STRATEGIC MARKET PERSPECTIVE

Outsourcing Repair Services Europe

1993-1998

Customer Services Programme–Europe

JULY 1993

OUTSOURCING REPAIR SERVICES EUROPE

1993-1998

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Abstract

This report presents the results of INPUT's 1993 survey of the fourth-party maintenance market in Europe, the market for outsourced repair services by vendors of service and support.

INPUT defines the fourth-party maintenance market as nonend-user revenues that result from the maintenance or repair of computer systems hardware, although there is an increasing trend for fourth-party maintenance companies to seek "return to base" repair work directly from end-users.

Delivery modes are defined together with an appraisal of vendor attitudes to the development and growth of fourth-party maintenance.

The report discusses a number of factors influencing market dynamics, and the manner in which the market can be segmented by product type and customer type. The report includes five-year forecasts for the market in the four major countries in Europe (France, Germany, Italy and the United Kingdom), as well as for the Benelux countries (treated as one group of countries) and for the rest of Europe, including Eastern Europe, treated likewise.

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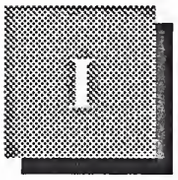

Introduction

This report has been produced by INPUT as part of its 1993 Customer Services Programme in Europe.

A

Objectives and Scope

In this report, INPUT identifies and defines the fourth-party maintenance market in Europe, a market which represents the outsourcing of equipment repair services by vendors of service and support.

The report discusses factors that are influencing the market and summarises the forces that are driving the dynamics of the market and controlling its development.

B

Methodology

The data presented in this report was researched from direct communication with third- and fourth-party service vendors supplemented by a review of press articles and other public domain information. More specific data was compiled from:

- Focused telephone and face-to-face interviews with fourth-party maintenance vendors to obtain views on market characteristics, growth factors, segmentation, delivery modes and product offerings.

C

Definitions

The terminology used in this report is explained as follows:

- FPM - fourth-party maintenance - is defined as maintenance revenue that results from non-end-user maintenance activities by companies, independent of their product sales.

- TPM- third-party - or independent maintenance, is defined as maintenance revenue that results from end-user maintenance activities by companies independent of equipment sales.

- Computer System Supplier - is a company supplying a complete ready-to-use computer system to the end-user.

  Such suppliers include:

  - Computer hardware manufacturers
  - Systems integrators
  - OEMs (Original Equipment Manufacturers)
  - Turnkey suppliers
  - VARs (Value Added Resellers)
  - Distributors/retailers

- Computer Hardware Component Manufacturer - is a company suppling components of a system's hardware such as disc drives, VDUs/monitors, and other peripherals.

- FRU - Field replaceable unit - is a sub-assembly or system component that is defined as not being serviceable/repairable on the end-user site. Functional FRU's are usually exchanged with faulty units to return the end-user's computer system to an operational condition.

D

Report Structure

The remaining chapters of this report are organised as follows:

- Chapter II is an executive overview that highlights the major findings and recommendations of the report.

- Chapter III defines and discusses the methods by which fourth-party maintenance (FPM) is delivered and contracted. It describes the context within which FPM must now seek to flourish and grow.

- Chapter IV discusses both user and vendor attitudes to the development of the fourth-party maintenance and repair markets.

- Chapter V provides the five-year forecasts for the following country markets:

  - France
  - Germany
  - Italy
  - United Kingdom
  - Benelux countries
  - The rest of Europe

- Appendix A contains the vendor questionnaire used to conduct vendor interviews.

- Appendix B contains the forecast database for each of the countries analysed.

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II

Executive Overview

A

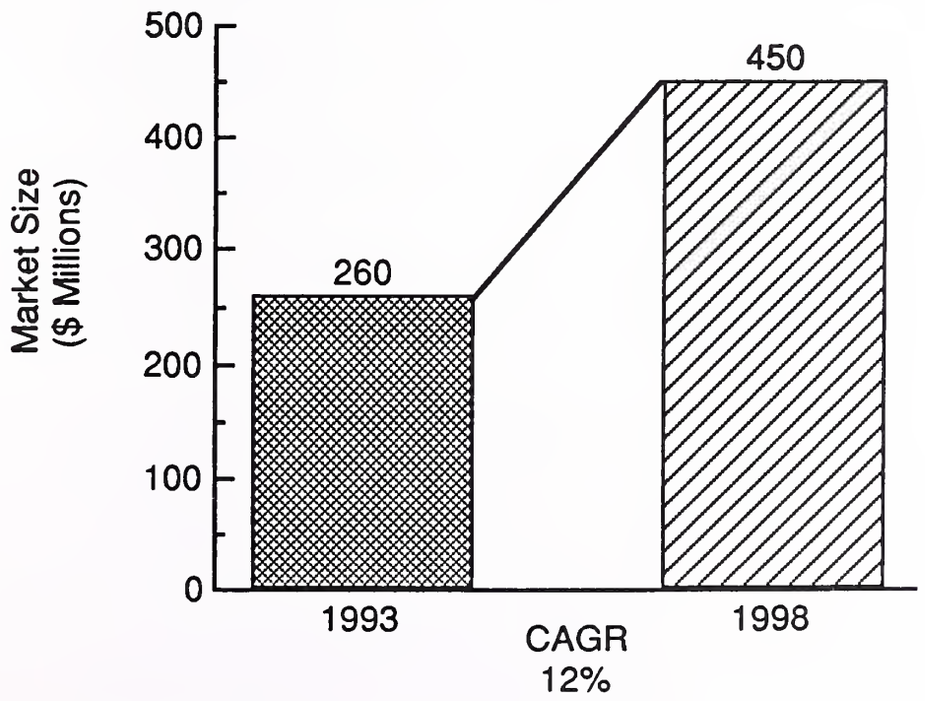
Fourth-Party Repair Services - $450M Market by 1998

As computer and communications equipment becomes less expensive and more reliable, unit repair has become increasingly less economic.

Despite these trends the fourth party maintenance market is continuing to grow at around 12% per annum (see Exhibit II-1).

EXHIBIT II-1

FPM Market Forecast—Europe, 1993-1998



Note: Numbers have been rounded.

The Fourth-Party Repair, or FPM (Fourth Party Maintenance), market is a manifestation of the continuing trend to outsource *non-core* activities to third-parties. The significance of this market is examined in this executive overview under the following headings:

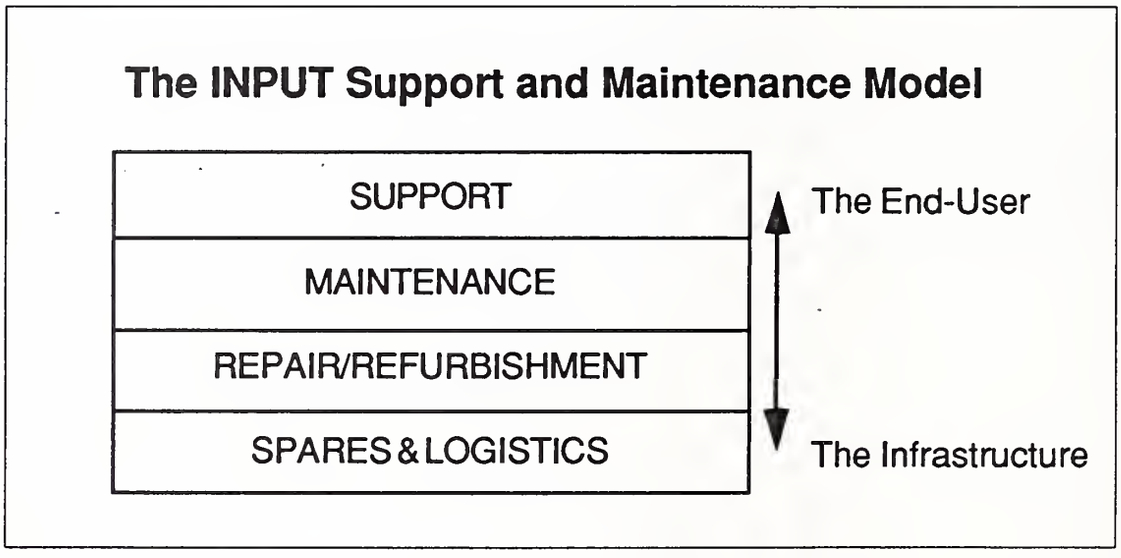
- Market position within the *Support and Maintenance Model*
- Implications for Vendors
- European Market Characteristics

B

The Support and Maintenance Model

The significance of the FPM market can be better understood by examining a simplified model of the market environment surrounding the repair process. This model is shown in Exhibit II-2.

EXHIBIT II-2



The model is constructed as four layers of service each built upon a lower layer:

- Support is provided to end-users in the first instance by some form of help-desk service and may be in-house or from an external supplier.
- Maintenance of IT hardware is normally provided through a contract, typically from a manufacturer, which is often renewable on an annual basis.
- Repair and refurbishment can be undertaken on-site (usually by a maintenance contractor) or off-site by a manufacturer, or a third- or fourth-party maintainer. This is the province of the fourth-party maintenance company or FPM supplier. These vendors can offer specialised skills in the workshop repair of faulty units returned from the field by maintenance providers or by users themselves.

- Spares and Logistics is the lowest layer providing essential parts, storage and transportation services to the repairer community. Many FPM vendors also operate on this level by stocking spares and reconditioned units for sale on the open market.

INPUT's current report focuses on the repair layer and describes and measures the actual and potential markets for services at this level. It does not include any expenditures on spares and logistics, as these are essentially a cost to the repair process. Nor does it include any revenues gained by the FPM vendors from the computer-users themselves.

The model suggests that, as the cost of replacing units tends to become less than the cost of repairing them, the central two layers become squeezed. Support tends to interface directly with Spares & Logistics, as is already happening with Desktop Services.

The key challenge to maintenance companies is to determine how much of their repair work they should appropriate for the FPM sector, and how much they should retain as a key core competence. This is the classic *outsourcing* challenge. Organisations have to decide what their core competences are and, subsequently, engineer their business appropriately.

Some vendors will wish to migrate the focus of their maintenance activities up towards the end-user and develop services in the help desk and desktop services areas.

Other vendors will wish to remain as operators in the repair and maintenance sectors relying on the fast-changing technological environment to present them with a series of short-term opportunities, as the complexities of open-networked systems continue to grow.

Many FPM vendors will find their main activity centering increasingly on a combination of repair and replacement/exchange services.

A key to success will be the development of a marketing management competence. The objectives of this marketing resource must be to:

- Establish the core competences of the company.

- Identify the groups of customers who could supply the volume of orders sufficient to allow economies of scale and, consequently, satisfactory profit margins.

- Continue to identify the new market trends, which will drive you to develop new competences, in time to bring new repair services on-stream, as older sectors dry up.

Marketing and sales will also have a big part to play in the establishment of the partnerships and long-term relationships that will allow the exploitation of core competences, while partners exploit theirs.

C

Implications for Vendors

Different types of supplier to the IT marketplace will have either a primary activity or a secondary interest in the fourth-party maintenance market - which INPUT defines as the open market non-user repair sector.

Hardware and component manufacturers, independent maintenance vendors, also known as third-party maintainers or TPMs, value-added resellers (VARs), distributors and other suppliers in the distribution chain are all potential interested parties.

In the economic climate of the 1990s, companies of all types are being forced to re-examine the markets they are in with the hopes of determining their key competences. Areas that are not of strategic value or do not fit with their chosen mix of activities are being put up for sale. Functions requiring investments that would be better devoted to building the core business are being outsourced to specialist suppliers.

In the repair sector, either or both of these solutions may be appropriate depending on the chosen strategic mix. Vendors must determine for themselves what their involvement should be. INPUT's model of the support and maintenance sector helps vendors to position themselves strategically and to judge their next moves:

- Manufacturers will aim to reduce inventory and repair shop headcount associated with low volume products.

- Third-party maintenance vendors will need to decide the relevance their repair activities alongside the need to satisfy the growing user demand for more support of their end-users at the desktop level.

- Companies in the business of adding value along the distribution chain for products and systems should be aiming to understand the growing need for support. They are more likely in the first instance to view repair in a manner traditional to their individual businesses:

  - The servicing of their dealer chains will be the number one priority for large distributors.

  - Software companies have an increasing opportunity to act, perhaps only in the short-term, as resellers of support and maintenance contracts.

  - TPMs see it as synergistic with their maintenance business aims.

Exhibit II-3 shows the percentage market shares today (1993) and in five years (1998) of the different purchasers of FPM services:

- The manufacturers are predicted to be the fastest growing users.
- TPMs and suppliers in the distribution chain will have growth rates that are only half those of the equipment manufacturers.
- The market, as defined by INPUT, excludes FPM services purchased directly from the end-users. But these are forecast by INPUT to have no growth anyway because the users will be better served by suppliers offering traditional maintenance and support or through the fast-growing desktop services vendors.

EXHIBIT II-3

Fourth-Party Maintenance, Europe
Revenue Sources by Customer Type, 1993-1998

	Market Size ($ Millions)		
Type of Customer	1993	1998	CAGR 1993-1998 (Percent)
Manufacturers	90	200	18
TPMs	100	145	8
VARs/Distributors and Others	70	105	9
End-Users	55	55	0
TOTAL	**315**	**500**	**35**

Source: INPUT
Note: Numbers have been rounded.

The challenge to the major suppliers of maintenance and support services is to fully understand the current and future forces impinging on their business. Vendors need to get answers to the following questions:

- Should they back-off more repair and refurbishment to fourth-parties?
- Should they themselves retain a foothold (or even a toe-hold) in what is basically a sub-contract market niche?

- How do they choose FPM suppliers who are going to be able to survive in an increasingly competitive market?

D

European Market Characteristics

Two key characteristics of the European FPM market are the growing importance of the PCB sector and the importance of the U.K. as a geographic market. These two areas are discussed below.

1. PCB Repair Specialists will Retain the Largest Market Share

INPUT segments the FPM market into two sectors by type of product repaired:

- The Hard disk drive repair sector
- The PCB and all Other device repair sector, including PCs and printers

The Fourth-Party Maintenance disk repair sector has been overtaken by the PCB and Other devices repair sector. This has been caused by:

- The proliferation of new products entering the end-user and open systems networking market. This has been boosted considerably by the advent of a whole range of desktop-printing units based on different technologies - ink jet, bubble jet, laser, etc.
- The consolidation of the disk drive sector on fewer suppliers, all with a global reach, has been a major factor.
- There has been a retention of profitable in-house disk drive repair capability on the part of a few, very large system vendors that own large market shares of the installed base.

Nevertheless both sectors are expected to share in double-figure growth as shown on Exhibit II-4, with the PCB and Other sector retaining and even extending its lead.

The two sectors are more closely coupled than they were five years ago, with more vendors sharing in both sectors. Disk drive repairers will derive more revenues from other FPMs, rather than from the maintenance companies because the nature of their specialisation dictates that there are fewer of them.

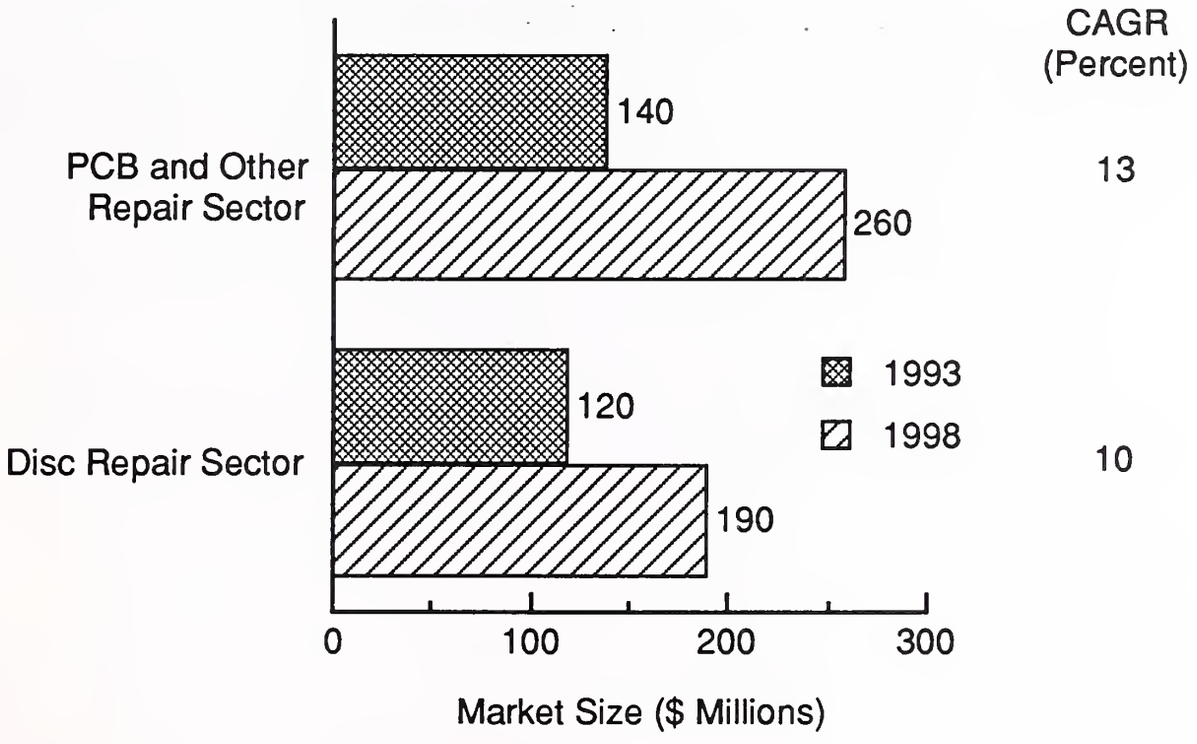
Key recommendations for all types of vendor are:

- Decide which product specialisations (or none) you will continue to include in your catalogue.
- Establish effective channels for secondsourcing of the product ranges which you do not wish to repair, but which you believe are likely to be frequently included in the configurations you will be choosing to repair.
- Study INPUT's market forecasts in order to position your current and future offerings in the most propitious sectors for growth.

FPM vendors, who are only now thinking of setting up dedicated sales and marketing forces, are further recommended to embrace this activity in a truly professional manner and not to shrink from seeking external consultancy support if serious doubts are held about their own in-house strengths.

EXHIBIT II-4

European Market Forecast by Market Segment 1993-1998



Note: Numbers have been rounded.

2. The U.K. Market will Continue to Lead Europe

The U.K. lead in the FPM market is clearly illustrated in Exhibit II-5. This lead is forecast by INPUT to be retained in spite of the U.K. growth rate being only in single figures, whereas the other European markets will have double digit annual growth rates.

Since the U.K. is also exhibiting competitive pressures caused by too many suppliers chasing too few orders, it will be necessary for more vendors currently operating only in the U.K. to expand their activities overseas.

The market forecast by country contained in Exhibit II-4 shows where the next growth markets will be:

- Germany will exhibit the fastest growth for the next five years, as recessionary pressures cause users to shelve their spending plans and squeeze a longer working life from their IT systems. This will have the effect of accelerating the development of German-owned repair companies.

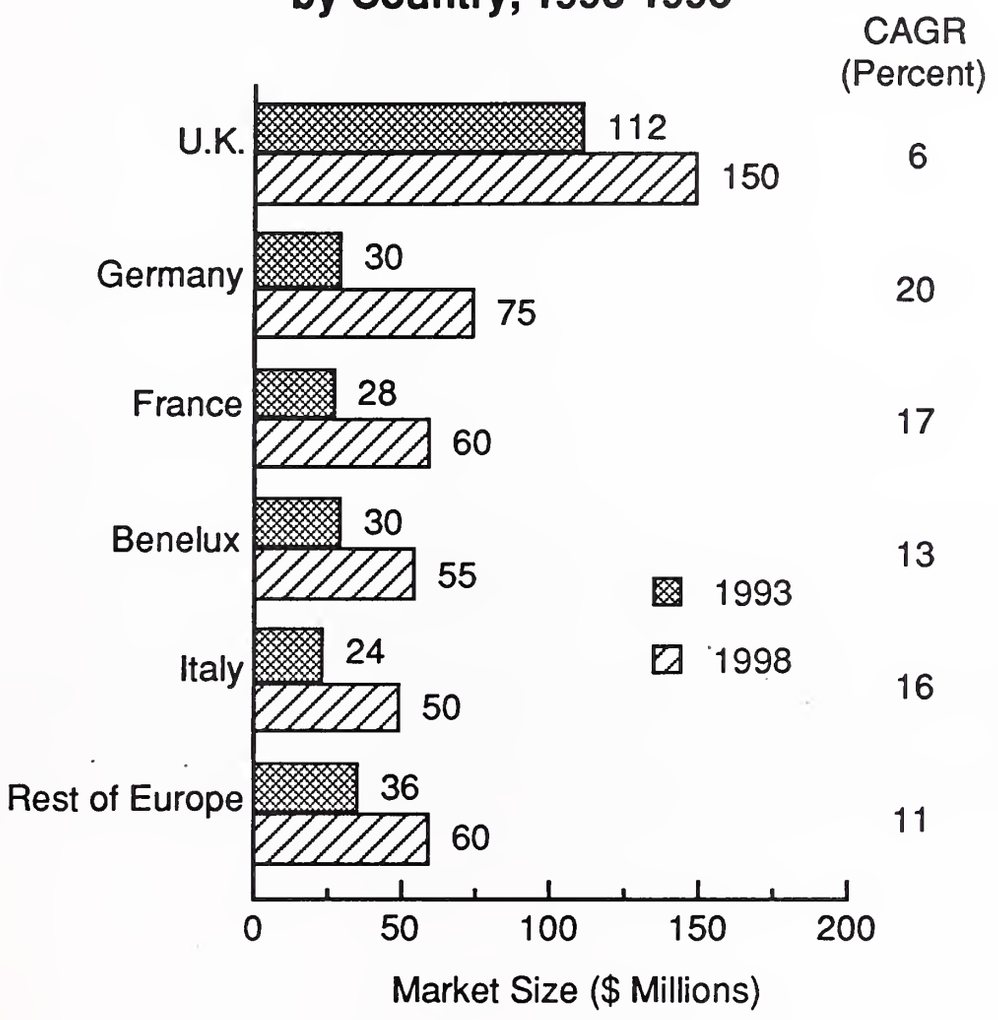
- France has its economy closely linked to that of Germany. For this reason, although it has been in recession for a longer time than its neighbour across the Rhine, it will come out of recession at an even slower pace than the U.K. has. The effect this will have on IT spending plans will again boost the repair and maintenance markets.

- Italy, a country populated with many small local firms, has had a more highly developed FPM sector relative to its GDP than its larger neighbours to the north. It is expected to continue to increase the FPM market over the next five years, but this market will be more localised than those of France and Germany. This is forecast by INPUT to make it less accessible to market penetration from overseas companies seeking market entry.

The Benelux countries will continue to offer good communications and logistics opportunities, especially for non-European repair and spare-parts specialists seeking a base in the Europe of the single market.

EXHIBIT II-5

European Fourth-Party Maintenance Market by Country, 1993-1998



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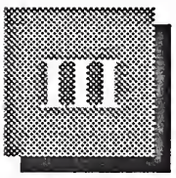


Market Definition and Delivery Modes

A

Market Definition

The evolution and growth of fourth-party maintenance (FPM) during the 1980s has largely followed in the footsteps of third-party or independent maintenance (TPM), a market which preceded it but has many differences.

Independent maintenance as a separate market was triggered by entrepreneurs who identified the opportunity presented by the large gross profit margins being earned by proprietary system vendors. FPM, on the other hand, grew up in response to the increasing complexity of a repair market which included many different types and makes of equipment. This market was created by the fast growth of personal computers and networking during the 1980s. Complexity generates specialisation and the FPM market is one for specialists.

FPM has now created a separate market and environment characterised by:

- Specialist national and local repair companies
- Multinational spares and logistics support
- A wide range of service products differentiated in a handful of ways
- A limited potential for growth and further development

INPUT defines the FPM market as non-user revenues that result from the maintenance, repair and refurbishment of computer, networking- and office systems-related hardware and hardware components. Due to the diverse nature of some FPM vendor activities, direct repair and maintenance services offered to user and end-user organisations do also occur. INPUT's definitions include these portions of the market in the independent sector of the multi-vendor maintenance market, and not in the FPM sector. However, for the sake of completeness they are included in the forecast database contained in Appendix B.

The primary activities engaged in by FPM companies are listed in below:

- Repair
- Refurbishment
- Re-manufacture
- Resale

"Repair" is defined as bringing an unserviceable system component, assembly or field replaceable unit (FRU) back to a reliable working state.

"Refurbishment" takes a worn unit and brings it to an "as-new" working condition.

"Re-manufacture" is refurbishment as applied to whole machines and involves the replacement of all worn parts by new parts so as to create a unit which, in all respects, looks and acts like new.

Resale is the selling of Repaired, Refurbished or Re-manufactured units on the open market to system vendors, TPMs or directly to users.

Any units finding their way onto the open market as a result of any of these activities will earn some revenue for the FPM vendor. Such revenues are defined by INPUT as part of the hardware, hardware spares or second-user markets and not as part of the FPM market. They are not included in the forecast database contained in Appendix B.

Exhibit III-1 illustrates the positioning of FPM companies with respect to their primary market - the system vendor and TPM companies. These organisations retain stocks of serviceable field replaceable units (FRU) on inventory to provide for the needs of their hardware maintenance contracts with end-users. When hardware failure occurs, an unserviceable FRU is removed from the end-user machine and becomes the property of the system vendor/TPM maintenance organisation. A replacement serviceable unit is installed in the user's system and becomes the property of the end-user.

Many FRUs are not economically repairable in the hardware vendor and TPM environments, and these units are batched together and despatched to a FPM company. Here, repairs are effected in a given turnaround period, normally at a fixed price, and are returned to the system vendor/TPM company. At this point, FRUs re-enter the inventory as serviceable stock with the appropriate valuation being placed upon them.

FPM companies may also purchase spare parts or work units on the open market. Spare parts are essential to effective repair of complete or sub-assemblies, in cases where it is cheaper to buy a component than to repair it. Worn units acquired through repair or via the open market may be refurbished and used as FPM inventory or sold on the open market to users or to other vendors.

EXHIBIT III-1

Fourth-Party Maintenance Company Market Position Relative to Manufacturing and TPM Companies

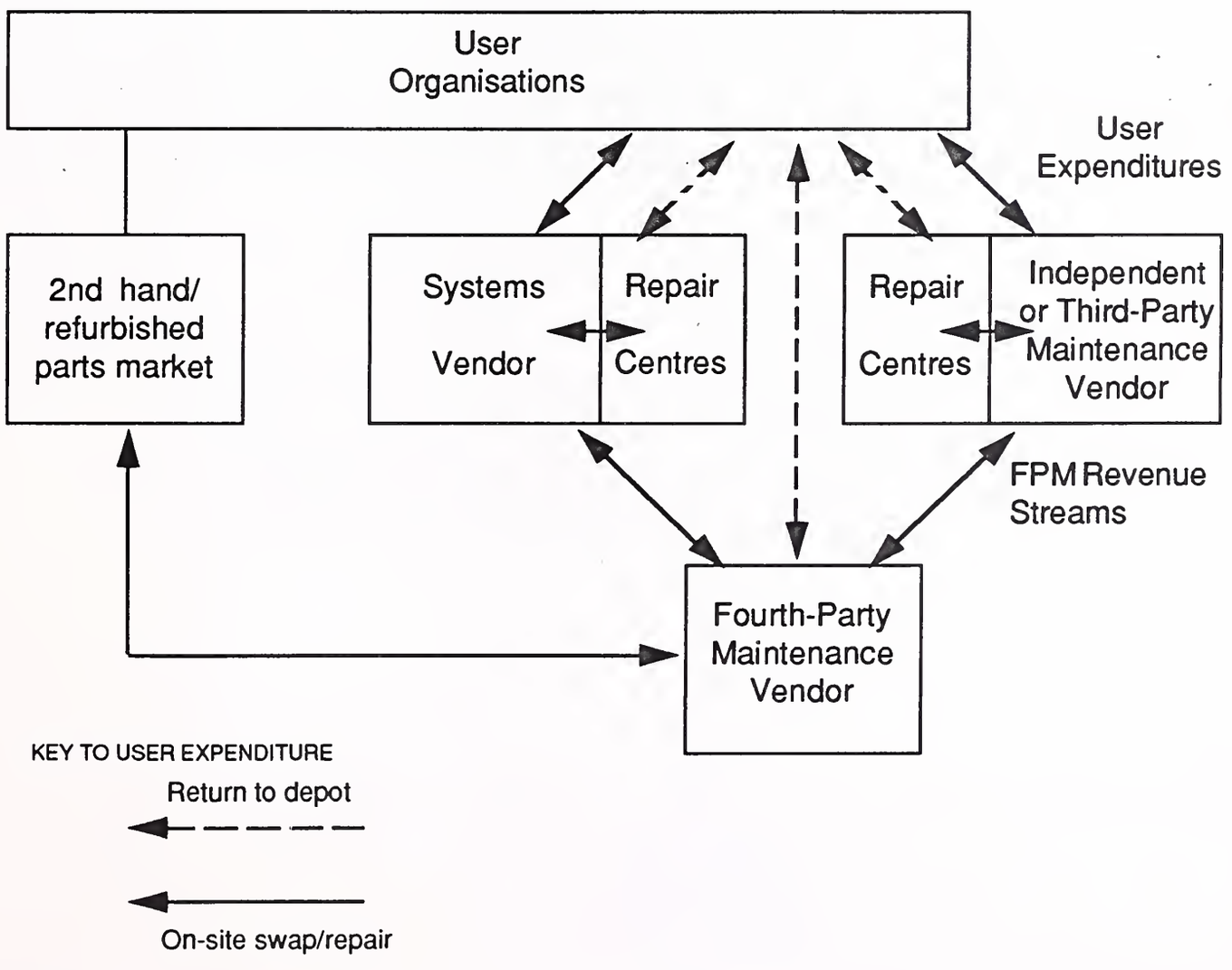
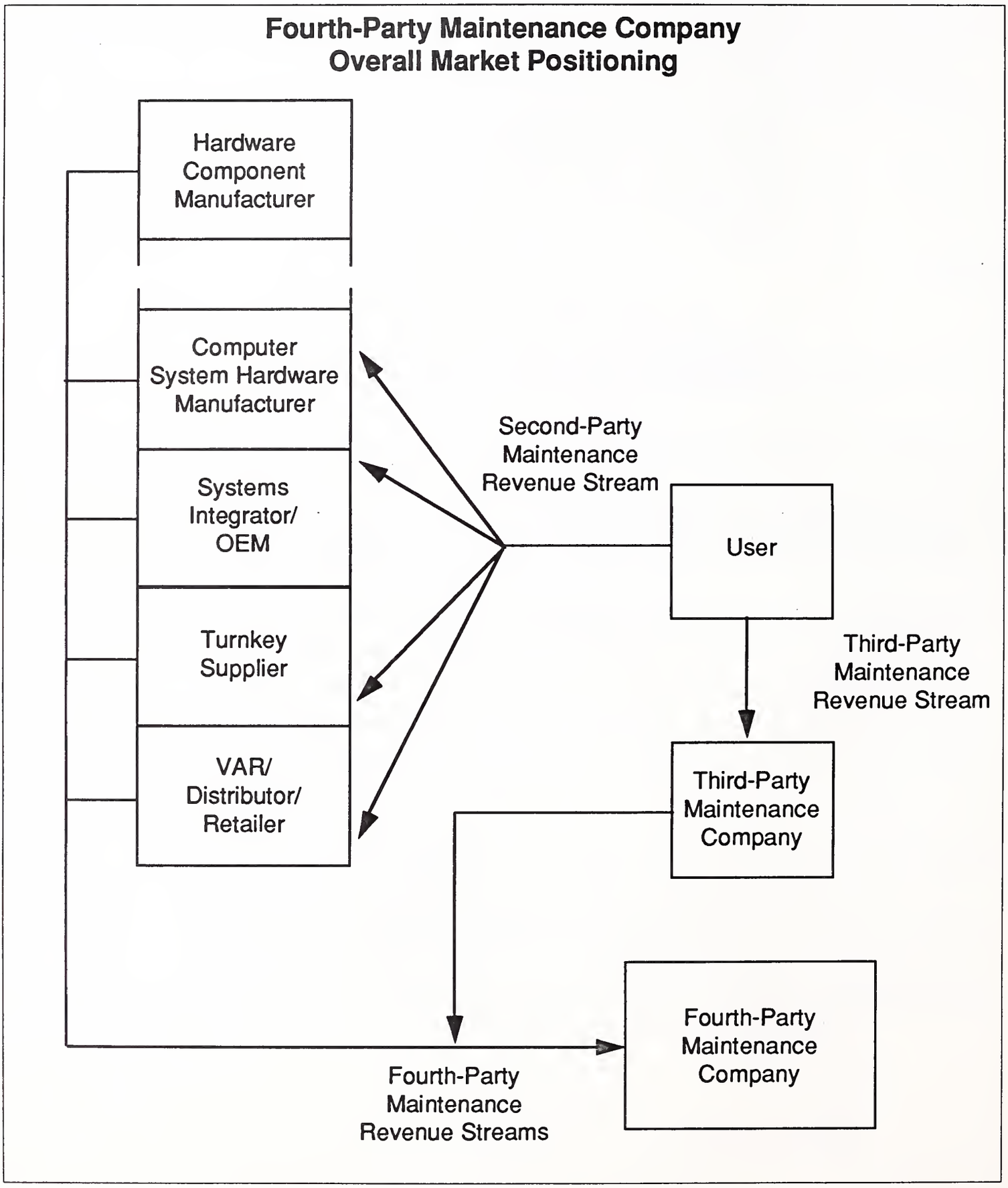


Exhibit III-2 illustrates the market positioning in the general context, with the manufacturing and distribution channels added.

EXHIBIT III-2



Frequently the system component manufacturer, being owned and based outside Europe, has no repair facility in the host country in Europe. New system components used in equipment supplied by the system manufacturers and suppliers are subsequently sold to the end-user through either direct or distribution channels.

It is quite usual for a VAR/retailer/distributor to provide a hardware maintenance service, and hence, to have an inventory holding of their own. The flow of repairable units to the FPM will either be directly from the distribution channel or via a hardware manufacturer or supplier. The system component manufacturer may receive repairable units from anywhere along the manufacturing and distribution chain and occasionally from the TPM.

Although not included within the definition of the fourth-party maintenance market, many FPM companies are now obtaining incremental revenue directly from users. Often, this source of revenue originates from users involved in "self maintenance", or those who do not perceive any benefit in contracting their service to the manufacturers or to TPM companies. This element of the user market is expected:

- In the short-term to grow as more units are repaired on an on-demand basis
- Over the five-year forecast period of this report to be virtually static, as market forces driving the outsourcing and desktop services sectors encourage the growth of vendor activities in the support sector (see Exhibit II-1), to the detriment of companies in the repair sector

Exhibit III-3 lists the revenue sources for FPM companies.
Although in the past they did not recognise the different revenue streams, many FPM respondents were able to provide figures differentiating between hardware manufacturers, system integrators, VARS and independent maintainers. Data complied for this report covers those three types of companies but does not distinguish between component manufacturers and hardware system manufacturers, nor between system integrators, turnkey supplies, retailers, distributors and VARs. This second group is aggregated under the heading of the VARs/Distributors & Others segment.

EXHIBIT III-3

Fourth-Party Maintenance Primary Business Sources

- Hardware Component manufacturers
- Computer hardware manufacturers
- Systems integrators/OEMs
- Turnkey suppliers
- VARs, retailers and distributors
- Independent maintenance companies
- Other FPM companies
- Users

Listed below are the types of market positioning adopted by FPM companies.

- Manufacturer-dedicated
- Partially manufacturer-dedicated
- Non manufacturer-related
- Reseller.

Manufacturer-dedicated companies wholly dedicate their resources to the services of hardware and system component manufacturers; any work undertaken on other types of clients is only with the agreement of the manufacturer. Very few vendors are operating today in this completely dedicated way, although many smaller FPM have highly focussed skills. For example, European Computer Services (U.K.) of Wolverhampton, Staffordshire, is operating in the Digital Equipment and compatibles sector.

Partially manufacturer-dedicated FPM companies will act as the authorised repair and refurbishment centres on behalf of certain selected manufacturer companies, but they will also compete against other manufacturer companies. Applied Digital Devices (ADD) of Hatfield, Hertfordshire in the U.K. has a highly publicised contract with ICL, but for the repair of non ICL printers. This is a key example of the trend, which is created by present economic conditions, for companies to form partnerships or to outsource for the supply of non-core competences.

Eyedot Europe is another example of a partially tied FPM supplier with a large proportion of its revenues coming from repair of Concurrent equipment.

Non manufacturer-related FPM companies will repair products from any manufacturer whose products they have expertise in servicing. Such companies are not officially authorised or recognised by the manufacturers and are often in competition with the manufacturing companies and their authorised agents. This class of vendors form the majority of the supplier base active in the sector.

The last type of FPM, the reseller, is a company that sells a wide variety of products from other FPM companies in some ways acting as an agent or broker. Repair activity, although present, is relatively low. Generally, reselling will include consumable products, for instance, filters and certain types of media. Increasingly, the smaller and less viable FPM vendors are supplementing their slow-growing repair revenues by this type of brokerage work. Hulcote Electronics and Meltek both perceive better growth prospects in this segment, which lies outside the scope of the current report.

In practice, the nature of FPM means that, apart from a few manufacturer dedicated FPMs, many companies operate as an amalgam of one or more of the last three types.

The market has moved away from FPMs being commercially tied to individual manufacturers' equipment. Inevitably their expertise is still higher for the given type or make of equipment than their expertise on other set of devices.

Many of the smaller FPMs back off the repair of units for which they do not have the skills onto other qualified FPMs. The structure of the market is therefore a network of interlocking specialists each gaining a certain percentage of revenues from other FPMs.

B

Market Segments

A relatively large range of hardware items is included in the repair and refurbishing activities of most FPM companies. Most FPM vendors exhibit a high degree of product diversification. Repair services offerings may range from complete computer hardware systems to individual hardware subassemblies.

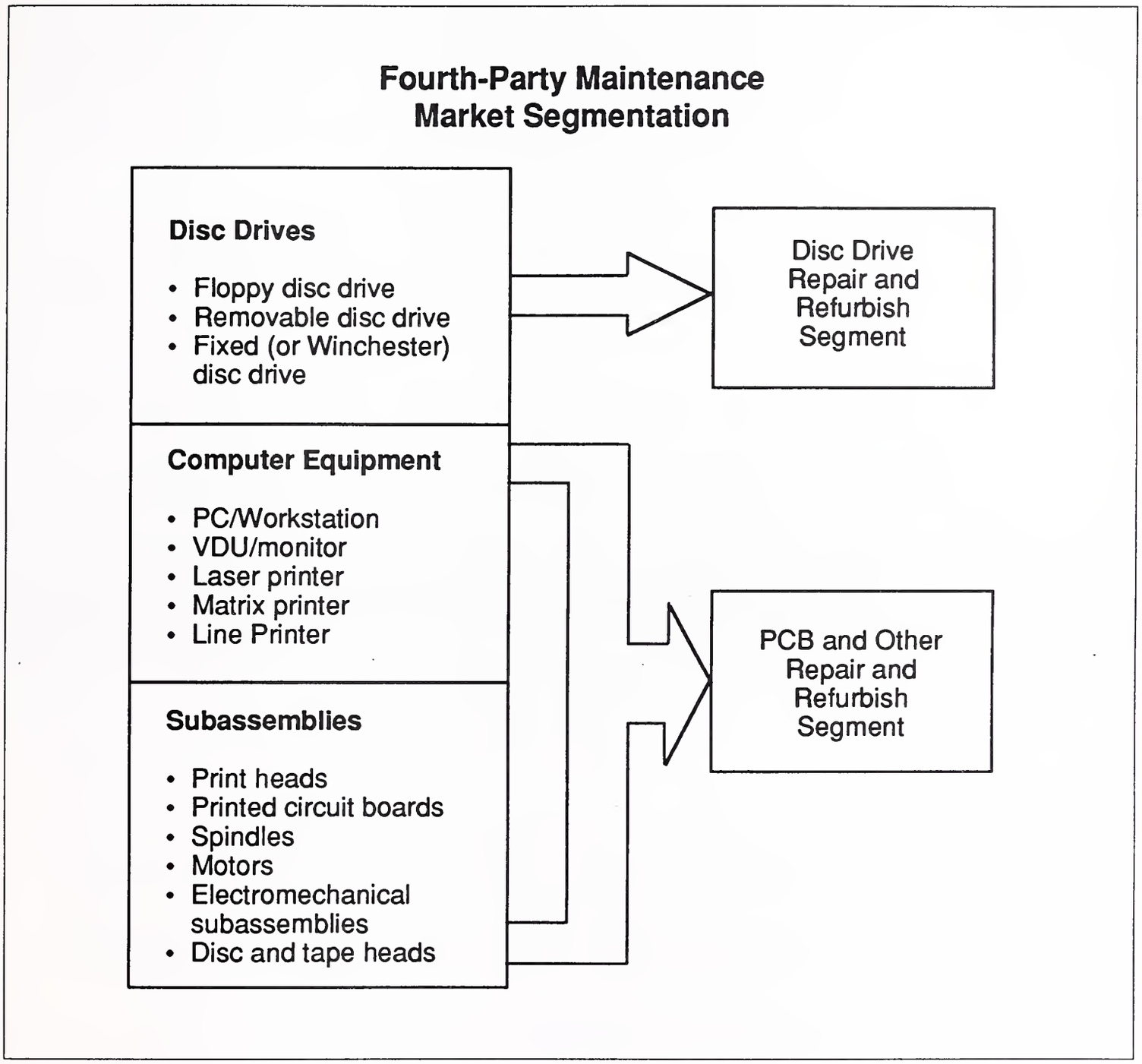
Some vendors operate in relatively narrow niche markets; for example, the repair and refurbishment of print heads or disk drives or printers are single manufacturer-dedicated. Others operate across a relatively wide range of hardware items; for example, from printed circuit boards (PCBs) and mechanical subassemblies to personal computers, printers, modems and workstations.

An example of a vendor in the first segment is Media Technology Group, whose European headquarters is in Utrecht, the Netherlands. It is a U.S.-owned company with its headquarters in Beaverton, Oregon. Media Technology specialises in Winchester disk drive repair.

An example of a company in the second segment would be Paragon Technical Services Ltd. of Aylesbury, Buckinghamshire U.K., which specialises in the repair of complete printers, PCs and portables, as well as monitors and terminals.

Due to the complexity and diverse nature of FPM activities, INPUT has derived two market segments, illustrated in Exhibit III-4. Also shown in Exhibit III-4 is a listing of the repair and refurbish activities undertaken by FPM vendors.

EXHIBIT III-4



Segmenting the market into the two sections shown in Exhibit III-5 is based on the following rationale.

- Disc drive repair and refurbishment require specialist skills, and in the case of fixed (Winchester) disc drives, relatively high levels of investment. For example, to repair the sealed module on a Winchester disc drive requires ideally a clean room certified to Class 100 and servo track writing equipment. Investment at this level can be as high as $500,000. Newbury Data Maintenance of Winsford, Cheshire in the U.K., a member of the FKI public group, is a good example of a company which has positioned itself firmly in this sector and has its roots in disk drive manufacture. Novhda is a French disk drive repair specialist based outside Paris.

- The PCB and other unit repair market segment requires a different and wider mix of skill levels, and the investment required is substantially lower. Computer Services & Engineering (CSE) of Altrincham, Cheshire is a good example of a mixed capability company based upon the repair of a range of equipment makers - Amstrad, Apricot, Compaq, Olivetti, Tandon, etc.

- FPM disk drive repair vendors indicate a tendency to polarise into one of the two segments: those fully repairing Winchester discs and those without the investment in Winchester capability. The pressure to polarise activities reduces with the less-complex disc technology. For example, investment to repair floppy disc drives is relatively low —up to $20,000 may be sufficient, and many vendors in the second segment offer this capability. An example of a company with a mixed capability, including floppy disk drive and streaming tape drive repairs, is Micro Techniques of Milton Keynes in the U.K. This company also illustrates the trend for office equipment, such as electronic typewriters and word processors to be included in the catalogues of FPMs.

C

Contractual Modes

The most commonly encountered contractual modes for FPM companies are displayed below:

- Fixed price repair per unit, inclusive of time and materials, with guaranteed turnaround time

- Exchange units at a fixed price

- Repair on a time and materials basis without guaranteed turnaround time

- Fixed income repair for a specified period

- Straight sales of refurbished parts/units

Fixed price repair and exchange units were cited by vendors as being the most common type.

Vendor sales literature normally specifies the manufacturer makes and models repaired with the terms and conditions attached. These terms state whether and under what conditions the price of repair is inclusive of parts and labour, whether carriage is included or not, and the turnaround period in elapsed working days from the receipt of the repairable unit.

Quoted turnaround periods for repair vary but are usually five or ten working days as standard or alternatively, if indeterminate, are referred to as "extended periods." Emergency repairs are undertaken at most establishments but at premium rates. The trend is for express repairs or exchange to be available both to users and to other FPMs.

Repair warranty is generally comprehensive, extending to the whole unit repaired, and includes parts and labour. The typical warranty period throughout the industry is 90 days (or more in certain circumstances). Periods of up to one year were quoted during our recent research. Extended warranty periods may sometimes be obtained by paying a premium. These above warranty conditions apply equally to exchange units.

Workshop exchange is a service offered by the larger FPMs who can hold stocks of some of the product lines which they repair.

Quantity discounts are available for given volumes of repairable items: this being subject to negotiation and not always revealed in the sales literature. The larger FPM organisations specialise in this area, as their business is geared to larger volume repair methods.

A FPM company may enter into a sophisticated subcontractual arrangement with a TPM company related to volumes of equipment on contract with a user. Here the TPM company provides stocks of FRUs for a first line swapout; repair and defective items are sent back to the FPM company. The contract is for a fixed period, and a percentage of the TPM's revenue stream services its contract with the FPM. The FBI accepts the risk of uncertain quantities of FRUs needing repair in the contract period. This type of fixed income contract is not widely utilised, but is much sought after as a 'bread and butter' revenue stream in a short-order backlog business.

It is one of INPUT's key recommendations that FPM vendors must seek and secure this type of outsourcing contract from both the independent maintenance companies and the major system vendors. The critical success factor will be the supplier's ability to establish a business case for the maintenance supplier to outsource a major part of its repair work to an external contractor. The case will have to be made at a high level within the client company and may have to include the acquisition of assets and human resources currently on the books of the target prospect.

More common are fixed income contracts based on an agreed field population and an estimate of failure rates. In this system, a FPM company will agree to repair any units which are returned to them, regardless of quantity, over a fixed period for a fixed fee. Here the FPM runs the risk of margin erosion as economic repair volumes are exceeded. Its increasing popularity is due to the increasing reliability of modern electronic devices. It is a dangerous type of contract to engage in when older types of device are involved, particularly if these are electro-mechanical units.

Further contractual arrangements provide for the maintenance of fixed levels of inventory at:

- Manufacturer
- TPM stores
- Others provide a guaranteed turnaround for inventory levels under pressure.

Discussions with smaller FPM vendors indicated that it is not unusual to state prices that include cash with order, but in most companies normal credit arrangements are available, subject to trade references, and extend to thirty days.

D

Vendor Diversification

Product diversification in the FPM marketplace is not confined to the central activity. A variety of related opportunistic activities, products and services are also provided by vendors and are listed below:

- Sales of new system components
- Media and bench mark media sales
- Second user equipment sales
- Sales of second-hand parts
- Sourcing of unique or obsolete parts
- Reselling other FPM company products
- Computer consumable and accessory sales
- Sales of specialist test equipment
- Diagnostic software programme sales
- Reverse engineering
- Data recovery facilities
- Consultancy
- Training and support of users engaged in workshop repair
- Third-party maintenance

Much of this activity falls outside the strict definition of FPM, since it is often a part of the hardware spares market or of the internal mutual support market among the community of FPMs. In the interest of completeness and in providing an overall view of the FPM environment, these extra activities are referred to in this report.

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Market Development and Growth Opportunities in Fourth-Party Maintenance

A

The Development of Fourth-Party Maintenance

The increasing number of companies operating within the FPM environment indicates a potential for relatively high growth but also heralds the imminent danger of a shakeout and radical realignment within the market. In the late 1970s and early 1980s, there was only a small number of companies operating within Europe that were mainly in the U.K. By the late 1980s there were approximately 100 companies and, currently, INPUT estimates that over three hundred companies of varying sizes are operating within Europe, over 200 of these in the U.K.

INPUT has identified a number of reasons for the past high growth of FPM:

- The diversity and complexity of devices coming onto the market
- The user demand for single-source maintenance
- The high overhead costs incurred by repair centres in major system vendor organisations.

1. Computer System Hardware Suppliers

Computer system manufacturers, OEMs and system integrators under competitive pressures produce systems that include a variety of peripherals and system components which are of nonproprietary origin. Field service departments effect repair of faulty components by exchange of field replaceable units (FRUs), for example disc drives, returning the faulty units for repair "off-site." The system supplier may not have the economic and logistical resources to handle the nonproprietary products. FPMs having skills in these market areas can offer the computer system supplier a cost-effective solution for handling this problem of repair.

One FPM user, a manufacturer company, said that he uses FPMs if they are cost-effective and have a good reputation. This represented an attractive option in a competitive market and allowed concentration on strategic products.

It is an increasingly necessary approach for systems vendors who are thinking of moving into multivendor maintenance services. A well-known customer of FPM services is ICL, the U.K. mainframe and distributed systems integrator. ICL uses among others, Applied Digital Devices (ADD) of Hatfield, Hertfordshire, U.K. to service many of its peripherals, POS and communications equipment.

One view expressed by a manufacturer-dedicated FPM vendor was that manufacturers are adopting a pragmatic attitude to external repair of even their own products—provided that the products were deemed to be nonstrategic. The economics of repairing such things as workstations and VDUs are dependent on volumes and low overheads.

Manufacturers can rely on their own repair departments, but their overheads generally reflect those of the entire manufacturing operation—unlike the FPM vendor, which has the whole focus of its activity based on the repair function alone. Meltek, the disk and tape products repair specialist, reports having 'partnership' contracts with Digital, ICL, Olivetti and Stratus among other suppliers.

Since system products require a great deal of investment to design, develop and manufacture, feedback from the field and workshop service teams is vital to enabling the designers to improve the serviceability of enhanced and future versions of the product. FPMs, which have management systems that provide this type of feedback, have an advantage in competing for a manufacturer's nonstrategic repair activity. Olivetti, the European leader in multivendor maintenance, has subcontracting arrangements with scores of FPMs and other specialists to give it the back-up it needs. ICL and IBM are both recent newcomers in the customer base for fourth-party repair services.

INPUT anticipates that many more system vendors will seek repair outsourcing arrangements with suitable FPMs—particularly those registered to ISO 9000 standard—for selected lines of equipment, as it becomes less economic for smaller volumes of older or alien products to be repaired in-house.

2. System Component Manufacturers

One FPM market opportunity identified—particularly by vendors in disc drive repair and refurbishment sector—is the system component manufacturers. These organisations are typified by a Far East or an American maker of a small hard disc drive for use by a PC manufacturer. Providing repair and refurbishment facilities from the country of manufacture, whilst sometimes done, can result in extended turnaround times, and, unless done by a very large and resourceful company, the economics of setting up a European repair operation are difficult to justify. A number of system component manufacturers take a more pragmatic view and form agreements or arrangements, giving the FPM companies of its choice Authorised Repairer status. This can include repair of warranty items. In the interest of reliability and flexibility, such a manufacturer may give this status to more than one company.

Apart from economic considerations, FPM vendors have their own perceptions as to why manufacturers may not be competitive in the repair business. This stems, they believe, from the fundamental reason for the manufacturer's existence—to design and manufacture products, with the attendant philosophy being unfriendly to a service-based approach. The FPM vendors allege that long turnaround times and a "take it or leave it" attitude reflect the belief that the quality of the product is being held in question. This was a common theme presented by the partially manufacturer-dedicated vendors in the PCB and disc repair sectors. It is becoming less common as hardware suppliers strive to embrace a service-oriented business culture.

3. Independent Maintenance Companies

Previous INPUT reports devoted to the third-party or independent maintenance market, have highlighted the competitive benefits of offering multivendor service. In that market, however, companies may be presented with opportunity contracts beyond their normal range of capacity or capability, but at the same time be unwilling to reject the opportunity outright. One solution to this situation is the possibility of sharing the contract or subcontracting part of the requirement to another TPM. This has two disadvantages—firstly, it introduces another TPM into the customer environment with the risk of an implied compromise, and secondly, the economics of subcontracting are not very favourable, as subcontracted TPMs tend to be unwilling to discount too heavily. A more effective proposition could be to provide a field service response, using spare system components and FRUs, with workshop repair of defective items being made by a FPM company—the option being exercised when the TPM's own workshop does not have the necessary resources or skills to perform the task in-house.

An interesting byproduct of this situation is that when TPM companies have speciality workshop repair skills, they also offer these services in the FPM market. In some cases, this is taken further, and a separate autonomous company is set up for this purpose whilst continuing to carry out repairs from the associated TPM company. Approximately 20% of FPMs now have an association with a TPM company in their group. Key examples of companies with this characteristic are:

- ACT Computer Support
- ATM
- Bell Atlantic
- CRC
- Granada
- ITS
- Misys
- Radius Computer Maintenance
- Thomainfor.

One FPM vendor operating with a high level of reselling activity stated that he had agreements with both manufacturer and TPM companies to supply his products directly to their customers as field service departments demanded it. This required a fast response by the FPM company but has the advantage to the manufacturer and TPM companies of reducing inventory overheads - in effect a "Just In Time" ordering system.

4. VARs, Retailers and Distributors

VARs, retailers and distributors have also continued to expand the range of services offered to their end-user customers to provide a one-stop solution to their needs. Hardware maintenance is one of these services, and the economics and logistics of doing this can be made more attractive by involving the services of a fourth-party maintenance company for the workshop-related activities, particularly for the units which have not been supplied directly by the distribution company but may form part of a network for which equipment has been supplied. Important companies in this class are the large distributors, such as:

- Computer 2000 of Munich, Germany and its national subsidiaries in most European countries

- Compunet of Kerpen, outside Cologne in Germany.

These vendors will put priority on the servicing of the needs of their own dealer chains, but are expected by INPUT to increase their revenues from workshop repairs to the open market. This activity will not be seen as competitive with the dealers.

5. User Organisations

The majority of FPM companies interviewed stated that they were pursuing and receiving an increasing level of work from users. This was due to the increased use of PCs where components, peripherals and systems could easily be returned for depot repair, even as the more sophisticated systems were still being maintained under contract by manufacturers or independent service organisations.

Occasionally, a user organisation will go onto the open FPM market as a vendor. The British Railways Board, which is about to start a long journey over the privatisation route, has launched its workshop repair facilities as a supplier of fixed-price repair services for:

- PCBs
- PCs
- Printers
- Other peripherals

It will trade as the Production Works Division and expects to make a considerable impact in its second year of trading, i.e. in 1994.

B

FPM Growth Drivers

Samples of vendor responses relating to factors contributing to and limiting growth are listed by market sector in Exhibits IV-1, IV-2, IV-3 and IV-4.

EXHIBIT IV-1

FPM Growth Drivers
Disk Repair Sector

- Numbers of disc devices coming out of warranty cause blips in revenues
- Overseas manufacturers face the cost of setting up in Europe
- TPM's have a commitment to diversity
- Manufacturer prices and turnaround are too high
- Manufacturers are expensive and too slow
- Cost cutting by manufacturers favours outsourcing
- Antipathy by customers to the hardware manufacturers
- Manufacturers can lack a service-oriented approach
- Value for money of FPMs
- Cost-effectiveness of FPM
- FPM companies are marketing at last
- Mixture of devices too broad for an independent to handle alone

EXHIBIT IV-2

FPM Growth Drivers
PCB, Peripheral, PC and Other Repair Sectors

- Advanced technology cannot be fixed easily; it is too complex for any but the specialist
- Manufacturers now use a lot of nonproprietary equipment
- Lack of manufacturer quality
- Manufacturers have a "take it or leave it" attitude
- An expensive and inflexible manufacturer
- Growth of multivendor maintenance
- Requirement for fast turnaround with quality
- FPMs keep the manufacturers' overheads down with better inventory control
- Response time of the FPM

EXHIBIT IV-3

FPM Growth Drivers
Total Market

- Recession
- Growth of independent and multivendor maintenance market
- Manufacturers contracting out warranty and using extended warranty as a competitive weapon
- TPMs are reducing workshop capacity and moving into support markets
- Increased end-user requirements as desk-top devices proliferate
- Concentration on niche markets

The European FPM market has been growing at an average 20% per annum over the last few years. The growth rate is now steadying to around half of that figure or less. The largest country market in Europe, the United Kingdom, is not expected to grow at more than 6% per annum over the next five years.

The most commonly quoted contributory factor for the growth of FPM was price and value for money. Respondents' range of prices varied widely between figures of 30% to 70% of the manufacturer's price for the equivalent repair with an average of 75% of the TPM price.

Turnaround times in FPM are somewhat analogous to response times in on-site maintenance and are a significant factor in the perceptions of FPM user satisfaction. Good turnaround times on repairs and exchanges allow FPM users to hold smaller inventories than would otherwise be the case, resulting in considerable savings. This is an important selling point of FPM, particularly in view of the fact that courier time is to be added as part of the overall unavailable time or downtime of the units being repaired.

Quality was recognised as being of prime importance. Nothing could be worse, as one respondent expressed, than for an item, having been repaired at a FPM workshop, to fail when used by a field engineer in the customer environment.

Over 20% of FPM companies already have ISO 9000/BSI 5750 certification and the majority of other FPMs are either working towards it or claim to work to the necessary standards already. This is seen as a step forward, and, although customers are not specifying registration as a prerequisite for doing business, having registration is a means of entry into places some FPMs would have had difficulty in accessing. Several respondents were of the opinion that, in two or three years, the absence of registration to these standards will rule out FPMs from certain sectors of the market. They were nevertheless worried by the cost of implementing the standard.

One respondent made the revealing observation that although he believed his repair standards would not be improved by obtaining ISO 9000 certification, he would himself only use accredited companies to repair units under subcontract if he did not have the skills for repairing them in-house. Using only accredited companies provided both his customers and himself with the necessary reassurance in case a back-off repair should not be satisfactory.

The growth of TPM, independent and now multivendor maintenance with the competitive pressures in the hardware maintenance market thus created, has been the primary reason for the growth of FPM. Many maintenance suppliers are now seeking the more cost-effective solutions for both repair and the handling of warranty which can be provided through the use of FPM companies.

Maintenance vendors need to have recourse to FPM because their multivendor activities frequently produce low volumes of complex unserviceable system components and field replaceable units that are uneconomical to repair in-house. The FPMs, by undertaking specialised volume-oriented production methods, can reduce unit repair costs to an attractive level.

The FPM's perceived view of manufacturers, obtained from their customers' feedback, is that many are insufficiently reactive to the needs of the market that is asking for value-for-money and speed of turnaround.

Another growth factor has been the relatively high proliferation of information systems typified by the PC market. This means that the traditional sources of repair/maintenance have been incapable of dealing with the large volumes of defective equipment. The PC market itself has opened up relatively good market opportunities for FPM but more in terms of volume. Recent research indicates that a very high wastage for scrapping is now being experienced in Europe for PCs and other desktop devices. These rates will have implications for the environmentally friendly disposal of scrapped units. INPUT has already identified companies who are specialising in this new growth area of scrapping and disposal.

All respondents could identify potential competitors, but the market still allows sales to be made without heavy competitive pressure. In general, this was less true in the U.K., where the FPM market is more mature than in other European countries, where fewer identifiable local FPMs operate. Competition is in general coming from the small local businesses who can compete on price due to very low overheads, but who cannot compete on diversity. One respondent stated that the larger customers will continue to go to the big FPMs, and the smaller one-off customers will go to the smaller local FPMs.

Growth in the direct market for user organisations was seen by some vendors as important with many end-users preferring to return items to a depot for repair rather than pay for field visits. An important factor in offering user service, according to one respondent, is the ability to provide a collection and delivery service, thus solving the end-users' total problem rather than just repairing their equipment. INPUT forecasts zero growth in the user organisation segment of the FPM market.

Many FPMs' sales and marketing literature is very crude reflecting the low profitability levels of this type of vendor. It often implies that it is the customer's responsibility to deliver and collect the items due for repair. This is not a good marketing stance. Insofar as it is dictated by lower levels of profitability, INPUT expects to see the FPM market undergo a period of consolidation as those vendors, who risk much in order to invest in the proper conduct of marketing and sales, start to draw ahead of their rivals in terms of growth.

C

FPM Inhibitors

The major factors inhibiting growth in the FPM marketplace are summarised in Exhibit IV-4.

The major worry in the FPM market at present must be the inhibitor to growth caused mainly by three linked factors:

- Firstly, the increased reliability of electronic products and the increased warranty being offered by manufacturers is reducing the need for repair and maintenance in general.
- As a direct result of this, replacement costs of equipment have been reduced to a level approaching the repair costs.
- Finally, the rapid changes in technology/built-in obsolescence of equipment is leading users to replace faulty equipment with the latest technology, often at a fraction of the price, rather than have it repaired.

Another factor that inhibits the development of FPM, is the nondisclosure, by manufacturers, of technical information and specifications of their products. This is more pronounced with Far Eastern manufacturers and on new, state-of-the-art products. In general this was felt likely to become less significant in the future, as products became conformant to more international standards. FPM vendors indicated that if cooperation could not be obtained, their reaction would be to "reverse engineer" the product.

Similar to the undisclosure of information is the lack of availability of small spare parts to effect repairs, particularly since many manufacturers were including custom-built components in their designs. One vendor specialising in the repair of older equipment, which the manufacturers are no longer interested in repairing, indicated that it was particularly difficult to obtain parts for these older machines from the manufacturers, and long delays in their supply were normal. This problem has now been lessened in impact by the growth of the international spare parts market in which companies such as Century Computer Marketing of Marina del Rey, California, U.S.; Euro Computer Services, based in Wolverhampton, in the U.K.; or Richardson Electronics with offices in several major countries worldwide, are active.

Another inhibitor to growth cited by many vendors was restrictive practices, which while including the aspects of non-disclosure and no supply parts, also covers generally obstructive attitudes on the part of suppliers.

From a technology point-of-view, the increased use of Surface Mount Technology is seen by some vendors as another factor which could inhibit growth. The high investment required in Surface Mount repair stations, the lack of technical documentation from manufacturers and the increased use of custom components were all seen as factors which would harm the operations of FPM companies.

EXHIBIT IV-4

FPM Growth Inhibitors

- Increased reliability of electronic products
- Extended warranty
- Reduced replacement costs vs. repair costs
- Rapid changes in technology /built-in obsolescence
- Throw away attitude of users
- Undisclosure of technical information on new products
- Lack of availability of small spare parts
- Increased use of Surface Mount Technology
- Proliferation of low-cost one-man operations
- Lack of marketing strategies

FPM companies designating themselves as manufacturer-dedicated because of working exclusively with one manufacturer do not meet the problem of lack of information. Most FPMs being partially manufacturer-dedicated, however, will most often compete with a wide range of manufacturers and liaise regularly with a few to obtain official authorised repair status. Vendors feel that, because of the increasing complexity of products, the lack of information will be an increasing problem. INPUT feels that these pressures will lead to the formation of more long-term agreements between FPMs and manufacturers.

Most vendors responded that there were an increasing number of FPM companies who were one-man operations, or who had dubious reputations. This might adversely affect the development of FPM. There was wide acceptance that for the sector to flourish quality standards need to be high and, just as important, are seen to be high.

In the late 1980s vendors were stating that, "FPM is booming now, but like TPM, there will be a shakeout as there are too many people all doing the same thing." This attitude appears to have changed and most vendors now believe that there will be no significant early shakeout in the market. INPUT considers that certain niche areas of the market, such as hard disk drive and laser printer repair, have become more competitive due to the entry of many vendors seeking the sectors where profit margins are likely to hold up longest. One respondent felt that the similarity of the types of business conducted between FPM and TPM could lead to a merging of companies with complimentary skills and that the distinction between TPM and FPM was becoming less and less, as the market moved to make off-site repair more economic than on-site repair. We have seen that this has indeed happened.

D

The International Nature of Fourth-Party Maintenance

One key to profitable business in the FPM sector lies in the ability to undertake volume repair activities economically, and this requires large markets. Some FPM vendors report high levels of business outside their own country, within Europe, further abroad into the Middle East and even as far as Australia. In particular, the disc drive repair and refurbishment market sector requires high volumes to cover its high-capital investment and tends to operate internationally. U.K. companies, in particular, continue to see Europe as a growth area and estimate that costs of repair in the U.K. are up to 30% less than in other European countries, as the U.K. exits from recession. This optimism is weakened, however, by the growing recession in Germany. INPUT estimates that growth of international business will continue, as many users under cost pressure will postpone new system purchases and be faced with obtaining longer life-times out of existing systems. This will give a short-term boost to the maintenance and repair markets.

The advent of the 1993 Single Market, which aims to foster the freer movement of goods and labour, is making transborder trade within the EC easier and more economical. The cost of transportation, for example, has reduced due to competition in the transportation sector, thereby lowering the cost of moving goods.

Broad strategies to sell in international markets fall into two categories:

- The first is a high-profile approach using the company's own name, strategically siting sales offices in the target country and employing locally recruited management and staff

- The second strategy has a lower profile and lower cost. This involves the appointment in selected countries of agencies that will effect the necessary sales and normally deal with the logistics of transportation.

Until now , the marketing of FPM services has been a low-profile activity, and many smaller vendors now see increased marketing both at home and abroad as the only way to obtain rates of growth over the next few years, similar to those of the past.

INPUT considers that the implementation of marketing and sales in FPM will be the most powerful influence determining which companies will become leading vendors in the mid- and late 1990s. U.K.-based vendors have a unique opportunity to sell from established businesses into the less mature markets in mainland Europe.

E

Diversification and Ancillary Services in the Fourth-Party Maintenance Market

Ancillary activities may be seen as an opportunity for FPM companies to maximise the use of their existing resources and match them to the needs and demands of their customers. The range of these activities covers the sales of:

- Services
- Products
- Manufacturing facilities
- Networking support

The type of services available to be marketed generally stems from the primary sources of an FPMs specialisation and can include consultancy, support and training. A range of support services is offered by most vendors:

- In the disc market services might include:
  - Data recovery from damaged discs
  - Emergency response to a disc head crash
- Technical support to TPM companies on a product of their specialisation which may take the form of:
  - Ad hoc call out
  - A retainer agreement providing a guaranteed response at a more favourable hourly rate

- Some FPM vendors offer training services covering hardware and/or software. These are often provided by repairers when they have system knowledge of a particular manufacturer's product range.

New product sales and upgrades can be a spinoff from a relationship with a manufacturer, often taking the form of distribution rights, and with sales being made through the medium of a separate company. Some independent FPM companies adopt a market position that restricts such activities, as they feel these practices prejudice their dealings with other manufacturers.

Genicom, the printer manufacturer, based in Waynesboro, Virginia U.S. has a Customer Services group that offers repair and on-site maintenance facilities through European offices in France, Germany, Italy and the U.K. Its services are available to users whether they purchased their printers through Genicom itself or not. These printers are typically of Genicom manufacture, but some third party products are also repaired. Besides supplying its own printer products, Genicom also supplies printer accessories and consumables and interface devices for linkage to local and wide-area networks. Its services activities are centred on the repair function with on-site maintenance being offered as an additional higher level of service.

The sales of second-user tested or refurbished equipment forms a significant part of many FPM companies' business, and an extension of this into brokerage services is increasingly also on offer.

A variety of software products are sold by FPMs. Repair centres use sophisticated test equipment that requires programming for a particular product. These programs are available for sale from certain FPMs although the majority of vendors purchase such items on the open market, rather than from their fellow FPMs.

F

Changes in the Structure of the Fourth-Party Maintenance Market

A factor previously noted in this report is the frequent presence of TPM companies closely associated with FPM activities and with FPM vendors. INPUT forecasts that this type of association will increase, and also that the distinction between TPM and FPM will reduce as more units are repaired on an on-demand slow response basis. This is already being borne out by the increase of activity in the end-user market by several FPM companies. Manufacturer-originated FPM activity is also expected to increase in two ways:

- Firstly, manufacturers will offer on-demand repair facilities directly to users if the economies of scale are sufficient to warrant it in specific countries. At present:

- Digital in the U.K. has already set up Digital Assisted Services as a separate enterprise to provide FPM repair services to users of all types.

- Digital Kienzle in Germany has offered a basic repair service for desk-top devices as part of its desk-top services offering.

- NCR is another manufacturer which has an offering for repairs provided directly to the user or via a dealer or independent services company.

• Secondly, in the areas of contracted out warranty manufacturers who do not have a significantly large base in the particular country where sales take place will subcontract repairs to FPMs.

The trend for structural changes in the fourth-party maintenance market, as it affects vendors in different segments, is illustrated in Exhibit IV-5.

G

The Economics of Fourth-Party Maintenance Repair Activity

Exhibit IV-6 compares diagramatically the relationship between repair cost/price versus new-price and second-user price. This is subject to variation dependent on whether the item in question has a finite life, such as a disc drive, or has a theoretical "infinite" life, such as a printed circuit board. This is a function of the amount of mechanical equipment, i.e. equipment involving the physical movement of parts in each device.

When a new product is introduced, the costs of repair start high due to start-up training, documentation and support costs and then decline steadily over a number of years. Due to the competitive nature of the IT market the cost of manufacture and sales price both decline over a period of years. This results in a new sales price which declines progressively towards the cost of repair. Due to competition between the price of repair and the price of replacement with a new unit, there is a tendency for the repair price to be in turn depressed and, therefore, repair margins are squeezed. If the new replacement price declines further, and the product becomes no longer economical to repair, then the "throw- away" option starts to be available. One factor contributing to the "throw-away" culture is the longer warranty periods being given by manufacturers, which make it more attractive to buy new rather than to repair an item, after warranty has expired. The opportunity being offered to FPMs is to obtain warranty repair contracts with manufacturers that are interested in outsourcing this function.

With nonwearable items, the second-user price has the greatest influence. When this declines, it also depresses the margin between repair cost and price. At point "A," when the second-user price equals the repair price, it no longer becomes economical for FPMs to repair, and they can usefully start to develop second-user sales themselves.

EXHIBIT IV-5

Changes in the Fourth-Party Maintenance Market

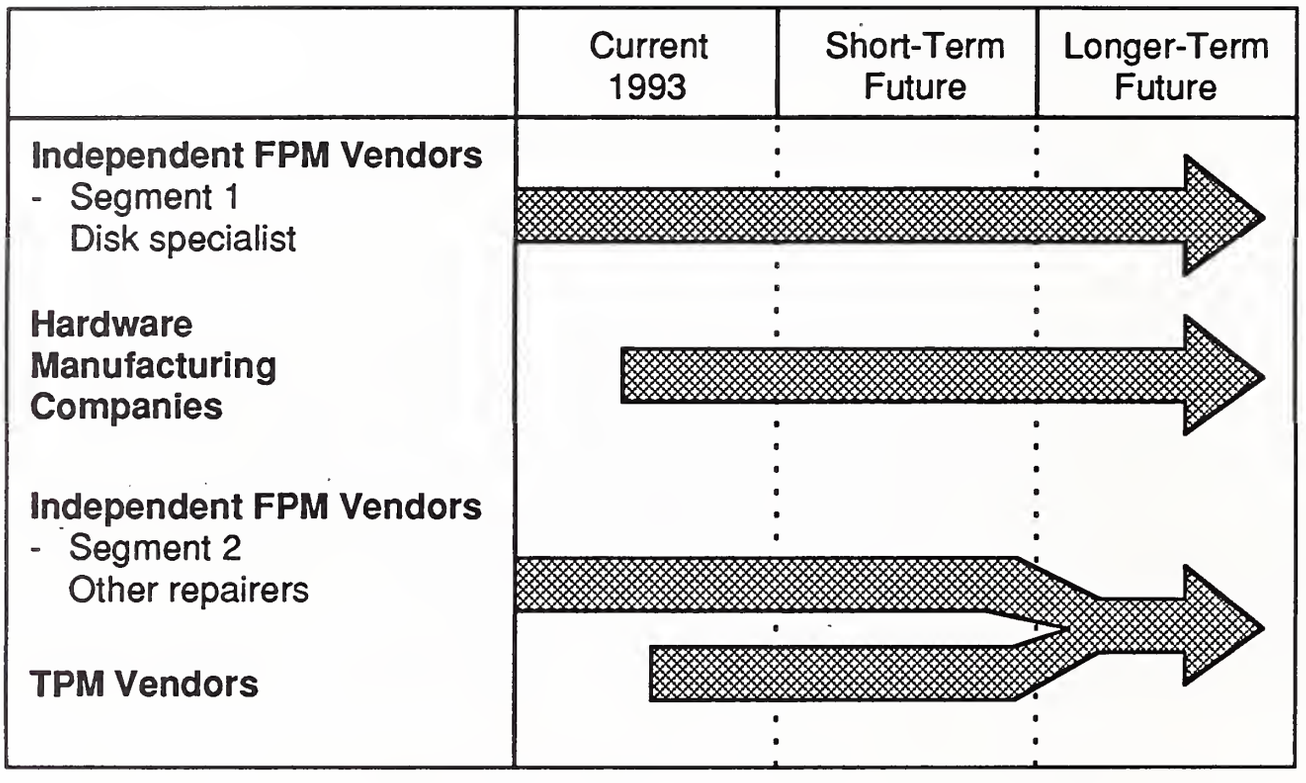
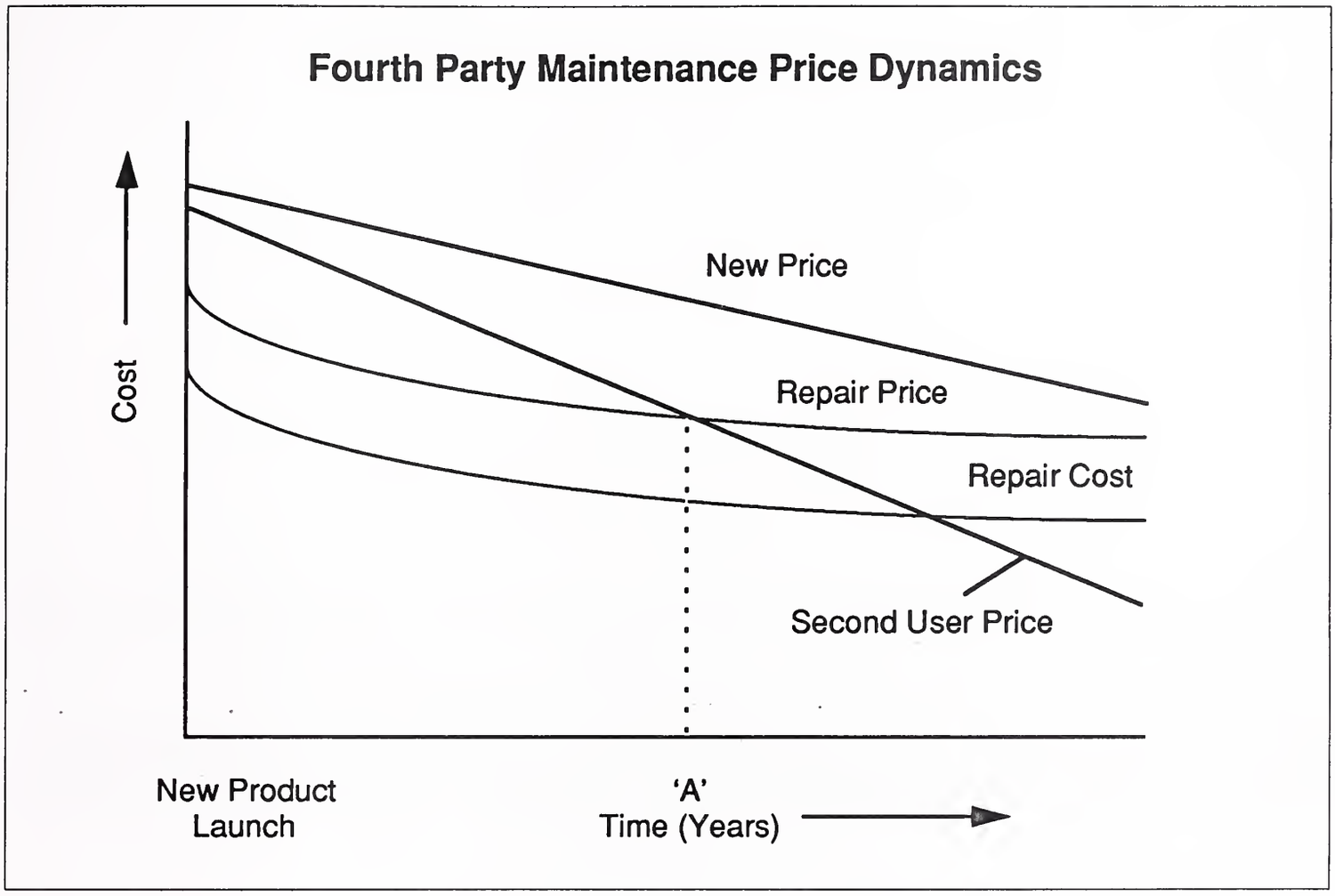


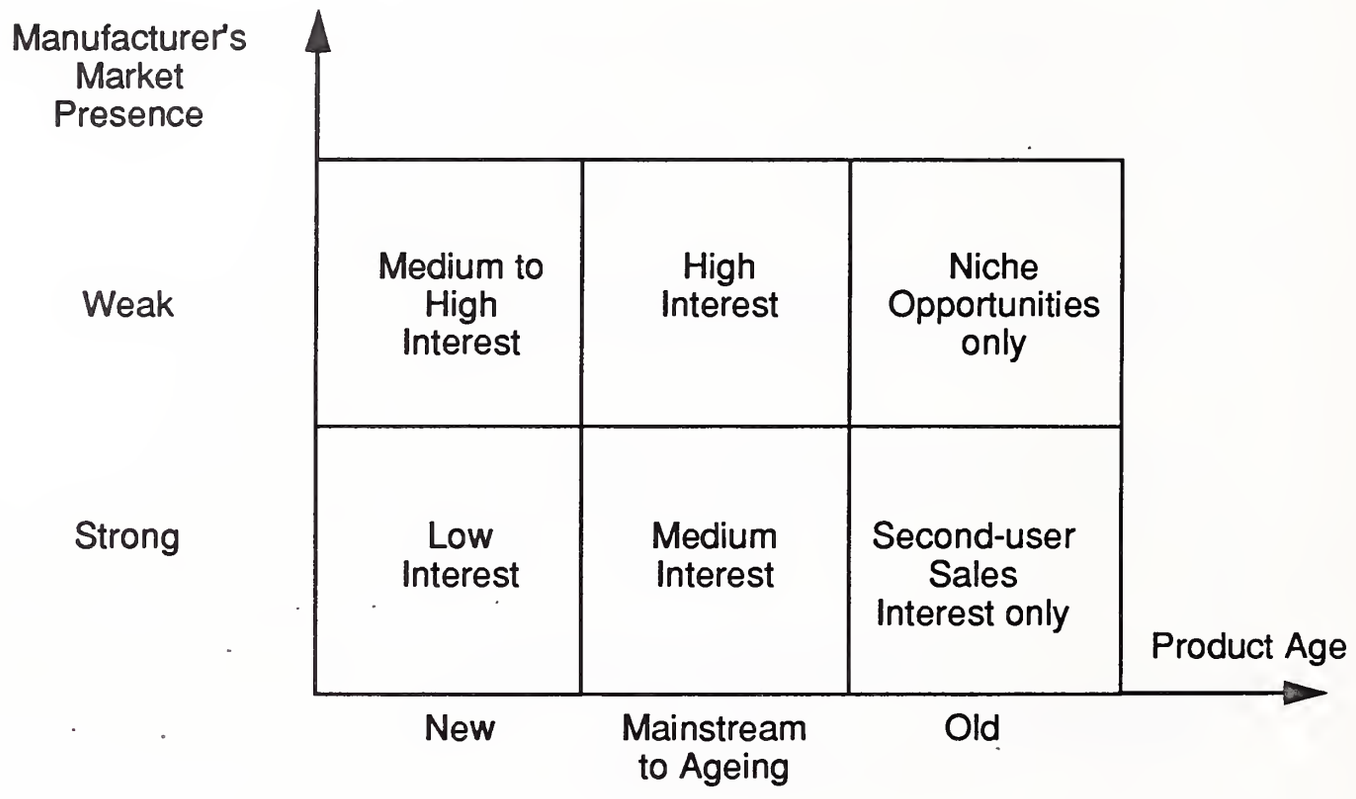
EXHIBIT IV-6

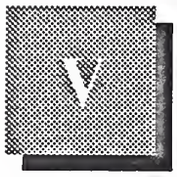


The marketing challenge for FPMs is to establish a structure for the ongoing acquisition of information on new repair markets. This information would allow them to be continually in the position of being able to anticipate when products will cross the different thresholds of interest. Exhibit IV-7 illustrates how FPM vendors can select sectors of the market which will ensure continuing revenues as products in individual sectors come and go.

EXHIBIT IV-7

Repair-Product Positioning for an FPM Vendor





The Fourth-Party Maintenance Market In Europe

This section of the report contains INPUT's market analysis-by-country of the European fourth-party maintenance (FPM) market. Section A provides a forecast for Europe overall, and Section B provides analysis of fourth-party maintenance operations in the major country markets.

A

European Market Forecast

The forecast provided in this section of the report is based on an assessment of the total fourth-party maintenance market in Europe in 1992. Forecasts cover a period 1993 to 1998 and refer to estimated expenditures on FPM repair services. The forecasts have been made in the local currencies and converted into U.S. dollars for comparative purposes. All forecasts have been made at constant 1992 conversion rates and include inflation. Exhibit V-1 lists the conversion rates and inflation factors that have been included in these forecasts.

EXHIBIT V-1

U.S. Dollar Conversion Rates and Inflation Rates by Country

Country	Currency	Exchange* Rate	Annual** Inflation Rate (Percent)
United Kingdom	£ Sterling	0.634	3.7
Benelux Countries Belgium	BF	31.91	3.2
Netherlands	DFl	1.74	3.3
France	FF	5.26	2.7
Germany	DM	1.55	3.9
Italy	Lira	1,360	5.2

* Source: OECD February 1993
** Source: OECD December 1992

Exhibit V-2 illustrates INPUT's overall forecast for the European FPM market. In 1992 the market was sized at $225 million. The market is expected to grow by 16% in 1993, and, over the next five years, it is expected to experience a 12% compound annual growth rate (CAGR) reaching $450 million in 1998.

EXHIBIT V-2

European Fourth-Party Maintenance Market Forecast 1993-1998 ($ Millions)

Country	FPM Market Size ($ Millions)				
	1992	Annual Growth 1992-1993 (Percent)	1993	1998	CAGR 1993-1998 (Percent)
United Kingdom	100	12	112	150	6
Benelux Countries	25	20	30	55	13
France	25	12	28	60	16
Germany	25	20	30	75	20
Italy	20	20	24	50	16
Rest of Europe	30	20	36	60	11
Total	225	16	260	450	12

Source: INPUT

Note: Numbers have been rounded

The year-by-year local currency market forecasts for each of the six countries or country groups in Europe are listed in Exhibit V-3. The U.K. is seen to be the largest and most developed market in Europe but now has the lowest growth projection at 6% CAGR. Development of the fourth-party maintenance markets in the other five countries analysed are still lagging behind the U.K. by varying degrees. For example, the market size in Germany was measured at one-quarter of the U.K. market in 1992.

EXHIBIT V-3

European Fourth-Party Maintenance Country Market Forecast, 1993-1998

	FPM Market Size (Local Currencies)									
Country	Currency	1992	Annual Growth 1992-1993 (%)	1993	1994	1995	1996	1997	1998	CAGR 1993-1998 (%)
United Kingdom	£ Millions	63	12	71	73	76	82	89	95	6
Benelux Countries	$ Millions	25	20	30	35	40	45	50	55	13
France	FF Millions	135	11	150	184	221	252	284	320	16
Germany	DM Millions	39	20	47	54	65	79	95	116	20
Italy	Lira Billions	27	20	33	38	45	52	60	68	16
Rest of Europe	$ Millions	30	20	36	41	46	51	56	60	11

Source: INPUT
Note: Numbers have been rounded

The fourth-party maintenance market has a number of key characteristics that will influence potential development and growth:

- The disc drive sector is considered to offer marginally higher growth potential over the PCB and other sectors, but ideally a company needs access to relatively significant investment funds. This now limits the number of new entrants which can start-up in this sector and expect to challenge the leaders.

- Due to the high investment required for the disc sector, relatively high unit volumes are necessary for investment recovery. Hence, operation at the pan-European level is a key ingredient of success. This has started to occur with several of the well-known names such as Meltek and MML offering this capability.

- The cost and efficiency of logistics operated at the pan-European level favour more centralized geographic locations. Consolidation in the FPM market is expected to occur in the next five years, led by the disc drive sector.

- A key element of early success in fourth-party maintenance has been obtaining some formal agreement with the manufacturers of the hardware being repaired and/or refurbished. Agreements have related to release of technology, documentation and component-level spare parts. With the spread of open systems and the growth of global spares part provision market, this factor is lessening in importance.

- Market growth is forecast as being lower during the period 1993-1998 than during the previous five years. This is due to the end of the entrepreneurial phase of FPM market development. The introduction of progressively cheaper technology during the forecast period will have the effect of making it easier for users to replace rather than repair their IT equipment.

These factors have influenced INPUT's growth predictions relative to the development of fourth-party maintenance in Europe. The potential for relatively high growth is considered to exist, but the growths in different counties will vary due to the different stages of development and recessionary impact in each country.

B

Country Markets

1. United Kingdom

The U.K. FPM market is the largest and most developed in Europe. With a total of over 200 companies operating within the U.K., the segmentation between the two sectors is less clearly established than it was at the time of our previous report in 1989:

- Includes disc drive repair and refurbishment market sector with clean room facilities.

- PCB and Other repair and refurbishment market sector includes repair and refurbishment on tape drives and streamers, printers and print heads, VDUs, workstations, and electro-mechanical assemblies.

The disc drive market is indicated as being the largest revenue earner. It contains an estimated 50 companies of which some 15 are significant also in the TPM market.

The PCB and Other repair and refurbishment sector in the U.K. contains the largest number of companies, with an estimated 150 vendors operating in a diversity of activities and special market niches.

In a similar manner to the development of third-party maintenance, FPM, within the U.K. has developed into a established market with signs of competitive pressure now starting to appear in earnest:

- INPUT's respondents claimed that they had direct competition—both in the general market and in narrow niche situations.

- FPM market opportunities have been recognised by manufacturers and major TPMs.

Opportunities within the U.K. FPM market have not gone unnoticed by U.S. vendors. A significant degree of advertising from U.S.-based FPMs is appearing regularly in trade magazines.

U.K. FPM companies varied in their approaches to marketing and sales. Most achieve sales purely from referrals, whilst others have an organised and developed sales presence with, in their opinion, a clear direction. INPUT considers that formal marketing and sales strategies are rare among FPM companies. Those that implement professional sales and marketing programmes are more likely to provide for continuing and future success. The others will not survive.

The proportion of revenues derived from the two market sectors are indicated in Exhibit V-4. A relatively significant proportion of revenues, 24%, is obtained from hardware and system component manufacturers. TPM companies account for 39% of the total, with end-users representing a relatively large proportion at 20%. Distribution channels and Others including independent services vendors accounted for 17%.

The activities of the same groups of customers operating within the PCB repair and other market sector vary depending on market positioning of individual companies. Some compete actively against a principal manufacturer and focus their activities on TPM and distribution channels. A significant number obtain business directly from manufacturers. Exhibit V-4 indicates INPUT's estimates of these proportions as they are in 1993.

Appendix B contains the database of market values corresponding to these percentage sector sizes, for the U.K. and for all other countries or country groups analysed in this report. The tables in the appendix also show how they are forecast to have developed by 1998.

EXHIBIT V-4

U.K. Fourth-Party Maintenance Revenues Sources - 1993

Type of Customer	Disc Repair Sector (Percent)	PCB & Other Sector (Percent)	Total Market (Percent)
Manufacturers	15	32	24
TPMs	60	20	39
VARs/Distributors and Others	20	15	17
End-Users	5	33	20
Total	100	100	100

Exhibit V-5 indicates INPUT's market forecast for the U.K. fourth-party maintenance market, showing that user expenditures will reach £71 M ($112 M) in 1993. The market is forecast to grow at a 6% compound annual growth rate (CAGR) to reach £95 M ($150 M) in 1998. To conform with INPUT's definition of the market these figures exclude revenues gained directly from users.

EXHIBIT V-5

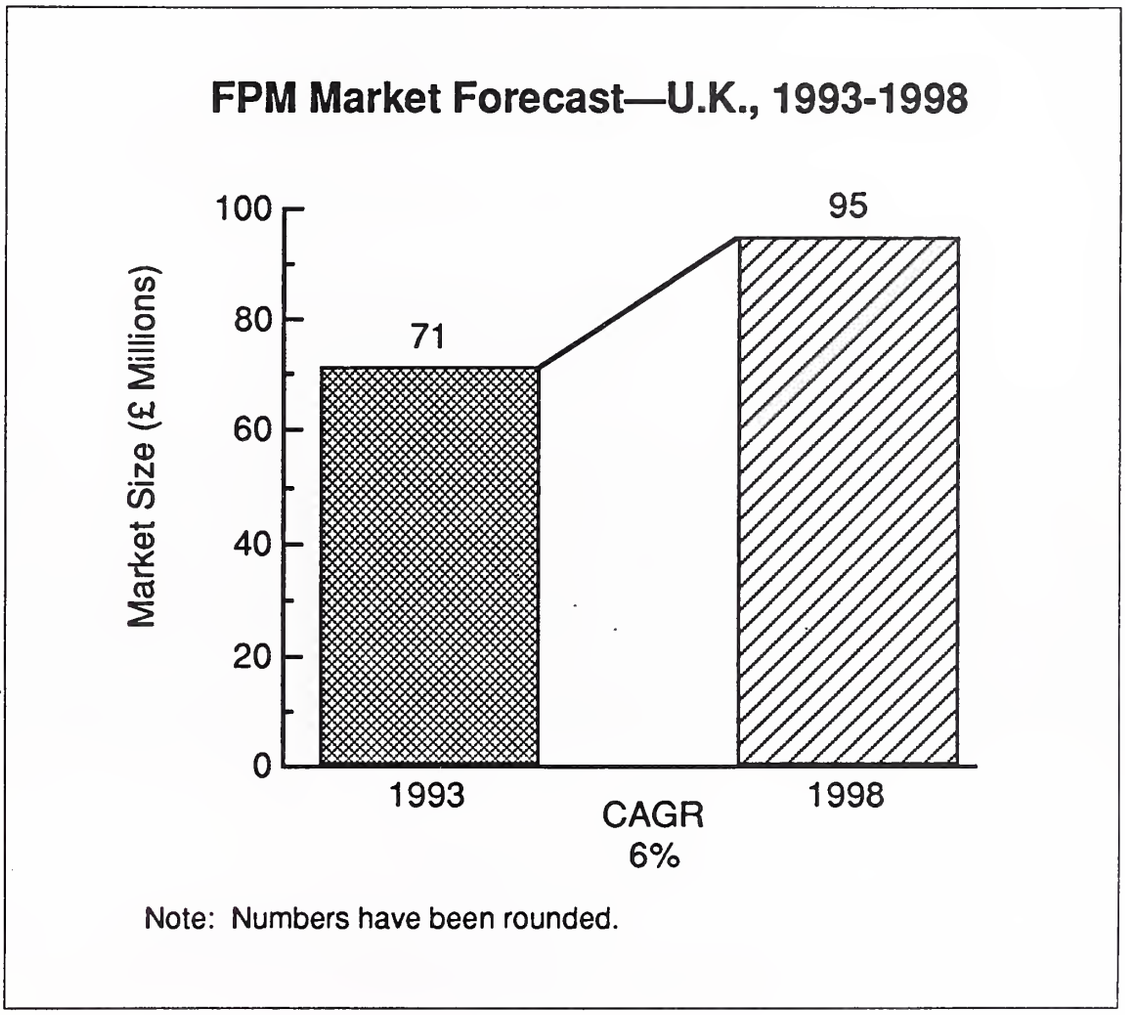
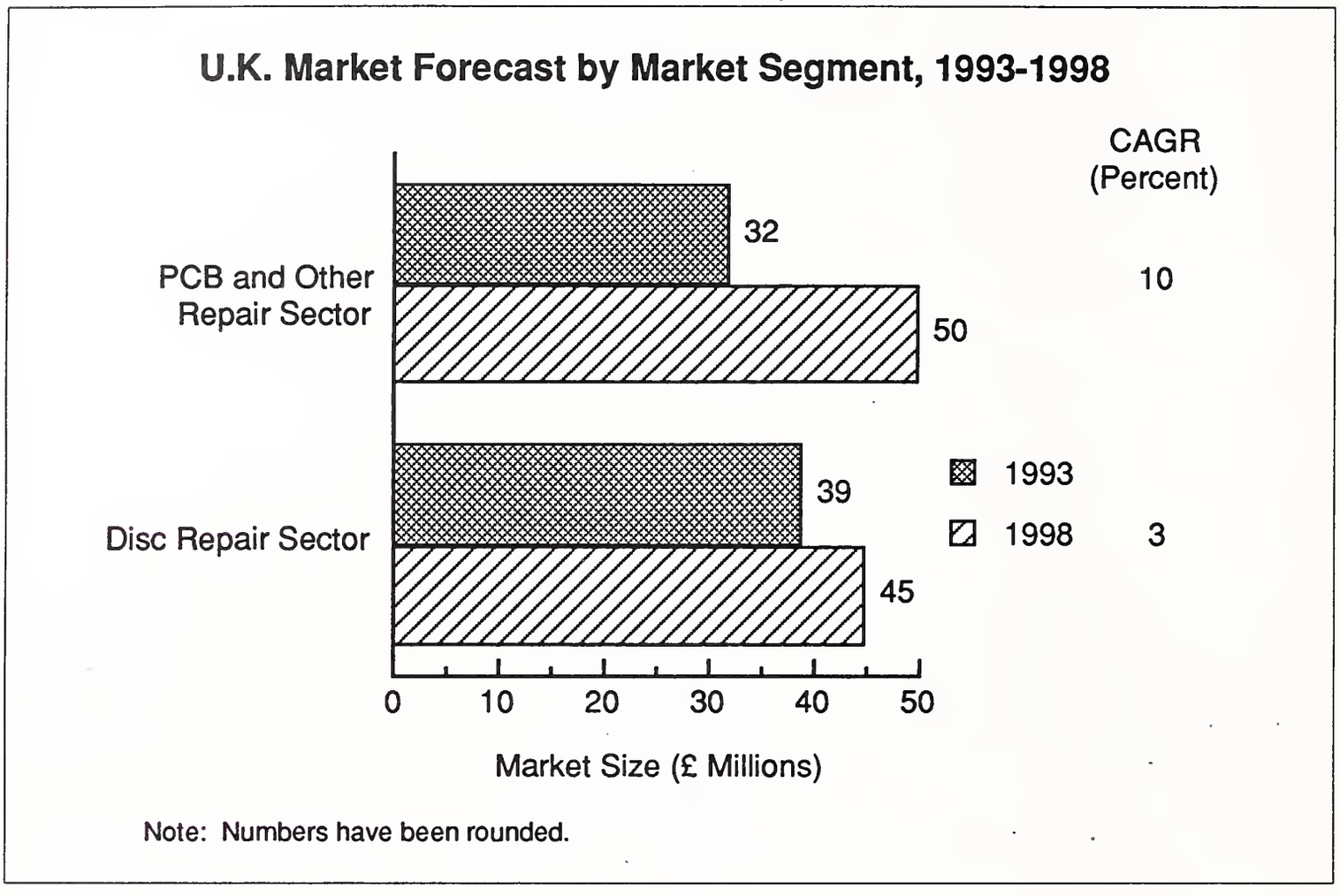


Exhibit V-6 illustrates the market forecast for both the disc repair and the PCB and other repair segments of the market. The disk repair sector is forecast to have the lower growth rate of 3%. Due to the large number of vendors active in the floppy disk drive sector (some of which also repair hard disk drives while the majority do not), these two segments are more closely coupled than they have been in earlier years.

If the revenues gained from users were also taken in account, both sectors would be seen to have the same 3% growth rate (see Appendix B).

EXHIBIT V-6



Note: Numbers have been rounded.

2. The Benelux Countries

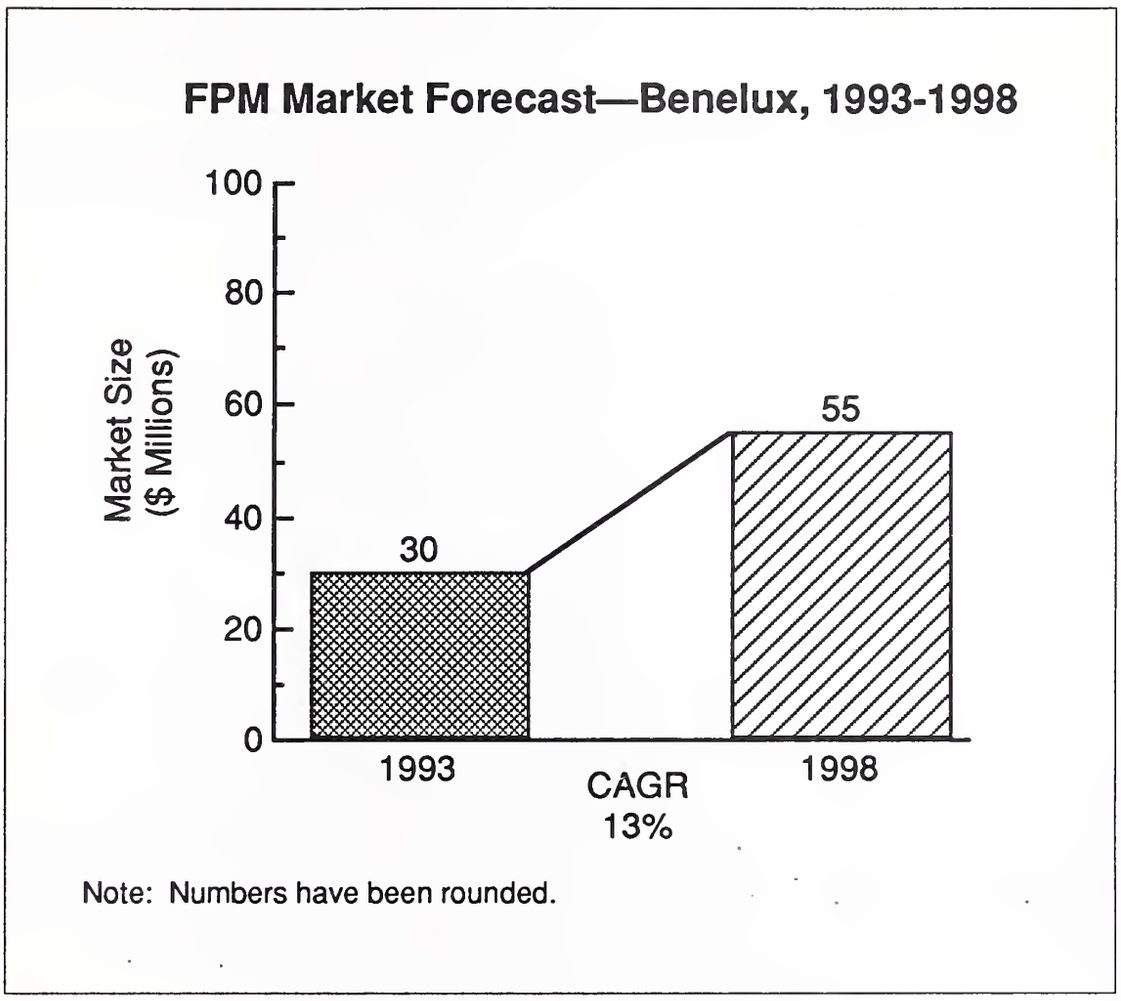
Fourth-party maintenance in the Benelux countries has been in advance of other larger countries in Europe due to two factors:

- The strategic geographic position occupied by these countries encourages their use for the siting of regional logistics centres by many vendors.

- The development of Amsterdam's Schiphol airport and the strong EDI market in Netherlands are two good examples of the power of these countries to attract vendor investment in logistics operations.

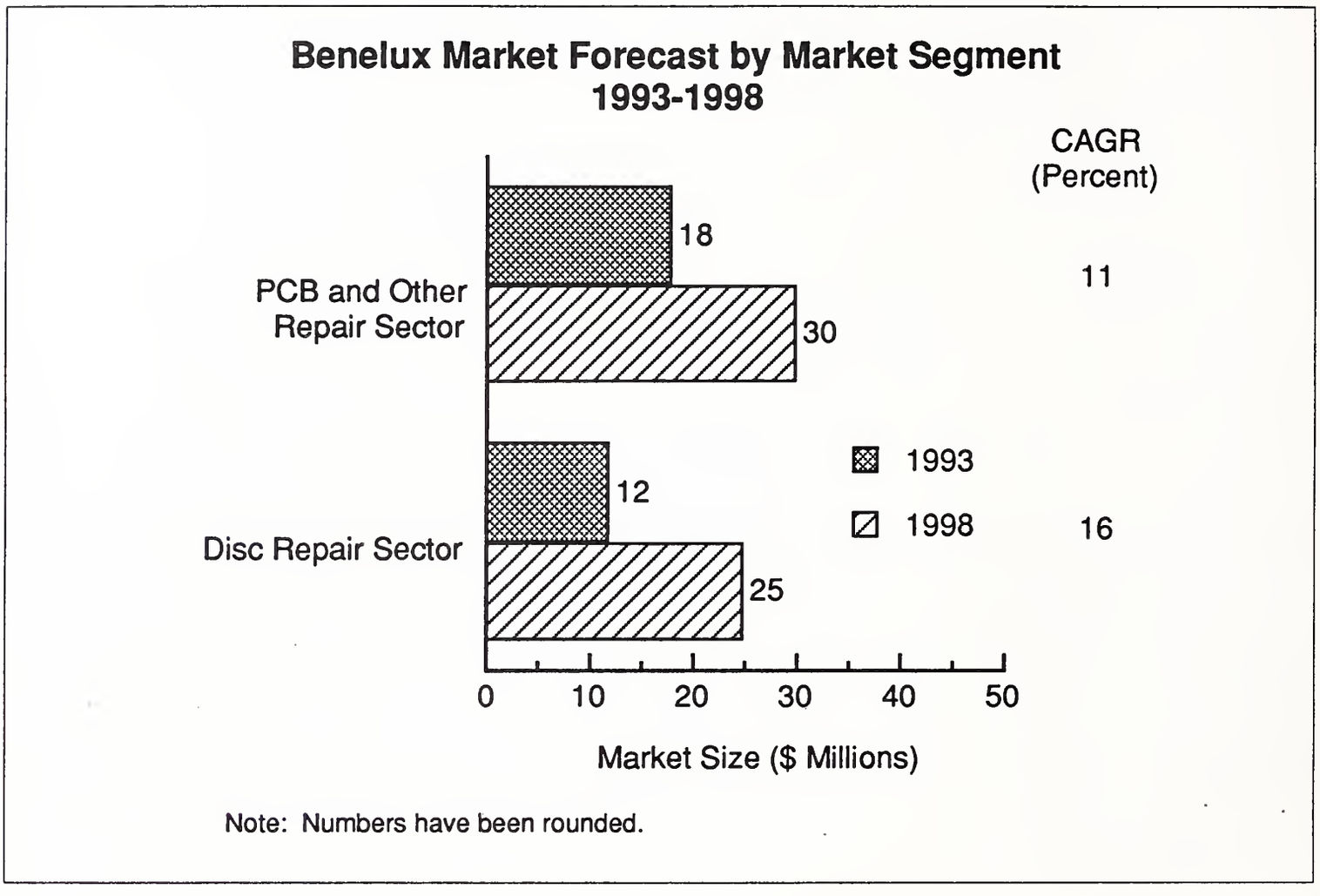
Market forecasts for the Benelux countries are illustrated in Exhibits V-7 and V-8. These are given in U.S. dollars.

EXHIBIT V-7



Note: Numbers have been rounded.

EXHIBIT V-8



Note: Numbers have been rounded.

Exhibit V-9 shows the Benelux market segmentation by type of repair and by type of purchasing customer.

EXHIBIT V-9

Benelux Countries Fourth-Party Maintenance Market, 1993-1998

	Proportion of FPM Market Size (Percent)								
	1993			1998			CAGR 1993/1998 (Percent)		
Revenue Source	Disc Repair Sector	PCB & Other Sector	All Sectors	Disc Repair Sector	PCB & Other Sector	All Sectors	Disc Repair Sector	PCB & Other Sector	All Sectors
Hardware Manufacturers	35	45	41	37	45	41	18	11	14
Independent Maintainers	35	18	24	33	20	26	15	13	14
VARs/Distributors and Others	20	18	19	15	20	18	13	13	12
Users	10	19	16	15	15	15	27	5	12
Total	100	100	100	100	100	100	17	10	13

Source: INPUT

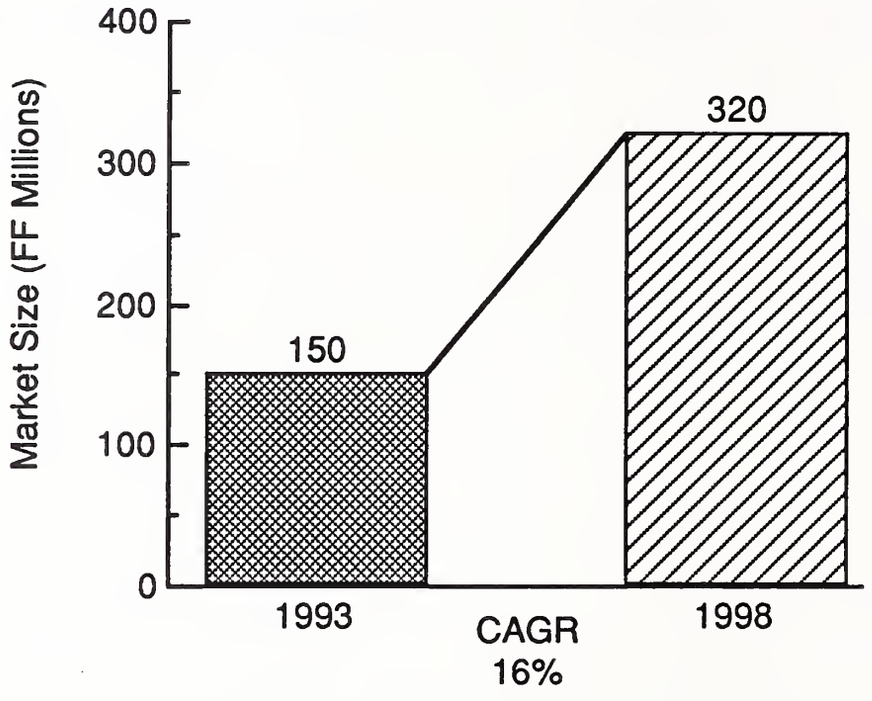
3. France

INPUT estimates that there are up to 100 small FPM companies in France, with revenues in excess of FF 1.0 Million. The market has developed significantly in the last five years, but is still not as well-developed as that in the U.K. However, with a 17% CAGR, over the next five year it is starting to catch up with the U.K.

Overall market forecasts and market forecasts by repair segment for the French market are illustrated in Exhibits V-10 and V-11, respectively.

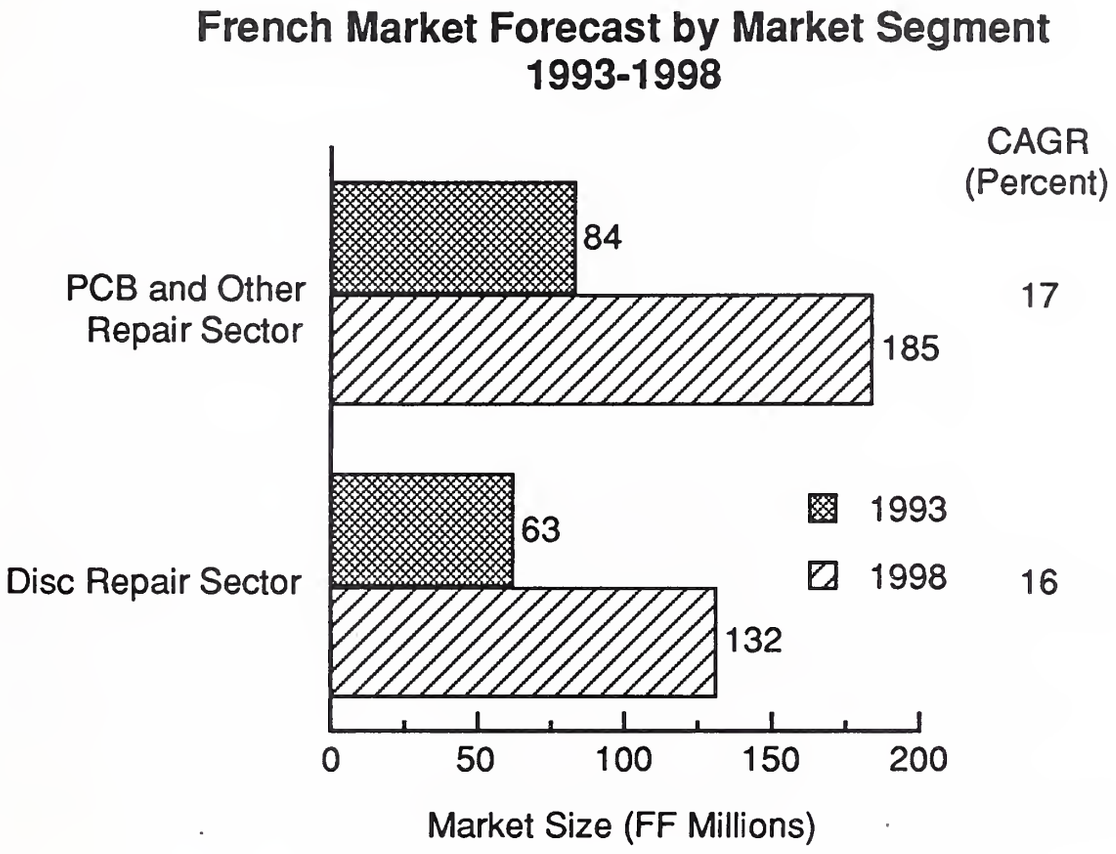
EXHIBIT V-10

FPM Market Forecast—France, 1993-1998



Note: Numbers have been rounded.

EXHIBIT V-11



Note: Numbers have been rounded.

Exhibit V-12 tabulates the market forecast by type of repair and by type of purchasing customer.

EXHIBIT V-12

French Fourth-Party Maintenance Market, 1993-1998

	Proportion of FPM Market Size (Percent)								
	1993			1998			CAGR 1993/1998 (Percent)		
Revenue Source	Disc Repair Sector	PCB & Other Sector	All Sectors	Disc Repair Sector	PCB & Other Sector	All Sectors	Disc Repair Sector	PCB & Other Sector	All Sectors
Hardware Manufacturers	25	30	28	38	45	42	28	25	26
Independent Maintainers	40	20	28	30	26	28	11	22	16
VARs/Distributors and Others	25	30	28	18	15	16	10	0	4
Users	10	20	16	14	14	14	26	7	13
Total	100	100	100	100	100	100	17	15	16

Source: INPUT

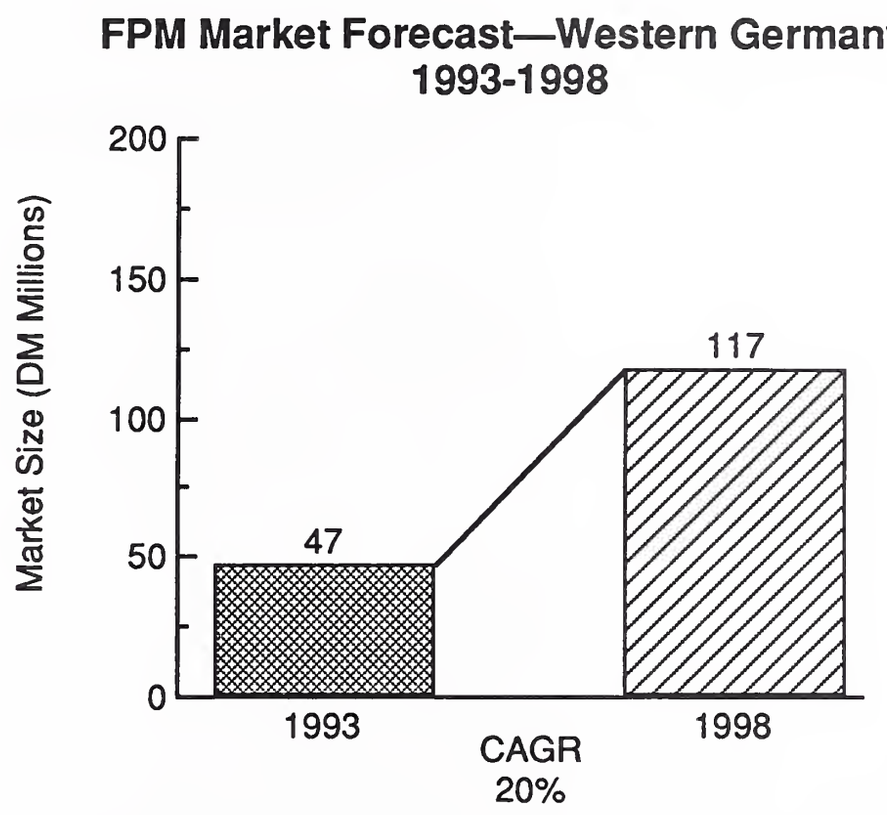
4. Germany

Germany has a traditionally conservative business environment, and this is seen to result in the slow uptake of new types of business activity. The relatively low acceptance of FPM parallels that of TPM. This situation is forecast to change as recession begins to bite in the German economy. Recession favours the repair activity at the expense of new projects involving capital outlay on new equipment.

Manufacturers, independent maintainers, large distributors and some user organisations are all expected to commission repairs from FPM vendors in increasing amounts. FPM activity will also grow as a minor part of these companies operations.

FPM expenditure in West Germany reached DM47 M ($30 M) in 1993, as indicated in Exhibit V-13, and will grow at a forecasted 20% CAGR to DM 117M ($75 M) in 1998.

EXHIBIT V-13

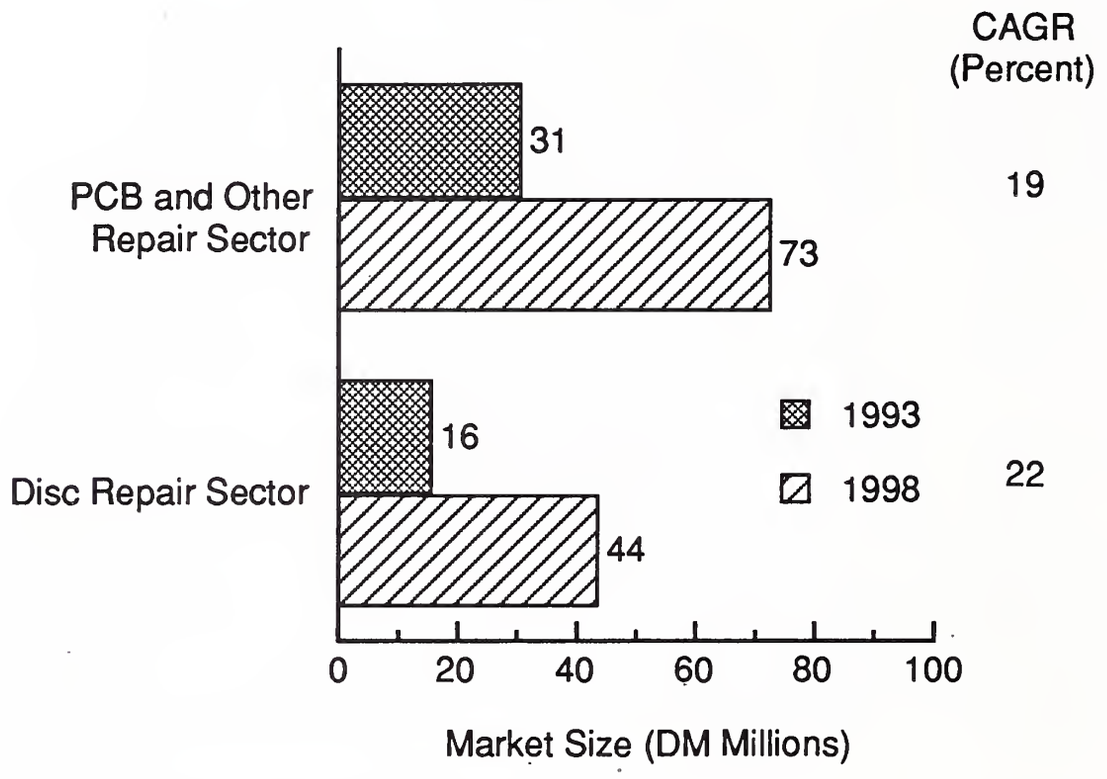


Note: Numbers have been rounded.

Exhibit V-14 shows the German forecast by repair type segment.

Exhibit V-15 adds the dimension of type of purchasing customer to give a tabular analysis.

EXHIBIT V-14



Note: Numbers have been rounded.

EXHIBIT V-15

German Fourth-Party Maintenance Market, 1993-1998

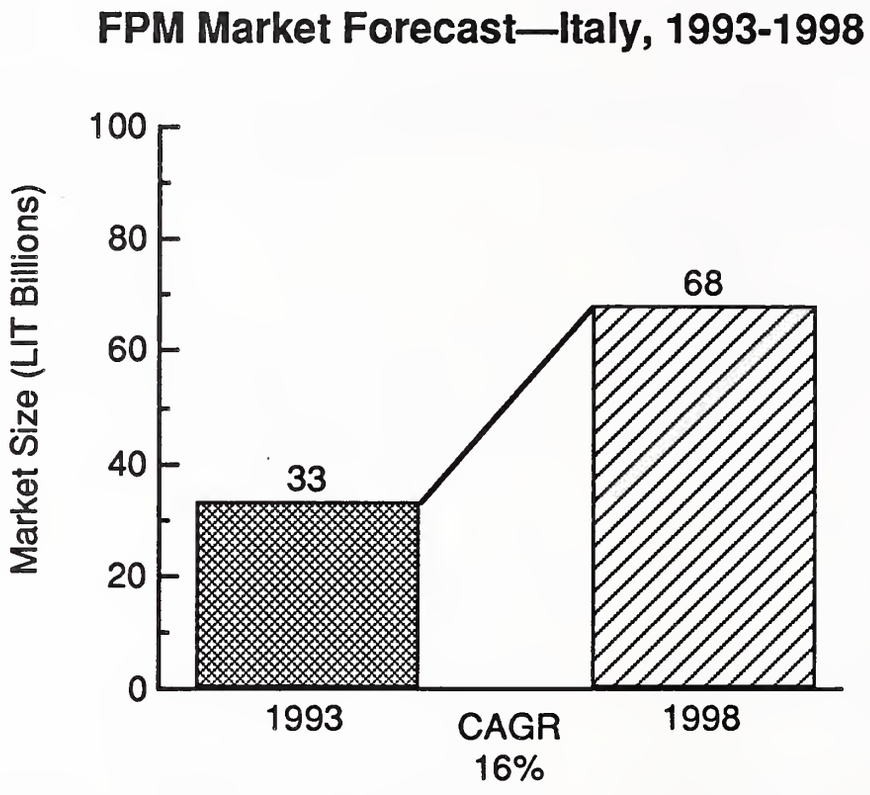
	Proportion of FPM Market Size (Percent)								
	1993			1998			CAGR 1993/1998 (Percent)		
Revenue Source	Disc Repair Sector	PCB & Other Sector	All Sectors	Disc Repair Sector	PCB & Other Sector	All Sectors	Disc Repair Sector	PCB & Other Sector	All Sectors
Hardware Manufacturers	20	28	26	34	35	35	37	25	28
Independent Maintainers	26	30	29	25	26	26	22	16	18
VARs/Distributors and Others	52	25	33	35	20	25	14	14	14
Users	2	17	12	6	19	15	54	22	24
Total	100	100	100	100	100	100	32	19	21

Source: INPUT

5. Italy

The market forecasts for Italy, illustrated in Exhibit V-16, indicates that FPM expenditures reached LIT 33 Bn ($24 M) in 1992 and will grow at an estimated 16% CAGR to reach LIT 68 Bn ($50 M) in 1998.

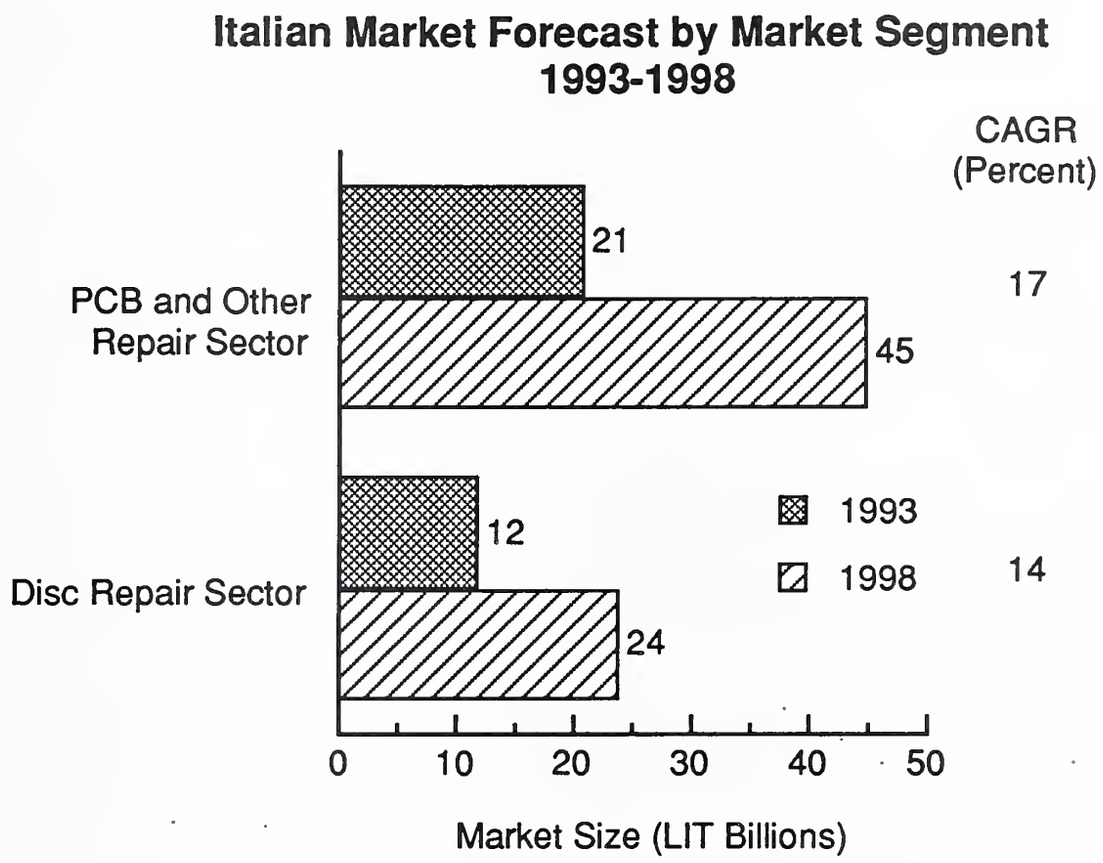
EXHIBIT V-16



Note: Numbers have been rounded.

Exhibit V-17 shows the corresponding growths of the repair type segments.

EXHIBIT V-17



Note: Numbers have been rounded.

Exhibit V-18 shows the market forecasts by repair type and type of customer.

EXHIBIT V-18

Italian Fourth-Party Maintenance Market, 1993-1998

	Proportion of FPM Market Size (Percent)								
	1993			1998			CAGR 1993/1998 (Percent)		
Revenue Source	Disc Repair Sector	PCB & Other Sector	All Sectors	Disc Repair Sector	PCB & Other Sector	All Sectors	Disc Repair Sector	PCB & Other Sector	All Sectors
Hardware Manufacturers	20	43	35	42	44	43	28	12	16
Independent Maintainers	40	15	24	30	26	27	4	25	14
VARs/Distributors and Others	20	18	19	24	24	24	14	18	17
Users	20	26	24	4	6	5	-20	-17	-18
Total	100	100	100	100	100	100	10	12	11

Source: INPUT

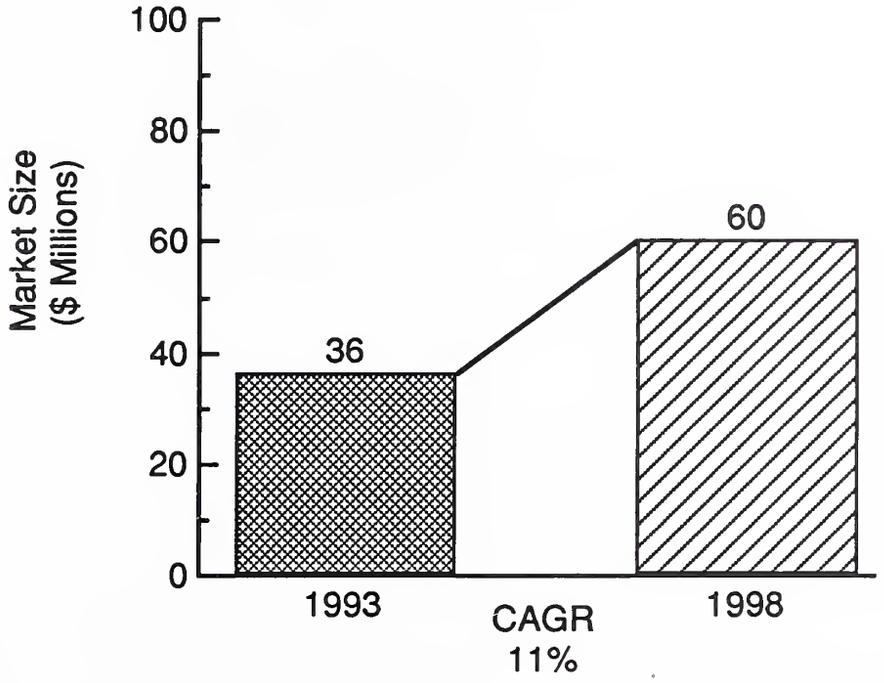
6. Rest of Europe

Exhibits V-19, V-20 and V-21 contain the forecasts for the remaining countries of Europe, comprising:

- Austria
- Denmark
- Finland
- Greece
- Ireland
- Norway
- Portugal
- Spain
- Sweden
- Switzerland
- Eastern European countries.

EXHIBIT V-19

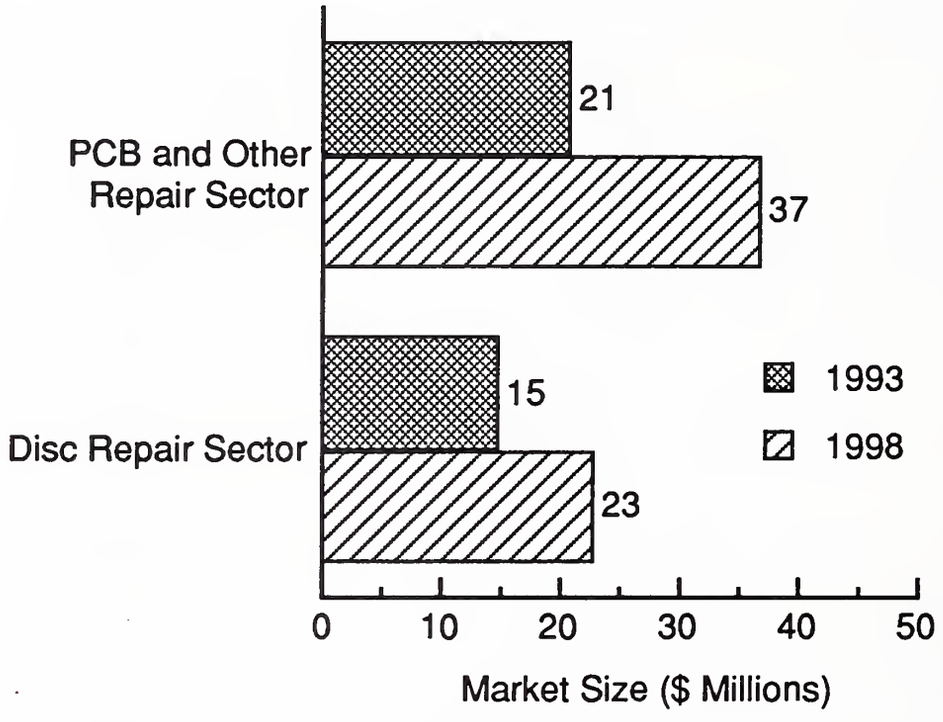
FPM Market Forecast—Rest of Europe 1993-1998



Note: Numbers have been rounded.

EXHIBIT V-20

Rest of Europe Market Forecast by Market Segment 1993-1998



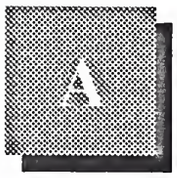
Note: Numbers have been rounded.

EXHIBIT V-21

Rest of Europe Fourth-Party Maintenance Market, 1993-1998

	Proportion of FPM Market Size (Percent)								
	1993			1998			CAGR 1993/1998 (Percent)		
Revenue Source	Disc Repair Sector	PCB & Other Sector	All Sectors	Disc Repair Sector	PCB & Other Sector	All Sectors	Disc Repair Sector	PCB & Other Sector	All Sectors
Hardware Manufacturers	15	40	30	38	44	42	30	12	17
Independent Maintainers	38	20	27	30	26	28	3	16	9
VARs/Distributors and Others	35	27	30	24	24	24	0	8	4
Users	12	13	13	8	6	7	0	-6	-3
Total	100	100	100	100	100	100	8	10	9

Source: INPUT



INPUT Fourth-Party Maintenance Opportunities Vendor Questionnaire

I. General

QU: 1 Respondent Name_____

QU: 2 Title_____

QU: 3 Company_____

QU: 4 Address_____

QU: 5 Country_____

QU: 6 Telephone No._____

II. Company Profile

QU: 7 Number of Workshop Centres_____

QU: 8 Locations of Workshop Centres_____

_____

_____

QU: 9 a. Number of Employees in FPM _____

b. Total Number of FPM Workshop Engineers_____

c. Total Number of FPM Support Engineers_____

QU: 10 Equipment Repaired/Refurbished - By Manufacturer

a. PCBs_____

_____

b. Printers_____

_____

c. Terminals/VDUs_____

_____

d. CPUs_____

_____

e. Tape Drives_____

_____

f. Disc Drives_____

_____

g. Recording Head_____

_____

h. Mechanical Assy_____

_____

i. Others/Specialist Services_____

_____

j. Data/Telecommunications Equipment_____

_____

k. Other/Specialist Services_____

_____

QU: 11 Classes and Areas of Clean Rooms_____

_____

_____

_____

III. Financial Information

		1992	1993	Currency
QU: 12	a. Total Revenues	_____	_____	_____
	b. Total European Revs. (By major country)	_____	_____	_____
		_____	_____	_____
		_____	_____	_____
		_____	_____	_____
		_____	_____	_____
QU: 13	a. FPM Revenues	_____	_____	_____
	b. European FPM Revs. (By major country)	_____	_____	_____
		_____	_____	_____
		_____	_____	_____
		_____	_____	_____
		_____	_____	_____
		_____	_____	_____

c. Approximate annual revenue growth rates anticipated

_____

QU: 14 What proportion of your FPM business is done with:

a. Hardware vendors/manufacturers/OEMs_____

b. Independent maintenance companies _____

c. Leasing & second-user suppliers/distributors/dealers_____

d. Others (i.e., Agents) _____

e. If agents, who do they deal with? _____

f. What proportion of your FPM business is directly with end-users?

_____

QU: 15 Who owns your company, and have you any associate companies?

_____

QU: 16 a. What, in your opinion, are the factors contributing to the growth of FPM in general?

_____

_____

_____

_____

b. What, in your opinion, are the factors contributing to the growth of FPM business directly with end-users?

_____

_____

_____

_____

QU: 17 a. What, in your opinion, are the factors hindering the growth of FPM in general?

_____

_____

_____

_____

b. What, in your opinion, are the factors hindering the growth of FPM business directly with end-users?

_____

_____

_____

_____

QU: 18 Has your company been involved in a merger or acquisition? If so, when?

a. Merger

Name of company merged with _____

Date of Merger _____

Price Paid _____

Please indicate name of newly merged company, if applicable.

_____

b. Acquisition

Company Acquired _____

Date of Acquisition _____

Price Paid _____

QU: 19 a. Are you registered to International quality standards ISO9000/BS5750?

b. If not, do you intend to apply for registration and when?

c. Are any of your customers insisting on registration as a prerequisite of doing business? Give details.

QU: 20 a. Who do you consider to be your main competition in the FPM market?

b. Who, in your opinion are the major players?

QU: 21 What services does your company offer other than pure fourth-party maintenance?

QU: 22 Are you planning to expand these services in the future? If so, give details.

QU: 23 Do you hold stocks of spare parts for sale to maintenance organisations? If so, give details.

QU: 24 What warranty do you provide on your repair work?

QU: 25 Do you do any FPM contract repair work? If so, give details including names of major customers, equipment vendors or other TPMs/FPMs.

IV. Pricing of Services

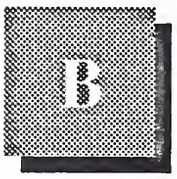
QU: 26 What methods of pricing your services do you use? i.e. fixed price, time and materials, by estimate

QU: 27 In general, how do your prices compare with the manufacturer's or TPM's repair/exchange prices?

_____

_____

THANK YOU FOR THE COMPLETED QUESTIONNAIRE



Market Sectors Forecast Database by Country or Country Group

EXHIBIT B-1

Europe

	Proportion of Market Size on FPM									
		1993			1998			CAGR 1993/1998 (Percent)		
Sector	Unit of Currency	Disc Repair Sector	PCB & Other Sector	All Sector	Disc Repair Sector	PCB & Other Sector	All Sector	Disc Repair Sector	PCB & Other Sector	All Sectors
Hardware Manufacturers	$ M.	25	65	89	74	128	201	25	14	18
Independent Maintainers	$ M.	62	38	100	69	74	143	2	14	7
VARs/Distributors and Others	$ M.	33	37	70	46	61	106	7	10	9
TOTAL Fourth-Party Maintenance	$ M.	120	140	260	190	260	450	10	13	12
Users	$ M.	10	45	56	19	36	55	13	-4	0
TOTAL	$ M.	130	185	315	208	298	506	10	10	10

EXHIBIT B-2

U.K.

		Proportion of Market Size on FPM								
		1993			1998			CAGR 1993/1998 (Percent)		
Sector	Unit of Currency	Disc Repair Sector	PCB & Other Sector	All Sector	Disc Repair Sector	PCB & Other Sector	All Sector	Disc Repair Sector	PCB & Other Sector	All Sectors
Hardware Manufacturers	$ M.	10	24	34	25	40	65	20	11	14
	£ M.	6	15	21	16	25	41			
Independent Maintainers	$ M.	39	15	54	31	21	52	-5	7	-1
	£ M.	25	10	34	20	14	33			
VARs/Distributors and Others	$ M.	13	11	24	15	18	33	3	10	6
	£ M.	8	7	15	10	11	21			
TOTAL Fourth-Party Maintenance	$ M.	62	50	112	71	79	150	3	10	6
	£ M.	39	32	71	45	50	95			
Users	$ M.	3	25	28	6	10	16	14	-17	-11
	£ M.	2	16	18	4	6	10			
TOTAL	$ M.	65	75	140	77	89	166	3	3	3
	£ M.	41	48	89	49	56	105			

EXHIBIT B-3

Benelux Countries

	Proportion of Market Size on FPM									
		1993			1998			CAGR 1993/1998 (Percent)		
Sector	Unit of Currency	Disc Repair Sector	PCB & Other Sector	All Sector	Disc Repair Sector	PCB & Other Sector	All Sector	Disc Repair Sector	PCB & Other Sector	All Sectors
Hardware Manufacturers	$ M.	5	10	15	11	16	27	18	10	13
Independent Maintainers	$ M.	5	4	9	10	7	17	15	13	14
VARs/Distributors and Others	$ M.	3	4	7	4	7	12	10	13	12
TOTAL Fourth-Party Maintenance	$ M.	12	18	30	25	31	55	15	11	13
Users	$ M.	1	4	6	4	5	10	27	5	12
TOTAL	$ M.	13	22	35	29	36	65	17	10	13

EXHIBIT B-4

France

		Proportion of Market Size on FPM								
		1993			1998			CAGR 1993/1998 (Percent)		
Sector	Unit of Currency	Disc Repair Sector	PCB & Other Sector	All Sector	Disc Repair Sector	PCB & Other Sector	All Sector	Disc Repair Sector	PCB & Other Sector	All Sectors
Hardware Manufacturers	$ M.	3	6	9	11	18	29	28	25	26
	FF M.	17	32	49	58	97	155			
Independent Maintainers	$ M.	5	4	9	9	11	19	11	22	16
	FF M.	27	21	48	46	56	102			
VARs/Distributors and Others	$ M.	3	6	9	5	6	11	10	0	4
	FF M.	17	32	49	27	32	60			
TOTAL Fourth-Party Maintenance	$ M.	12	16	28	25	35	60	16	17	17
	FF M.	62	84	146	131	185	317			
Users	$ M.	1	4	5	4	6	10	26	7	13
	FF M.	7	21	28	21	30	52			
TOTAL	$ M.	13	20	33	29	41	70	17	15	16
	FF M.	68	105	174	153	216	368			

EXHIBIT B-5

Germany

	Proportion of Market Size on FPM									
		1993			1998			CAGR 1993/1998 (Percent)		
Sector	Unit of Currency	Disc Repair Sector	PCB & Other Sector	All Sector	Disc Repair Sector	PCB & Other Sector	All Sector	Disc Repair Sector	PCB & Other Sector	All Sectors
Hardware Manufacturers	$ M.	2	7	9	10	20	31	37	25	28
	DM M.	3	10	14	16	31	47			
Independent Maintainers	$ M.	3	7	10	8	15	23	22	16	18
	DM M.	4	11	15	12	23	35			
VARs/Distributors and Others	$ M.	5	6	11	11	12	22	14	14	14
	DM M.	8	9	18	16	18	34			
TOTAL Fourth-Party Maintenance	$ M.	10	20	30	28	47	75	22	19	20
	DM M.	16	31	47	44	73	117			
Users	$ M.	0	4	4	2	11	13	54	22	24
	DM M.	0	6	7	3	17	20			
TOTAL	$ M.	11	24	35	30	58	88	32	19	21
	DM M.	16	37	53	47	90	136			

EXHIBIT B-6

Italy

	Proportion of Market Size on FPM									
		1993			1998			CAGR 1993/1998 (Percent)		
Sector	Unit of Currency Sector	Disc Repair Sector	PCB & Other Sector	All Sector	Disc Repair Sector	PCB & Other Sector	All Sector	Disc Repair Sector	PCB & Other Sector	All Sectors
Hardware Manufacturers	$ M.	2	9	11	8	15	23	28	12	16
	LIT BN.	3	12	15	10	21	31			
Independent Maintainers	$ M.	4	3	7	5	9	15	4	25	14
	LIT BN.	6	4	10	7	12	20			
VARs/Distributors and Others	$ M.	2	4	6	4	8	13	14	18	17
	LIT BN.	3	5	8	6	11	17			
TOTAL Fourth-Party Maintenance	$ M.	9	15	24	17	33	50	14	17	16
	LIT BN.	12	21	33	24	45	68			
Users	$ M.	2	5	7	1	2	3	-20	-17	-18
	LIT BN.	3	7	10	1	3	4			
TOTAL	$ M.	11	20	31	18	35	53	10	12	11
	LIT BN.	15	28	43	24	48	72			

EXHIBIT B-7

Rest of Europe

	Proportion of Market Size on FPM									
		1993			1998			CAGR 1993/1998 (Percent)		
Sector	Unit of Currency Sector	Disc Repair Sector	PCB & Other Sector	All Sector	Disc Repair Sector	PCB & Other Sector	All Sector	Disc Repair Sector	PCB & Other Sector	All Sectors
Hardware Manufacturers	$ M.	3	10	12	10	17	27	30	12	17
Independent Maintainers	$ M.	6	5	11	8	10	18	3	16	9
VARs/Distributors and Others	$ M.	6	6	12	6	9	15	0	8	4
TOTAL Fourth-Party Maintenance	$ M.	15	21	36	23	37	60	9	12	11
Users	$ M.	2	3	5	2	2	4	0	-6	-3
TOTAL	$ M.	17	24	41	25	39	64	8	10	9

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