisor's) established name and advertising.
 - The field service firm would receive a fixed percentage of current and future revenues. It would also receive revenues from:
 - Spare parts.
 - Documentation.

- . Backup technical support.
 - . Remote diagnostics.
 - . Software support.
 - . Revisions and updates.
-
- The customer needn't know that his field engineer was a franchisee, since the service firm would continue to take the initial call, dispatch the franchisee, and bill the customer. (Although in other cases it would work better if the franchisee handled the entire administrative burden.)
 - Of course, the most sensitive issue in such an arrangement is the customer's relationship with the franchisee, and vice versa. This problem must have caused IBM some heartburn as they pondered the use of distributors and agents to sell and service their personal computer.
 - For smaller systems, franchising field service could be mutually beneficial to the manufacturer and franchisee both, regardless of how remote the equipment is.
 - The concept of field service franchising is not new. A pilot program was conducted by Raytheon Service Company in Portland, Oregon and Toronto, Canada about five years ago but apparently was dropped following TRW's buy-out of Raytheon Service Company's computer business.
 - The concept of field service franchising is worth revisiting. It has been described here in basic terms. The selection of various options and enhancements to fit the specific needs of clients depends on each individual set of circumstances. The following section of this report gives a few hypothetical examples.

- The majority of the report is therefore a description of the mechanics of franchising. As further definitions of franchising ideas become clearer in specific client situations, these ideas can be evaluated using the fundamental principles described in the remainder of this brief.

C. PROJECTED IMPACT OF FRANCHISED FIELD SERVICE

I. ORGANISATION

- Organisationally, field service firms would eliminate those engineers who now operate in a territory that would be designated for franchised service. One approach to the always-uncomfortable task of elimination or redundancy is to engage the former employee as the Franchisee.
- Alternatively, the proposed franchise territory could be staffed by a new individual who, for a fee, would be trained by the service firm (franchisor).
- Exhibit II-2 shows the structural appearance of a field service firm that provides field service itself and also acts as a franchisor.
- Exhibit II-3 illustrates how a field service firm would look as a franchisor only. The service company would franchise its service to acceptable franchisees, supplying basic resources for the following service:
 - Parts.
 - Repairs.
 - Backup technical support.

EXHIBIT 11-2

FIELD SERVICE FIRM AND FRANCHISOR (Conceptual)

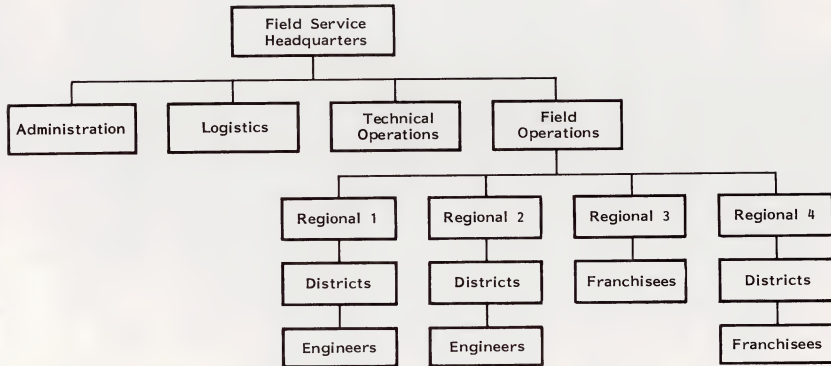
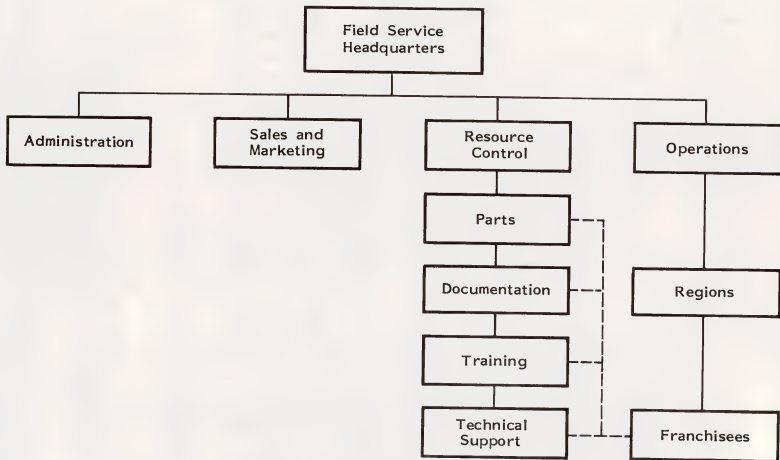


EXHIBIT II-3

FIELD SERVICE FRANCHISOR (Conceptual)



- Reputable name.
 - Advertising.
 - Training.
 - Documentation.
 - Dispatch.
 - Administration.
- Execution of service would be handled by the franchisee.

2. OPERATIONS

- Under both schemes, service would have to be delivered to the customer without any degradation of quality. The fact the service is delivered by a franchisee instead of the manufacturer's (or his representative's) engineer should not affect the customer.
- The franchisor would supply all the necessary logistical and technical support and perhaps also administrative, sales, and advertising help. The franchisee would make the actual repair.

3. FINANCIAL

- A well conceived and managed franchising program could have a very significant financial impact. By eliminating heavy expenses from travel, direct and indirect labor, salaries, benefits, unutilised time, repeat calls, etc., the net cost of service coverage in a labor intensive area could diminish considerably after it is replaced by a franchise.

- Aside from a potential increase in productivity (described above), franchising would produce revenue. While the revenue from the franchisee would be less than that coming directly from the customer, the potential profitability would be greater.

- Three hypothetical and conceptual examples of the impact of a field service franchise are illustrated in Exhibits II-4 to II-6. There are almost limitless ways to show the impact of franchising. These examples are for illustrative purposes only and involve selecting values for:
 - Amount of remote business (can range from 3% to 30%).

 - Ratio of remote business expense to revenue before franchise (80% to 20%).

 - Ratio of urban business expense to revenue before franchise (72% to 87%).

 - After-franchise revenue (remote - 10% to 33%).

 - Cost of franchising (\$50,000 to \$138,000 per year).

- The bottom-line effect (gross pretax profit) of franchising field service changes as a result of the amount of remote service required, the cost and income from remote service, and the cost of the franchise. Using three different sets of these variables demonstrates some interesting results of franchising:
 - The medium-sized company (as shown in Exhibit II-4), experiences a jump from 15% gross profit to 26% gross profit as a result of franchising, assuming:
 - A significant amount (30%) of remote service now required.

EXHIBIT II-4

FINANCIAL IMPACT OF FRANCHISING FIELD SERVICE
 HYPOTHETICAL EXAMPLE: MEDIUM-SIZE MAINTENANCE FIRM
 (\$ thousands annually)

BEFORE THE FRANCHISE		AFTER THE FRANCHISE
	<u>Revenues</u>	
\$ 2,800	Urban	\$ 2,800
1,200	Remote	120
<u>4,000</u>	Total	<u>\$ 2,920</u>
	<u>Expenses</u>	
\$ 2,020	Urban	\$ 2,020
1,380	Remote	0
0	Franchise	138
<u>3,400</u>	Total	<u>\$ 2,158</u>
\$ 600 15%	<u>Gross Profit Before Tax</u>	\$ 762 26%

Assumptions:

1. Significant Remote Business = 30%
2. Remote business = 115% Expense to revenue before franchise
3. Urban business = 72% Expense to revenue before franchise
4. After-franchise revenue = 10% of before-franchise (remote) revenue
5. Cost of franchising = 10% of remote costs
6. Gross pretax profit before franchise = 15% (before franchise)

EXHIBIT II-5

FINANCIAL IMPACT OF FRANCHISING FIELD SERVICE
 HYPOTHETICAL EXAMPLE: SMALL MAINTENANCE FIRM
 (\$ thousands annually)

BEFORE THE FRANCHISE		AFTER THE FRANCHISE
	<u>Revenues</u>	
\$ 900	Urban	\$ 900
<u>100</u>	Remote	<u>20</u>
\$ 1,000	Total	\$ 920
	<u>Expenses</u>	
\$ 800	Urban	\$ 800
<u>200</u>	Remote	0
<u>0</u>	Franchise	<u>50</u>
\$ 1,000	Total	\$ 850
\$ 0	<u>Gross Profit Before Tax</u>	\$ 70 7.6%

Assumptions:

1. Small amount of remote business (10%)
2. Remote business = 200%, Expense to revenue - very expensive before franchise (because small firm)
3. Urban business = 87%, Expense to revenue before franchise.
4. After-franchise revenue = 20% of before-franchise (remote) revenue
5. Cost of franchising = \$50,000
6. Gross pretax profit before franchise = 0

EXHIBIT II-6

FINANCIAL IMPACT OF FRANCHISING FIELD SERVICE
 HYPOTHETICAL EXAMPLE: LARGE MAINTENANCE FIRM
 (\$ thousands annually)

BEFORE THE FRANCHISE		AFTER THE FRANCHISE
	<u>Revenues</u>	
\$ 9,700	Urban	\$ 9,700
300	Remote	100
<u>10,000</u>	Total	<u>\$ 9,800</u>
	<u>Expenses</u>	
\$ 7,760	Urban	\$ 7,760
240	Remote	0
0	Franchise	<u>80</u>
<u>8,000</u>	Total	<u>\$ 7,840</u>
\$ 2,000 (20%)	<u>Gross Profit Before Tax</u>	\$ 1,960 (20%)

Assumptions:

1. Very small amount of remote business = 3%
2. Remote and urban, expense to revenue before franchise = 80%
3. After-franchise revenue = 33% of that before franchise (remote)
4. Cost of franchising = \$80,000
5. Gross pretax profit = 20% before franchise

- A conservative amount of revenue from the franchise (10% of what it was before the franchise).
 - A reasonable estimated franchise cost (10% of remote costs prior to the franchise).
 - Cost of remote business exceeds revenues (expense to revenue = 115%).
- The small company (as shown in Exhibit II-5), goes from a break-even status to a gross profit of 7.6% as a result of franchising, considering the assumptions that:
 - There is a small amount of remote business (10% of the total business).
 - Revenue from the franchise would be one-third that of pre-franchise revenues for remote sites.
 - The cost of franchising is a fixed amount: \$80,000.
 - Cost of remote service is high (expense to revenue is 200%).
- The net effect of franchising service for the large firm is shown to be nil as a result of the assumptions that:
 - There is no increased cost of maintaining remote sites currently (expense to revenue ratio is 80% for remote and urban service).
 - Franchise revenue is one-third of the pre-franchise revenue for the remote portion of the business.

- . The cost of franchising is a fixed sum of \$80,000.
- . There is a small amount of remote business (3% of the total).
- Generally, although the examples are hypothetical, the result of franchising can be significant using fairly reasonable assumptions. The true impact of franchising depends on the individual service firm's financial data being tested in lieu of the examples.

III ELEMENTARY "FRANCHISOLOGY"

- This section, Elementary "Franchisology," discusses nonfinancial issues relating to evaluation, contracts, and advantages and disadvantages. The following discussion is conducted primarily from the franchisee's point of view and makes use of commercial experience in other fields (fast food, printing, etc.).

A. EVALUATING THE FRANCHISE

- Most franchisors have discovered that hard sell techniques aren't in their own interest. Successful franchising is a question of mutual dependence and franchisees who feel shortchanged are not likely to be cooperative. At the same time it must be said that, with the exception of the prohibition of pyramid selling, very little specific legal protection is available to the franchisee. (Pyramid selling is a concept in which franchisees are recruited to sell "distributorships" of a product or service that is of secondary importance and may, in fact, be quite unviable.)
- Basically, protection is embodied in the franchise agreement, but that document is subject to omissions and commissions that can make a great deal of difference. The agreement can also throw much light on the intent and/or experience of the franchisor. A great many questions need to be asked by prospective franchisees and their advisers in order to properly evaluate the contract.

1. THE PRODUCT OR SERVICE OFFERED

- The product/service may be new or it may be already established. There is nothing wrong with a product or service being new, provided that it has been tested and found to work, preferably for at least a couple of years in a location similar to that in which it is to be sold, and provided also that the franchisee is satisfied that the product enjoys a good reputation among users and customers. The franchisees should feel that the product is something he would want to be associated with.
- The product should have some unique feature like, for instance, the "secret recipe" for Kentucky Fried Chicken. This unique feature should be protected by a patent or trademark.
- The franchisee needs to know how his product/service compares with similar ones in the local marketplace.

2. THE TERRITORY

- Though the franchisor should provide a map showing the franchisee's exact territory, this is not a guarantee of protection. Under EEC competition laws, franchisors cannot prevent one franchisee from trading in another's "exclusive" territory, though franchisors may decline to license a competitor within it; for instance, there is nothing to stop a print shop in one territory from serving customers from the territory of another franchisee.
- There is very little that can be done about this, except to check where the nearest operator of the same franchise is located - and indeed where operators of other franchises and other businesses offering a similar product or service are to be found. The franchisee should also check whether the agreement specifies any circumstances under which the exclusive territory could be reduced.

3. THE RELATIONSHIP BETWEEN FRANCHISEE AND FRANCHISOR

- Perhaps the most important single question in evaluating franchisors is how long they have been in business, how many outlets they have established in that time, how successful they have been (and what the criteria for success are), how many outlets have been closed down, and the reasons they were shut down. Failing a local track record, the question must be related to the licensor's operations elsewhere. It would also be useful to know who the company directors are and something of their qualifications, background, experience, and nationality.

- Supplies. The success of a franchise, in terms of both profits and turnover, will be closely related to the sources and costs of equipment, goods, and services. These items will be controlled, wholly or in part, by the franchisor. The franchisee needs to be sure that the prices are fair and competitive and that the supply is likely to be trouble-free.
 - There might, for instance, be question marks where goods have to be obtained from Third World countries with political problems. Some franchisors set a minimum ordering quantity for supplies and this has to be realistic in relation to the franchisee's resources and expectations of volume.

 - Ideally, through, the franchisee should not be too dependent on the franchisor or its nominees for supplies because this obviously gives the franchisor leverage that can be abused.

- Standards of quality. The franchisee should be aware of quality standards that are being set (and their cost), what opening hours have to be kept (again these may have implications in terms of staffing and overtime payments), and what the reporting procedures are for accounting purposes. Even though the franchisee is running his own business, the franchisor will want to check that the

royalties being paid accurately reflect the volume of business, and will also demand the right to enter and inspect the premises at will.

- Future developments. The format of the business may be amended from time to time and the franchisee will have to go along with the amendments. Therefore it is important to establish, as far as is possible, what the franchisor's future plans are. Are any hidden but costly innovations being planned? Is the franchisor planning any future franchises or other moves that may be in competition with the franchises now being offered? In each of these cases, the franchisee might suffer.
- Termination. The conditions under which the franchise agreement can be terminated, reassigned, or renewed by either party, should be clearly spelt out. There should be a satisfactory procedure for resolving disputes. Arbitration has become a popular alternative to litigation, but it is still expensive and in the end has not always avoided litigation.

4. THE FRANCHISE PACKAGE

- To a large extent the package determines and overlaps the nature of the franchisor/franchisee relationship, but it has characteristics of its own. Fees are most important here: not only how much they are, but the form in which they are to be paid.
 - There will be an initial fee and a royalty on turnover and/or profits, but there can be significant differences in the amount of these payments and the way they are collected. In general, the advice is to be very careful about franchises with a high initial fee and a low royalty: the franchisor may be of the "take your money and run" variety.
- Advertising. Related to the question of fees is that of advertising. Normally the franchisor undertakes to devote a certain proportion of his fee income to advertising. The question is how much, and whether it is dedicated to the

franchise as a whole or to promoting individual outlets. In both cases the franchisee needs to be satisfied that the advertising is good and relevant with regard to contents and medium.

- Training. Training is another area where one must clarify who pays for what. Indeed, since training is in itself a very important part of the package, the franchisee must know how much there will be and how long it will take. In America the concept of training is sometimes taken to ludicrous lengths - for example McDonald's operates a Hamburger University that one suspects is meant only partly as a joke.
 - Apart from formal training and refresher courses, there ought also to be some procedure for when things go wrong. What happens if the franchisee falls ill? Can an emergency crew step in? And what happens if the franchisee runs into administrative or equipment trouble? Is help of sufficient calibre available and if so, how quickly and at what cost?
- Operating manual. The operating manual embodies the blueprint of the business format franchise; some contracts state that the manual supercedes anything said in the agreement. The franchisees and their advisers must be sure that they fully understand the manual and that it covers all the situations they are likely to encounter in operating the franchise.

B. ADVANTAGES AND DISADVANTAGES

- The advantages and disadvantages of taking up a franchise depend to some extent on the content of one's individual agreement, but there is nevertheless a general pattern.

I. THE FRANCHISOR

- From the franchisor's point of view, the advantages are that he or she does not have any direct investment in an outlet bearing his or her name.
 - The franchisee, as the owner of the business, is likely to be more highly motivated than an employee and more responsive to local market needs and conditions; also, the franchisor receives an income from the franchise and saves on personnel and administrative costs.
 - Without direct financial involvement, the franchisor may derive some of the benefits of expansion, in as much as franchising gives economies of scale from centralised purchasing and, if it is feasible, some degree of centralised administration.
- The disadvantages are that although the failure of an individual franchise may reflect badly on the franchise operation as a whole, all that can be controlled is the format itself. The franchisor can only influence the running of individual operations by pulling the reins on this or that clause in the agreement.
 - In extreme cases franchisors may terminate the agreement or at least not renew it, but the franchisor cannot throw the franchisee out as if he or she were an employee.
 - Franchisors are therefore dependent on the willingness of the franchisee to observe the rules. Any failure to do so is perhaps more damaging to the franchisor (and to other franchisees) than to the franchisee concerned because of the effects on the franchise as a whole.
 - Another disadvantage sometimes turns out to be the curious mixture of dependence and independence that franchising produces.

- Franchisees are encouraged to think of themselves as independent business entities and to a large extent this is true. Nevertheless franchisees are operating the franchisor's business concept under a license for which a fee is payable. There are cases where franchisees identify so closely with the particular business they are running that they ultimately resent the payment of the fee. In these cases the franchisee's success is felt to be due to his or her own efforts, rather than the franchise concept or the franchisor. If the franchisor adopts a lower profile than he should, either in terms of direct help or in matters like national advertising, the situation is made worse. Clearly, of course, the franchisee would be obliged under the terms of the agreement, to pay but a sour relationship is not good for either party, so it is up to the franchisors to maintain their part of the bargain both in letter and in spirit. Franchises are a matter of mutual interest and obligation.

2. THE FRANCHISEE

- From the point of view of the franchisee there are advantages and disadvantages, which might, perhaps, be most clearly expressed in the form of a list. Advantages include:
 - A business format or product that has already been market tested and, presumably, found to work; consequently, major problems can be avoided in the startup period.
 - A recognised name of which the public is already aware and that already has credibility with suppliers.
 - Publicity, both direct (via the franchisor advertising his product or services), and indirect (through signage and other corporate image promotion in all the franchisor's outlets).
 - A smaller (usually) initial capital outlay than if the franchisee were starting up on his own (though franchises that have shown a very high

profit record are correspondingly expensive and can run well into six figures).

- Direct and close assistance during the startup period.
 - A period of training for production and management.
 - A set of standard management, accounting, sales, and stock control procedures that are incorporated in an operating manual.
 - Better bulk purchase terms that have been negotiated through the franchisor. (In some cases the franchisor may be looking to markups in this area as a source of revenue).
 - Design of the premises according to an established scheme. This saves on interior design fees and may eliminate them altogether if the franchisor has a set of specifications.
 - The franchisor's advice on equipment and initial inventory levels (though this advice may not be impartial in cases where the franchisor is also the supplier).
 - Help with site selection, and help with negotiating with planning officers and developers.
 - Access (possibly) to the franchisors' legal and financial advisers.
 - The exclusive rights to the franchise within a given area.
- Disadvantages include:
 - Business format franchising is, of necessity, something of a cloning exercise. There is virtually no opportunity for individual initiative in

matters of product, service, or design. However, the franchisor will demand uniformly high standards of maintenance, appearance, and packaging in whatever the franchise entails. Quality is usually monitored by regular inspections.

- The fee paid to the franchisor may be a percentage of gross turnover or of profits. The problem here is that if the franchisor is not pulling his weight or if the franchisee feels this to be the case, the fee can be a subject of bitter dispute. The franchisee may then feel justified in withholding all or part of the fee on the grounds of non-performance by the franchisor, but this is always a difficult matter to prove in the courts. Furthermore, the franchisor's resources to conduct a long, drawn-out case will usually be greater than the franchisee's.
- A further problem is that a high turnover does not necessarily imply a highly profitable operation. If the franchisor's fees are wholly or partially based on turnover, the franchisor may try to push for turnover at the expense of the franchisee's profitability.
- The franchisee is not absolutely at liberty to sell the franchise, even though he is in many respects operating the business independently. The sale has to be approved by the franchisor, who is also entitled to vet the vendor and charge the cost of any investigations to the existing franchisee. Furthermore, although the business in trading terms would be valued as a going concern, the goodwill remains the property of the franchisor. Again, the franchisee may feel that, at least to some extent, the goodwill has been built up by his own efforts. The resale of a franchise, in other words, is a process rich in those grey areas that can lead to expensive litigation.
- Exclusive territory agreements may be difficult to enforce in practice. For instance, one firm may have the exclusive rights in the suburb in which it is located, but there is nothing to prevent the citi-

zens of that suburb from buying the same product or service in some neighbouring outlet.

- The franchisee, as well as paying a fee to the franchisor, may be obliged to buy goods and services from the franchisor at disadvantageous rates.

- Though the franchisor places all sorts of controls and obligations on the franchisee to maintain the quality of image, the scope for doing the reverse is more limited. If the franchisor's product or service gets bad publicity, this is bound to affect the franchisee adversely, and there is very little that can be done about it. Equally, the franchisor may engage in promotional activities - and involve the franchisee in them as well - which, though perfectly harmless are, from the point of view of a particular outlet, an irrelevant waste of time.

3. MUTUAL DEPENDENCE

- From this list of advantages and disadvantages to both parties, the business format franchise emerges as a relationship of mutual dependence that allows each party to use its strength to mutual and, at best, equal advantage. Franchisors are able to expand without further investment and, though the return is obviously lower than from expansion by ownership, they do receive an income from the franchisee, an additional outlet for the product, and more muscle in negotiating the purchase of materials and equipment.

- Franchisees, on the other hand, are able to concentrate their entrepreneurial skills at the sharp end of sales and customer service, while the administrative headaches of setting up the business are mitigated by the uniform nature of the format. By the same token, franchisees are saved (through feedback via the franchisor about the accumulated experience of other franchisees) from making the errors to which businesses are prone in their beginning, most vulnerable stages. This relationship is expressed in the purchase and franchise agreements. But before considering these documents it is necessary to evaluate the franchise contract as a whole.

APPENDIX: TYPICAL FRANCHISE AGREEMENT

This agreement is made the ____ day of _____ one thousand nine hundred and eighty-three BETWEEN AJAX whose registered office is situated at 35 Piccadilly, London (hereinafter called "the Franchisor") of the one part and _____

_____ (hereinafter called "the Franchisee") of the other part.

WHEREAS:

- (1) The franchisor, as a result of extensive research and practical business experience, has developed the service and business for conducting the sale and service of widgets and all its accessories, and has acquired knowledge and skill from this business (hereinafter called "the knowhow").
- (2) The Franchisor will provide valuable management guidance and assistance in marketing and sales training to operate the Ajax service/business and has established, through publishing in various media the Ajax trademark and other identifying material, a reputation and demand that signifies the highest standard of quality and service.
- (3) The Franchisor is entitled to use the trade name "Ajax" and the trademarks (hereinafter called "the Trademarks") set out in the schedule hereto.
- (4) The Franchisor controls the sale and distribution in the United Kingdom of widgets and all related articles.

- (5) The Franchisor has agreed to grant to the Franchisee a franchise on the terms and conditions hereinafter set out.

NOW THIS AGREEMENT WITNESSETH AND IT IS HEREBY AGREED AND DECLARED as follows:

1. TERRITORY

- (a) The Franchisee desires the sole and exclusive right to supply and distribute and the Franchiser HEREBY GRANTS to the Franchisee the sole and exclusive right to sell and distribute the Ajax goods from the Ajax shops in the territory outlined in red on the map annexed hereto in Schedule I of this Agreement, which map has been initialed by the parties hereto for the purposes of identification of such territory (hereinafter called "the Territory").
- (b) The Franchisee may, at the request of another franchisee or of the Franchisor or any Company in the Franchisor's Group, arrange for a purchaser of Ajax goods from such other franchisee or the Franchisor or other Company in the Franchisor's Group to collect them from or have them delivered by the Franchisee on terms that the Franchisee shall be entitled to recover from such other Franchisee or as aforesaid a commission of ten per centum (10%) of the sum invoiced to the purchaser.
- (c) The Franchisor shall inform the Franchisee of the name and address of each franchisee appointed by the Franchisor in the United Kingdom and the area covered by such appointment, and shall notify the Franchisee forthwith of all changes in such information.

2. TERM OF FRANCHISE

THIS Agreement shall commence as from the ___ day of _____, in the year one thousand nine hundred and _____, and shall continue in effect (subject as

hereinafter provided) for a period of FIVE YEARS from the date upon the terms hereinafter appearing, subject to the Franchisor having received the Franchise Fee as set out in Clause 3 hereof and subject to due compliance by the Franchisee with the terms hereof. The Franchisor hereby grants to the Franchisee an option to renew this Agreement (if it is not previously determined) on the expiration of the five-year term hereof for an additional period of five years provided that the Franchisee shall enter into such new Agreement in such form as is currently offered to the new Franchisees AND such new Agreement shall not require payment of an initial Franchise Fee as provided in Clause 3 (a) hereof.

3. FRANCHISE FEE

- (a) Forthwith upon the signing hereof the Franchisee will pay to the Franchisor the sum _____ as an initial franchise payment for the rights, grants, and privileges provided for by this Agreement.
- (b) In every month during the currency of this Agreement the Franchisee shall pay to the Franchisor a Franchise Fee (hereinafter called "the Franchise Fee") amounting to ten per centum (10%) of the invoiced amounts of the sales of all the Ajax goods and of all other goods and articles sold in or from the Ajax shops (whether sold to personal customers or as a result of mail orders) in the previous month, PROVIDED ALWAYS that any Sales Value Added Tax or other similar tax (if such is imposed) payable upon the goods or other articles by the Purchaser thereof, shall be deducted from the invoiced amount of the sales as aforesaid before calculation of the amount upon which the Franchise Fee is payable.

On the tenth day of each month a statement shall be sent by the Franchisee to the Franchisor giving details of the invoiced amount of the sale made as aforesaid and of the Franchise Fees payable in respect of the previous month together with payment of the amount due PROVIDED that if a Franchise Fee has previously been paid on sales that have proved to be a bad debt or where the order has been cancelled and a refund of the purchase price made, the

Franchisee may deduct the amount of the Franchisee Fee previously paid in respect of that sale PROVIDED that it gives to the Franchisor full details thereof. An unpaid invoice shall be deemed to be a bad debt if it proves irrecoverable for a period of at least three months, during which time not less than three reminders shall have been sent.

- (c) The minimum annual Franchise Fee to be paid by the Franchisee to the Franchisor shall be:
- (i) _____ in respect of the first twelve-month period of this Agreement.
 - (ii) _____ in respect of the second twelve-month period of this Agreement.
- (d) The first payment of a monthly Franchise Fee shall be made on the tenth day of the month following the date hereof or at the commencement of the fifth week after the date hereof, whichever is the later, and all subsequent Franchise Fees for each monthly trading period shall be paid as set out in sub-clause (b) hereof. If the Franchisee shall make a delay in making any monthly payment on the due date, then the Franchisee shall become liable to pay to the Franchisor interest on the unpaid balance of Franchisee Fees, such interest to be calculated at the rate of one-half of one per centum per week for each week or part of a week during which there is any unpaid balance of Franchise Fees.
- (e) Upon the determination of this Agreement for whatsoever reason any outstanding Franchise Fees in connection with the business up to the date of termination shall be payable forthwith by the Franchisee to the Franchisor without any deduction except for bad debts as herein defined and money refunded by cancelled orders.

- (f) All Franchise Fees discussed in this Agreement are subject to the addition of Value Added Tax at the standard rate for the time being in force.

4. FRANCHISOR'S OBLIGATIONS

IT is a condition of this Agreement that the Franchisor is entitled to use the trade name Ajax and the Trademarks and is entitled to license or permit the Franchisee to make full use thereof in accordance with the Terms of the Agreement. The Franchisor agrees to indemnify the Franchisee from and against all liability proceedings, actions, claims, and demands and costs arising out of such use by the Franchisee of such Tradename and Trademarks.

The Franchisor will, during the currency hereof:

- (a) Forthwith train for a period not exceeding four (4) weeks such employee or employees of the Franchisee as are accepted for training by the Franchisor at the offices of the Franchisor or of any Company in the Franchisor's Group in the operation of an Ajax Franchise and the methods and procedures to be adopted. During the period whilst any such employee is being so trained the Franchisee shall remain liable for his salary and for all other costs and expenses of such employee.
- (b) Carry out such national advertising and publicity of the Ajax goods as the Franchisor shall spend a minimum of thirty per centum (30%) of the annual Franchise Fees received from all its franchises upon such advertising in each calendar year during this Agreement.
- (c) Pay to the Franchisee one-half of the Franchisee's initial advertising relating to its opening of an Ajax shop PROVIDED that such advertising shall be approved both as to form and cost by the Franchisor.
- (d) In response to any general sales inquiries to the Franchisor at its Head Office, the Franchisor shall send to the inquirer a list of current addresses of Ajax shops.

- (e) At the Franchisee's request and expense assist the Franchisee in the selection of premises, and advise and give guidance on shopfitting and rentals, unless otherwise provided for in this Agreement. The Franchisor also reserves the right to approve any premises and shopfittings thereof so as to protect the national corporate image of Ajax.
- (f) At the Franchisor's cost give to the Franchisee continuing advice and guidance, and from time to time visit his principal place of business to analyse the Franchisee's operating methods and techniques and advertising, and furnish the Franchisee with suggestions in writing for improvements thereof, if any be required in the Franchisor's discretion. The Franchisee shall implement any such suggestions within twenty-one days of receipt thereof.
- (g) Produce a catalogue (hereinafter called the "Brochure") at least once in each year of this Agreement and make available from time to time to the Franchisee advertising copy, promotional programmes, brochures, catalogues, and sales campaigns to assist in selling the Ajax goods to the general public. ALL such items shall be made available by the Franchisor at the Franchisor's prices plus delivery charges.
- (h) Provide the Franchisee with the marketing, merchandising, and sales knowledge and knowhow necessary to operate the Ajax service and business.
- (i) Not grant an Ajax franchise to any other person, firm, or company within the Territory.
- (j) Use its best endeavours to execute orders received from the Franchisee within such reasonable time as is specified in the order by the Franchisee.
- (k) (i) Ensure that the Ajax goods ordered by the Franchisee from time to time are invoiced to the Franchisee at the lowest prices and on the most favourable terms of the Franchisor or other supplier as the case

may be applicable from time to time and together with the benefit of the usual trade discount and cash discount.

- (ii) In respect of Ajax products and accessories the Franchisor shall procure that the recommended retail prices of all Ajax goods will be such as to enable the Franchisee to obtain a one hundred and ten per centum (110%) mark-up on the prices invoiced to the Franchisee.
- (l) Use its best endeavors to hold or procure that there is at least once in every year a National Conference of persons, firms, or companies who are franchisees of Ajax goods, to which the Franchisee is invited for the purposes of viewing and ordering Ajax goods. The cost of travel and accommodation is to be borne by the Franchisee.
- (m) Assist the Franchisee with the opening of each of the Ajax shops in the Territory by sending at least one suitably qualified representative to be present at such opening and at any time thereafter upon the reasonable request of the Franchisee to assist and advise in connection with the serving of customers and the initial advertising and promotion of the Ajax shop.
- (n) The Franchisor will train the Franchisee in the accounting methods and procedures recommended by the Franchisor and will provide all such forms for the keeping of internal records in relation to the Ajax shops as may be required by the Franchisor, and the Franchisee shall keep at its usual place of business all such records of its business operations in relation to the Ajax shops, including but without prejudice to the generality thereof, records of purchases and sales of the Ajax goods and of all other goods and articles, and such records shall be open to the inspection of the Franchisor's authorised representatives during normal business hours.
- (o) Subject to obtaining all necessary consents from the appropriate planning authority and the lessor of premises leased to a Franchisee of an Ajax shop, the Franchisee shall at his expense erect a fascia sign or inscribe on an existing

facia panel the Ajax sign to a specification format and colour as shall first be approved in writing by the Franchisor and thereafter maintain such sign in good condition until this Agreement is terminated for any reason herein mentioned, when the Franchisee shall forthwith remove or obliterate the Ajax sign completely.

- (p) The Franchisor will supply to the Franchisee drawings and specifications for the approved uses of the Trademarks, and the Franchisee shall use such Trademarks (and no other trademarks or tradenames) only upon and in relation to the Ajax goods in accordance with the reasonable directions of the Franchisor. Save as aforesaid the Franchisee shall have no right to use the Trademarks and shall not authorise any other person or corporation to use any of the Trademarks.
- (q) The Franchisor shall have the right from time to time to change or add to the quality and designs of the Ajax goods, and the Franchisee shall so far as reasonably practicable accept and follow such changes and operate the Ajax shops in such a way as to maintain to the maximum capacity the goodwill and prestige of the Ajax goods.

5. FRANCHISEE'S OBLIGATIONS

The Franchisee agrees during the currency hereof:

- (a) To purchase as a principal and not as an agent such Ajax goods as the Franchisee in his absolute discretion is willing to buy solely from the Franchisor or from such other supplier the Franchisor shall authorise in writing to the Franchisee.
- (b) Not without the Franchisor's consent in writing to stock for sale or sell any goods or other articles at, or carry on any other trade or business from the Ajax shops, other than the Ajax goods and services.

- (c) Not to purchase or sell or in any other way deal in competitive products or any other ancillary articles, except from the Ajax shops.
- (d) Strictly and continuously adhere to the Franchisor's rule, regulations, and standards as to methods, systems, operating procedures, and programmes, as specified in the Franchisor's standards of operations in the conduct of the Franchisee's business as the same may be published by the Franchisor from time to time.
- (e) Notwithstanding sub-clause (a) hereof, and subject to the Franchisor's compliance with Clause 4 (j) hereof, to use and maintain in stock at least one sample for display at all times in each of the Ajax shops of all the Ajax goods shown in the Ajax Brochure from time to time issued by the Franchisor for distribution to the public or shown on national advertising conducted by the Franchisor.
- (f) To sell the Ajax goods at retail prices not to exceed those retail prices recommended by the Franchisor.
- (g) To pay the Franchisor for all goods promptly and on time, the normal trading terms for all goods being thirty (30) days after delivery.
- (h) The Franchisee agrees to expend for direct local advertising an annual amount equal to three per centum (3%) of his previous year's gross Ajax sales after the deduction of any sales of Value Added Tax thereon, this amount to be expended by the Franchisee in consultation with the Franchisor and in accordance with the national advertising conducted by the Franchisor and which complies with the Franchisor's reasonable directions as to content, layout, and artwork.
- (i) The Franchisee specifically agrees to use only customers' order forms and receipts as supplied by the Franchisor.

- (j) To use all stationery and advertising material with a design and format previously approved in writing by the Franchisor.
- (k) To keep the Ajax shops, the Ajax goods, and all other articles in the Ajax shops insured to their full value against loss or damage by fire and other usual risks except theft, with a reputable insurance company satisfactory to the Franchisor.
- (l) Not to give any written warranty for or on behalf of the Franchisor in respect of the Ajax goods without the authority in writing of the Franchisor.
- (m) Be responsible for all operating expenses (including losses) of the business, including, without prejudice to the generality of the foregoing, insurance, salaries, advertising, rent, telephone, and the cost of leased or rented equipment. The Franchisee shall indemnify the Franchisor from all actions, claims, demands, damages, or expenses whatsoever arising by reason of act or omission of the Franchisee in connection with the carrying on of the business, and the relationship between the parties shall at all times be one of Franchisor and Franchisee, nor shall the Franchisee hold himself out as servant, agent, Partner, or contractor of the Franchisor.
- (n) Pay all Franchise Fees or other payments hereby agreed to be made on the tenth day of each month to the Franchisor or as directed by the Franchisor without formal notice or demand.
- (o) The Franchisee shall not, either during or after the termination of this Agreement, disclose to any third person or corporation any secret or confidential information relating to the business of the Franchisor or of any Company in the Franchisor's Group.
- (p) The Franchisee shall establish and maintain in the Territory a retail shop (herein called "the Ajax shop") for the purpose of selling the Ajax goods. The Ajax shop shall be established in such location as may be approved by the

Franchisor, which approval shall not be unreasonably withheld. And the Franchisee shall design, equip, and furnish the Ajax shop in accordance with the directions of the Franchisor to the intent that all Ajax shops within the United Kingdom shall be similar in their basic design equipment and in the presentation of their goods to the public.

- (q) The Franchisee shall maintain the Ajax sign in good and clean condition.
- (r) The Franchisee shall procure that the Provisions of this Agreement shall be observed by every Company in the Franchisee's Group.

6. ALIENATION

THE Franchisee shall have the right to sell or assign the business upon the following terms and conditions:

- (a) The Franchisee shall first give to the Franchisor notice in writing of the intention to sell the business and set out therein all relevant details of the terms of sale, including information as to the estimated value of stock and turnover and as to the lease under which premises are held. The Franchisee shall give to the Franchisor first refusal to purchase the business on terms that are fair and reasonable, such terms to be mutually agreed.
- (b) In the event of the Franchisor giving to the Franchisee a counternotice in writing within twenty-eight days of service of the notice that it does not wish to purchase the business or terms for purchase have not been agreed within such twenty-eight day period, then the Franchisee may offer the business for sale to third parties.
- (c) Prior to the Franchisee entering into an agreement to sell or assign the business to a third party, he shall first obtain the consent in writing of the Franchisor, such consent not to be unreasonably withheld subject to the following terms and conditions being fulfilled:

- (i) Any proposed purchaser or assignee shall meet the Franchisor's reasonable standards with respect to prior related business experience and financial ability. The Franchisee shall procure the furnishing of such reference to the Franchisor as he shall reasonably require and in the case of a private limited company shall procure that the proposed purchaser or assignee shall give such guarantees from its directors or other persons as the Franchisor shall reasonably require.
 - (ii) The Franchisee shall forthwith submit to the Franchisor a copy of the proposed purchaser's or assignee's written offer to purchase or take an assignment of the business from the Franchisee.
 - (iii) The Franchisee shall procure that the proposed purchaser or assignee shall enter into a fresh agreement with the Franchisor in the same terms and conditions as are herein contained, for a term to expire on the same date as herein provided, and he shall ensure that a clause to this effect is included in the contract for sale or assignment and that such agreement shall be completed between the Franchisor and the purchaser or assignee contemporaneously with the completion of the purchase or assignment and thereupon this Agreement shall be treated as terminated but without prejudice to any outstanding obligations or rights of either party against the other which may have occurred up to the date of such termination and all provisions which continue after the term hereof shall continue in full force and effect.
- (d) In the event of the death or of disability of the Franchisee (if the Franchisee for the time being is not a corporation) his personal representative or custodian of his assets shall have the same right to sell or assign the business and be subject to the same duties as are set out herein, provided the active management of the business during the administration of the Franchisee's estate shall be continued in a manner satisfactory to the Franchisor. Notice of death or disability of the Franchisee shall be given to the Franchisor within twenty-eight days after its occurrence.

7. TERMINATION BY FRANCHISEE

- (a) The Franchisee shall be entitled to terminate the Agreement after the first year thereof by giving to the Franchisor six months notice in writing of termination, such notice to expire between the 1st August and 31st October in any year excluding the first, but without any claim against the Franchisor for repayment of any such sum paid by the Franchisee to the Franchisor and after discharging the minimum annual Franchise Fee hereinbefore covenanted to be made in respect only of the period prior to such termination.
- (b) The Franchisee shall have the right to terminate this Agreement forthwith by notice in writing to the Franchisor in the event of any material breach by the Franchisor of its obligations hereunder which are not capable of rectification.

8. FRANCHISEE'S OBLIGATIONS ON TERMINATION

IMMEDIATELY upon termination of this Agreement, whatever the reason for such termination, all of the Franchisee's rights shall terminate and the Franchisee shall:

- (a) Thereafter cease to use by advertising or otherwise the name "Ajax" either alone or in any combination of other names and marks on any goods, accessories, articles, stationery, business cards, uniforms, brochures, or any devices, service marks, trademarks, systems slogans, symbols copyrights, or any other business stationery used in connection with the "Ajax" business and service.
- (b) Save as hereinafter provided, the Franchisee shall not thereafter sell the Ajax goods or supply the Ajax service.
- (c) The Franchisee shall not thereafter make any use of the Trademarks or the tradename "Ajax" or of any secret or confidential information of the Franchisor or of any Company in the Franchisor's Group, and the Franchisee shall

forthwith return to the Franchisor all literature and advertising material in its possession supplied by the Franchisor and will forthwith remove or completely obliterate all "Ajax" signs.

- (d) The Franchisee shall immediately upon termination of this Agreement, whatever the reason for such termination, direct the Post Office to transfer to the franchisor any telephone number or telephone numbers that appear in the Brochure published by or on behalf of the Franchisor or to his nominee, and the Franchisee shall use his best endeavours not to abandon the said telephone number or numbers. The Franchisee shall not, without the prior written consent of the Franchisor, which consent shall not unreasonably be withheld, initiate or agree any change of the said telephone number or numbers appearing in the said Brochure.
- (e) The Franchisee shall not at any time within six months after the termination of this Agreement, whatever the reason for such termination, either solely or in partnership with or as agent for any other person, firm, or company directly or indirectly carry on or be engaged, concerned, or interested in carrying on within a radius of two miles of the location of the Ajax shop or shops within the said Territory the business of hiring or sale of widgets or any business whose principal or main activity is or includes the hiring or sale of widgets or other business that uses design techniques, procedures, or marketing expertise developed by the Franchisor.
- (f) The Franchisor may purchase back at their net price to the Franchisee the Franchisee's stock, provided that it is in good and marketable condition. Any stocks of Ajax goods not so purchased by the Franchisor may be sold by the Franchisee to third parties provided that no use is made of the Trademarks or the tradename "Ajax."
- (g) The Franchisor or the supplier, as the case may be, shall retain the property in the Ajax goods until the Franchisee has paid for them in cash, but the Franchisee shall not be prevented thereby from passing good title to a bona fide customer.

- (h) Pay to the Franchisor all monies owing in respect of the Franchise Fees supply of Ajax goods, or otherwise owing.

9. TERMINATION BY FRANCHISOR

The Franchisor shall be entitled to terminate this Agreement forthwith by notice in writing to the Franchisee in the event of the happening of any of the following:

- (a) If the Franchise Fee payable hereunder (including the minimum annual Franchise Fee referred to in Clause 3 (c), (i), and (ii)) is in arrear for twenty-one (21) days after the same has been formally demanded in writing.
- (b) If the Franchisee fails to rectify any breach of any of the provisions of this Agreement, and on its part to be performed and observed, and capable of rectification within twenty-eight (28) days after written notice of such breach has been given to the Franchisee.
- (c) If the Franchisee commits a material breach of any of the provisions of this Agreement that is not capable of rectification.
- (d) If the Franchisee shall cease or threaten to cease to carry on the business within the Territory.
- (e) If the Franchisee commits any act of bankruptcy or makes any arrangement with its creditors or, being a company, goes into liquidation, whether compulsory or voluntary, other than voluntary liquidation for the purpose of reconstruction.

10. THE termination of this Agreement shall be without prejudice to any rights of either party against the other which may have occurred up to the date of such termination and all provisions that continue after the term hereof shall continue in full force and effect.

11. PROVIDED ALWAYS AND IT IS HEREBY AGREED AND DECLARED

- (a) The failure of either party hereto to seek damages for any breach or to insist upon the strict performance of any provision of this Agreement shall not be construed to condone a subsequent act of similar or other nature nor shall it in any way be deemed a waiver of such party's right with respect thereto.
- (b) The Franchisee HEREBY CONVENANTS to save the Franchisor harmless and indemnify the Franchisor against and from any and all claims, demands, causes of action, losses, costs, damages, suits, judgments, penalties, expenses, and liabilities or obligations of any kind, type, or description arising directly or indirectly out of the Franchisee's acts or defaults in carrying out any provision herein set forth.
- (c) The Franchisee shall conduct his Ajax business and maintain his Territory in strict compliance with all applicable laws, ordinances, regulations, and other requirements, whether imposed by statute or otherwise, and whether of a national or local character, and will obtain all necessary permits, licenses, or other necessary consents for the operation of his Ajax business, all at the Franchisee's own expense.
- (d) The Franchisee shall not assign or sublicense this Agreement or any of its rights or obligations hereunder to any other person or corporation save as provided in Clause 6 hereof.
- (e) Whilst the Franchisor will do its best to supply against an accepted order on time, the Franchisor shall not be liable to the Franchisee for failure to deliver any goods where the said failure is due to out-of-stock position inability to obtain raw materials, fire, floods, strikes, labour disturbances, power failures, reductions in power supplies, acts of God, or any causes beyond the Franchisor's control.

- (f) In the event of any default of the terms of this Agreement by the Franchisee for which the Franchisee has received due written notice of default the Franchisor reserves the right to withhold or withdraw any franchisee support services, advertising support, or goods until the said default that is capable of rectification has been rectified.
- (g) If either of the parties of this Agreement is unable to perform any of its obligations hereunder for a period not exceeding six (6) consecutive calendar months by reason of strikes, acts of God, restrictions imposed by governmental authority, or for any other similar reason beyond such party's control, such failure shall be deemed not to be a breach of this Agreement provided that the party so affected shall forthwith notify the other of the existence of such cause and shall use its best endeavours to remove such cause.
- (h) (i) The term "Franchise Group," when used in this Agreement, shall mean the Franchisor and Holding Company of the Franchisor or any such Holding Company in accordance with the definition of the terms "Holding Company" and "Subsidiary" given in the Companies Act 1948, Section 154, or as amended.
- (ii) The term "Franchisee's Group," when used in this Agreement, shall mean the Franchisee and a Holding Company of the Franchisee and any subsidiary of the Franchisee or any such Holding Company in accordance with the definition of the terms "Holding Company" and "Subsidiary" given in the Companies Act 1948, Section 154, or as amended.
- (i) No agent of either party has authority to make oral representations prior to or after the date of this Agreement and neither party has relied upon any oral representations in entering into this Agreement nor has any agent of either party any authority to make any agreements that modify or vary the terms and conditions of this Agreement, which may not be modified or varied other than in writing and signed by both parties.

12. ANY notice under this Agreement shall be in writing and may be served on the Franchisee either personally, in the case of an individual, or by leaving it addressed to him at the Franchisee's premises or his last known place of abode by recorded delivery post, or in the case of the Franchisor or in the case of the Franchisee being a Limited Company, either by leaving any notice at the registered office of the Franchisor or the Franchisee, or sending there by recorded delivery post.

13. THIS Agreement shall be read and constructed according to and shall be governed by the law of England.

SIGNED FOR AND ON BEHALF OF AJAX LIMITED

IN THE PRESENCE OF: _____

WITNESS: _____

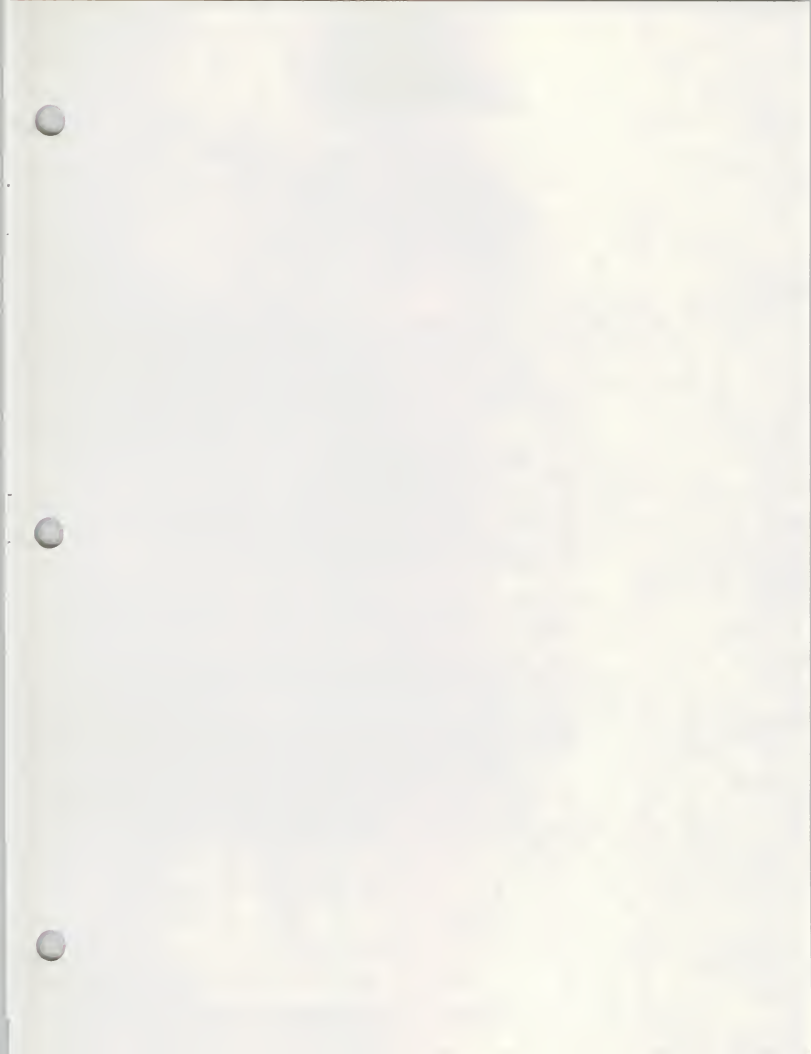
ADDRESS: _____

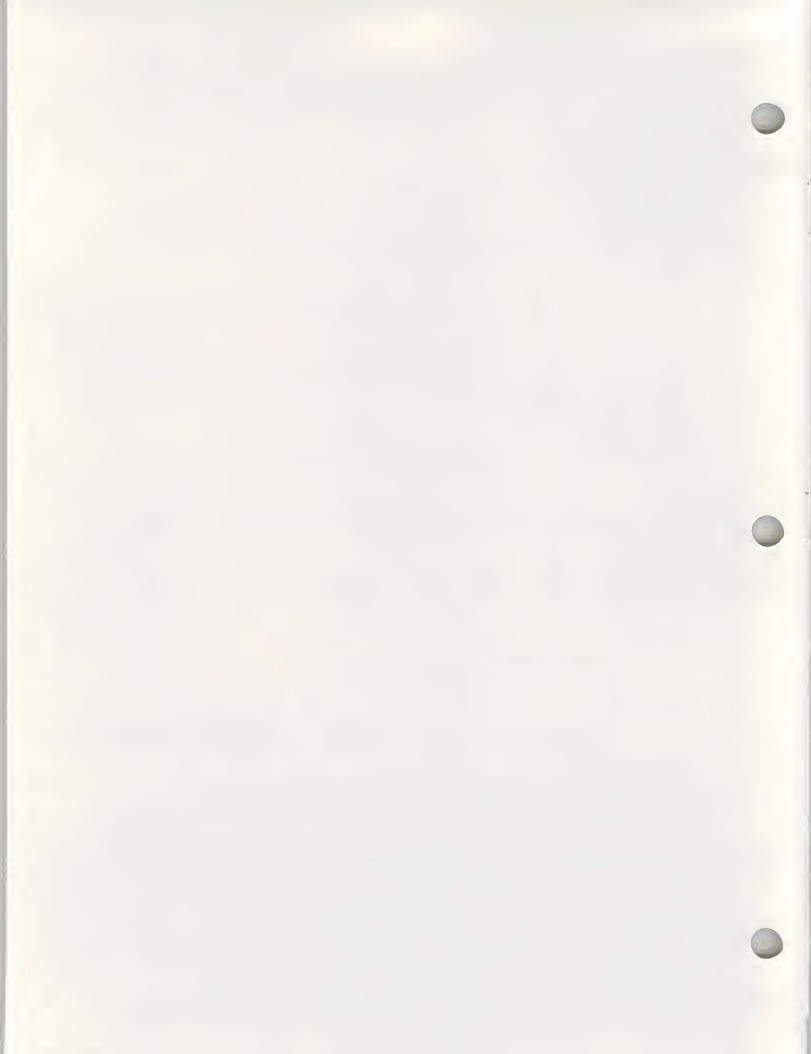
SIGNED by the said _____

IN THE PRESENCE OF: _____

WITNESS: _____

ADDRESS: _____





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

- Management Planning Program in Information Systems - Provides managers of large computer/communications facilities with timely and accurate information on developments which affect today's decisions and plans for the future.
- Management Planning Program for the Information Services Industry - Provides market forecasts and business information to software and processing services companies to support planning and product decisions.
- Company Analysis and Monitoring Program for the Information Services Industry - Provides immediate access to detailed information on over 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.
- 1982 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 planning services firm. Clients include over 100 of the world's largest and most technically advanced companies.

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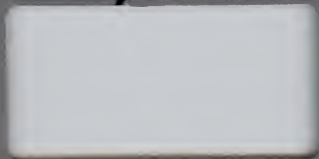
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Planning Services for Management



INPUT

**MANAGEMENT
PLANNING PROGRAM
IN
FIELD SERVICE**



MANAGEMENT PLANNING PROGRAM
IN FIELD SERVICE

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

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

- 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 present an in-depth analysis of major trends that will assist field service executives make recommendations that will assist field service executives in the planning of major activities in the field and their effects on future trends of likely changes in field service requirements, may affect the
- Annual Report - A report that provides a summary of major activities in the field services in the current year and their effects on future trends of likely changes in field service requirements, may affect the
- Annual Presentation - A presentation to field service executives on the current year's research and development program for the research and development program for the second half of each year.
- Inquiry Service - A service that provides a special "hot line" is needed based on special requirements. Staffed evenings.

RESEARCH METHODS: Research in communications, computer research, and

- Research in communications, computer research, and discussions with client representatives.
- Research from universities and industry with users, vendors, and other professionals.
- Conclusions from professional judgement of INPUT's research and development staff.
- Professional experience of nearly 20 years of field service executives and senior management positions with major vendors and users.

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

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FIELD SERVICE PROGRAM

FIELD SERVICE BRIEF

OPPORTUNITIES FOR
FIELD SERVICE FRANCHISING

DECEMBER 1983



OPPORTUNITIES FOR FIELD SERVICE FRANCHISING

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OPPORTUNITIES FOR FIELD SERVICE FRANCHISING

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I INTRODUCTION

- This brief is included as part of INPUT's Field Service Programme for Europe. INPUT feels that franchising could help client field service organisations address the need for alternative revenue sources and increased productivity. The franchising of field service, in a specific sense, also addresses the critical field service requirement of creativity in marketing.
- Sales from franchising now account for 32% of all U.S. retail sales. There are thought to be some 250,000 business format franchises now in operation in the U.S.
- The cult of owning your own business is perhaps more strongly established in the U.S. than in some other countries, but there are very good reasons why franchising can be expected to become more popular in Europe. Some of these reasons have to do with the fact that setting up one's own business may be the only alternative to unemployment, though curiously enough, a recent survey by the British Franchise Association shows that only 8% of franchise owners come from the ranks of the redundant. However, clearly the uncertainty of the job market and the difficulty of even getting a foothold in it attracts many to franchising.
- Franchising seems ideal for those with little experience of running their own business because it operates in a way that takes some of the sting and isolation out of going at it absolutely alone. The most compelling reason of all, however, for the growth of franchising is its success. As many as 90% of all new businesses fail, whereas 90% of new franchises succeed.

- The fact that franchises are sometimes said to succeed because the franchisor will pull out all the stops to prevent the franchise from failing is actually an argument in franchising's favour. It helps to be able to turn to someone who will not only be there to advise you, but who has an interest in your success because any failure reflects on the whole operation. No wonder that when regular employment diminishes, franchising looks like an attractive alternative for someone with money to invest and an interest in running his or her own business.

- However, while franchising eliminates some of the more costly and at times disastrous bumps in the learning curve of working for oneself, it is not an easy way to riches either. Furthermore, there are dangers as well as advantages in some of the compromises franchising offers between self-employment and working for someone else. Prospective franchisees can be exploited by unscrupulous operators who tend to emerge whenever there are inexperienced people around with money to invest in business ventures. Even though some of the less-savoury versions, or rather perversions, of franchising (e.g., pyramid selling), are now subject to legislation, it is still quite possible for an unscrupulous franchisor to stay within the law and give the franchisee very little in return for his fee.

- Nevertheless franchising is an industry with very rapid growth. In the U.K., since 1978, franchised outlets have more than doubled to over 4,000. Annual sales from the U.K. are growing at a rate of about 300 million pounds per year.

- This report offers the reader a general explanation of franchising. Areas covered are: the definition of franchises, types of contracts, and the advantages and disadvantages of franchising.

- The data is from consumer-oriented products and services since it is this area that has been most successful.

- Similarities between the field servicing of sophisticated electronic gear and the operation of hamburger restaurants may seem few, but nevertheless there are principles in common.

- The present study is largely oriented towards the franchisee or prospective franchisee (the person(s) who operate(s) the franchise). The franchisor is the party who owns the rights to the franchise and assigns the right to the franchisee under a franchise contract.

- The relationship of franchising to field service operations is discussed in conceptual terms. Examples of the projected impact on field service are illustrated.

- Readers are encouraged to comment on the content, applicability, and presentation of the material in this report.

II THE CONCEPT OF FIELD SERVICE FRANCHISES

A. WHAT FRANCHISING MEANS

I. DEFINITION OF A FRANCHISE

- The following formal definition of a franchise has been made by the British Franchise Association:

- A franchise is a contractual license granted by one person (the franchisor) to another person (the franchisee) that:
 - Permits or requires the franchisee to carry on during the period of the franchise a particular business under or using a specified name that belongs to or is associated with the franchisor.
 - Entitles the franchisor to exercise during the period of the franchise continuing control over the manner in which the franchisee carries on the given business.
 - Obliges the franchisor to provide the franchisee with assistance in carrying on the franchised business, (assistance with organisation training, merchandising, management, etc.)

- Requires the franchisee periodically during the period of the franchise to pay to the franchisor sums of money in consideration for the franchise or for goods or services provided by the franchisor to the franchisee.
 - Is not a transaction between a holding company and its subsidiary, between subsidiaries of the same holding company, or between an individual and a company controlled by that individual.
- The last clause establishes the important distinction between a franchise and an agency. Although this official definition is certainly useful, it does not mention a number of aspects that are important from the point of view of the franchisee: it does not indicate that an initial fee is usually paid by the franchisee, nor does it stress that the subject of the franchise should be a tried-and-tested commercial operation.
 - Furthermore, the above definition does not mention that the business, once set up, is the property of the franchisor, nor does it warn the franchisee of the degree of control he may be subject to under the second clause. The definition also gives no indication of the extent of the backup services that the franchisee might reasonably expect to get for his money. In other words, the definition is not an adequate measure against which to check the franchise contract.

2. FORMS OF FRANCHISING

- Franchising is most commonly associated with such well-known names as Wimpy, Prontaprint, and Kentucky Fried Chicken. There are, however, other forms of franchising and it is important to be clear about distinctions.

- The term "franchise" covers a wide variety of arrangements under which the owner of a product, a process, a service, or even just a name having certain connotations (e.g., that of a sportsman) licenses another to make or use something in exchange for some form of payment. This payment can be either direct, in the form of a fee and royalty, or indirect, in the form of an obligation to buy a service or product in which the licence holder has some kind of commercial interest.

- A familiar example of the indirect arrangement is the "tied" pub, wherein the licensee has to obtain his supplies from a particular brewery. This type of arrangement, by the way, has been around for some 150 years.

- Various types of relationships between licensee and licensor that are also described as franchises (but can be quite different) are described as follows:
 - A distributorship for a particular product, such as a make of car. This arrangement is also sometimes referred to as an agency, but there is a fundamental difference between an agency and a distributorship.
 - An agent acts on behalf of a principal even though the agent is not employed by the principal, and even though the agent may have an agency for the products and services of more than one principal, what the agent does, says, or represents to third parties is binding on the principal in question as if principal and agent were employer and employee.
 - A distributorship, however, is an arrangement whereby vendor and purchaser, are legally independent except that the purchaser, in exchange for certain exclusive territorial rights, backed up by the vendor's advertising, promotion, and possibly training of the staff, will be expected to hold adequate stock and maintain the premises in a way that reflects well on the vendor's product or service.

- A licence to manufacture a certain product within a certain territory and over a given period of time, have access to any secret process this involves, and use the licensor's brand name in exchange for a royalty on sales.
 - . This arrangement resembles a distributorship. Licensor and licensee are independent of each other, except that, in order to preserve the good name of his product, the licensor will no doubt insist that the licensee complies with certain specifications as regards content and quality.
 - . Manufacturing licenses are often found in industry and a well-known recent example is the Rank Organisation's licence to produce the photocopying devices pioneered by the Xerox Corporation.

- The use of a celebrity name to enhance the sales appeal of a product and to guarantee, at least by implication, its quality.
 - . The most common example is the endorsement by a sports personality of equipment associated with activity and bearing his name, in return for a royalty payment by the manufacturer.
 - . In the thirties there were attempts to capitalise on movie stars' names in a similar way - an early poster associating Ronald Reagan with a brand of cigarettes has been much reprinted since he became prominent in politics - but sportsmen and women have perhaps been more ready and able to cash in on the advertising spin-off from their media coverage.
 - . A name can be franchised to validate a product, particularly if there appears to be a direct connection. For instance, Arnold Palmer golf clubs.

- The use of a trademark. Here a widely recognised product, rather than the name of an individual, is exploited commercially for a fee and subject to certain licensing conditions. A recent example which may be familiar is Rubik's cube, always shown with the symbol "TM" beside it.

- Although all these forms of franchising continue to flourish, it could be said that business format franchising has emerged as the dominant and certainly the most rapidly expanding mode. This is because business format franchising meets present commercial needs.

3. HISTORY OF FRANCHISING

- Distributorship franchises were first applied to Singer Sewing machines after the American Civil War, when the U.S. began to emerge as a vast market, but when long-distance communications were still too poor to make centralised distribution effective.

- The concept of franchising was then picked up by the motor car industry, though the problem there was somewhat different. In the case of automobiles it was not so much a problem of finding a mass market, but more one of establishing outlets to provide display space, back-up service, and of course, to sell the actual cars. The manufacturers could not afford to set up distribution outlets and finance stock, as well as make the cars.

- The success of these varieties of franchising encouraged numerous imitators from the twenties to the fifties, during which time the trend was to nationalise small, locally based manufacturing units into national and even multi-national entities.

- This conglomeration, however, did cause problems of sales and distribution. Local industries, aware of local market conditions, were shown in many cases

to have been rather more successful in sales and distribution than were "face-less corporations" located a long way distant.

- Franchised distribution and licensing were developed as methods of recreating the virtues of local industry. From the franchisor's point of view these arrangements turned out to have another advantage as well, they eliminated the need for total control of a costly national (and in the post-war period, international) network of salespeople and warehouses.
- Franchisors found that their franchisees were usually more dedicated to the interests of the franchisor (in whose success they stood to share) than many a salaried employee would have been.
- The above dedication was found even in cases where the franchisee was also trading in goods and services other than those for which he held a franchise. Distributorship franchises were successful because they were often arrangements that placed no great obligation on the franchisor and instead gave much freedom to the franchisee.

4. BUSINESS FORMAT FRANCHISING

- Business format franchising incorporates elements from all these earlier ideas and combines them in a way that is particularly suited to current circumstances and economic conditions.
 - Such a franchise is a license for a specific period of time to trade in a defined geographic area under the franchisor's name and a license to use any associated trademark or logo.
 - What is franchised is an activity, usually some form of service, that has already been tried elsewhere and shown to work.

- The franchisor provides the entire business concept (usually called the "blueprint"), which must be followed by the franchisee. In fast food, for instance, the ingredients of any "secret" recipe are strictly laid down, as are the specifications for the surroundings. The blueprint is generally set out in an operating manual, which is given to the franchisee when negotiations are completed.
- The franchisor educates the franchisee in how to conduct business in accordance with the blueprint.
- The franchisor also provides backup services to ensure that the franchise operates successfully. Backup should certainly cover advertising and promotion of the franchise's name in general and may also cover local promotion. The franchisor might also provide ongoing general business advice, help in raising finances, assistance with negotiating leases and obtaining planning permissions, aid for site selection and development, building plans and specifications, delivery of a standardized accounting system - in other words, help with virtually everything connected with setting up a new business.
- In exchange for the business blueprint and other franchisor services, the franchisee is expected to make an initial investment in the business and to pay a royalty to the franchisor that is based on turnover or profits. The franchisee might also be obligated to buy some or all goods and equipment from sources nominated by the franchisor.
- The participation of the franchisor in setting up the business does not mean that the franchisor owns it. The business belongs to the franchisee and the franchisee is free to dispose of it, though he will probably have to give the franchisor first refusal and will have to obtain the franchisor's approval of any new owner (if the franchisor does not want to buy the business back).

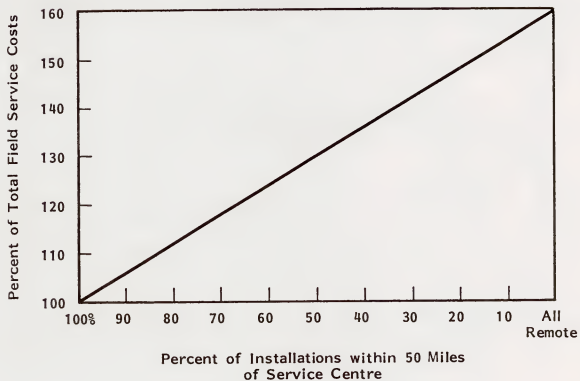
B. APPLICATION TO FIELD SERVICE

I. BACKGROUND

- Employing engineers in areas where there is not enough equipment density to support them is a costly proposition.
 - Exhibit II-1 shows that as more service requirements fall beyond a 50-mile radius of a service centre, the increase of service costs is dramatic.
 - The high cost of remote service is due to:
 - Extraordinarily high travel and living expenses that are incurred by travelling to and from the site.
 - Unusually low utilisation or "hands-on" time because of travel and the wide spacing of the equipment that needs servicing.
 - Repeat calls or long wait times owing to the scarcity of spare parts in remote areas.
- In a previous INPUT survey, remote service (greater than 50 miles from a service centre) represented between 5% and 60% of all service and between 10% and 50% of total field service costs.
- One respondent commented: "If all my users were within 50 miles of our support centres, I would need 30% fewer engineers."
- Nevertheless many companies put field engineers in remote locations to satisfy customer demands, regardless of cost or revenue considerations.

EXHIBIT II-1

IMPACT OF REMOTE SERVICE
ON TOTAL FIELD SERVICE COSTS



SOURCE: INPUT Survey

- Remote service is most costly for newer products sold in areas where similar equipment is scarce. The demand for better remote service will increase as microcomputer-based products are marketed beyond urban areas.

2. THE CONCEPT

- The concept of field service franchising involves (but is not necessarily restricted to) operating remote service through franchisees in lieu of full-time employees.
- For an agreed amount (a fixed-sum royalty or rate), the field service vendor would sell off the remote service business to an entrepreneurial engineer or engineers. This person(s) might at the present time be an employee of the field service firm.
 - The newly created franchisee would assume the risk associated with the business but would receive most of the revenues created from current and future business.
 - Depending on the circumstances, the franchisee also could assume any other business opportunities that were related to his work and in his territory.
 - The franchisee could also benefit from the service firm's (franchisor's) established name and advertising.
 - The field service firm would receive a fixed percentage of current and future revenues. It would also receive revenues from:
 - Spare parts.
 - Documentation.

- . Backup technical support.
 - . Remote diagnostics.
 - . Software support.
 - . Revisions and updates.
-
- The customer needn't know that his field engineer was a franchisee, since the service firm would continue to take the initial call, dispatch the franchisee, and bill the customer. (Although in other cases it would work better if the franchisee handled the entire administrative burden.)
 - Of course, the most sensitive issue in such an arrangement is the customer's relationship with the franchisee, and vice versa. This problem must have caused IBM some heartburn as they pondered the use of distributors and agents to sell and service their personal computer.
 - For smaller systems, franchising field service could be mutually beneficial to the manufacturer and franchisee both, regardless of how remote the equipment is.
 - The concept of field service franchising is not new. A pilot program was conducted by Raytheon Service Company in Portland, Oregon and Toronto, Canada about five years ago but apparently was dropped following TRW's buy-out of Raytheon Service Company's computer business.
 - The concept of field service franchising is worth revisiting. It has been described here in basic terms. The selection of various options and enhancements to fit the specific needs of clients depends on each individual set of circumstances. The following section of this report gives a few hypothetical examples.

- The majority of the report is therefore a description of the mechanics of franchising. As further definitions of franchising ideas become clearer in specific client situations, these ideas can be evaluated using the fundamental principles described in the remainder of this brief.

C. PROJECTED IMPACT OF FRANCHISED FIELD SERVICE

I. ORGANISATION

- Organisationally, field service firms would eliminate those engineers who now operate in a territory that would be designated for franchised service. One approach to the always-uncomfortable task of elimination or redundancy is to engage the former employee as the Franchisee.
- Alternatively, the proposed franchise territory could be staffed by a new individual who, for a fee, would be trained by the service firm (franchisor).
- Exhibit II-2 shows the structural appearance of a field service firm that provides field service itself and also acts as a franchisor.
- Exhibit II-3 illustrates how a field service firm would look as a franchisor only. The service company would franchise its service to acceptable franchisees, supplying basic resources for the following service:
 - Parts.
 - Repairs.
 - Backup technical support.

EXHIBIT II-2

FIELD SERVICE FIRM AND FRANCHISOR (Conceptual)

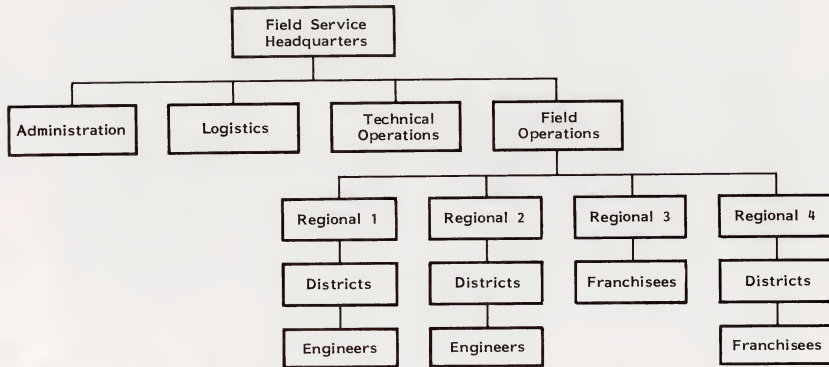
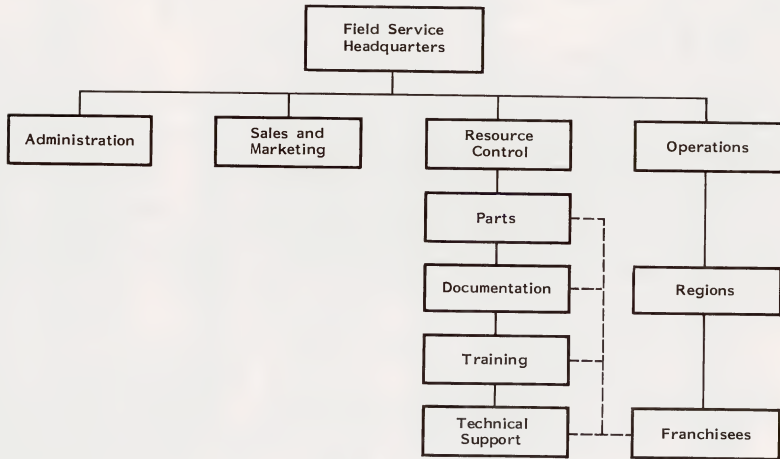


EXHIBIT II-3

FIELD SERVICE FRANCHISOR (Conceptual)



- Reputable name.
 - Advertising.
 - Training.
 - Documentation.
 - Dispatch.
 - Administration.
- Execution of service would be handled by the franchisee.

2. OPERATIONS

- Under both schemes, service would have to be delivered to the customer without any degradation of quality. The fact the service is delivered by a franchisee instead of the manufacturer's (or his representative's) engineer should not affect the customer.
- The franchisor would supply all the necessary logistical and technical support and perhaps also administrative, sales, and advertising help. The franchisee would make the actual repair.

3. FINANCIAL

- A well conceived and managed franchising program could have a very significant financial impact. By eliminating heavy expenses from travel, direct and indirect labor, salaries, benefits, unutilised time, repeat calls, etc., the net cost of service coverage in a labor intensive area could diminish considerably after it is replaced by a franchise.

- Aside from a potential increase in productivity (described above), franchising would produce revenue. While the revenue from the franchisee would be less than that coming directly from the customer, the potential profitability would be greater.

- Three hypothetical and conceptual examples of the impact of a field service franchise are illustrated in Exhibits II-4 to II-6. There are almost limitless ways to show the impact of franchising. These examples are for illustrative purposes only and involve selecting values for:
 - Amount of remote business (can range from 3% to 30%).
 - Ratio of remote business expense to revenue before franchise (80% to 20%).
 - Ratio of urban business expense to revenue before franchise (72% to 87%).
 - After-franchise revenue (remote - 10% to 33%).
 - Cost of franchising (\$50,000 to \$138,000 per year).

- The bottom-line effect (gross pretax profit) of franchising field service changes as a result of the amount of remote service required, the cost and income from remote service, and the cost of the franchise. Using three different sets of these variables demonstrates some interesting results of franchising:
 - The medium-sized company (as shown in Exhibit II-4), experiences a jump from 15% gross profit to 26% gross profit as a result of franchising, assuming:
 - A significant amount (30%) of remote service now required.

EXHIBIT II-4

FINANCIAL IMPACT OF FRANCHISING FIELD SERVICE
 HYPOTHETICAL EXAMPLE: MEDIUM-SIZE MAINTENANCE FIRM
 (\$ thousands annually)

BEFORE THE FRANCHISE		AFTER THE FRANCHISE
	<u>Revenues</u>	
\$ 2,800	Urban	\$ 2,800
1,200	Remote	120
<u>4,000</u>	Total	<u>\$ 2,920</u>
	<u>Expenses</u>	
\$ 2,020	Urban	\$ 2,020
1,380	Remote	0
0	Franchise	138
<u>3,400</u>	Total	<u>\$ 2,158</u>
\$ 600 15%	<u>Gross Profit Before Tax</u>	\$ 762 26%

Assumptions:

1. Significant Remote Business = 30%
2. Remote business = 115% Expense to revenue before franchise
3. Urban business = 72% Expense to revenue before franchise
4. After-franchise revenue = 10% of before-franchise (remote) revenue
5. Cost of franchising = 10% of remote costs
6. Gross pretax profit before franchise = 15% (before franchise)

EXHIBIT II-5

FINANCIAL IMPACT OF FRANCHISING FIELD SERVICE
 HYPOTHETICAL EXAMPLE: SMALL MAINTENANCE FIRM
 (\$ thousands annually)

BEFORE THE FRANCHISE		AFTER THE FRANCHISE
	<u>Revenues</u>	
\$ 900	Urban	\$ 900
100	Remote	20
<u>1,000</u>	Total	<u>\$ 920</u>
	<u>Expenses</u>	
\$ 800	Urban	\$ 800
200	Remote	0
0	Franchise	50
<u>1,000</u>	Total	<u>\$ 850</u>
\$ 0	Gross Profit <u>Before Tax</u>	\$ 70 7.6%

Assumptions:

1. Small amount of remote business (10%)
2. Remote business = 200%, Expense to revenue - very expensive before franchise (because small firm)
3. Urban business = 87%, Expense to revenue before franchise
4. After-franchise revenue = 20% of before-franchise (remote) revenue
5. Cost of franchising = \$50,000
6. Gross pretax profit before franchise = 0

EXHIBIT II-6

FINANCIAL IMPACT OF FRANCHISING FIELD SERVICE
 HYPOTHETICAL EXAMPLE: LARGE MAINTENANCE FIRM
 (\$ thousands annually)

BEFORE THE FRANCHISE		AFTER THE FRANCHISE
	<u>Revenues</u>	
\$ 9,700	Urban	\$ 9,700
<u>300</u>	Remote	<u>100</u>
\$ 10,000	Total	\$ 9,800
	<u>Expenses</u>	
\$ 7,760	Urban	\$ 7,760
240	Remote	0
<u>0</u>	Franchise	<u>80</u>
\$ 8,000	Total	\$ 7,840
\$ 2,000 (20%)	Gross Profit <u>Before Tax</u>	\$ 1,960 (20%)

Assumptions:

1. Very small amount of remote business = 3%
2. Remote and urban, expense to revenue before franchise = 80%
3. After-franchise revenue = 33% of that before franchise (remote)
4. Cost of franchising = \$80,000
5. Gross pretax profit = 20% before franchise

- A conservative amount of revenue from the franchise (10% of what it was before the franchise).
 - A reasonable estimated franchise cost (10% of remote costs prior to the franchise).
 - Cost of remote business exceeds revenues (expense to revenue = 115%).
- The small company (as shown in Exhibit II-5), goes from a break-even status to a gross profit of 7.6% as a result of franchising, considering the assumptions that:
 - There is a small amount of remote business (10% of the total business).
 - Revenue from the franchise would be one-third that of pre-franchise revenues for remote sites.
 - The cost of franchising is a fixed amount: \$80,000.
 - Cost of remote service is high (expense to revenue is 200%).
- The net effect of franchising service for the large firm is shown to be nil as a result of the assumptions that:
 - There is no increased cost of maintaining remote sites currently (expense to revenue ratio is 80% for remote and urban service).
 - Franchise revenue is one-third of the pre-franchise revenue for the remote portion of the business.

- . The cost of franchising is a fixed sum of \$80,000.
- . There is a small amount of remote business (3% of the total).
- Generally, although the examples are hypothetical, the result of franchising can be significant using fairly reasonable assumptions. The true impact of franchising depends on the individual service firm's financial data being tested in lieu of the examples.

III ELEMENTARY "FRANCHISOLOGY"

- This section, Elementary "Franchisology," discusses nonfinancial issues relating to evaluation, contracts, and advantages and disadvantages. The following discussion is conducted primarily from the franchisee's point of view and makes use of commercial experience in other fields (fast food, printing, etc.).

A. EVALUATING THE FRANCHISE

- Most franchisors have discovered that hard sell techniques aren't in their own interest. Successful franchising is a question of mutual dependence and franchisees who feel shortchanged are not likely to be cooperative. At the same time it must be said that, with the exception of the prohibition of pyramid selling, very little specific legal protection is available to the franchisee. (Pyramid selling is a concept in which franchisees are recruited to sell "distributorships" of a product or service that is of secondary importance and may, in fact, be quite unviable.)
- Basically, protection is embodied in the franchise agreement, but that document is subject to omissions and commissions that can make a great deal of difference. The agreement can also throw much light on the intent and/or experience of the franchisor. A great many questions need to be asked by prospective franchisees and their advisers in order to properly evaluate the contract.

1. THE PRODUCT OR SERVICE OFFERED

- The product/service may be new or it may be already established. There is nothing wrong with a product or service being new, provided that it has been tested and found to work, preferably for at least a couple of years in a location similar to that in which it is to be sold, and provided also that the franchisee is satisfied that the product enjoys a good reputation among users and customers. The franchisees should feel that the product is something he would want to be associated with.
- The product should have some unique feature like, for instance, the "secret recipe" for Kentucky Fried Chicken. This unique feature should be protected by a patent or trademark.
- The franchisee needs to know how his product/service compares with similar ones in the local marketplace.

2. THE TERRITORY

- Though the franchisor should provide a map showing the franchisee's exact territory, this is not a guarantee of protection. Under EEC competition laws, franchisors cannot prevent one franchisee from trading in another's "exclusive" territory, though franchisors may decline to license a competitor within it; for instance, there is nothing to stop a print shop in one territory from serving customers from the territory of another franchisee.
- There is very little that can be done about this, except to check where the nearest operator of the same franchise is located - and indeed where operators of other franchises and other businesses offering a similar product or service are to be found. The franchisee should also check whether the agreement specifies any circumstances under which the exclusive territory could be reduced.

3. THE RELATIONSHIP BETWEEN FRANCHISEE AND FRANCHISOR

- Perhaps the most important single question in evaluating franchisors is how long they have been in business, how many outlets they have established in that time, how successful they have been (and what the criteria for success are), how many outlets have been closed down, and the reasons they were shut down. Failing a local track record, the question must be related to the licensor's operations elsewhere. It would also be useful to know who the company directors are and something of their qualifications, background, experience, and nationality.
- Supplies. The success of a franchise, in terms of both profits and turnover, will be closely related to the sources and costs of equipment, goods, and services. These items will be controlled, wholly or in part, by the franchisor. The franchisee needs to be sure that the prices are fair and competitive and that the supply is likely to be trouble-free.
 - There might, for instance, be question marks where goods have to be obtained from Third World countries with political problems. Some franchisors set a minimum ordering quantity for supplies and this has to be realistic in relation to the franchisee's resources and expectations of volume.
 - Ideally, through, the franchisee should not be too dependent on the franchisor or its nominees for supplies because this obviously gives the franchisor leverage that can be abused.
- Standards of quality. The franchisee should be aware of quality standards that are being set (and their cost), what opening hours have to be kept (again these may have implications in terms of staffing and overtime payments), and what the reporting procedures are for accounting purposes. Even though the franchisee is running his own business, the franchisor will want to check that the

royalties being paid accurately reflect the volume of business, and will also demand the right to enter and inspect the premises at will.

- Future developments. The format of the business may be amended from time to time and the franchisee will have to go along with the amendments. Therefore it is important to establish, as far as is possible, what the franchisor's future plans are. Are any hidden but costly innovations being planned? Is the franchisor planning any future franchises or other moves that may be in competition with the franchises now being offered? In each of these cases, the franchisee might suffer.
- Termination. The conditions under which the franchise agreement can be terminated, reassigned, or renewed by either party, should be clearly spelt out. There should be a satisfactory procedure for resolving disputes. Arbitration has become a popular alternative to litigation, but it is still expensive and in the end has not always avoided litigation.

4. THE FRANCHISE PACKAGE

- To a large extent the package determines and overlaps the nature of the franchisor/franchisee relationship, but it has characteristics of its own. Fees are most important here: not only how much they are, but the form in which they are to be paid.
 - There will be an initial fee and a royalty on turnover and/or profits, but there can be significant differences in the amount of these payments and the way they are collected. In general, the advice is to be very careful about franchises with a high initial fee and a low royalty: the franchisor may be of the "take your money and run" variety.
- Advertising. Related to the question of fees is that of advertising. Normally the franchisor undertakes to devote a certain proportion of his fee income to advertising. The question is how much, and whether it is dedicated to the

franchise as a whole or to promoting individual outlets. In both cases the franchisee needs to be satisfied that the advertising is good and relevant with regard to contents and medium.

- Training. Training is another area where one must clarify who pays for what. Indeed, since training is in itself a very important part of the package, the franchisee must know how much there will be and how long it will take. In America the concept of training is sometimes taken to ludicrous lengths - for example McDonald's operates a Hamburger University that one suspects is meant only partly as a joke.
 - Apart from formal training and refresher courses, there ought also to be some procedure for when things go wrong. What happens if the franchisee falls ill? Can an emergency crew step in? And what happens if the franchisee runs into administrative or equipment trouble? Is help of sufficient calibre available and if so, how quickly and at what cost?
- Operating manual. The operating manual embodies the blueprint of the business format franchise; some contracts state that the manual supercedes anything said in the agreement. The franchisees and their advisers must be sure that they fully understand the manual and that it covers all the situations they are likely to encounter in operating the franchise.

B. ADVANTAGES AND DISADVANTAGES

- The advantages and disadvantages of taking up a franchise depend to some extent on the content of one's individual agreement, but there is nevertheless a general pattern.

I. THE FRANCHISOR

- From the franchisor's point of view, the advantages are that he or she does not have any direct investment in an outlet bearing his or her name.
 - The franchisee, as the owner of the business, is likely to be more highly motivated than an employee and more responsive to local market needs and conditions; also, the franchisor receives an income from the franchise and saves on personnel and administrative costs.
 - Without direct financial involvement, the franchisor may derive some of the benefits of expansion, in as much as franchising gives economies of scale from centralised purchasing and, if it is feasible, some degree of centralised administration.
- The disadvantages are that although the failure of an individual franchise may reflect badly on the franchise operation as a whole, all that can be controlled is the format itself. The franchisor can only influence the running of individual operations by pulling the reins on this or that clause in the agreement.
 - In extreme cases franchisors may terminate the agreement or at least not renew it, but the franchisor cannot throw the franchisee out as if he or she were an employee.
 - Franchisors are therefore dependent on the willingness of the franchisee to observe the rules. Any failure to do so is perhaps more damaging to the franchisor (and to other franchisees) than to the franchisee concerned because of the effects on the franchise as a whole.
 - Another disadvantage sometimes turns out to be the curious mixture of dependence and independence that franchising produces.

- Franchisees are encouraged to think of themselves as independent business entities and to a large extent this is true. Nevertheless franchisees are operating the franchisor's business concept under a license for which a fee is payable. There are cases where franchisees identify so closely with the particular business they are running that they ultimately resent the payment of the fee. In these cases the franchisee's success is felt to be due to his or her own efforts, rather than the franchise concept or the franchisor. If the franchisor adopts a lower profile than he should, either in terms of direct help or in matters like national advertising, the situation is made worse. Clearly, of course, the franchisee would be obliged under the terms of the agreement, to pay but a sour relationship is not good for either party, so it is up to the franchisors to maintain their part of the bargain both in letter and in spirit. Franchises are a matter of mutual interest and obligation.

2. THE FRANCHISEE

- From the point of view of the franchisee there are advantages and disadvantages, which might, perhaps, be most clearly expressed in the form of a list. Advantages include:
 - A business format or product that has already been market tested and, presumably, found to work; consequently, major problems can be avoided in the startup period.
 - A recognised name of which the public is already aware and that already has credibility with suppliers.
 - Publicity, both direct (via the franchisor advertising his product or services), and indirect (through signage and other corporate image promotion in all the franchisor's outlets).
 - A smaller (usually) initial capital outlay than if the franchisee were starting up on his own (though franchises that have shown a very high

profit record are correspondingly expensive and can run well into six figures).

- Direct and close assistance during the startup period.
 - A period of training for production and management.
 - A set of standard management, accounting, sales, and stock control procedures that are incorporated in an operating manual.
 - Better bulk purchase terms that have been negotiated through the franchisor. (In some cases the franchisor may be looking to markups in this area as a source of revenue).
 - Design of the premises according to an established scheme. This saves on interior design fees and may eliminate them altogether if the franchisor has a set of specifications.
 - The franchisor's advice on equipment and initial inventory levels (though this advice may not be impartial in cases where the franchisor is also the supplier).
 - Help with site selection, and help with negotiating with planning officers and developers.
 - Access (possibly) to the franchisors' legal and financial advisers.
 - The exclusive rights to the franchise within a given area.
- Disadvantages include:
- Business format franchising is, of necessity, something of a cloning exercise. There is virtually no opportunity for individual initiative in

matters of product, service, or design. However, the franchisor will demand uniformly high standards of maintenance, appearance, and packaging in whatever the franchise entails. Quality is usually monitored by regular inspections.

- The fee paid to the franchisor may be a percentage of gross turnover or of profits. The problem here is that if the franchisor is not pulling his weight or if the franchisee feels this to be the case, the fee can be a subject of bitter dispute. The franchisee may then feel justified in withholding all or part of the fee on the grounds of non-performance by the franchisor, but this is always a difficult matter to prove in the courts. Furthermore, the franchisor's resources to conduct a long, drawn-out case will usually be greater than the franchisee's.

- A further problem is that a high turnover does not necessarily imply a highly profitable operation. If the franchisor's fees are wholly or partially based on turnover, the franchisor may try to push for turnover at the expense of the franchisee's profitability.

- The franchisee is not absolutely at liberty to sell the franchise, even though he is in many respects operating the business independently. The sale has to be approved by the franchisor, who is also entitled to vet the vendor and charge the cost of any investigations to the existing franchisee. Furthermore, although the business in trading terms would be valued as a going concern, the goodwill remains the property of the franchisor. Again, the franchisee may feel that, at least to some extent, the goodwill has been built up by his own efforts. The resale of a franchise, in other words, is a process rich in those grey areas that can lead to expensive litigation.

- Exclusive territory agreements may be difficult to enforce in practice. For instance, one firm may have the exclusive rights in the suburb in which it is located, but there is nothing to prevent the citi-

zens of that suburb from buying the same product or service in some neighbouring outlet.

- The franchisee, as well as paying a fee to the franchisor, may be obliged to buy goods and services from the franchisor at disadvantageous rates.

- Though the franchisor places all sorts of controls and obligations on the franchisee to maintain the quality of image, the scope for doing the reverse is more limited. If the franchisor's product or service gets bad publicity, this is bound to affect the franchisee adversely, and there is very little that can be done about it. Equally, the franchisor may engage in promotional activities - and involve the franchisee in them as well - which, though perfectly harmless are, from the point of view of a particular outlet, an irrelevant waste of time.

3. MUTUAL DEPENDENCE

- From this list of advantages and disadvantages to both parties, the business format franchise emerges as a relationship of mutual dependence that allows each party to use its strength to mutual and, at best, equal advantage. Franchisors are able to expand without further investment and, though the return is obviously lower than from expansion by ownership, they do receive an income from the franchisee, an additional outlet for the product, and more muscle in negotiating the purchase of materials and equipment.

- Franchisees, on the other hand, are able to concentrate their entrepreneurial skills at the sharp end of sales and customer service, while the administrative headaches of setting up the business are mitigated by the uniform nature of the format. By the same token, franchisees are saved (through feedback via the franchisor about the accumulated experience of other franchisees) from making the errors to which businesses are prone in their beginning, most vulnerable stages. This relationship is expressed in the purchase and franchise agreements. But before considering these documents it is necessary to evaluate the franchise contract as a whole.

APPENDIX: TYPICAL FRANCHISE AGREEMENT

This agreement is made the ___ day of _____ one thousand nine hundred and eighty-three BETWEEN AJAX whose registered office is situated at 35 Piccadilly, London (hereinafter called "the Franchisor") of the one part and _____

_____ (hereinafter called "the Franchisee") of the other part.

WHEREAS:

- (1) The franchisor, as a result of extensive research and practical business experience, has developed the service and business for conducting the sale and service of widgets and all its accessories, and has acquired knowledge and skill from this business (hereinafter called "the knowhow").
- (2) The Franchisor will provide valuable management guidance and assistance in marketing and sales training to operate the Ajax service/business and has established, through publishing in various media the Ajax trademark and other identifying material, a reputation and demand that signifies the highest standard of quality and service.
- (3) The Franchisor is entitled to use the trade name "Ajax" and the trademarks (hereinafter called "the Trademarks") set out in the schedule hereto.
- (4) The Franchisor controls the sale and distribution in the United Kingdom of widgets and all related articles.

- (5) The Franchisor has agreed to grant to the Franchisee a franchise on the terms and conditions hereinafter set out.

NOW THIS AGREEMENT WITNESSETH AND IT IS HEREBY AGREED AND DECLARED as follows:

1. TERRITORY

- (a) The Franchisee desires the sole and exclusive right to supply and distribute and the Franchiser HEREBY GRANTS to the Franchisee the sole and exclusive right to sell and distribute the Ajax goods from the Ajax shops in the territory outlined in red on the map annexed hereto in Schedule I of this Agreement, which map has been initialed by the parties hereto for the purposes of identification of such territory (hereinafter called "the Territory").
- (b) The Franchisee may, at the request of another franchisee or of the Franchisor or any Company in the Franchisor's Group, arrange for a purchaser of Ajax goods from such other franchisee or the Franchisor or other Company in the Franchisor's Group to collect them from or have them delivered by the Franchisee on terms that the Franchisee shall be entitled to recover from such other Franchisee or as aforesaid a commission of ten per centum (10%) of the sum invoiced to the purchaser.
- (c) The Franchisor shall inform the Franchisee of the name and address of each franchisee appointed by the Franchisor in the United Kingdom and the area covered by such appointment, and shall notify the Franchisee forthwith of all changes in such information.

2. TERM OF FRANCHISE

THIS Agreement shall commence as from the ___ day of _____, in the year one thousand nine hundred and _____, and shall continue in effect (subject as

hereinafter provided) for a period of FIVE YEARS from the date upon the terms hereinafter appearing, subject to the Franchisor having received the Franchise Fee as set out in Clause 3 hereof and subject to due compliance by the Franchisee with the terms hereof. The Franchisor hereby grants to the Franchisee an option to renew this Agreement (if it is not previously determined) on the expiration of the five-year term hereof for an additional period of five years provided that the Franchisee shall enter into such new Agreement in such form as is currently offered to the new Franchisees AND such new Agreement shall not require payment of an initial Franchise Fee as provided in Clause 3 (a) hereof.

3. FRANCHISE FEE

- (a) Forthwith upon the signing hereof the Franchisee will pay to the Franchisor the sum _____ as an initial franchise payment for the rights, grants, and privileges provided for by this Agreement.
- (b) In every month during the currency of this Agreement the Franchisee shall pay to the Franchisor a Franchise Fee (hereinafter called "the Franchise Fee") amounting to ten per centum (10%) of the invoiced amounts of the sales of all the Ajax goods and of all other goods and articles sold in or from the Ajax shops (whether sold to personal customers or as a result of mail orders) in the previous month, PROVIDED ALWAYS that any Sales Value Added Tax or other similar tax (if such is imposed) payable upon the goods or other articles by the Purchaser thereof, shall be deducted from the invoiced amount of the sales as aforesaid before calculation of the amount upon which the Franchise Fee is payable.

On the tenth day of each month a statement shall be sent by the Franchisee to the Franchisor giving details of the invoiced amount of the sale made as aforesaid and of the Franchise Fees payable in respect of the previous month together with payment of the amount due PROVIDED that if a Franchise Fee has previously been paid on sales that have proved to be a bad debt or where the order has been cancelled and a refund of the purchase price made, the

Franchisee may deduct the amount of the Franchisee Fee previously paid in respect of that sale PROVIDED that it gives to the Franchisor full details thereof. An unpaid invoice shall be deemed to be a bad debt if it proves irrecoverable for a period of at least three months, during which time not less than three reminders shall have been sent.

- (c) The minimum annual Franchise Fee to be paid by the Franchisee to the Franchisor shall be:
- (i) _____ in respect of the first twelve-month period of this Agreement.
 - (ii) _____ in respect of the second twelve-month period of this Agreement.
- (d) The first payment of a monthly Franchise Fee shall be made on the tenth day of the month following the date hereof or at the commencement of the fifth week after the date hereof, whichever is the later, and all subsequent Franchise Fees for each monthly trading period shall be paid as set out in sub-clause (b) hereof. If the Franchisee shall make a delay in making any monthly payment on the due date, then the Franchisee shall become liable to pay to the Franchisor interest on the unpaid balance of Franchisee Fees, such interest to be calculated at the rate of one-half of one per centum per week for each week or part of a week during which there is any unpaid balance of Franchise Fees.
- (e) Upon the determination of this Agreement for whatsoever reason any outstanding Franchise Fees in connection with the business up to the date of termination shall be payable forthwith by the Franchisee to the Franchisor without any deduction except for bad debts as herein defined and money refunded by cancelled orders.

- (f) All Franchise Fees discussed in this Agreement are subject to the addition of Value Added Tax at the standard rate for the time being in force.

4. FRANCHISOR'S OBLIGATIONS

IT is a condition of this Agreement that the Franchisor is entitled to use the trade name Ajax and the Trademarks and is entitled to license or permit the Franchisee to make full use thereof in accordance with the Terms of the Agreement. The Franchisor agrees to indemnify the Franchisee from and against all liability proceedings, actions, claims, and demands and costs arising out of such use by the Franchisee of such Tradename and Trademarks.

The Franchisor will, during the currency hereof:

- (a) Forthwith train for a period not exceeding four (4) weeks such employee or employees of the Franchisee as are accepted for training by the Franchisor at the offices of the Franchisor or of any Company in the Franchisor's Group in the operation of an Ajax Franchise and the methods and procedures to be adopted. During the period whilst any such employee is being so trained the Franchisee shall remain liable for his salary and for all other costs and expenses of such employee.
- (b) Carry out such national advertising and publicity of the Ajax goods as the Franchisor shall spend a minimum of thirty per centum (30%) of the annual Franchise Fees received from all its franchises upon such advertising in each calendar year during this Agreement.
- (c) Pay to the Franchisee one-half of the Franchisee's initial advertising relating to its opening of an Ajax shop PROVIDED that such advertising shall be approved both as to form and cost by the Franchisor.
- (d) In response to any general sales inquiries to the Franchisor at its Head Office, the Franchisor shall send to the inquirer a list of current addresses of Ajax shops.

- (e) At the Franchisee's request and expense assist the Franchisee in the selection of premises, and advise and give guidance on shopfitting and rentals, unless otherwise provided for in this Agreement. The Franchisor also reserves the right to approve any premises and shopfittings thereof so as to protect the national corporate image of Ajax.
- (f) At the Franchisor's cost give to the Franchisee continuing advice and guidance, and from time to time visit his principal place of business to analyse the Franchisee's operating methods and techniques and advertising, and furnish the Franchisee with suggestions in writing for improvements thereof, if any be required in the Franchisor's discretion. The Franchisee shall implement any such suggestions within twenty-one days of receipt thereof.
- (g) Produce a catalogue (hereinafter called the "Brochure") at least once in each year of this Agreement and make available from time to time to the Franchisee advertising copy, promotional programmes, brochures, catalogues, and sales campaigns to assist in selling the Ajax goods to the general public. ALL such items shall be made available by the Franchisor at the Franchisor's prices plus delivery charges.
- (h) Provide the Franchisee with the marketing, merchandising, and sales knowledge and knowhow necessary to operate the Ajax service and business.
- (i) Not grant an Ajax franchise to any other person, firm, or company within the Territory.
- (j) Use its best endeavours to execute orders received from the Franchisee within such reasonable time as is specified in the order by the Franchisee.
- (k) (i) Ensure that the Ajax goods ordered by the Franchisee from time to time are invoiced to the Franchisee at the lowest prices and on the most favourable terms of the Franchisor or other supplier as the case

may be applicable from time to time and together with the benefit of the usual trade discount and cash discount.

- (ii) In respect of Ajax products and accessories the Franchisor shall procure that the recommended retail prices of all Ajax goods will be such as to enable the Franchisee to obtain a one hundred and ten per centum (110%) mark-up on the prices invoiced to the Franchisee.

- (l) Use its best endeavors to hold or procure that there is at least once in every year a National Conference of persons, firms, or companies who are franchisees of Ajax goods, to which the Franchisee is invited for the purposes of viewing and ordering Ajax goods. The cost of travel and accommodation is to be borne by the Franchisee.

- (m) Assist the Franchisee with the opening of each of the Ajax shops in the Territory by sending at least one suitably qualified representative to be present at such opening and at any time thereafter upon the reasonable request of the Franchisee to assist and advise in connection with the serving of customers and the initial advertising and promotion of the Ajax shop.

- (n) The Franchisor will train the Franchisee in the accounting methods and procedures recommended by the Franchisor and will provide all such forms for the keeping of internal records in relation to the Ajax shops as may be required by the Franchisor, and the Franchisee shall keep at its usual place of business all such records of its business operations in relation to the Ajax shops, including but without prejudice to the generality thereof, records of purchases and sales of the Ajax goods and of all other goods and articles, and such records shall be open to the inspection of the Franchisor's authorised representatives during normal business hours.

- (o) Subject to obtaining all necessary consents from the appropriate planning authority and the lessor of premises leased to a Franchisee of an Ajax shop, the Franchisee shall at his expense erect a fascia sign or inscribe on an existing

facia panel the Ajax sign to a specification format and colour as shall first be approved in writing by the Franchisor and thereafter maintain such sign in good condition until this Agreement is terminated for any reason herein mentioned, when the Franchisee shall forthwith remove or obliterate the Ajax sign completely.

- (p) The Franchisor will supply to the Franchisee drawings and specifications for the approved uses of the Trademarks, and the Franchisee shall use such Trademarks (and no other trademarks or tradenames) only upon and in relation to the Ajax goods in accordance with the reasonable directions of the Franchisor. Save as aforesaid the Franchisee shall have no right to use the Trademarks and shall not authorise any other person or corporation to use any of the Trademarks.
- (q) The Franchisor shall have the right from time to time to change or add to the quality and designs of the Ajax goods, and the Franchisee shall so far as reasonably practicable accept and follow such changes and operate the Ajax shops in such a way as to maintain to the maximum capacity the goodwill and prestige of the Ajax goods.

5. FRANCHISEE'S OBLIGATIONS

The Franchisee agrees during the currency hereof:

- (a) To purchase as a principal and not as an agent such Ajax goods as the Franchisee in his absolute discretion is willing to buy solely from the Franchisor or from such other supplier the Franchisor shall authorise in writing to the Franchisee.
- (b) Not without the Franchisor's consent in writing to stock for sale or sell any goods or other articles at, or carry on any other trade or business from the Ajax shops, other than the Ajax goods and services.

- (c) Not to purchase or sell or in any other way deal in competitive products or any other ancillary articles, except from the Ajax shops.
- (d) Strictly and continuously adhere to the Franchisor's rule, regulations, and standards as to methods, systems, operating procedures, and programmes, as specified in the Franchisor's standards of operations in the conduct of the Franchisee's business as the same may be published by the Franchisor from time to time.
- (e) Notwithstanding sub-clause (a) hereof, and subject to the Franchisor's compliance with Clause 4 (j) hereof, to use and maintain in stock at least one sample for display at all times in each of the Ajax shops of all the Ajax goods shown in the Ajax Brochure from time to time issued by the Franchisor for distribution to the public or shown on national advertising conducted by the Franchisor.
- (f) To sell the Ajax goods at retail prices not to exceed those retail prices recommended by the Franchisor.
- (g) To pay the Franchisor for all goods promptly and on time, the normal trading terms for all goods being thirty (30) days after delivery.
- (h) The Franchisee agrees to expend for direct local advertising an annual amount equal to three per centum (3%) of his previous year's gross Ajax sales after the deduction of any sales of Value Added Tax thereon, this amount to be expended by the Franchisee in consultation with the Franchisor and in accordance with the national advertising conducted by the Franchisor and which complies with the Franchisor's reasonable directions as to content, layout, and artwork.
- (i) The Franchisee specifically agrees to use only customers' order forms and receipts as supplied by the Franchisor.

- (j) To use all stationery and advertising material with a design and format previously approved in writing by the Franchisor.
- (k) To keep the Ajax shops, the Ajax goods, and all other articles in the Ajax shops insured to their full value against loss or damage by fire and other usual risks except theft, with a reputable insurance company satisfactory to the Franchisor.
- (l) Not to give any written warranty for or on behalf of the Franchisor in respect of the Ajax goods without the authority in writing of the Franchisor.
- (m) Be responsible for all operating expenses (including losses) of the business, including, without prejudice to the generality of the foregoing, insurance, salaries, advertising, rent, telephone, and the cost of leased or rented equipment. The Franchisee shall indemnify the Franchisor from all actions, claims, demands, damages, or expenses whatsoever arising by reason of act or omission of the Franchisee in connection with the carrying on of the business, and the relationship between the parties shall at all times be one of Franchisor and Franchisee, nor shall the Franchisee hold himself out as servant, agent, Partner, or contractor of the Franchisor.
- (n) Pay all Franchise Fees or other payments hereby agreed to be made on the tenth day of each month to the Franchisor or as directed by the Franchisor without formal notice or demand.
- (o) The Franchisee shall not, either during or after the termination of this Agreement, disclose to any third person or corporation any secret or confidential information relating to the business of the Franchisor or of any Company in the Franchisor's Group.
- (p) The Franchisee shall establish and maintain in the Territory a retail shop (herein called "the Ajax shop") for the purpose of selling the Ajax goods. The Ajax shop shall be established in such location as may be approved by the

Franchisor, which approval shall not be unreasonably withheld. And the Franchisee shall design, equip, and furnish the Ajax shop in accordance with the directions of the Franchisor to the intent that all Ajax shops within the United Kingdom shall be similar in their basic design equipment and in the presentation of their goods to the public.

- (q) The Franchisee shall maintain the Ajax sign in good and clean condition.
- (r) The Franchisee shall procure that the Provisions of this Agreement shall be observed by every Company in the Franchisee's Group.

6. ALIENATION

THE Franchisee shall have the right to sell or assign the business upon the following terms and conditions:

- (a) The Franchisee shall first give to the Franchisor notice in writing of the intention to sell the business and set out therein all relevant details of the terms of sale, including information as to the estimated value of stock and turnover and as to the lease under which premises are held. The Franchisee shall give to the Franchisor first refusal to purchase the business on terms that are fair and reasonable, such terms to be mutually agreed.
- (b) In the event of the Franchisor giving to the Franchisee a counternotice in writing within twenty-eight days of service of the notice that it does not wish to purchase the business or terms for purchase have not been agreed within such twenty-eight day period, then the Franchisee may offer the business for sale to third parties.
- (c) Prior to the Franchisee entering into an agreement to sell or assign the business to a third party, he shall first obtain the consent in writing of the Franchisor, such consent not to be unreasonably withheld subject to the following terms and conditions being fulfilled:

- (i) Any proposed purchaser or assignee shall meet the Franchisor's reasonable standards with respect to prior related business experience and financial ability. The Franchisee shall procure the furnishing of such reference to the Franchisor as he shall reasonably require and in the case of a private limited company shall procure that the proposed purchaser or assignee shall give such guarantees from its directors or other persons as the Franchisor shall reasonably require.
 - (ii) The Franchisee shall forthwith submit to the Franchisor a copy of the proposed purchaser's or assignee's written offer to purchase or take an assignment of the business from the Franchisee.
 - (iii) The Franchisee shall procure that the proposed purchaser or assignee shall enter into a fresh agreement with the Franchisor in the same terms and conditions as are herein contained, for a term to expire on the same date as herein provided, and he shall ensure that a clause to this effect is included in the contract for sale or assignment and that such agreement shall be completed between the Franchisor and the purchaser or assignee contemporaneously with the completion of the purchase or assignment and thereupon this Agreement shall be treated as terminated but without prejudice to any outstanding obligations or rights of either party against the other which may have occurred up to the date of such termination and all provisions which continue after the term hereof shall continue in full force and effect.
- (d) In the event of the death or of disability of the Franchisee (if the Franchisee for the time being is not a corporation) his personal representative or custodian of his assets shall have the same right to sell or assign the business and be subject to the same duties as are set out herein, provided the active management of the business during the administration of the Franchisee's estate shall be continued in a manner satisfactory to the Franchisor. Notice of death or disability of the Franchisee shall be given to the Franchisor within twenty-eight days after its occurrence.

7. TERMINATION BY FRANCHISEE

- (a) The Franchisee shall be entitled to terminate the Agreement after the first year thereof by giving to the Franchisor six months notice in writing of termination, such notice to expire between the 1st August and 31st October in any year excluding the first, but without any claim against the Franchisor for repayment of any such sum paid by the Franchisee to the Franchisor and after discharging the minimum annual Franchise Fee hereinbefore covenanted to be made in respect only of the period prior to such termination.
- (b) The Franchisee shall have the right to terminate this Agreement forthwith by notice in writing to the Franchisor in the event of any material breach by the Franchisor of its obligations hereunder which are not capable of rectification.

8. FRANCHISEE'S OBLIGATIONS ON TERMINATION

IMMEDIATELY upon termination of this Agreement, whatever the reason for such termination, all of the Franchisee's rights shall terminate and the Franchisee shall:

- (a) Thereafter cease to use by advertising or otherwise the name "Ajax" either alone or in any combination of other names and marks on any goods, accessories, articles, stationery, business cards, uniforms, brochures, or any devices, service marks, trademarks, systems slogans, symbols copyrights, or any other business stationery used in connection with the "Ajax" business and service.
- (b) Save as hereinafter provided, the Franchisee shall not thereafter sell the Ajax goods or supply the Ajax service.
- (c) The Franchisee shall not thereafter make any use of the Trademarks or the tradename "Ajax" or of any secret or confidential information of the Franchisor or of any Company in the Franchisor's Group, and the Franchisee shall

forthwith return to the Franchisor all literature and advertising material in its possession supplied by the Franchisor and will forthwith remove or completely obliterate all "Ajax" signs.

- (d) The Franchisee shall immediately upon termination of this Agreement, whatever the reason for such termination, direct the Post Office to transfer to the franchisor any telephone number or telephone numbers that appear in the Brochure published by or on behalf of the Franchisor or to his nominee, and the Franchisee shall use his best endeavours not to abandon the said telephone number or numbers. The Franchisee shall not, without the prior written consent of the Franchisor, which consent shall not unreasonably be withheld, initiate or agree any change of the said telephone number or numbers appearing in the said Brochure.

- (e) The Franchisee shall not at any time within six months after the termination of this Agreement, whatever the reason for such termination, either solely or in partnership with or as agent for any other person, firm, or company directly or indirectly carry on or be engaged, concerned, or interested in carrying on within a radius of two miles of the location of the Ajax shop or shops within the said Territory the business of hiring or sale of widgets or any business whose principal or main activity is or includes the hiring or sale of widgets or other business that uses design techniques, procedures, or marketing expertise developed by the Franchisor.

- (f) The Franchisor may purchase back at their net price to the Franchisee the Franchisee's stock, provided that it is in good and marketable condition. Any stocks of Ajax goods not so purchased by the Franchisor may be sold by the Franchisee to third parties provided that no use is made of the Trademarks or the tradename "Ajax."

- (g) The Franchisor or the supplier, as the case may be, shall retain the property in the Ajax goods until the Franchisee has paid for them in cash, but the Franchisee shall not be prevented thereby from passing good title to a bona fide customer.

- (h) Pay to the Franchisor all monies owing in respect of the Franchise Fees supply of Ajax goods, or otherwise owing.

9. TERMINATION BY FRANCHISOR

The Franchisor shall be entitled to terminate this Agreement forthwith by notice in writing to the Franchisee in the event of the happening of any of the following:

- (a) If the Franchise Fee payable hereunder (including the minimum annual Franchise Fee referred to in Clause 3 (c), (i), and (ii)) is in arrear for twenty-one (21) days after the same has been formally demanded in writing.
- (b) If the Franchisee fails to rectify any breach of any of the provisions of this Agreement, and on its part to be performed and observed, and capable of rectification within twenty-eight (28) days after written notice of such breach has been given to the Franchisee.
- (c) If the Franchisee commits a material breach of any of the provisions of this Agreement that is not capable of rectification.
- (d) If the Franchisee shall cease or threaten to cease to carry on the business within the Territory.
- (e) If the Franchisee commits any act of bankruptcy or makes any arrangement with its creditors or, being a company, goes into liquidation, whether compulsory or voluntary, other than voluntary liquidation for the purpose of reconstruction.

10. THE termination of this Agreement shall be without prejudice to any rights of either party against the other which may have occurred up to the date of such termination and all provisions that continue after the term hereof shall continue in full force and effect.

11. PROVIDED ALWAYS AND IT IS HEREBY AGREED AND DECLARED

- (a) The failure of either party hereto to seek damages for any breach or to insist upon the strict performance of any provision of this Agreement shall not be construed to condone a subsequent act of similar or other nature nor shall it in any way be deemed a waiver of such party's right with respect thereto.
- (b) The Franchisee HEREBY CONVENANTS to save the Franchisor harmless and indemnify the Franchisor against and from any and all claims, demands, causes of action, losses, costs, damages, suits, judgments, penalties, expenses, and liabilities or obligations of any kind, type, or description arising directly or indirectly out of the Franchisee's acts or defaults in carrying out any provision herein set forth.
- (c) The Franchisee shall conduct his Ajax business and maintain his Territory in strict compliance with all applicable laws, ordinances, regulations, and other requirements, whether imposed by statute or otherwise, and whether of a national or local character, and will obtain all necessary permits, licenses, or other necessary consents for the operation of his Ajax business, all at the Franchisee's own expense.
- (d) The Franchisee shall not assign or sublicense this Agreement or any of its rights or obligations hereunder to any other person or corporation save as provided in Clause 6 hereof.
- (e) Whilst the Franchisor will do its best to supply against an accepted order on time, the Franchisor shall not be liable to the Franchisee for failure to deliver any goods where the said failure is due to out-of-stock position inability to obtain raw materials, fire, floods, strikes, labour disturbances, power failures, reductions in power supplies, acts of God, or any causes beyond the Franchisor's control.

- (f) In the event of any default of the terms of this Agreement by the Franchisee for which the Franchisee has received due written notice of default the Franchisor reserves the right to withhold or withdraw any franchisee support services, advertising support, or goods until the said default that is capable of rectification has been rectified.
- (g) If either of the parties of this Agreement is unable to perform any of its obligations hereunder for a period not exceeding six (6) consecutive calendar months by reason of strikes, acts of God, restrictions imposed by governmental authority, or for any other similar reason beyond such party's control, such failure shall be deemed not to be a breach of this Agreement provided that the party so affected shall forthwith notify the other of the existence of such cause and shall use its best endeavours to remove such cause.
- (h) (i) The term "Franchise Group," when used in this Agreement, shall mean the Franchisor and Holding Company of the Franchisor or any such Holding Company in accordance with the definition of the terms "Holding Company" and "Subsidiary" given in the Companies Act 1948, Section 154, or as amended.
- (ii) The term "Franchisee's Group," when used in this Agreement, shall mean the Franchisee and a Holding Company of the Franchisee and any subsidiary of the Franchisee or any such Holding Company in accordance with the definition of the terms "Holding Company" and "Subsidiary" given in the Companies Act 1948, Section 154, or as amended.
- (i) No agent of either party has authority to make oral representations prior to or after the date of this Agreement and neither party has relied upon any oral representations in entering into this Agreement nor has any agent of either party any authority to make any agreements that modify or vary the terms and conditions of this Agreement, which may not be modified or varied other than in writing and signed by both parties.

12. ANY notice under this Agreement shall be in writing and may be served on the Franchisee either personally, in the case of an individual, or by leaving it addressed to him at the Franchisee's premises or his last known place of abode by recorded delivery post, or in the case of the Franchisor or in the case of the Franchisee being a Limited Company, either by leaving any notice at the registered office of the Franchisor or the Franchisee, or sending there by recorded delivery post.

13. THIS Agreement shall be read and constructed according to and shall be governed by the law of England.

SIGNED FOR AND ON BEHALF OF AJAX LIMITED

IN THE PRESENCE OF: _____

WITNESS: _____

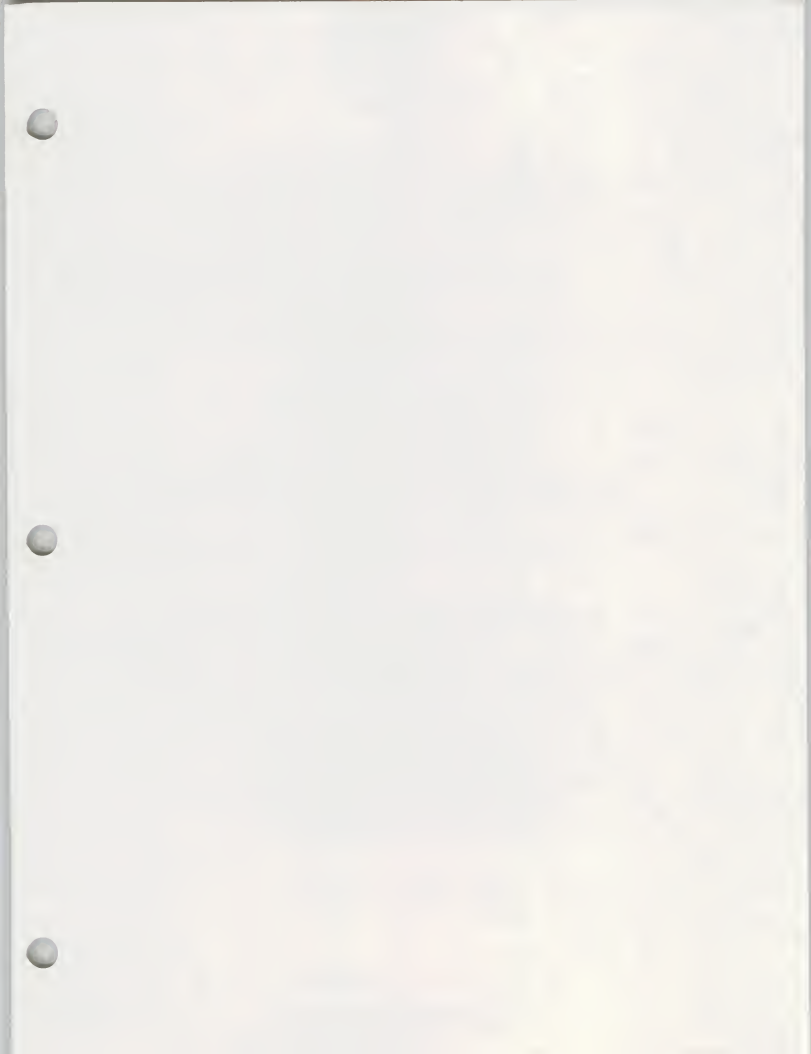
ADDRESS: _____

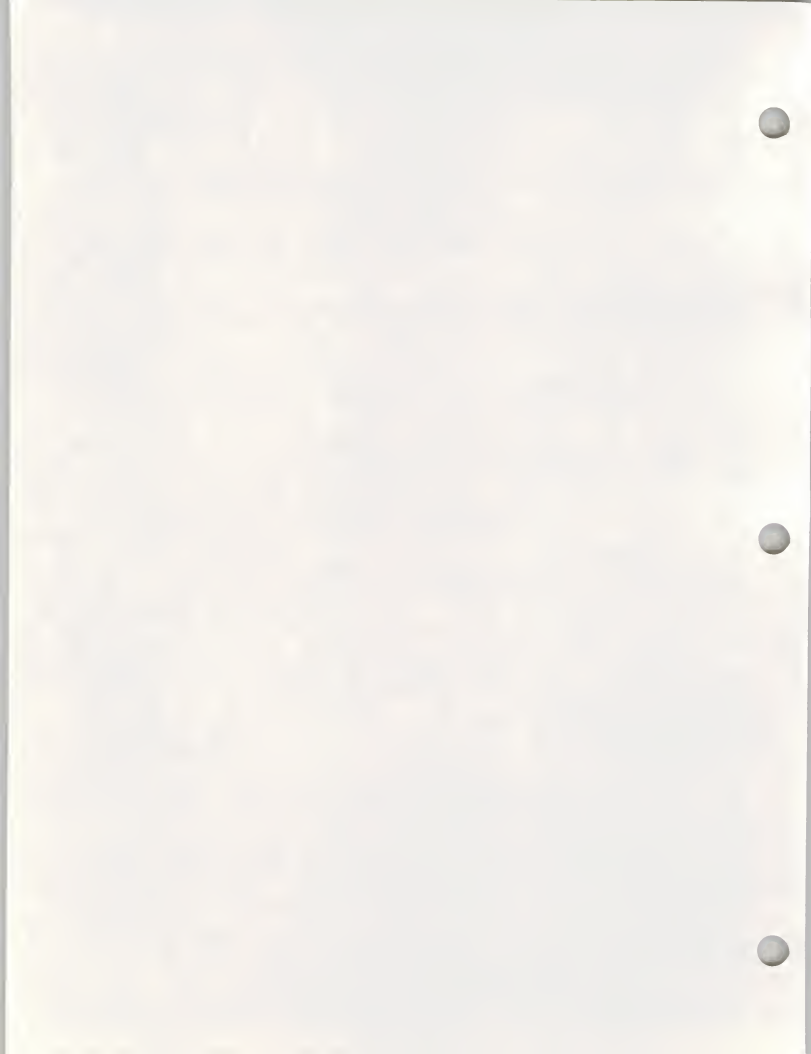
SIGNED by the said _____

IN THE PRESENCE OF: _____

WITNESS: _____

ADDRESS: _____





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

- Management Planning Program in Information Systems - Provides managers of large computer/communications facilities with timely and accurate information on developments which affect today's decisions and plans for the future.
- Management Planning Program for the Information Services Industry - Provides market forecasts and business information to software and processing services companies to support planning and product decisions.
- Company Analysis and Monitoring Program for the Information Services Industry - Provides immediate access to detailed information on over 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.
- 1982 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 planning services firm. Clients include over 100 of the world's largest and most technically advanced companies.

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Planning Services for Management

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**MANAGEMENT
PLANNING PROGRAM
IN
FIELD SERVICE**

F-EBS
1983

**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 - This study provides an in-depth analysis of major technical issues that will assist in the planning of field services. F-1983 EBS
- Annual Report - Strategic Planning Guidelines - This report provides activities in the field services industry and their effects on future field service operations. It also discusses technical and management issues that may affect the future requirements of the field service industry. In Field Service
- Annual Presentation - This presentation provides a summary of field service research and development activities for the current year's program for each region. F-EBS 1983
- Inquiry Service - This service provides a staffed ever-ready response to client research staff on an as-needed basis. A special "hot line" is available for special requirements.

RESEARCH METHODS: Research in communications, and

- Research to identify client needs and discussions with client representatives.
- Research for industry trends and developments with users, vendors, and competitors.
- Conclusions and recommendations based on judgement of INPUT's professional staff.
- Professional staff with nearly 20 years of experience in data processing and communications, including senior management positions with major vendors and users.

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

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INPUT

FIELD SERVICE PROGRAM

FIELD SERVICE BRIEF

STRATEGIC PLANNING GUIDELINES

IN FIELD SERVICE

1983-1987

APRIL 1983



STRATEGIC PLANNING GUIDELINES
IN FIELD SERVICE
1983-1987

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STRATEGIC PLANNING GUIDELINES
IN FIELD SERVICE
1983-1987

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I INTRODUCTION

- This brief is published as part of INPUT's 1983 European Field Service Programme.
- The subject, "Strategic Planning Guidelines in Field Service," was selected by clients of INPUT's 1982 Field Service Programme.
- Opportunities and challenges exist for field service organizations throughout the 1980s. Changing markets, technologies, and user expectations will require the utmost in strategic planning from maintenance vendors, both in responding to requirements and optimizing revenue and profit opportunities.
- A brief review of strategic planning elements is discussed in Chapter II, and key service trends and issues are identified in Chapter III.
- A combination of information sources was used for this report, including vendor and user surveys from the United States and Europe as analysed in other INPUT reports, including both annual surveys.
- Readers of this brief are encouraged to give INPUT their comments, suggestions, or criticisms.

II STRATEGIC PLANNING REQUIREMENTS

A. THE FIVE-YEAR PLAN

- Field service management must construct strategies in two dimensions:
 - Strategic planning covering the next strategic period of time (normally five years), and including the overall operations from the standpoint of revenue, profit, product mix, and personnel skill mix.
 - Product planning for each product maintained, including profit, marketing, sales, and support plans for the life cycle of the product (which usually varies from three to eight years).
 - The two sets of strategic long-range plans must be in harmony and the plans of all departments should be coordinated to eliminate conflicts.
- The five-year strategic plan for field service should be subordinate to, and supportive of, each and every corporate strategic objective and implementation plan.
 - Field service organizations need to submit forecasts of revenue and profit goals as input to the company's strategic plan.

- Implementation schedules for meeting general company objectives in corporate image, personnel productivity, management training, and professionalism should be included in the five-year plan.
- A significant set of assumptions, to be stated within the general five-year strategic plan, should be derived from the product strategic plans covering the same timeframe.
- Strategic support plans for products will be initiated at different phases of the product life cycle for different companies.
 - Product support strategy must extend beyond the sales plan.
 - Some field service organizations become involved with the original product marketing and design specification phases while others are brought into the planning after manufacturing prototypes are built.
 - Field service management should be involved as early as possible in the product planning phase.
 - From a company perspective, field service management is more likely to be fully committed to product plans if they are part of the planning process.
 - Field service engineers represent an excellent feedback channel for the needs and desires of users.
 - Maintainability design can multiply profits during the product's life and result in higher credibility for follow-on products.
 - Maintenance pricing strategy becomes more visible as product price/performance improves.

- Just as the field service general strategic plan must support the corporate plan, strategic product plans must support the overall product marketing plan.

B. SETTING OBJECTIVES

- The process of setting objectives is central to strategic planning. Every other activity revolves around this process. If this process fails, then the entire planning process fails.
 - Objectives are established at both top and bottom levels of management and communicated up and down through the ranks of line management.
 - Staff managers contribute a great deal to facilitate the process, but it is line management's responsibility to establish the objectives.
- A few very broad, general, long-term objectives are established by the management based on input from the lower levels of management.
- The lower levels of management then propose detailed plans for meeting the general objectives established.
- After a number of iterations of the above process, during which negotiations take place to reach a consensus at all levels of management, the top and bottom levels of management come to an agreement on the overall objectives of the corporation and how resources will be allocated and used to attain those objectives. The result is the strategic plan.
- Key executives' comments on why planning is increasing in importance is revealed, from a previous INPUT survey, in Exhibit II-1.

EXHIBIT II-1

REASONS FOR INCREASED IMPORTANCE OF PLANNING

"We need to improve our performance through better allocation of resources and better industry market planning."

"Technological changes are so frequent that long-range planning is required. Also, more planning is required for us to manage our high growth rate and the attendant problems."

"Competition is getting tougher and the technology is changing faster, which makes planning the investment of company resources more important."

"Because our current business market is maturing and we have to diversify, we must identify real market opportunities and focus our company's resources on them."

"The business is getting more complex through a proliferation of applications, changing technology, and larger size of business."

"We have been reacting too much. Too many opportunistic decisions are being made without regard to long-term plans."

"The business environment is rapidly changing. We learned from mistakes that we could have avoided bad situations with better planning."

"Our environment is getting more complex and is rapidly changing."

"We are recognizing the importance of market segmentation in providing new opportunities."

"We have been investigating opportunities improperly. We must place more emphasis on the evaluation process."

"In the past we have managed by the seat of our pants. We can't afford to do that anymore because our market is more mature and the competition is getting severe."

SOURCE: INPUT Survey

C. PLAN DEVELOPMENT

- Larger firms use a planning manual or formal guidelines for the planning process, whereas smaller companies use other means, including meetings, discussions and more flexible rules for establishing plans.
- The number of iterations needed to develop a strategic plan varies.
 - The number of versions developed is an indicator of the depth of the negotiating consensus process in the development of the plan.
 - It is an expensive and time-consuming process, but it has proven its value to the managers.
 - The frequency is a function of the number of years in the corporate plan and the rate of change of the market served; frequently a new iteration will be initiated by a competitor's move.
 - The longer the life of the plan, the more frequently it is updated.

D. PLAN EXECUTION

- After the longer term strategic plan has been developed, it is then used as the basis for developing a one-year business (or operating) plan.
 - This business plan may be a part of the original corporate plan or it may require a further draft to specify more detail with respect to tactics and quantitative objectives.

- The business plan is reviewed at least quarterly, and often monthly.
- Line management is always responsible for executing the plan, but in most companies, managers below the field service division level only see the portion of the business plan for which they are responsible.

E. CONTROLLING AND MONITORING THE PLAN

- Execution of the plan is controlled through revenue and expense budgets and through establishing qualitative controls.
 - Qualitative objectives are reviewed much less frequently than quantitative ones, mainly because they are usually harder to measure.
 - Measuring success and providing incentives for meeting qualitative objectives is a problem for most companies.
- A variety of quantitative measures can be incorporated into strategic plans.
 - One common measure is revenue growth and profitability.
 - Other measures include customer satisfaction, expense control, productivity, employee turnover, and the value of parts inventory.
- Methods of monitoring and controlling the plan include:
 - Customer satisfaction surveys.
 - Regular monthly review sessions to improve the sharing of information.
 - Early warning signals.

- Market share analysis.
- Financial controls on product development and planning.
- Automated reporting process.

III KEY SERVICE TRENDS AND ISSUES

- Proper strategic planning is contingent upon recognition of the driving forces in the marketplace. These frequently go beyond a single product market, e.g., integration of office automation with data processing or the proliferation of microcomputers.
 - Identifying key trends and issues in the quickly changing service business is paramount and requires a constant flow of market intelligence to field service management.
 - Long-range strategical plans addressing specific, substantiated issues and trends will enhance field service organizations' strength as corporate and industry contributors.
- Following are the major issues and trends for field service strategical plans. They are based on research from users and vendors alike.

A. IMPACT OF MICROCOMPUTERS

I. MARKET ENVIRONMENT

- Despite extremely rapid growth in microcomputer sales, the corresponding services market is not experiencing the same expansion. There are several reasons for this:

- A high percentage of the installed base is composed of personal computer products that are still under warranty (first time users do not pay for maintenance contracts if they believe they can get along without them).
- On-site service pricing is prohibitively expensive (typically 20% of list price per year) and is therefore the least popular of the maintenance options adopted by users. Also, until recently, it was not a standard option for systems purchased from dealers and distributors.
- An estimated 65% of users prefer to use time and materials service, which in the early stages of a product life means reduced service revenues to vendors (low product failure rate). This will rebound in later years, however, as the failure rate increases.
- Users' unrealistic expectations of their microcomputers' reliability and their lack of service contract coverage will work against vendors in a number of ways:
 - Service revenue will be reduced, which is an ongoing loss to the vendor.
 - When equipment failures do begin there may be an impact on further user base development. Users, used to paying little if anything for parts and labor, will suddenly be confronted with significant expenditures and may cease using the product altogether.
- The initial phase of market development of the microcomputer is characterized by the attempted rapid multiplication of retail outlets for each product in the shape of proprietary and nonexclusive distributors, OEMs, and dealerships of all types and sizes.

- The objective is to obtain high-volume sales leverage for the product as quickly as possible. In this environment service requirements are not given a high priority (nor are end user training, software requirements, or professional service support).
- The second phase of market development will soon begin where major vendors reduce and consolidate the number of dealers, OEMs, and distributors allowed to handle their product. Simultaneously they will restructure service offerings in line with the new marketing methods.
- So far the thrust appears to be to provide large corporate accounts with direct vendor/end-user field service, whereas single-unit sales are to be serviced by a slimmed-down network of dealers. These front-line dealers in turn will receive their service support either directly from the vendor or through a single third-party maintenance vendor.
- The type of user that purchases a microcomputer determines the characteristics of the maintenance service needed. These needs can be conveniently divided into three service categories:
 - Mail-in service, which is limited to users who have the ability to diagnose their own equipment's failures. Mail-in service provides a turnaround time of one to two weeks. The defective parts are removed and replaced by the system's owner.
 - An extension of this is the large corporation that purchases many microcomputers and services its own "installed base" internally through a small, dedicated staff of engineers. Diagnosis and parts-swapping are accomplished by the service group, who obtain repairs by mail from established vendor depots.
 - Costs are limited to basic diagnostics (both software and hardware tools), a limited supply of commonly needed spares (to reduce repair time), and shipping costs.

- This type of service is popular with start-up vendors (new suppliers of the microcomputer market) and is usually replaced by repair depot or dealer/distributor service as soon as possible.
- Carry-in service, which is an option provided by either the local dealer, the regional/national distributor, or the third-party maintenance vendor through repair depots.
 - In exchange for delivering failed equipment to the repair center, the end user benefits from lower service charges than on-site maintenance, faster turnaround time than mail-in service, and an opportunity to negotiate the payment of repair (according to the user's view of who is responsible).
 - An increasingly large number of dealers supply their own service, but the success of this approach is open to question.
 - Most major vendors have agreements with third-party maintenance organizations to supply service to dealers and OEMs through nationwide repair depots. They are somewhat able to control the quality of repair service obtained by the user.
 - This is an excellent way of temporarily channeling assistance to the dealer network while the user base expands (and the dealer network is stabilized). At a later date, coinciding with the renewal date of the third-party maintenance (TPM) contract, it will be logical for the equipment manufacturer to provide his own dealer service (which is a lucrative business).
- On-site maintenance, which is very expensive, when available. Microcomputers range in cost from one and one-half to five times the cost of typewriters, yet on-site maintenance is not universally as available for microcomputers as it is for typewriters.

- When microcomputer user populations begin to approach the size of typewriter user populations, on-site service may become the norm.
 - The initial user currently avoids the on-site option because there are few failures in the initial six to nine months of use within the warranty period, and time and materials are certainly cheaper than on-site contracts.
 - This means that the service revenue base is not homogeneous and is difficult to measure and budget for. It also means the user base is developing a bad attitude toward service.
 - To combat this, service prices must be reduced and heavier sales effort applied to capturing standard on-site agreements at the time of sale.
- The type of service determines the type of contract, the pricing format and level, and the type of service organization and engineers needed. Any one vendor will be required to provide one or more of these directly (i.e., through his own service organization) with the option to subcontract one or more to third-party maintenance organizations.
- The equipment manufacturers view the dealers' networks as sales, support, training, and service distribution channels that provide the leverage for the product. Unfortunately, many main dealer groups are becoming cluttered with a large number of competing products.
 - The majority of Level I (parts swap) service support is provided to end users by the dealers who sell the product, and a growing number of them are acquiring a Level II (parts repair) service capability as well.

- The competition is for shelf space, user attention, dealer attention and the limited support and service resources the dealer has available.
- As time goes by the proliferation of products will cause serious problems for those microcomputer manufacturers who do not pay attention to each of the service training and repair support outlets.
- Service quality is uniformly low at present and can seriously impair product image. The only immediate solution appears to be increased attention to product reliability at the manufacturing source.

2. MICROCOMPUTER SERVICE TRENDS

- Activity in the field service of microcomputers is at fever pitch with parallel efforts being made by vendors, TPMs, OEMs, dealers, and distributors.
- On the vendor side, depot repair centers are being established at key locations, supplemented by courier services to carry failed units from customer to repair center and back.
- Vendors are also advising users on self-maintenance, sources of spare parts, and hotline support contacts during standard training sessions.
- TPMs are scrambling to sign up exclusive contracts with as many personal computer manufacturers as possible.
- Dealers are attempting to provide at least Level I service while organizing for Level II. Depending on the product they sell, dealers may have access to repair centers run by the vendor or TPM service.
- Other information equipment vendors are looking to expand the range of products they service by complementing their own product line with microcomputers (thereby expanding service revenue and leveraging their service network).

- Notwithstanding the trend for less on-site maintenance cover for micro-computers, the sheer volume expected in microcomputers will expand the field service market faster than anything else has in the past.

B. SOFTWARE MAINTENANCE

I. SYSTEMS SOFTWARE MAINTENANCE

- Mainframe field service organizations have had one or more system control software specialists performing basic software maintenance for over 20 years.
- It is becoming more difficult to draw the line between firmware and system control software in today's mainframes and subsystems.
- Further confusion is caused by attempts to distinguish firmware from micro-code from system control software. The clearest distinction among them is in the user's ability to define and alter system parameters.
- It is logical, if not always practical, for the field service organization to assume total responsibility for the after-market support of the fundamental product, including all software support activities controlling the delivery of functional specifications, such as:
 - Assistance in initial systems generation, defining configurations, and initializing options for the user.
 - Diagnosing user-reported faults with vendor-supplied operating systems and forwarding results to software continuation engineering for resolution.

- Installing published temporary fixes in current releases as supplied by software engineering.
 - Assisting users to upgrade to new releases, especially if reported problems are corrected in the latest release.
 - Working together with software engineering and users to design temporary circumventions and on-site fixes in critical situations.
- One great advantage of employing system software specialists in field service is general problem determination of complex hardware failures.
 - System software maintenance pricing should be completely unbundled allowing users to select varying levels of service.
 - Firmware maintenance should remain bundled with hardware maintenance.
 - Loadable microcode maintenance can be provided under the umbrella of hardware maintenance or can be provided as an unbundled option. Generally it falls under the firmware category.
 - Field service organizations employing software maintenance specialists should have a firm understanding with the sales organization about the distinction between pre-sales support functions and after-sales support functions.

2. APPLICATION SOFTWARE MAINTENANCE

- While it is not generally recommended that field service organizations seek opportunities in the maintenance of applications software, a great number of opportunities exist for organizations that have developed the capability of managing the after-sales support function, including system control program maintenance.

- Turnkey systems represent a special cast of applications program maintenance.
 - The basic vendor-supplied applications software represents value added to the hardware and is delivered as part of the overall functional specification.
 - It is best to view this kind of applications software as essentially the same as operating systems software in the after-sales support function.
 - Because of the industry focus of turnkey systems (CAD/CAM for example), a higher level of specialization is required from software support specialists.

- As in the case of system software, field service maintenance should initially be limited to diagnosis of failures and coordination of fixes with software designers. On-site code changes should be attempted only in extreme emergencies and should then be well documented for subsequent regressive failure analysis.

- For a more in-depth discussion of applications software maintenance, the reader is referred to Software Maintenance Planning, published by INPUT as a part of the 1982 Field Service Program (USA).

C. FIELD SERVICE PRICING PARAMETERS

I. ELASTICITY

- Many European service vendors believe that users have no limit with regard to the ratio of maintenance price to purchase price of equipment.

- But despite its importance to vendors, users see little relationship between the cost of equipment and the price of maintenance service.
- The critical ratio, for users, is between the perceived quality of service and the price of service.
- Vendors who attempt to raise the price of maintenance and experience resistance from users may be receiving a signal for higher quality service.
- The price of field service is generally inelastic in the long term and moderately elastic in the short term when the user has alternatives.
- Elasticity cannot be viewed as a simple concept in field service because of possible variables. For example:
 - Maintenance is actually insurance against disaster; therefore, elasticity is inversely related to the criticality of the information processing system and to the relative cost of downtime.
 - Constituents of unbundled maintenance contracts will have different elasticities, especially during the short term. Forced budget cuts by users during the recession resulted in reductions of extra shift coverage but not in a significant number of defections to third-party contracts.
 - The periods of greatest elasticity for maintenance prices are early in the product life when users are considering the product and its total cost of use and again when the product begins its period of obsolescence. In these periods users have the greatest latitude in selection of products and/or maintenance vendors.
 - The period of least elasticity of maintenance price is the middle period when sales are peaking and the installed base is growing most rapidly.

2. USER PERCEPTIONS OF PRICE/PERFORMANCE ISSUES

- Users judge maintenance price/performance according to the perceived needs of their companies.
 - Users of the equipment may or may not perceive the real needs of their company.
 - Distortions of real company needs occur at the operating level in data processing due to pressures similar to those felt by maintenance vendors.
- Ironically, users equate good maintenance performance not with how often they see the field service engineers, but with how seldom they see them.
 - The intangible benefit of uptime is perceived by the user as performance within the context of after-market support.
 - The tangible benefits of response time and repair time are quite important to the user but are less important than uptime.
 - Users do not perceive uptime in terms of how quickly service is restored when the system goes down as much as they perceive it as how infrequently they are interrupted.
 - The better the performance of their maintenance contract, the less conscious the users will be of its existence.
- Users do not naturally differentiate between the reliability of the product and the reliability of the maintenance organization, especially if one vendor supplies both the product and the service.

- When service becomes necessary, users tend to equate vendor performance with the user's ability to influence or control the maintenance organization.
 - The maintenance vendor who projects the image of total subordination to the user's immediate needs is perceived as the top performer.
 - Conversely, the service organization that takes charge and pushes the user aside is perceived as the lesser performer, even if the equipment is restored sooner as a result.
 - The important point here is in the word "perceived." There is no practical way to demonstrate to the user that one method is actually superior to the other in reducing repair time.

- Users do not perceive vendor productivity improvements as benefits in the price/performance equation, for example:
 - Remote diagnostics and support centers have not been successfully sold to the users as performance benefits.
 - A change from dedicated field service engineer assignments to multiple assignments is perceived as a vendor benefit without a corresponding reduction in price. It is not seen as a performance benefit to the user.

- Users desire on-site maintenance for all equipment and consider it superior to a substitute such as walk-in or mail-in repair centers.

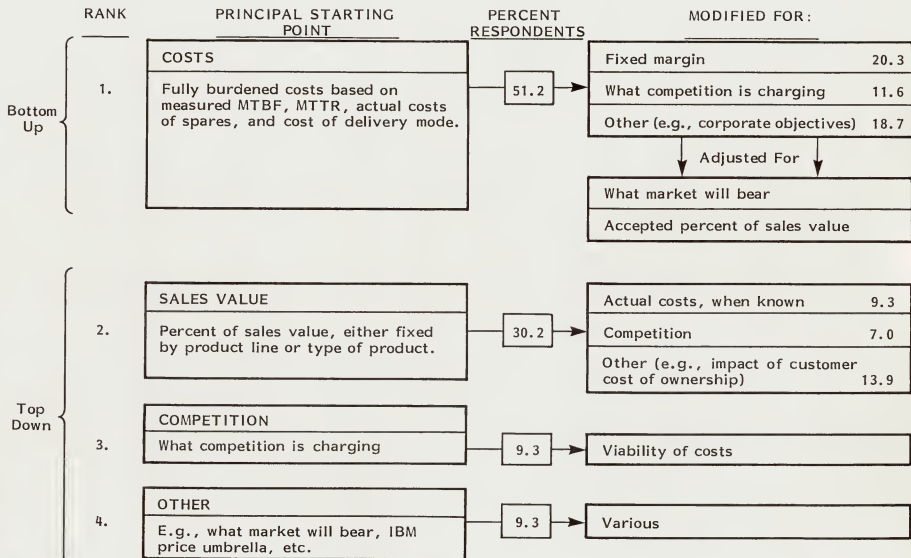
3. TOP-DOWN VERSUS BOTTOM-UP PRICING

- In pricing, the top-down versus bottom-up approach refers more to the marketing versus cost approach than to top management versus operating management.

- Half the vendors approach the pricing problem from the cost (bottom) perspective, as shown in Exhibit III-1.
 - The initial model is tested with profit objectives, competition, and reasonableness tests by the ratio of maintenance price to purchase price.
 - Most vendors using this model limit the cost analysis to the first 18 months to two years of a product's life.
- The top-down approach starts with a marketing strategy for product sales and support, also shown in Exhibit III-1.
 - According to a recent INPUT survey, 30% of the vendors reported that the premise for their maintenance pricing model is a simple, pre-established percentage of product list price.
 - Another 20% of the vendors look directly at competition or the dominant vendor within their sphere of influence.
 - The vendors are evenly split on methods to modify their original pricing assumptions between adjustments for costs and adjustments for additional market considerations.
- The major advantage of top-down modeling is that the competitive strategy for a new product is addressed in the beginning. The major disadvantage is that field service will operate at a loss early in the product life cycle.
- The two major advantages of bottom-up modeling are that support costs are clearly identified in advance and that field service profits are usually assured in the first year of product introduction. The major disadvantage is that the pricing problem tends to be an internal issue rather than a total marketing strategic issue.

EXHIBIT III-1

FIELD SERVICE PRICING METHODOLOGY

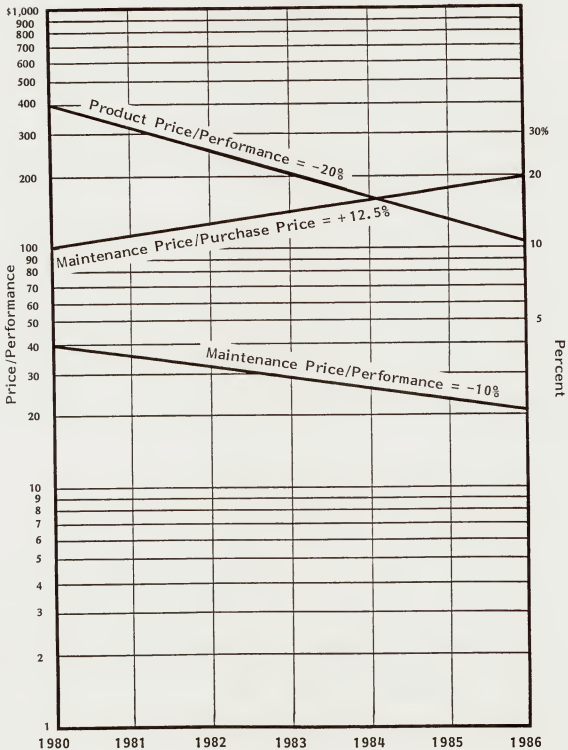


4. PRICING STRATEGY

- Strategic pricing, as opposed to tactical pricing, allows management to enjoy the advantages of both market analysis pricing and cost analysis pricing.
 - The disadvantages of the tactical methods of pricing can be compensated for if not overcome completely.
 - A well-designed pricing strategy provides sound guidelines for tactical adjustments as later needs dictate.
- Pricing strategy in field service must address the two major strategic fronts:
 - Remaining life of current products and projected life of new products.
 - Company and departmental strategic planning periods, typically five years.
- A conceptual look at a fundamental pricing problem is provided in Exhibit III-2.
 - Exhibit III-2 is presented on a log/linear scale for two reasons:
 - The compound percentage curves become straight lines.
 - Ranges from tens through hundreds may be displayed together with hundreds through thousands for relative effects.
 - In the conceptual example, product price performance improves at a 20% rate annually from a 1980 base of \$400,000 per million units of performance to \$105,000 in 1986.

EXHIBIT III-2

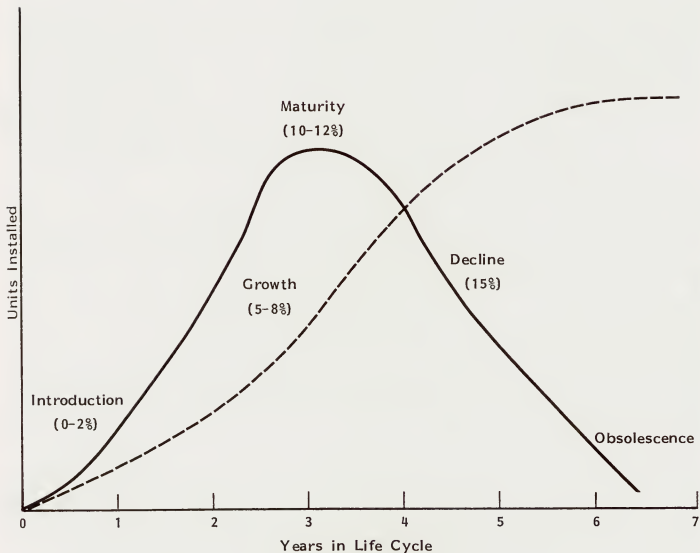
EFFECT OF PRICE PERFORMANCE IMPROVEMENTS
AND MAINTENANCE/PRODUCT PRICE RATIO



- A corresponding 10% annual improvement in maintenance price per million units or product performance would reduce annual maintenance charges of \$40,000 per million units to \$21,000 by 1986.
- The ratio of maintenance price to product price grows from 10% in 1980 to 20% in 1986 as a result of the relative changes.
- A pricing communication strategy can be derived from the preceding example, and that is to communicate the improvement in maintenance price/performance over a series of products drawing attention away from the ratio of maintenance price to product price.
- A conceptual example of a price increase strategy for the service of a specific product is presented in Exhibit III-3.
 - In harmony with the product marketing strategy, maintenance price increases are held to a minimum in the first year or two of the product life.
 - This is one of the two periods of greatest elasticity.
 - Price increases with a relatively small installed base are not significantly multiplied to offset negative effects on sales efforts.
 - During stage two the product has credibility and can tolerate small increases in maintenance prices of 5% to 8%.
 - In stage three the product sales will peak and the installed base will be growing at its fastest rate.
 - This is the period of least elasticity.

EXHIBIT III-3

STRATEGIC MAINTENANCE PRICE INCREASES



— = Products Sold
- - - = Products Installed
(%) Percent Price Increase

- Price increases of 10% to 12% will increase total revenue significantly because of the large installed base.
 - Profits during this period are also greater because of cost improvements.
 - This is the period that maximum profits should be generated to recapture invested expenses in the product startup phase and to underwrite support of newer products.
- In phase four product sales will decline as the product approaches obsolescence, and the product will experience greater maintenance price elasticity.
 - It will be consistent with most marketing strategies to raise prices of maintenance during phase four in order to help push replacement products.
 - Those users who remain with the older product will provide even greater profits to field service as the product moves through functional obsolescence.
- Combining a maintenance price performance improvement for a series of new products with strategic price increases during the life of individual products is consistent with overall objectives.
 - Planned product life cycle increases are consistent with product marketing strategy.
 - While the price increase strategy reverses the changes in product maintenance costs, greater profits are realized in the strategic sense, i.e., the long run.

- Lowering maintenance price per unit of product performance in new products is consistent with lower costs of providing maintenance and with the marketing tactic of discouraging purchases of older products once their replacements are announced.
- Tactical maintenance pricing policies attempt to recapture all support costs within one or two years. Strategic pricing, on the other hand, examines total costs of support over the product life cycle and recaptures them in harmony with the overall product marketing and support plan.

D. COST CONTROL MEASURES

I. PRODUCTIVITY TOOLS

- Productivity in field service has been a key issue for several years. Initially it was because of the scarcity of qualified personnel and more recently because of the trade-offs of capital investment for savings in relatively expensive labor.
- The nature of the information processing equipment maintenance business provides more than one aspect of the problem of productivity.
 - Use of idle time to increase total production is an obvious approach within an industry that has historically accepted personnel utilization of 50% to 75% as normal.
 - As idle time becomes productive time, improvements in data collection and other field administrative burdens will be necessary.
 - The concentration of specialist level experience in various devices provides yet another point of attack.

- Untapped resources of collective experience diminish the effects of a company learning curve.
- Greater expenditures in diagnostic tools and test equipment may be justified upon examination of the trade-offs for today's labor costs.
- There are potential trade-offs from using repair centers for the various levels of field repair, such as:
 - . Component.
 - . Circuit board.
 - . Mechanical assembly.
 - . Module.
 - . Device.
- The first point of attack in field service personnel productivity must be the utilization of field personnel. Productivity will not be gained by improving support to field service engineers if it just creates additional idle time.
 - Classical queuing theory applied to the territory remedial maintenance model reveals considerable opportunity for increasing the productivity of field service engineers, as shown in Exhibit III-4.
 - The principle of increased efficiency using parallel service points is easily demonstrated using simple assumptions.
 - The conceptual model in Exhibit III-4 illustrates a possible utilization improvement from 39.3% to 64.7% given that the major objective in

EXHIBIT III-4

EFFECT OF MULTIPLE FIELD ENGINEERING TERRITORY ASSIGNMENTS

UNITS PER FE	RESPONSE TIME (hours)			AVERAGE DOWNTIME (hours)			EXPECTED NUMBER OF UNITS DOWN PER FE			EXPECTED NUMBER AWAITING SERVICE PER FE			UTILIZATION ON REMEDIAL MAINTENANCE
	1 FE	2 FEs	3 FEs	1 FE	2 FEs	3 FEs	1 FE	2 FEs	3 FEs	1 FE	2 FEs	3 FEs	
30	1.7	0.7	0.5	3.7	2.7	2.5	.6	.5	.4	.25	.07	.03	34.7%
34	2.0	0.8	0.6	4.0	2.8	2.6	.8	.6	.5	.35	.11	.05	39.3
35	2.1	0.9	0.6	4.1	2.9	2.6	.8	.6	.5	.38	.12	.06	40.5
40	2.7	1.2	0.8	4.7	3.2	2.8	1.0	.7	.6	.56	.20	.10	46.2
45	3.4	1.5	1.0	5.4	3.5	3.0	1.4	.9	.8	.83	.32	.18	52.0
50	4.4	2.0	1.3	6.4	4.0	3.3	1.9	1.2	1.0	1.21	.50	.29	57.8
55	5.9	2.8	1.9	7.9	4.8	3.9	2.5	1.5	1.2	1.80	.79	.49	63.6
56	6.3	3.0	2.0	8.3	5.0	4.0	2.7	1.6	1.3	1.95	.87	.55	64.7

Assumptions:

Average Repair Time (MTTR) = 2.0 hours

Average Travel Within Single Territory = 0.25 hour/incident

Additional Travel per Territory Merged = 10%

MTBF = 173 Working Hours, Single Shift (1 Incident per Month per Unit)

SOURCE: Computed using classical queuing theory.

territory assignments is to provide average on-site response time of two hours.

- One of the trade-offs in this model can be seen in the expected number of customers waiting for service per field engineer, for example:
 - With single territory assignments of 34 units per FE, the response time is two hours, but an average of only 0.35 customers will be awaiting service at any given time.
 - By increasing average territory sizes to 56 units using three field engineers in a multiple assignment, the response time objective of two hours is maintained at the expense of an average of 0.55 customers per FE awaiting service.
- Remote diagnostics have been introduced in several field service organizations, so far with little improvement in overall productivity.
 - Remote diagnostics have been accepted in remote areas where users are accustomed to significant delays in on-site service.
 - In cases where remote diagnostics have been substituted for traditional maintenance rather than used as an additional tool to enhance the quality of service, both users and local field engineers have resisted them.
- Support centers are more established in principle than remote diagnostics, but actual results in productivity are difficult to find.
 - Conceptually, support centers should reduce travel and repair times.
 - Maintenance vendors contacted by INPUT have yet to reveal quantitative studies of productivity improvements directly attributable to support centers.

- Automated centralized dispatch systems provide potential relief from administrative demands on field engineers during the time between unscheduled calls.
 - If the time available for scheduled maintenance reduction activities such as preventive maintenance and installations of field changes is being fully utilized, then automated dispatch systems increase field productivity.
 - Automated dispatch systems have a greater potential for increasing the productivity of management and administrative personnel than field personnel.
- Other productivity tools being introduced include:
 - Regional repair centers.
 - Higher quality test instruments such as signature analyzers and logic analyzers.
 - Portable spare parts kits.

2. PARTS HANDLING

- With spare parts inventories running from 40% to over 100% of annual field service revenues, the logistics function presents a major opportunity for cost savings.
- If one year's revenue is tied up in spare parts inventories, the carrying costs of some 35% are taking all of the profit potential from the business.

- One method of reducing gross inventories is to attack the spare parts in float, as several vendors are already doing.
 - By controlling parts repairs within the field engineering function, some vendors are able to manage spare parts logistics of maintenance separately from the material logistics of manufacturing.
 - Additional reductions in spare parts in the pipeline have been accomplished by the decentralization of repair centers.
 - One of the advantages of centralized automated dispatching has been to improve the tracking of used parts and to alert local management when defective parts are expected in the repair center.
- Queuing models based on expected demands for parts help to optimize hierarchical stocking levels in branches, districts, regions, and headquarters.
- Inventory computer models for reorder timing, economic order sizes, etc., originally designed for manufacturing, wholesalers, and retailers, have been easily modified to address the logistics problems of field service.
 - Opportunity costs are altered to reflect the total cost of being out of stock, including the field engineer's time and expenses and a quantitative expression of poor customer relations.
 - Most of the inventory models will accept target probabilities of meeting demands for inventory items.
 - No translation is required for inventory carrying costs.
- Most field service vendors have recognized the need for specialists in logistics and inventory management and have ceased the practice of filling these vital management positions with line managers who have little experience in material logistics.

3. OTHER AREAS OF COST CONTROLS

- Most vendors are predicting significant decreases in travel expenses as a percentage of the cost of a fault call.
 - The predictions are based primarily on expected returns from overhead expenditures in support centers, remote diagnostics, and better logistics support.
 - Several maintenance vendors have discontinued company car plans.
 - At least one vendor has stopped paying parking fees and tolls for field engineers supplying their own cars, a cost-cutting practice which may prove costly in personnel relations.
- Salaries and wages generally have not been considered cost-cutting targets within field service.
 - Several maintenance vendors have had to freeze salaries as part of parent company programs during the recession.
 - Field service personnel located at headquarters in a few companies have been required to join the rest of the plant in shortened work weeks, a method of sharing reduction in work force that is impractical in field locations.
- Communications expenses are expected to increase significantly during 1982, but they are expected to significantly decrease travel expenses.
- Field office space is being used more efficiently. As leases expire, the tradition of locating field service facilities with sales offices is being examined more closely.

- Increasing numbers of maintenance vendors are using zero-based budgeting methods as opposed to incremental adjustments to expenses for the prior year.

4. COST CONTROL TRENDS FOR 1983-1987

- The coming years in field service management will be characterized by an acceleration of the trend toward scientific management and operations analysis.
 - The trend toward scientific management, already established by leading-edge maintenance organizations, has been accelerated by the current economic recession.
 - Cost controls will result from optimization studies recommending increased spending in some line items to compensate for the decreases in others.
 - In order for scientific management practices to work in field service, existing managers will need to study fundamentals through specialized training that takes advantage of their management experience.
- By 1987 all field service managers will be forecasting and controlling expenses based on some form of zero-based budgeting.
- Logistics experts will continue optimising spares controls over the next five years as field personnel learn to appreciate the trade-offs of tangible costs versus out-of-stock, intangible costs.
- Field service personnel productivity will remain a key issue in cost control for the next five years. It will become obvious that productivity improvements will not reduce costs unless they result in reductions in personnel per unit serviced.

E. GENERAL MANAGEMENT ISSUES

1. FIELD SERVICE CONTRIBUTIONS TO REVENUE AND PROFIT

- The percentage of European field service organizations operating as profit centers is stabilizing at around 80%, after a rapid change from cost center control.
- Field service contributed 20-25% of equipment manufacturers' revenue during 1982, and frequently more than a third of the total company profit.
 - During the recession, while users tend to hold back on purchases of new products, the field service contribution to profit has become vital to an increasingly large number of computer manufacturers, particularly those with mature product lines.
 - Maintenance of older products becomes a more valuable commodity to users and can be priced accordingly.
 - Maintenance vendors have written off startup support costs, are well beyond the early learning costs, and can earn good profits on large installed bases of equipment that have not fully depreciated.

2. NEWER SOURCES OF REVENUE

- The topic of additional revenues has become a key issue among field service executives for several reasons:

- As mentioned above, it has become an accepted practice for field service managers to be measured and compensated on the basis of profitability.
- Increasing labor costs have forced productivity measures, creating more available time for field personnel.
- Pressures to keep maintenance prices below a certain percentage of product list price are being felt as the price/performance ratio of more reliable products continues to improve.
- The issue of alternative revenues is of such interest to field service executives that a separate report on the subject was published by INPUT as part of the 1982 Field Service Program. The reader is referred to Alternative Revenue Opportunities for Field Service, published in December 1982.

3. PERSONNEL ISSUES

- A latent personnel issue of the 1980s is the potential for labor organizations.
 - The levels of personnel growth in the 1960s and 1970s created a large number of technical personnel with critical skills who have not advanced into management and who do not identify with management concerns.
 - Cross-training for the integration of office equipment and traditional data processing equipment will be met with resistance by large groups of personnel.
 - Cost-cutting measures taken during the recession have not always been communicated properly to field personnel.

- Productivity measures coupled with increased territory assignment are taking away idle time field personnel have come to regard as their own discretionary time.
 - A general resurgence of labor organization activities can be expected after the recession to make up for recent setbacks to labor in general.
 - Field service personnel continue to see themselves as professionals exercising a great deal of independent judgment. They are beginning to perceive management, however, as failing to recognize them as professionals but instead seeing them as units of labor.
 - As field service managers become more qualified in general business, they become less qualified to communicate with field service engineers on technical issues.
- An economic issue, which also remains a personnel issue, is field transportation.
 - A traditional benefit to field engineers has been the underwriting of a family car through reasonable car plans.
 - Relatively few territory assignments allow the use of public transportation for assigned coverage.
 - Field service engineers perceive the transportation issue as a company problem, not a personal one.
 - Advanced training of personnel will continue to present management with problems.
 - Cross-training senior personnel will compound the problems associated with investing too much training in a few people.

- Problems are created by moving field personnel from an environment where they exercise independent judgement into a training environment that is regimented. The problems are compounded by the fact that field personnel are forced to live for extended periods at levels below their personal standards.
- Finally, successful field service businesses will depend on continued development and management of their most valuable asset, personnel.
 - Adjusting personnel skills to coincide with technical changes is critical and essential.
 - Management sensitivity to changing field engineer attitudes and responsible follow-up is equally important as a strategic planning parameter.

STRATEGIC PLANNING GUIDELINES
IN FIELD SERVICE
1983-1987

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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.
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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.
- 1982 ADAPSO Survey of the Computer Services Industry.
- Evaluation of the current status and future trends of software terms and conditions.
- Analysis and forecast of user self-maintenance for a vendor's line of equipment.

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

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'

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Planning Services for Management

INPUT
MANAGEMENT
PLANNING PROGRAM
IN
FIELD SERVICE

F-1983

EBS

**MANAGEMENT PLANNING PROGRAM
IN FIELD SERVICE**

OBJECTIVE: To provide senior field service executives with basic information and data to support their management decisions.

DESCRIPTION: Clients of this program receive a report each year:

- Management Issue Report - Reports on new technical and management issues that require specific issues that require attention. F-1983
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- Planning Support Studies - In-depth analysis of major technical and management issues. AUTHOR
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TITLE
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DATE
- Annual Report - Reports on the field services industry and its impact on future field service planning. F-1983
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- Annual Presentation - Presentation to field service executives on current year's research and to support the research program for the upcoming year. EBS
- Inquiry Service - Staffed on an as-needed basis through a "hot line" in every work area.

RESEARCH METHOD: Research is conducted through communications, and associated with client

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

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FIELD SERVICE PROGRAM

FIELD SERVICE BRIEF

STRATEGIC PLANNING GUIDELINES
IN FIELD SERVICE

1983-1987

APRIL 1983



STRATEGIC PLANNING GUIDELINES
IN FIELD SERVICE
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I INTRODUCTION

- This brief is published as part of INPUT's 1983 European Field Service Programme.
- The subject, "Strategic Planning Guidelines in Field Service," was selected by clients of INPUT's 1982 Field Service Programme.
- Opportunities and challenges exist for field service organizations throughout the 1980s. Changing markets, technologies, and user expectations will require the utmost in strategic planning from maintenance vendors, both in responding to requirements and optimizing revenue and profit opportunities.
- A brief review of strategic planning elements is discussed in Chapter II, and key service trends and issues are identified in Chapter III.
- A combination of information sources was used for this report, including vendor and user surveys from the United States and Europe as analysed in other INPUT reports, including both annual surveys.
- Readers of this brief are encouraged to give INPUT their comments, suggestions, or criticisms.

II STRATEGIC PLANNING REQUIREMENTS

A. THE FIVE-YEAR PLAN

- Field service management must construct strategies in two dimensions:
 - Strategic planning covering the next strategic period of time (normally five years), and including the overall operations from the standpoint of revenue, profit, product mix, and personnel skill mix.
 - Product planning for each product maintained, including profit, marketing, sales, and support plans for the life cycle of the product (which usually varies from three to eight years).
 - The two sets of strategic long-range plans must be in harmony and the plans of all departments should be coordinated to eliminate conflicts.
- The five-year strategic plan for field service should be subordinate to, and supportive of, each and every corporate strategic objective and implementation plan.
 - Field service organizations need to submit forecasts of revenue and profit goals as input to the company's strategic plan.

- Implementation schedules for meeting general company objectives in corporate image, personnel productivity, management training, and professionalism should be included in the five-year plan.
- A significant set of assumptions, to be stated within the general five-year strategic plan, should be derived from the product strategic plans covering the same timeframe.
- Strategic support plans for products will be initiated at different phases of the product life cycle for different companies.
 - Product support strategy must extend beyond the sales plan.
 - Some field service organizations become involved with the original product marketing and design specification phases while others are brought into the planning after manufacturing prototypes are built.
 - Field service management should be involved as early as possible in the product planning phase.
 - From a company perspective, field service management is more likely to be fully committed to product plans if they are part of the planning process.
 - Field service engineers represent an excellent feedback channel for the needs and desires of users.
 - Maintainability design can multiply profits during the product's life and result in higher credibility for follow-on products.
 - Maintenance pricing strategy becomes more visible as product price/performance improves.

- Just as the field service general strategic plan must support the corporate plan, strategic product plans must support the overall product marketing plan.

B. SETTING OBJECTIVES

- The process of setting objectives is central to strategic planning. Every other activity revolves around this process. If this process fails, then the entire planning process fails.
 - Objectives are established at both top and bottom levels of management and communicated up and down through the ranks of line management.
 - Staff managers contribute a great deal to facilitate the process, but it is line management's responsibility to establish the objectives.
- A few very broad, general, long-term objectives are established by the management based on input from the lower levels of management.
- The lower levels of management then propose detailed plans for meeting the general objectives established.
- After a number of iterations of the above process, during which negotiations take place to reach a consensus at all levels of management, the top and bottom levels of management come to an agreement on the overall objectives of the corporation and how resources will be allocated and used to attain those objectives. The result is the strategic plan.
- Key executives' comments on why planning is increasing in importance is revealed, from a previous INPUT survey, in Exhibit II-1.

EXHIBIT II-1

REASONS FOR INCREASED IMPORTANCE OF PLANNING

"We need to improve our performance through better allocation of resources and better industry market planning."

"Technological changes are so frequent that long-range planning is required. Also, more planning is required for us to manage our high growth rate and the attendant problems."

"Competition is getting tougher and the technology is changing faster, which makes planning the investment of company resources more important."

"Because our current business market is maturing and we have to diversify, we must identify real market opportunities and focus our company's resources on them."

"The business is getting more complex through a proliferation of applications, changing technology, and larger size of business."

"We have been reacting too much. Too many opportunistic decisions are being made without regard to long-term plans."

"The business environment is rapidly changing. We learned from mistakes that we could have avoided bad situations with better planning."

"Our environment is getting more complex and is rapidly changing."

"We are recognizing the importance of market segmentation in providing new opportunities."

"We have been investigating opportunities improperly. We must place more emphasis on the evaluation process."

"In the past we have managed by the seat of our pants. We can't afford to do that anymore because our market is more mature and the competition is getting severe."

SOURCE: INPUT Survey

C. PLAN DEVELOPMENT

- Larger firms use a planning manual or formal guidelines for the planning process, whereas smaller companies use other means, including meetings, discussions and more flexible rules for establishing plans.
- The number of iterations needed to develop a strategic plan varies.
 - The number of versions developed is an indicator of the depth of the negotiating consensus process in the development of the plan.
 - It is an expensive and time-consuming process, but it has proven its value to the managers.
 - The frequency is a function of the number of years in the corporate plan and the rate of change of the market served; frequently a new iteration will be initiated by a competitor's move.
 - The longer the life of the plan, the more frequently it is updated.

D. PLAN EXECUTION

- After the longer term strategic plan has been developed, it is then used as the basis for developing a one-year business (or operating) plan.
 - This business plan may be a part of the original corporate plan or it may require a further draft to specify more detail with respect to tactics and quantitative objectives.

- The business plan is reviewed at least quarterly, and often monthly.
- Line management is always responsible for executing the plan, but in most companies, managers below the field service division level only see the portion of the business plan for which they are responsible.

E. CONTROLLING AND MONITORING THE PLAN

- Execution of the plan is controlled through revenue and expense budgets and through establishing qualitative controls.
 - Qualitative objectives are reviewed much less frequently than quantitative ones, mainly because they are usually harder to measure.
 - Measuring success and providing incentives for meeting qualitative objectives is a problem for most companies.
- A variety of quantitative measures can be incorporated into strategic plans.
 - One common measure is revenue growth and profitability.
 - Other measures include customer satisfaction, expense control, productivity, employee turnover, and the value of parts inventory.
- Methods of monitoring and controlling the plan include:
 - Customer satisfaction surveys.
 - Regular monthly review sessions to improve the sharing of information.
 - Early warning signals.

- Market share analysis.
- Financial controls on product development and planning.
- Automated reporting process.

III KEY SERVICE TRENDS AND ISSUES

- Proper strategic planning is contingent upon recognition of the driving forces in the marketplace. These frequently go beyond a single product market, e.g., integration of office automation with data processing or the proliferation of microcomputers.
 - Identifying key trends and issues in the quickly changing service business is paramount and requires a constant flow of market intelligence to field service management.
 - Long-range strategical plans addressing specific, substantiated issues and trends will enhance field service organizations' strength as corporate and industry contributors.
- Following are the major issues and trends for field service strategical plans. They are based on research from users and vendors alike.

A. IMPACT OF MICROCOMPUTERS

I. MARKET ENVIRONMENT

- Despite extremely rapid growth in microcomputer sales, the corresponding services market is not experiencing the same expansion. There are several reasons for this:

- A high percentage of the installed base is composed of personal computer products that are still under warranty (first time users do not pay for maintenance contracts if they believe they can get along without them).
- On-site service pricing is prohibitively expensive (typically 20% of list price per year) and is therefore the least popular of the maintenance options adopted by users. Also, until recently, it was not a standard option for systems purchased from dealers and distributors.
- An estimated 65% of users prefer to use time and materials service, which in the early stages of a product life means reduced service revenues to vendors (low product failure rate). This will rebound in later years, however, as the failure rate increases.
- Users' unrealistic expectations of their microcomputers' reliability and their lack of service contract coverage will work against vendors in a number of ways:
 - Service revenue will be reduced, which is an ongoing loss to the vendor.
 - When equipment failures do begin there may be an impact on further user base development. Users, used to paying little if anything for parts and labor, will suddenly be confronted with significant expenditures and may cease using the product altogether.
- The initial phase of market development of the microcomputer is characterized by the attempted rapid multiplication of retail outlets for each product in the shape of proprietary and nonexclusive distributors, OEMs, and dealerships of all types and sizes.

- The objective is to obtain high-volume sales leverage for the product as quickly as possible. In this environment service requirements are not given a high priority (nor are end user training, software requirements, or professional service support).
- The second phase of market development will soon begin where major vendors reduce and consolidate the number of dealers, OEMs, and distributors allowed to handle their product. Simultaneously they will restructure service offerings in line with the new marketing methods.
- So far the thrust appears to be to provide large corporate accounts with direct vendor/end-user field service, whereas single-unit sales are to be serviced by a slimmed-down network of dealers. These front-line dealers in turn will receive their service support either directly from the vendor or through a single third-party maintenance vendor.
- The type of user that purchases a microcomputer determines the characteristics of the maintenance service needed. These needs can be conveniently divided into three service categories:
 - Mail-in service, which is limited to users who have the ability to diagnose their own equipment's failures. Mail-in service provides a turnaround time of one to two weeks. The defective parts are removed and replaced by the system's owner.
 - An extension of this is the large corporation that purchases many microcomputers and services its own "installed base" internally through a small, dedicated staff of engineers. Diagnosis and parts-swapping are accomplished by the service group, who obtain repairs by mail from established vendor depots.
 - Costs are limited to basic diagnostics (both software and hardware tools), a limited supply of commonly needed spares (to reduce repair time), and shipping costs.

- This type of service is popular with start-up vendors (new suppliers of the microcomputer market) and is usually replaced by repair depot or dealer/distributor service as soon as possible.
- Carry-in service, which is an option provided by either the local dealer, the regional/national distributor, or the third-party maintenance vendor through repair depots.
 - In exchange for delivering failed equipment to the repair center, the end user benefits from lower service charges than on-site maintenance, faster turnaround time than mail-in service, and an opportunity to negotiate the payment of repair (according to the user's view of who is responsible).
 - An increasingly large number of dealers supply their own service, but the success of this approach is open to question.
 - Most major vendors have agreements with third-party maintenance organizations to supply service to dealers and OEMs through nationwide repair depots. They are somewhat able to control the quality of repair service obtained by the user.
 - This is an excellent way of temporarily channeling assistance to the dealer network while the user base expands (and the dealer network is stabilized). At a later date, coinciding with the renewal date of the third-party maintenance (TPM) contract, it will be logical for the equipment manufacturer to provide his own dealer service (which is a lucrative business).
- On-site maintenance, which is very expensive, when available. Microcomputers range in cost from one and one-half to five times the cost of typewriters, yet on-site maintenance is not universally as available for microcomputers as it is for typewriters.

- When microcomputer user populations begin to approach the size of typewriter user populations, on-site service may become the norm.
 - The initial user currently avoids the on-site option because there are few failures in the initial six to nine months of use within the warranty period, and time and materials are certainly cheaper than on-site contracts.
 - This means that the service revenue base is not homogeneous and is difficult to measure and budget for. It also means the user base is developing a bad attitude toward service.
 - To combat this, service prices must be reduced and heavier sales effort applied to capturing standard on-site agreements at the time of sale.
- The type of service determines the type of contract, the pricing format and level, and the type of service organization and engineers needed. Any one vendor will be required to provide one or more of these directly (i.e., through his own service organization) with the option to subcontract one or more to third-party maintenance organizations.
- The equipment manufacturers view the dealers' networks as sales, support, training, and service distribution channels that provide the leverage for the product. Unfortunately, many main dealer groups are becoming cluttered with a large number of competing products.
 - The majority of Level I (parts swap) service support is provided to end users by the dealers who sell the product, and a growing number of them are acquiring a Level II (parts repair) service capability as well.

- The competition is for shelf space, user attention, dealer attention and the limited support and service resources the dealer has available.
- As time goes by the proliferation of products will cause serious problems for those microcomputer manufacturers who do not pay attention to each of the service training and repair support outlets.
- Service quality is uniformly low at present and can seriously impair product image. The only immediate solution appears to be increased attention to product reliability at the manufacturing source.

2. MICROCOMPUTER SERVICE TRENDS

- Activity in the field service of microcomputers is at fever pitch with parallel efforts being made by vendors, TPMs, OEMs, dealers, and distributors.
- On the vendor side, depot repair centers are being established at key locations, supplemented by courier services to carry failed units from customer to repair center and back.
- Vendors are also advising users on self-maintenance, sources of spare parts, and hotline support contacts during standard training sessions.
- TPMs are scrambling to sign up exclusive contracts with as many personal computer manufacturers as possible.
- Dealers are attempting to provide at least Level I service while organizing for Level II. Depending on the product they sell, dealers may have access to repair centers run by the vendor or TPM service.
- Other information equipment vendors are looking to expand the range of products they service by complementing their own product line with microcomputers (thereby expanding service revenue and leveraging their service network).

- Notwithstanding the trend for less on-site maintenance cover for micro-computers, the sheer volume expected in microcomputers will expand the field service market faster than anything else has in the past.

B. SOFTWARE MAINTENANCE

I. SYSTEMS SOFTWARE MAINTENANCE

- Mainframe field service organizations have had one or more system control software specialists performing basic software maintenance for over 20 years.
- It is becoming more difficult to draw the line between firmware and system control software in today's mainframes and subsystems.
- Further confusion is caused by attempts to distinguish firmware from micro-code from system control software. The clearest distinction among them is in the user's ability to define and alter system parameters.
- It is logical, if not always practical, for the field service organization to assume total responsibility for the after-market support of the fundamental product, including all software support activities controlling the delivery of functional specifications, such as:
 - Assistance in initial systems generation, defining configurations, and initializing options for the user.
 - Diagnosing user-reported faults with vendor-supplied operating systems and forwarding results to software continuation engineering for resolution.

- Installing published temporary fixes in current releases as supplied by software engineering.
 - Assisting users to upgrade to new releases, especially if reported problems are corrected in the latest release.
 - Working together with software engineering and users to design temporary circumventions and on-site fixes in critical situations.
- One great advantage of employing system software specialists in field service is general problem determination of complex hardware failures.
 - System software maintenance pricing should be completely unbundled allowing users to select varying levels of service.
 - Firmware maintenance should remain bundled with hardware maintenance.
 - Loadable microcode maintenance can be provided under the umbrella of hardware maintenance or can be provided as an unbundled option. Generally it falls under the firmware category.
 - Field service organizations employing software maintenance specialists should have a firm understanding with the sales organization about the distinction between pre-sales support functions and after-sales support functions.

2. APPLICATION SOFTWARE MAINTENANCE

- While it is not generally recommended that field service organizations seek opportunities in the maintenance of applications software, a great number of opportunities exist for organizations that have developed the capability of managing the after-sales support function, including system control program maintenance.

- Turnkey systems represent a special cast of applications program maintenance.
 - The basic vendor-supplied applications software represents value added to the hardware and is delivered as part of the overall functional specification.
 - It is best to view this kind of applications software as essentially the same as operating systems software in the after-sales support function.
 - Because of the industry focus of turnkey systems (CAD/CAM for example), a higher level of specialization is required from software support specialists.

- As in the case of system software, field service maintenance should initially be limited to diagnosis of failures and coordination of fixes with software designers. On-site code changes should be attempted only in extreme emergencies and should then be well documented for subsequent regressive failure analysis.

- For a more in-depth discussion of applications software maintenance, the reader is referred to Software Maintenance Planning, published by INPUT as a part of the 1982 Field Service Program (USA).

C. FIELD SERVICE PRICING PARAMETERS

I. ELASTICITY

- Many European service vendors believe that users have no limit with regard to the ratio of maintenance price to purchase price of equipment.

- But despite its importance to vendors, users see little relationship between the cost of equipment and the price of maintenance service.
- The critical ratio, for users, is between the perceived quality of service and the price of service.
- Vendors who attempt to raise the price of maintenance and experience resistance from users may be receiving a signal for higher quality service.
- The price of field service is generally inelastic in the long term and moderately elastic in the short term when the user has alternatives.
- Elasticity cannot be viewed as a simple concept in field service because of possible variables. For example:
 - Maintenance is actually insurance against disaster; therefore, elasticity is inversely related to the criticality of the information processing system and to the relative cost of downtime.
 - Constituents of unbundled maintenance contracts will have different elasticities, especially during the short term. Forced budget cuts by users during the recession resulted in reductions of extra shift coverage but not in a significant number of defections to third-party contracts.
 - The periods of greatest elasticity for maintenance prices are early in the product life when users are considering the product and its total cost of use and again when the product begins its period of obsolescence. In these periods users have the greatest latitude in selection of products and/or maintenance vendors.
 - The period of least elasticity of maintenance price is the middle period when sales are peaking and the installed base is growing most rapidly.

2. USER PERCEPTIONS OF PRICE/PERFORMANCE ISSUES

- Users judge maintenance price/performance according to the perceived needs of their companies.
 - Users of the equipment may or may not perceive the real needs of their company.
 - Distortions of real company needs occur at the operating level in data processing due to pressures similar to those felt by maintenance vendors.
- Ironically, users equate good maintenance performance not with how often they see the field service engineers, but with how seldom they see them.
 - The intangible benefit of uptime is perceived by the user as performance within the context of after-market support.
 - The tangible benefits of response time and repair time are quite important to the user but are less important than uptime.
 - Users do not perceive uptime in terms of how quickly service is restored when the system goes down as much as they perceive it as how infrequently they are interrupted.
 - The better the performance of their maintenance contract, the less conscious the users will be of its existence.
- Users do not naturally differentiate between the reliability of the product and the reliability of the maintenance organization, especially if one vendor supplies both the product and the service.

- When service becomes necessary, users tend to equate vendor performance with the user's ability to influence or control the maintenance organization.
 - The maintenance vendor who projects the image of total subordination to the user's immediate needs is perceived as the top performer.
 - Conversely, the service organization that takes charge and pushes the user aside is perceived as the lesser performer, even if the equipment is restored sooner as a result.
 - The important point here is in the word "perceived." There is no practical way to demonstrate to the user that one method is actually superior to the other in reducing repair time.
- Users do not perceive vendor productivity improvements as benefits in the price/performance equation, for example:
 - Remote diagnostics and support centers have not been successfully sold to the users as performance benefits.
 - A change from dedicated field service engineer assignments to multiple assignments is perceived as a vendor benefit without a corresponding reduction in price. It is not seen as a performance benefit to the user.
- Users desire on-site maintenance for all equipment and consider it superior to a substitute such as walk-in or mail-in repair centers.

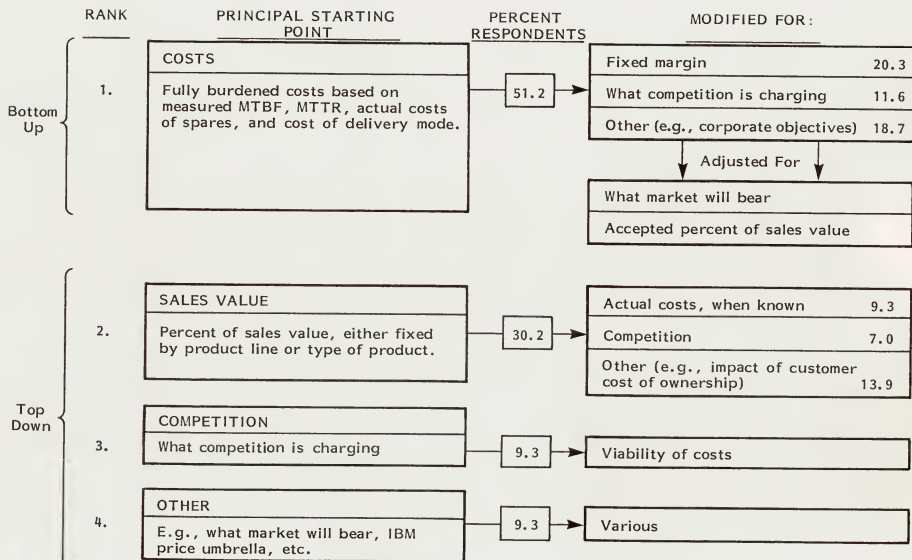
3. TOP-DOWN VERSUS BOTTOM-UP PRICING

- In pricing, the top-down versus bottom-up approach refers more to the marketing versus cost approach than to top management versus operating management.

- Half the vendors approach the pricing problem from the cost (bottom) perspective, as shown in Exhibit III-1.
 - The initial model is tested with profit objectives, competition, and reasonableness tests by the ratio of maintenance price to purchase price.
 - Most vendors using this model limit the cost analysis to the first 18 months to two years of a product's life.
- The top-down approach starts with a marketing strategy for product sales and support, also shown in Exhibit III-1.
 - According to a recent INPUT survey, 30% of the vendors reported that the premise for their maintenance pricing model is a simple, pre-established percentage of product list price.
 - Another 20% of the vendors look directly at competition or the dominant vendor within their sphere of influence.
 - The vendors are evenly split on methods to modify their original pricing assumptions between adjustments for costs and adjustments for additional market considerations.
- The major advantage of top-down modeling is that the competitive strategy for a new product is addressed in the beginning. The major disadvantage is that field service will operate at a loss early in the product life cycle.
- The two major advantages of bottom-up modeling are that support costs are clearly identified in advance and that field service profits are usually assured in the first year of product introduction. The major disadvantage is that the pricing problem tends to be an internal issue rather than a total marketing strategic issue.

EXHIBIT III-1

FIELD SERVICE PRICING METHODOLOGY

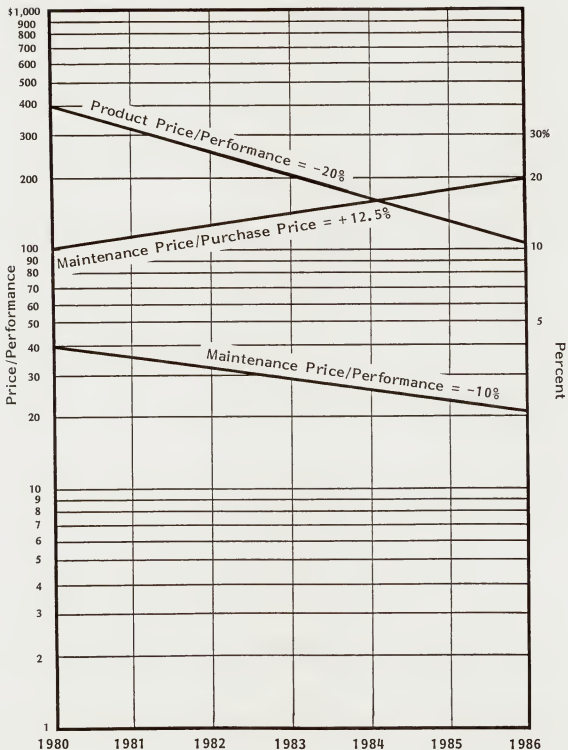


4. PRICING STRATEGY

- Strategic pricing, as opposed to tactical pricing, allows management to enjoy the advantages of both market analysis pricing and cost analysis pricing.
 - The disadvantages of the tactical methods of pricing can be compensated for if not overcome completely.
 - A well-designed pricing strategy provides sound guidelines for tactical adjustments as later needs dictate.
- Pricing strategy in field service must address the two major strategic fronts:
 - Remaining life of current products and projected life of new products.
 - Company and departmental strategic planning periods, typically five years.
- A conceptual look at a fundamental pricing problem is provided in Exhibit III-2.
 - Exhibit III-2 is presented on a log/linear scale for two reasons:
 - The compound percentage curves become straight lines.
 - Ranges from tens through hundreds may be displayed together with hundreds through thousands for relative effects.
 - In the conceptual example, product price performance improves at a 20% rate annually from a 1980 base of \$400,000 per million units of performance to \$105,000 in 1986.

EXHIBIT III-2

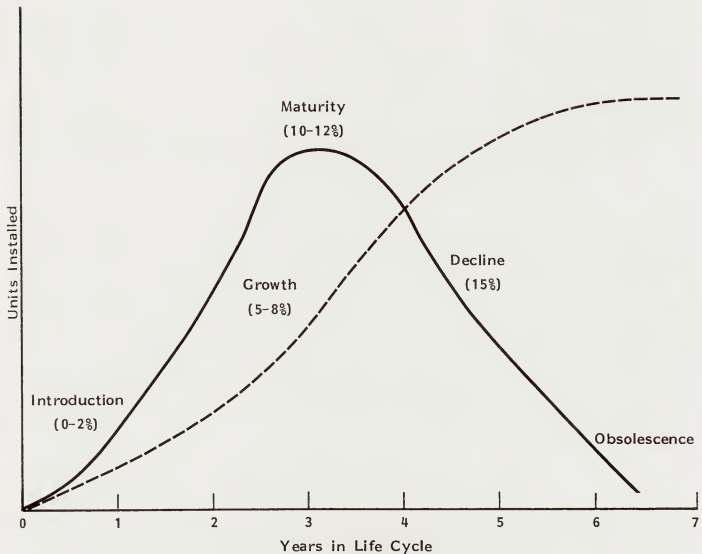
EFFECT OF PRICE PERFORMANCE IMPROVEMENTS
AND MAINTENANCE/PRODUCT PRICE RATIO



- A corresponding 10% annual improvement in maintenance price per million units or product performance would reduce annual maintenance charges of \$40,000 per million units to \$21,000 by 1986.
- The ratio of maintenance price to product price grows from 10% in 1980 to 20% in 1986 as a result of the relative changes.
- A pricing communication strategy can be derived from the preceding example, and that is to communicate the improvement in maintenance price/performance over a series of products drawing attention away from the ratio of maintenance price to product price.
- A conceptual example of a price increase strategy for the service of a specific product is presented in Exhibit III-3.
 - In harmony with the product marketing strategy, maintenance price increases are held to a minimum in the first year or two of the product life.
 - This is one of the two periods of greatest elasticity.
 - Price increases with a relatively small installed base are not significantly multiplied to offset negative effects on sales efforts.
 - During stage two the product has credibility and can tolerate small increases in maintenance prices of 5% to 8%.
 - In stage three the product sales will peak and the installed base will be growing at its fastest rate.
 - This is the period of least elasticity.

EXHIBIT III-3

STRATEGIC MAINTENANCE PRICE INCREASES



— = Products Sold
- - - = Products Installed
(%) Percent Price Increase

- Price increases of 10% to 12% will increase total revenue significantly because of the large installed base.
 - Profits during this period are also greater because of cost improvements.
 - This is the period that maximum profits should be generated to recapture invested expenses in the product startup phase and to underwrite support of newer products.
- In phase four product sales will decline as the product approaches obsolescence, and the product will experience greater maintenance price elasticity.
 - It will be consistent with most marketing strategies to raise prices of maintenance during phase four in order to help push replacement products.
 - Those users who remain with the older product will provide even greater profits to field service as the product moves through functional obsolescence.
- Combining a maintenance price performance improvement for a series of new products with strategic price increases during the life of individual products is consistent with overall objectives.
 - Planned product life cycle increases are consistent with product marketing strategy.
 - While the price increase strategy reverses the changes in product maintenance costs, greater profits are realized in the strategic sense, i.e., the long run.

- Lowering maintenance price per unit of product performance in new products is consistent with lower costs of providing maintenance and with the marketing tactic of discouraging purchases of older products once their replacements are announced.
- Tactical maintenance pricing policies attempt to recapture all support costs within one or two years. Strategic pricing, on the other hand, examines total costs of support over the product life cycle and recaptures them in harmony with the overall product marketing and support plan.

D. COST CONTROL MEASURES

I. PRODUCTIVITY TOOLS

- Productivity in field service has been a key issue for several years. Initially it was because of the scarcity of qualified personnel and more recently because of the trade-offs of capital investment for savings in relatively expensive labor.
- The nature of the information processing equipment maintenance business provides more than one aspect of the problem of productivity.
 - Use of idle time to increase total production is an obvious approach within an industry that has historically accepted personnel utilization of 50% to 75% as normal.
 - As idle time becomes productive time, improvements in data collection and other field administrative burdens will be necessary.
 - The concentration of specialist level experience in various devices provides yet another point of attack.

- Untapped resources of collective experience diminish the effects of a company learning curve.
- Greater expenditures in diagnostic tools and test equipment may be justified upon examination of the trade-offs for today's labor costs.
- There are potential trade-offs from using repair centers for the various levels of field repair, such as:
 - . Component.
 - . Circuit board.
 - . Mechanical assembly.
 - . Module.
 - . Device.
- The first point of attack in field service personnel productivity must be the utilization of field personnel. Productivity will not be gained by improving support to field service engineers if it just creates additional idle time.
 - Classical queuing theory applied to the territory remedial maintenance model reveals considerable opportunity for increasing the productivity of field service engineers, as shown in Exhibit III-4.
 - The principle of increased efficiency using parallel service points is easily demonstrated using simple assumptions.
 - The conceptual model in Exhibit III-4 illustrates a possible utilization improvement from 39.3% to 64.7% given that the major objective in

EXHIBIT III-4

EFFECT OF MULTIPLE FIELD ENGINEERING TERRITORY ASSIGNMENTS

UNITS PER FE	RESPONSE TIME (hours)			AVERAGE DOWNTIME (hours)			EXPECTED NUMBER OF UNITS DOWN PER FE			EXPECTED NUMBER AWAITING SERVICE PER FE			UTILIZATION ON REMEDIAL MAINTENANCE
	1 FE	2 FEs	3 FEs	1 FE	2 FEs	3 FEs	1 FE	2 FEs	3 FEs	1 FE	2 FEs	3 FEs	
30	1.7	0.7	0.5	3.7	2.7	2.5	.6	.5	.4	.25	.07	.03	34.7%
34	2.0	0.8	0.6	4.0	2.8	2.6	.8	.6	.5	.35	.11	.05	39.3
35	2.1	0.9	0.6	4.1	2.9	2.6	.8	.6	.5	.38	.12	.06	40.5
40	2.7	1.2	0.8	4.7	3.2	2.8	1.0	.7	.6	.56	.20	.10	46.2
45	3.4	1.5	1.0	5.4	3.5	3.0	1.4	.9	.8	.83	.32	.18	52.0
50	4.4	2.0	1.3	6.4	4.0	3.3	1.9	1.2	1.0	1.21	.50	.29	57.8
55	5.9	2.8	1.9	7.9	4.8	3.9	2.5	1.5	1.2	1.80	.79	.49	63.6
56	6.3	3.0	2.0	8.3	5.0	4.0	2.7	1.6	1.3	1.95	.87	.55	64.7

Assumptions:

Average Repair Time (MTTR) = 2.0 hours

Average Travel Within Single Territory = 0.25 hour/incident

Additional Travel per Territory Merged = 10%

MTBF = 173 Working Hours, Single Shift (1 Incident per Month per Unit)

SOURCE: Computed using classical queuing theory.

territory assignments is to provide average on-site response time of two hours.

- One of the trade-offs in this model can be seen in the expected number of customers waiting for service per field engineer, for example:
 - With single territory assignments of 34 units per FE, the response time is two hours, but an average of only 0.35 customers will be awaiting service at any given time.
 - By increasing average territory sizes to 56 units using three field engineers in a multiple assignment, the response time objective of two hours is maintained at the expense of an average of 0.55 customers per FE awaiting service.
- Remote diagnostics have been introduced in several field service organizations, so far with little improvement in overall productivity.
 - Remote diagnostics have been accepted in remote areas where users are accustomed to significant delays in on-site service.
 - In cases where remote diagnostics have been substituted for traditional maintenance rather than used as an additional tool to enhance the quality of service, both users and local field engineers have resisted them.
- Support centers are more established in principle than remote diagnostics, but actual results in productivity are difficult to find.
 - Conceptually, support centers should reduce travel and repair times.
 - Maintenance vendors contacted by INPUT have yet to reveal quantitative studies of productivity improvements directly attributable to support centers.

- Automated centralized dispatch systems provide potential relief from administrative demands on field engineers during the time between unscheduled calls.
 - If the time available for scheduled maintenance reduction activities such as preventive maintenance and installations of field changes is being fully utilized, then automated dispatch systems increase field productivity.
 - Automated dispatch systems have a greater potential for increasing the productivity of management and administrative personnel than field personnel.
- Other productivity tools being introduced include:
 - Regional repair centers.
 - Higher quality test instruments such as signature analyzers and logic analyzers.
 - Portable spare parts kits.

2. PARTS HANDLING

- With spare parts inventories running from 40% to over 100% of annual field service revenues, the logistics function presents a major opportunity for cost savings.
- If one year's revenue is tied up in spare parts inventories, the carrying costs of some 35% are taking all of the profit potential from the business.

- One method of reducing gross inventories is to attack the spare parts in float, as several vendors are already doing.
 - By controlling parts repairs within the field engineering function, some vendors are able to manage spare parts logistics of maintenance separately from the material logistics of manufacturing.
 - Additional reductions in spare parts in the pipeline have been accomplished by the decentralization of repair centers.
 - One of the advantages of centralized automated dispatching has been to improve the tracking of used parts and to alert local management when defective parts are expected in the repair center.
- Queuing models based on expected demands for parts help to optimize hierarchical stocking levels in branches, districts, regions, and headquarters.
- Inventory computer models for reorder timing, economic order sizes, etc., originally designed for manufacturing, wholesalers, and retailers, have been easily modified to address the logistics problems of field service.
 - Opportunity costs are altered to reflect the total cost of being out of stock, including the field engineer's time and expenses and a quantitative expression of poor customer relations.
 - Most of the inventory models will accept target probabilities of meeting demands for inventory items.
 - No translation is required for inventory carrying costs.
- Most field service vendors have recognized the need for specialists in logistics and inventory management and have ceased the practice of filling these vital management positions with line managers who have little experience in material logistics.

3. OTHER AREAS OF COST CONTROLS

- Most vendors are predicting significant decreases in travel expenses as a percentage of the cost of a fault call.
 - The predictions are based primarily on expected returns from overhead expenditures in support centers, remote diagnostics, and better logistics support.
 - Several maintenance vendors have discontinued company car plans.
 - At least one vendor has stopped paying parking fees and tolls for field engineers supplying their own cars, a cost-cutting practice which may prove costly in personnel relations.
- Salaries and wages generally have not been considered cost-cutting targets within field service.
 - Several maintenance vendors have had to freeze salaries as part of parent company programs during the recession.
 - Field service personnel located at headquarters in a few companies have been required to join the rest of the plant in shortened work weeks, a method of sharing reduction in work force that is impractical in field locations.
- Communications expenses are expected to increase significantly during 1982, but they are expected to significantly decrease travel expenses.
- Field office space is being used more efficiently. As leases expire, the tradition of locating field service facilities with sales offices is being examined more closely.

- Increasing numbers of maintenance vendors are using zero-based budgeting methods as opposed to incremental adjustments to expenses for the prior year.

4. COST CONTROL TRENDS FOR 1983-1987

- The coming years in field service management will be characterized by an acceleration of the trend toward scientific management and operations analysis.
 - The trend toward scientific management, already established by leading-edge maintenance organizations, has been accelerated by the current economic recession.
 - Cost controls will result from optimization studies recommending increased spending in some line items to compensate for the decreases in others.
 - In order for scientific management practices to work in field service, existing managers will need to study fundamentals through specialized training that takes advantage of their management experience.
- By 1987 all field service managers will be forecasting and controlling expenses based on some form of zero-based budgeting.
- Logistics experts will continue optimising spares controls over the next five years as field personnel learn to appreciate the trade-offs of tangible costs versus out-of-stock, intangible costs.
- Field service personnel productivity will remain a key issue in cost control for the next five years. It will become obvious that productivity improvements will not reduce costs unless they result in reductions in personnel per unit serviced.

E. GENERAL MANAGEMENT ISSUES

1. FIELD SERVICE CONTRIBUTIONS TO REVENUE AND PROFIT

- The percentage of European field service organizations operating as profit centers is stabilizing at around 80%, after a rapid change from cost center control.
- Field service contributed 20-25% of equipment manufacturers' revenue during 1982, and frequently more than a third of the total company profit.
 - During the recession, while users tend to hold back on purchases of new products, the field service contribution to profit has become vital to an increasingly large number of computer manufacturers, particularly those with mature product lines.
 - Maintenance of older products becomes a more valuable commodity to users and can be priced accordingly.
 - Maintenance vendors have written off startup support costs, are well beyond the early learning costs, and can earn good profits on large installed bases of equipment that have not fully depreciated.

2. NEWER SOURCES OF REVENUE

- The topic of additional revenues has become a key issue among field service executives for several reasons:

- As mentioned above, it has become an accepted practice for field service managers to be measured and compensated on the basis of profitability.
- Increasing labor costs have forced productivity measures, creating more available time for field personnel.
- Pressures to keep maintenance prices below a certain percentage of product list price are being felt as the price/performance ratio of more reliable products continues to improve.
- The issue of alternative revenues is of such interest to field service executives that a separate report on the subject was published by INPUT as part of the 1982 Field Service Program. The reader is referred to Alternative Revenue Opportunities for Field Service, published in December 1982.

3. PERSONNEL ISSUES

- A latent personnel issue of the 1980s is the potential for labor organizations.
 - The levels of personnel growth in the 1960s and 1970s created a large number of technical personnel with critical skills who have not advanced into management and who do not identify with management concerns.
 - Cross-training for the integration of office equipment and traditional data processing equipment will be met with resistance by large groups of personnel.
 - Cost-cutting measures taken during the recession have not always been communicated properly to field personnel.

- Productivity measures coupled with increased territory assignment are taking away idle time field personnel have come to regard as their own discretionary time.
 - A general resurgence of labor organization activities can be expected after the recession to make up for recent setbacks to labor in general.
 - Field service personnel continue to see themselves as professionals exercising a great deal of independent judgment. They are beginning to perceive management, however, as failing to recognize them as professionals but instead seeing them as units of labor.
 - As field service managers become more qualified in general business, they become less qualified to communicate with field service engineers on technical issues.
- An economic issue, which also remains a personnel issue, is field transportation.
 - A traditional benefit to field engineers has been the underwriting of a family car through reasonable car plans.
 - Relatively few territory assignments allow the use of public transportation for assigned coverage.
 - Field service engineers perceive the transportation issue as a company problem, not a personal one.
 - Advanced training of personnel will continue to present management with problems.
 - Cross-training senior personnel will compound the problems associated with investing too much training in a few people.

- Problems are created by moving field personnel from an environment where they exercise independent judgement into a training environment that is regimented. The problems are compounded by the fact that field personnel are forced to live for extended periods at levels below their personal standards.
- Finally, successful field service businesses will depend on continued development and management of their most valuable asset, personnel.
 - Adjusting personnel skills to coincide with technical changes is critical and essential.
 - Management sensitivity to changing field engineer attitudes and responsible follow-up is equally important as a strategic planning parameter.

STRATEGIC PLANNING GUIDELINES
IN FIELD SERVICE
1983-1987

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- Analysis of the opportunities and problems associated with field service capabilities for CAD/CAM systems.
- Analysis of the market potential for third-party maintenance.
- 1982 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'

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