U.S. TURNKEY SYSTEMS MARKETS

1985 - 1990

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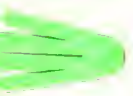20127 Milano
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U.S. TURNKEY SYSTEMS MARKETS
1985-1990

U.S. TURNKEY SYSTEMS MARKETS
1985-1990

ABSTRACT

This annual report provides an analysis and forecasts of U.S. turnkey systems markets for 1985 to 1990. Market size and growth rates are provided for 13 industry-specific segments as well as for the overall cross-industry and custom turnkey marketplaces.

The factors behind the demand for these products and services are highlighted and analyzed. Key issues, trends, and developments are provided together with business and market strategy recommendations.

This report contains 76 pages, including 19 exhibits.

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1985-1990

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U.S. TURNKEY SYSTEMS MARKETS
1985-1990

EXHIBITS

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I INTRODUCTION

I   INTRODUCTION

● This report is produced as one of a series of reports in INPUT's Market Analysis and Planning Service (MAPS) for the Information Services industry.

A.   PURPOSE OF THIS REPORT

● This report reviews and analyzes the turnkey systems mode of the information services market.

● This report is designed to assist vendors in:

   - Identifying new markets and product opportunities.

   - Assessing product and marketing risk exposure.

   - Allocating R&D and operations resources.

   - Obtaining insights into market-related developments that impact profitability.

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B.   SCOPE

- This report focuses on U.S. markets and analyzes user expenditures that are noncaptive (i.e., expenditures on products and services provided by organizations outside the buyer's own corporate structure).

- This report is organized as follows:

    - Chapter II is an Executive Summary provided in presentation format, complete with script.

    - Chapter III provides market forecasts and analysis of turnkey systems markets. Market sizes and five-year growth rates of numerous key market segments are identified.

    - Chapter IV includes a discussion of key issues and trends.

    - Chapter V reviews the competitive structure of the turnkey systems marketplace and includes revenue rankings of leading vendors.

    - Appendix A contains a set of definitions relevant to this report.

    - Appendix B contains a data base of the market sizes and growth rates discussed in this report. It includes statistics for each year from 1984 through 1990. Also included is a reconciliation of this year's forecasts with those made a year earlier.

    - Appendix C lists other INPUT reports relevant to the topics discussed in this report.

- Readers of prior INPUT reports in this series will note that the delivery mode previously termed "integrated systems" is now called "turnkey systems."

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INPUT made this name change to avoid confusion with similar terms like "integrated software systems" which addresses multiple software applications that interface with each other and which, when sold by a vendor, may not necessarily include hardware.

- Most value-added resellers (VARs) are classified by INPUT as turnkey vendors because they combined software with hardware and sell it as an applications solution, complete with ongoing support.

- Exhibit I-I on the following page profiles the classification scheme used by INPUT to structure software application areas. Readers will find this chart helpful in understanding which applications are included in the turnkey systems market segment forecasts contained in this report.

C.   METHODOLOGY

- The process of forecasting is a continuous one. Two fundamental and complimentary approaches are used to analyze the industry.

    - The first approach requires a constant interface through formal and informal interviews and contacts with buyers of turnkey systems in each of the industries surveyed.

    - The second approach requires an ongoing monitoring of all turnkey systems vendors with annual revenues greater than $10 million. Stratified random sampling techniques are employed to estimate the size and change in that portion of the industry represented by smaller firms.

- At the convergence of these two processes, INPUT researchers analyze industry size, composition, change, direction, etc. to generate the forecasts included in this report.

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EXHIBIT 1-1

SOFTWARE MARKET STRUCTURE

Software

Systems Software

Systems Control
- Access Control
- Communications Monitors
- Micro-Mainframe Links
- Network Control
- Operating Systems
- Security Systems
- System Library Control
- Windowing Systems
- Other

Data Center Management
- Capacity Management
- Computer Operations Scheduling
- Data Center Management
- Disk Management
- Downtime/Repair Monitoring Management
- Job Accounting
- Performance Monitors
- Tape Management
- Utilities
- Other

Applications Development

Program Development and Production Tools
- Application Generators
- Assemblers
- Automatic Documentation
- Compilers
- Debugging Aids
- Languages (All Generations)
- Systems Development Control
- Retrieval Systems
- Translators
- Other

Data Base Management Systems
- Data Base Management Systems
- Data Dictionaries
- Other

Applications Software

Cross-Industry

Accounting
- Accounts Payable
- Accounts Receivable
- Fixed Assets
- General Ledger
- Purchasing
- Other

Human Resources
- Benefits
- Payroll
- Personnel
- Other

Planning and Analysis
- Budgeting
- Financial Planning
- Forecasting
- Integrated Analysis Systems
- Modeling
- Spreadsheet Systems
- Project Management
- Other

Engineering and Scientific
- Chemical/Biological
- Electrical
- Mechanical
- Piping
- Nuclear
- Statistics/Operations Research
- Structural Analysis
- Other

Education and Training
- Authoring Languages
- Computer-Assisted Instruction
- Other

Other Cross-Industry
- Business Graphics
- Sales, Marketing and Distribution
- Word Processing
- Desktop Managers
- Other

Industry-Specific
- Banking & Finance
- Discrete Manufacturing
- Distribution (Retail and Wholesale)
- Education
- Federal Government
- Insurance
- Medical
- Process Manufacturing
- Services
- State & Local Government
- Telecommunications
- Transportation
- Utilities
- Other

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- All forecast numbers presented are in current dollars (i.e., 1990 market sizes are in 1990 dollars). Inflation is assumed to be 3% for 1985, 4% for 1986, 5% for 1987, and 6% for each year from 1988 through 1990.

- INPUT always welcomes comments, inquiries, and suggestions relating to report contents and structure.

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II EXECUTIVE SUMMARY

II EXECUTIVE SUMMARY

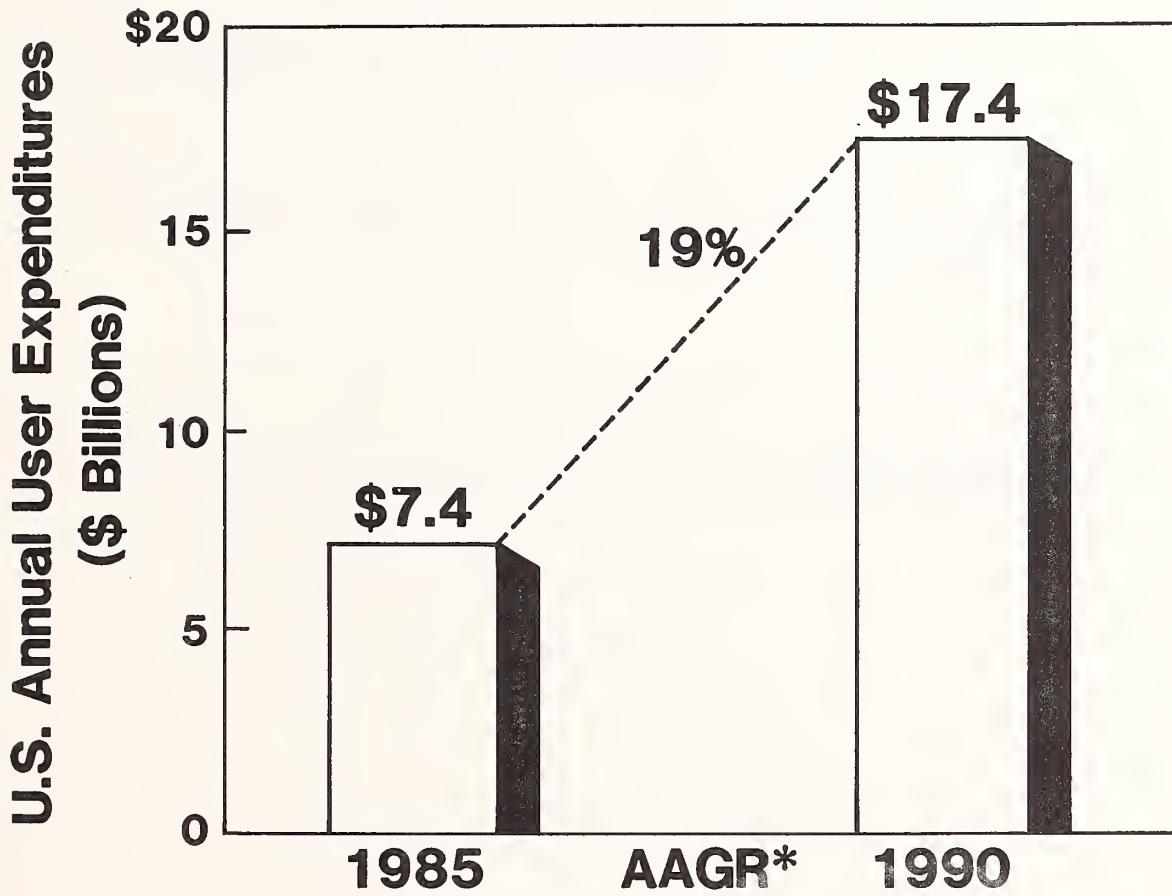- This chapter summarizes key forecasts, issues, and trends that are discussed in more detail in the remainder of the report.

- This Executive Summary is prepared in a presentation format; i.e., the exhibits are set in larger type for ease of use with an overhead projector and the text is in script form. The script for each exhibit is contained on the left-hand page opposite the exhibit.

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A.   TURNKEY MARKET HAS SOLID LONG-TERM OUTLOOK

- User expenditures for turnkey systems will increase almost two and one-half times during the next five years. From a 1985 base of $7.4 billion, the market will average a 19% annual growth to become a $17.4 billion opportunity by 1990.

- In spite of a yearly growth rate decline from 30% in 1984 to 16% for the year ending 1985, there are numerous positive driving forces that will improve the outlook for the turnkey market during the remainder of the decade. These factors include:

    - The urgency which top management is assigning to the use of automation as a major competitive tool, an attitude which favors turnkey's "ready-to-go" solutions.

    - The every-increasing appeal of a turnkey vendor's "one stop" service, which relieves confused buyers of a time-consuming, error-prone mix and match approach to selecting the most appropriate hardware/software/service.

    - The continuously improving price/performance of both mini and microcomputers which opens new markets by lowering the entry threshold of turnkey solutions.

- The turnkey market will also be fueled by the healthy growth of the software product marketplace. Turnkey vendors will have a constantly expanding menu of extremely innovative software solutions available for bundling into a turnkey offering.

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EXHIBIT II-1

TURNKEY MARKET HAS
SOLID LONG-TERM OUTLOOK

Bar chart titled "TURNKEY MARKET HAS SOLID LONG-TERM OUTLOOK". Y-axis: U.S. Annual User Expenditures ($ Billions), from 0 to $20. 1985 bar = $7.4; 1990 bar = $17.4. AAGR* = 19%. *Average Annual Growth Rate

B.   MAJOR INDUSTRY RESTRUCTURING TO CONTINUE

● The underlying structure of the turnkey industry will continue to change during the next five years.

- The marketplace will become more concentrated. Whereas the top 10 vendors comprise only 22% of the market currently, this percentage will increase by five to ten percentage points during the next five years. The additional concentration will be most prevalent in major national markets such as CAD/CAM/CAE, medical, and discrete manufacturing. These segments require especially complex solutions which in turn require major ongoing R&D investments from turnkey vendors.

- Value-added resellers (VARs) will increasingly emerge from existing computer-oriented organizations, such as in-house information systems departments and computer dealers. Many Fortune 1000 firms will offer proprietary turnkey solutions to their dealers and/or suppliers. This "be-our-own" turnkey vendor approach offers major advantages to corporations anxious to maintain or enhance business control over their users and/or affiliates. These groups bring to the VAR market numerous pre-established assets (such as a "brand name" and a reservoir of technical and support talent) which are difficult to acquire without major investments of time and money. These new competitors have excellent access to their "marketplace" which can result in insurmountable entry barriers to "outside" turnkey providers.

- Many of the vendors who, as a "sideline," offer turnkey solutions to markets which are not sharply defined and use strategies which are not frequently reviewed will be forced to make major increases in their commitment to the marketplace or else drop out. The rapidly changing economics of developing, as well as selling, solutions will preempt the casual approaches of the past.

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EXHIBIT II-2

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MAJOR INDUSTRY RESTRUCTURING TO CONTINUE

- **More Concentration**

- **Many VARs to Evolve from Existing Organizations**

- **"Sideline" Vendors Must Recommit or Drop Out**

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C. THE "VALUE-ADDED" OF THE FUTURE WILL BE MOSTLY SERVICE

- As users become willing to implement ever more complex systems which address the heart of the user's business, service rather than excessive product features will become the key determinant of vendor success. Services that will be especially valued by turnkey systems buyers of the future will include:

    - Education in the management principles underlying the architecture of the application. Even very well designed systems can fail if key users refuse to accept the new ways of doing business that the turnkey system utilizes. Vendors who establish motivational-related education that more clearly justifies the application's philosophy of business will possess important product differentiation.

    - More extensive pre-installation systems consulting. Successful systems of the future require a great deal of smoothly designed connectivity to other systems upon which the turnkey application depends. Turnkey vendors of the future should be willing to provide consulting that carefully analyzes these related systems and advises on modifications that will improve the performance of the overall collection of systems.

    - Innovative hardware/software problem resolution methods. Vendors must continually strive to reduce both the time required to resolve system bugs and the high-cost labor component that must be expended. Techniques should be explored such as advanced remote diagnostics, on-line access to problem resolution data bases, and two-way customer-vendor electronic interaction.

- Turnkey systems vendors of the future will become so service oriented that they will, in some cases, begin to resemble a quasi-facilities management supplier.

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EXHIBIT II-3

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THE "VALUE-ADDED" OF THE FUTURE WILL BE MOSTLY SERVICE
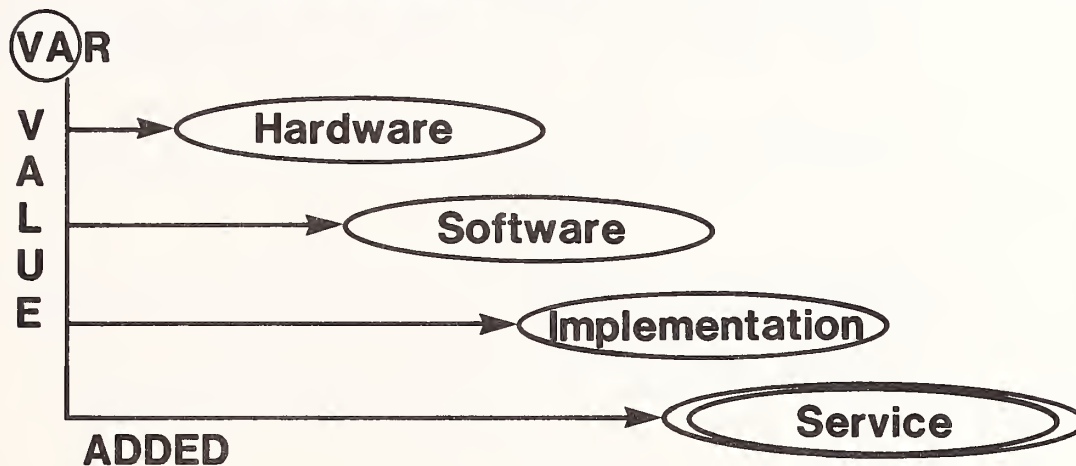
- **Key Components Include:**

  - **Education in Underlying Management Principles**

  - **More Pre-Installation Consulting**

  - **Innovative Problem Resolution Methods**

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D.   RECOMMENDATIONS

• Turnkey vendors should focus on strengthening their competitive edge via:

-    Stronger emphasis on industry-specific solutions that automate the main operations of the user's business. This approach helps users most easily justify automation payoffs and helps specialty vendors keep less knowledgeable competition at bay. An in-depth industry orientation is also a strong antidote to the attempts by internal information systems departments to become turnkey suppliers to their own end users or affiliated organizations.

-    More aggressive use of software development tools. These productivity packages reduce the product development cycle, thereby enabling vendors to capture critical market share earlier.

-    Expanded offerings of add-on software packages. Buyers in the future will increasingly prefer vendors who have proven their trustworthiness by past performance. Vendors should develop even more comprehensive product lines which enable customers to expand into related applications. Significantly lower marketing costs make these add-on sales potentially very profitable.

-    Heavy emphasis on service. Enthusiastic user support of a vendor's offering is most frequently a function of effective education combined with highly responsive ongoing problem resolution. Unusually good service can far outweigh other aspects of a vendor's offerings over the long run.

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EXHIBIT II-4

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RECOMMENDATIONS

- **Strengthen Competitive Edge Via:**

  - **Stronger Industry-Specific Focus**

  - **More Aggressive Use of Software Development Tools**

  - **Expanded Offerings of Add-On Software**

  - **Heavy Emphasis on Service**

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III MARKET FORECASTS AND CHARACTERISTICS

# III   MARKET FORECASTS AND CHARACTERISTICS

A.   MARKET FORECAST

I.   FIVE-YEAR OUTLOOK: 1985-1990

- The turnkey systems market will increase at an average annual growth rate of 19% to become a $17.4 billion opportunity by 1990 (see Exhibit III-1). This represents a more than twofold growth of user expenditures over the 1985 level of $7.4 billion.

- Turnkey systems will outpace processing services in annual growth and will be very close to professional services' rate of increase during the next five years. Although turnkey will continue to be the smallest of the four major information services delivery modes throughout the remainder of the decade, the 1990 turnkey market size nevertheless will be greater than the largest delivery mode (processing services) of 1985.

- A number of factors are influencing the growth rate for turnkey systems:

    - Positive factors include:

        . Growth of U.S. economy. Capital spending will continue to grow throughout the decade, thereby providing a built-in budget source for turnkey systems.

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EXHIBIT III-1

TURNKEY SYSTEMS MARKET SIZE COMPARISON
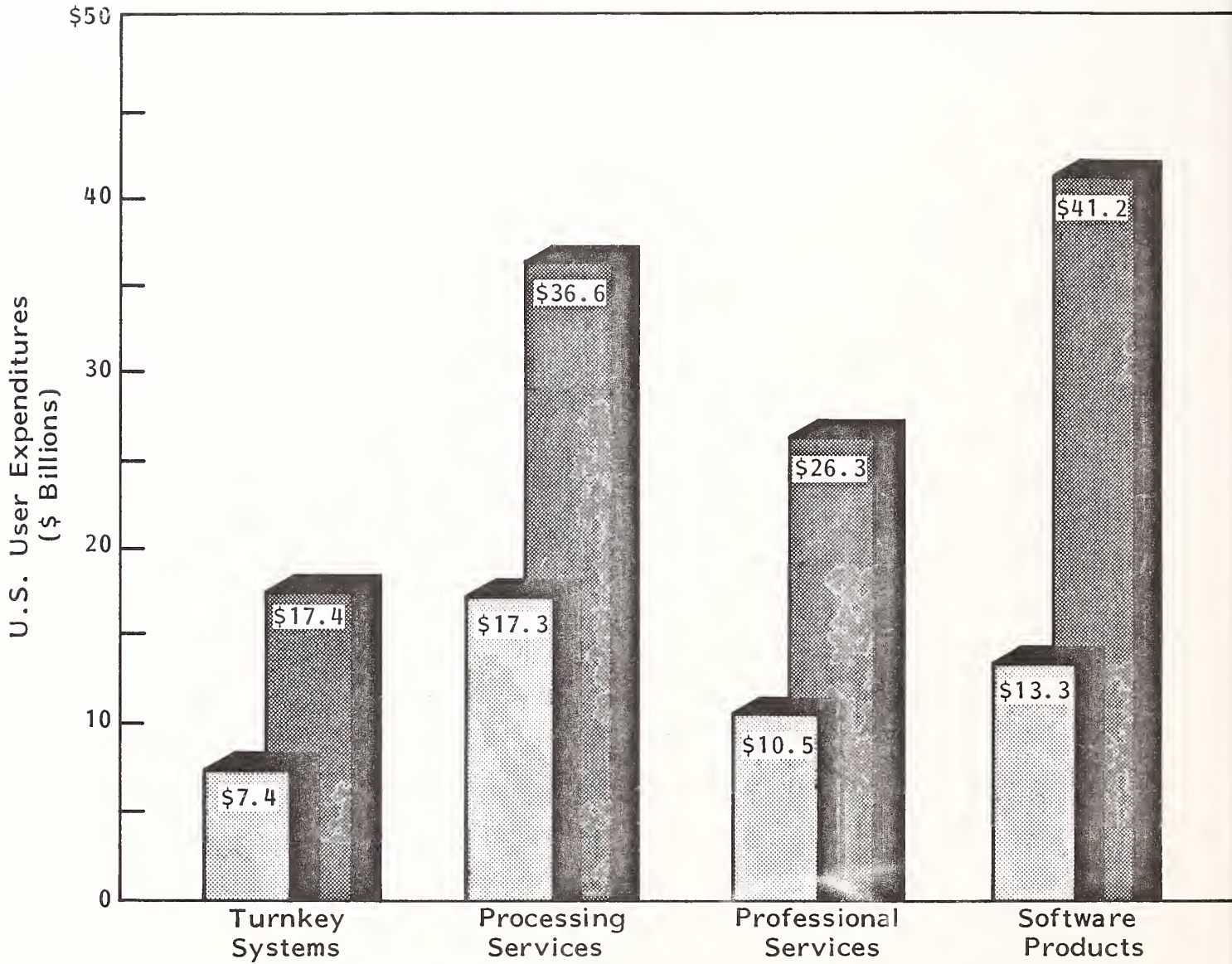
Note: Dollar amounts are rounded to the nearest $10 million.

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- Information systems (IS) departments' focus on large applications. Overburdened, centralized data processing units will continue to "allow" end users to acquire turnkey systems while they concentrate on developing and installing bigger, more complex systems which impact the overall corporation in a more strategic manner.

- Improvement in hardware price/performance. This economic phenomena will be prevalent for the next five years and thus will open major new markets and applications by lowering the automation entry price.

- Decentralization of management. This ongoing organizational technique enables turnkey purchasing authority to remain close to the system user, thereby making application justification faster and easier.

- MBA management culture. Computer-confident professional business managers will infiltrate higher levels of management and therefore provide a more willing forum for turnkey systems acquisitions.

- Improvements in distributed systems technology, micro-main-frame links, local area networks, and other communications-related capabilities. These technologies will become more widely accepted, thereby helping to enhance the value of department-oriented turnkey systems which can connect to these data pathways.

- Increased end user sophistication. The ubiquity of micro-computers will whet users' computing appetites for more powerful solutions that remain under their control. Turnkey systems fit this need especially well.

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- Confusion caused by multiple system alternatives. The explosion of hardware/software options is bewildering even to computer-knowledgeable buyers. Turnkey's "ready-to-go" solution backed by the vendor's comprehensive service thus becomes an enticing proposition.

- Viability of the micro-based value-added reseller. With several thousand VARs already in existance, the list of successes with both small and large customers grows longer. Thus, users will become more open to accepting VAR solutions during the next five years.

- Negative factors impacting turnkey systems growth include:

  - Short-term budgeting. Buyers of turnkey systems typically lack long-range plans and budgets. Thus, even minor departmental cutbacks in spending rarely exclude computer expenditures.

  - Implementation bottleneck. The proliferation of automated solutions in the past several years is beginning to tax the ability of the buying organizations to change fast enough to accommodate all the new policies and procedures required. Thus, even very attractive new turnkey offerings can be postponed until prior installed systems are digested. The lack of availability of more comprehensive vendor support also contributes to this drag on market growth.

2. ERRATIC GROWTH

- Although INPUT believes that turnkey systems have a bright future, as shown by the five-year outlook described above, the market is more susceptible to rapid swings in growth rates than are many other information services

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delivery modes. Exhibit III-2 illustrates these shifts during the past four years.

- Real growth rates increased during the middle two years, but declined steeply in the other two periods.

- The 1984-1985 decline is the most severe of the decade to date. User expenditures for this period increased by 16%, down from a 30% growth rate for the previous 12-month timeframe.

• A different perspective on this phenomena of declining growth rates is available in Exhibit III-3. This composite look at 18 publicly-held turnkey vendors shows the steady revenue growth rate decline which has taken place since the second quarter of 1984. The impact on net profits has been even more severe since vendor management failed, for the most part, to take appropriate cost cutting measures in anticipation of the downturn.

• Causes for this variability in growth rates during the past several years are primarily related to the nature of the buyer. As discussed above, many recent purchasers of turnkey systems are end users with relatively litle data processing sophistication. They have budgets that are very time and condition sensitive. Downturns in business often have immediate negative impact on planned computer spending. (This is in contrast to centralized, mainframe-oriented computer departments whose budget commitments are often very realistic and are put in place for a longer time period.)

3. INDUSTRY-SPECIFIC VERSUS CROSS-INDUSTRY SEGMENTS

a. Comparison of Overall Size and Growth

• As shown in Exhibit III-4, industry-specific turnkey user expenditures will outperform cross-industry expenditures during the next five years. In 1985, industry-specific applications will exceed $5 billion and will comprise 68% of
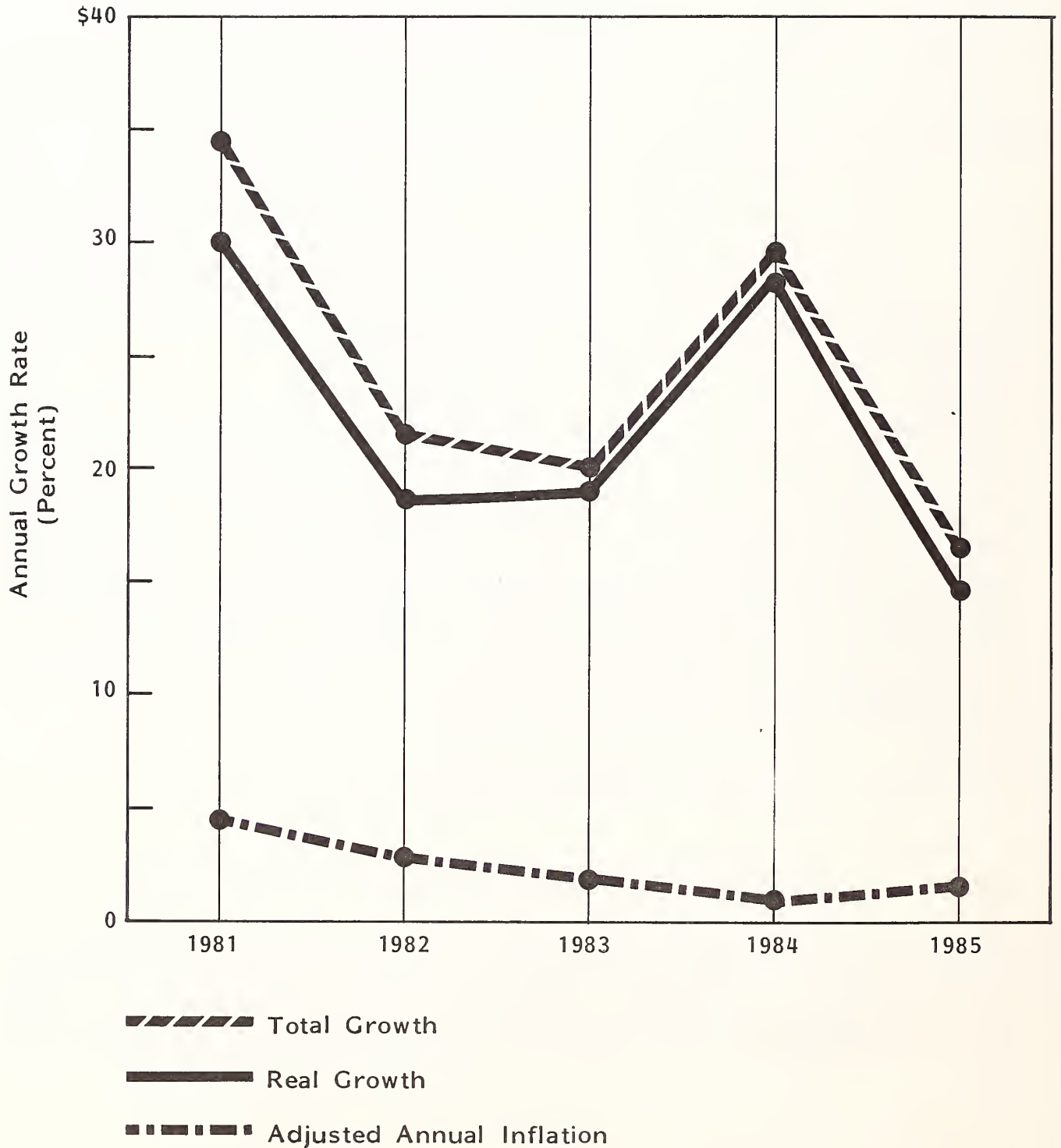
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EXHIBIT III-2

TURNKEY SYSTEMS GROWTH
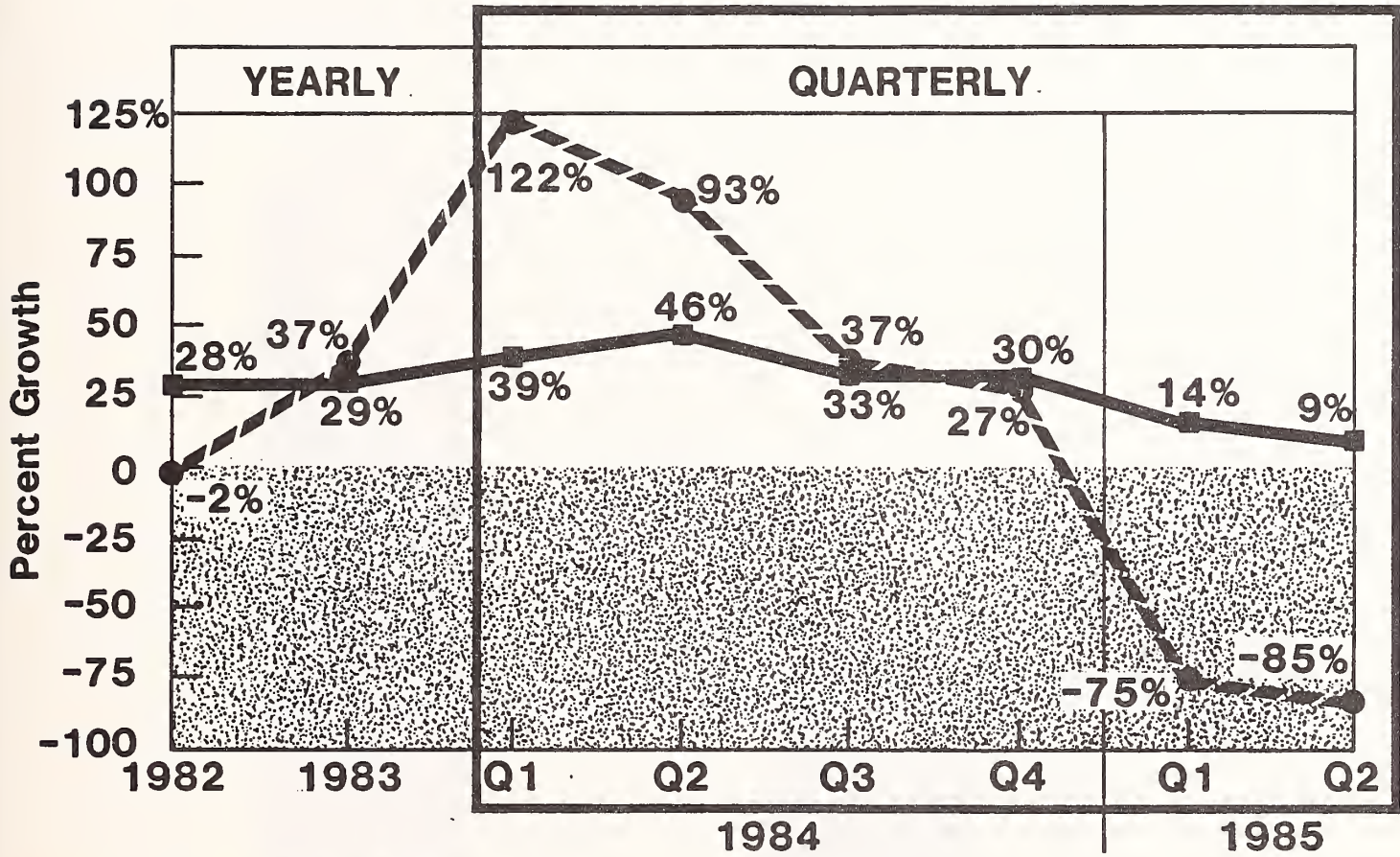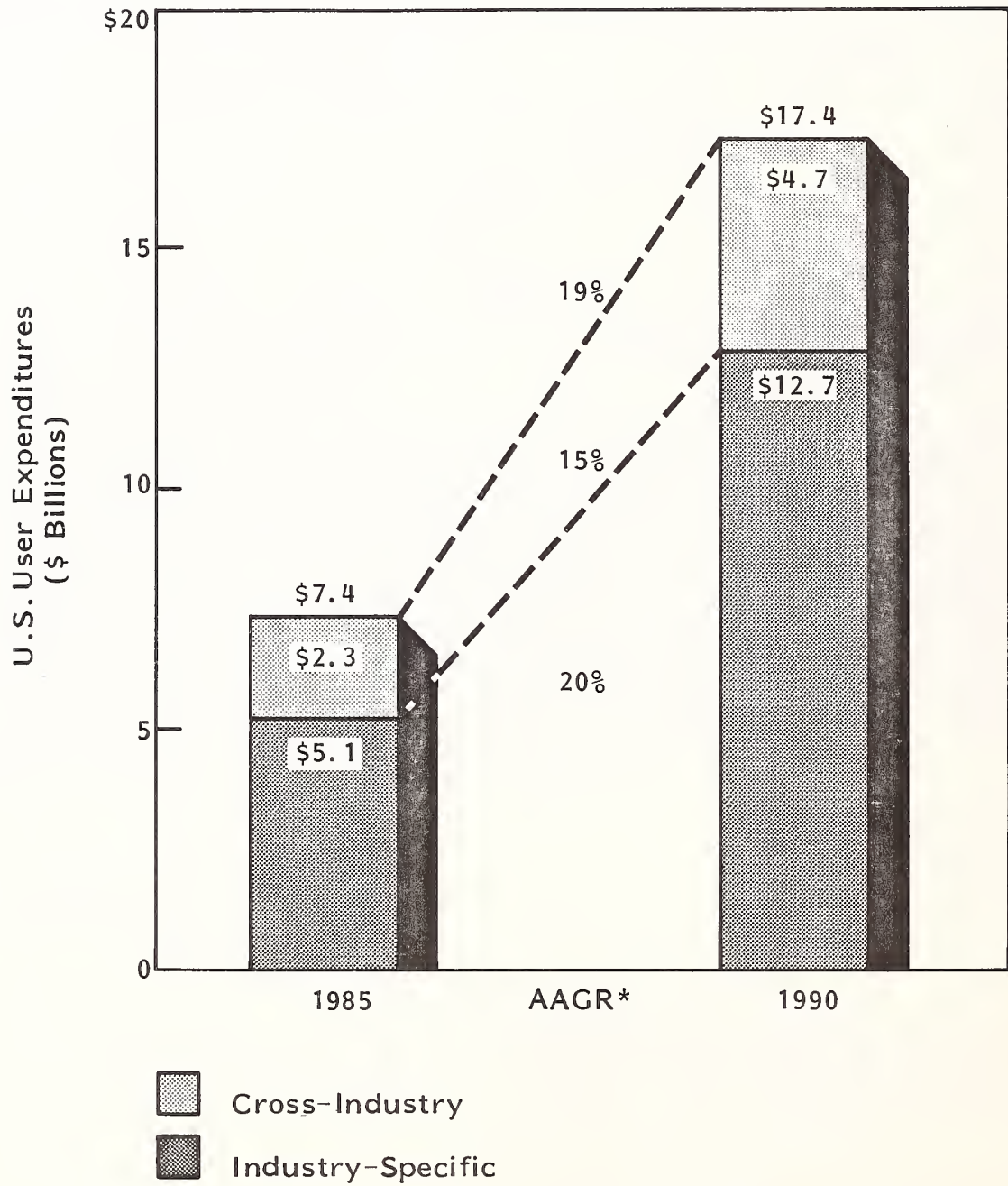### 1981–1985

EXHIBIT III-3

PUBLIC TURNKEY SYSTEMS VENDORS

*Percent growth is based on each quarter as compared to the same
quarter two years earlier.

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EXHIBIT III-4

TURNKEY SYSTEMS MARKET BY SEGMENT TYPE
1985-1990

the entire market. With a growth rate of 20% annually, this segment will increase two and one-half times by 1990 to become a $12.7 billion opportunity. Industry-specific applications' share of the total turnkey market will increase slightly from 68% in 1985 to 73% in 1990.

- Reasons for the stronger showing by industry-specific applications include:

  - Increased buyer sophistication. End users have in many instances cut their teeth on either terminal-based mainframe systems, microcomputers, or earlier turnkey offerings, many of which addressed more generic applications such as accounting and financial analysis. Having had their basic "easier" needs satisfied, they will increasingly want to automate those applications which have the highest potential payback for the organization. In most cases, these types of applications address the mainstream of the organization's operations, which are typically industry-specific. Thus, manufacturers will turn to critical applications such as manufacturing resources planning, retailers to point-of-sale solutions, etc.

  - Emergence of the value-added resellers. Value-added resellers have evolved as a major market force. Encouraged by major hardware vendors, stimulated by ever more powerful micro technology, and propelled by a very focused market strategy, these vendors have successfully developed expertise in very narrow segments where knowledge of the customers business is paramount. Therefore, VAR specialists exist in such diverse vertical areas as consumer goods, plastics manufacturing, office supply stores, farm management systems, etc. These VARs are bringing economical automation to businesses which otherwise would not have the expertise to benefit from this technology.

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b.   Comparison of 13 Major Industry Segments

• Exhibit III-5 provides a quick comparison of 13 major industry turnkey systems market sizes and growth rates for the period 1985 and 1990.

-    Discrete manufacturing is both the largest market in 1985 and also one of the fastest growing (21%). CAD/CAM/CAE comprises over one-quarter of the entire discrete manufacturing market and as such contributes much to the attractiveness of the overall discrete manufacturing marketplace. CAD/CAM/CAE encountered tough times in 1985 due to reduced capital spending (on the user side) and stumbles in market strategy (on the vendor side). However, the five-year outlook is strong and will help stimulate the overall discrete manufacturing market.

-    Services and "Other Industries" will be the growth leaders at 27% for the balance of the decade. From a small base in 1985 ($400 million), this segment will reach $1.5 billion in user expenditures by 1990. This segment will benefit greatly from the proliferation of smaller, regionally-oriented vendors who are especially well suited (by virtue of their economical micro-based systems and local support) to address the needs of the thousands of small business units that comprise this market, such as accountants, lawyers, hotels/motels, construction, and real estate.

-    Banking and finance will continue to be a major turnkey systems market during the next five years. An 18% average annual growth rate will lift 1985 user expenditures of $0.6 billion to $1.5 billion by 1990. As this segment struggles to adjust to the chaos of deregulation, turnkey solutions will have high appeal as individual financial units look for creative ways to enhance their competitive edge via automation-based new products.

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EXHIBIT III-5

TURNKEY SYSTEMS
INDUSTRY-SPECIFIC APPLICATIONS MARKETS, 1985-1990

		AAGR* 1985-1990
Discrete Manufacturing	$1.5 ... $3.8	21%
Process Manufacturing	$0.3/$0.7	14
Transportation	$0.1/$0.3	20
Utilities	$.04/$0.1	20
Telecommunications	$0.2/$0.5	20
Distribution	$0.4 ... $1.0	20
Banking and Finance	$0.6 ... $1.5	18
Insurance	$0.2/$0.4	20
Medical	$0.5 ... $1.2	18
Education	$0.1/$0.2	19
Services and "Other Industries"	$0.4 ... $1.5	27
Federal Government	$0.5 ... $1.2	20
State/Local Government	$0.1/$0.2	20

0   0.5   1.0   1.5   2.0 $4.0

U.S. User Expenditures
($ Billions)

		AAGR*
1985	$5.1	20%
1990	$12.7	

*Average Annual Growth Rate

Note: All dollar amounts are rounded to the nearest $100 million.

4.   CUSTOM VERSUS PACKAGED TURNKEY MARKETS

- The custom market includes those turnkey systems where the vendor develops software uniquely designed for the needs of a specific customer. The hardware component may or may not be customized.

- The custom turnkey market will remain a small but viable segment during the next five years. As shown in Exhibit III-6, user expenditures will increase from $0.7 billion to $1.6 billion by 1990, an average annual growth rate of 16%.

- Custom turnkey's share of the entire turnkey market will remain at close to 10% for the entire five-year period. This market niche will continue to focus on specialized applications where the customer is sufficiently sophisticated (and budgeted) to define its unique needs.

- One of the key driving forces which will shape the custom marketplace for the next five years is the importance of automating an especially critical business function. The more reliant the user is on an application to perform the organization's primary task, and the higher the penalty for system failure, the more appealing a custom turnkey solution is.

- The next five years will bring hardware and software capabilities that open up ever more sophisticated applications opportunities for well-funded buyers predisposed toward custom-fit solutions.

B.   MARKET STRUCTURE

- The turnkey systems marketplace has the distinction of being both very concentrated (in terms of vendor size) at the high end and yet being extremely diverse at the low end where most of the thousands of VARs reside. The

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EXHIBIT III-6

CUSTOM VERSUS PACKAGED TURNKEY SYSTEMS MARKET
1985-1990

Custom

Packages

*Average Annual Growth Rate

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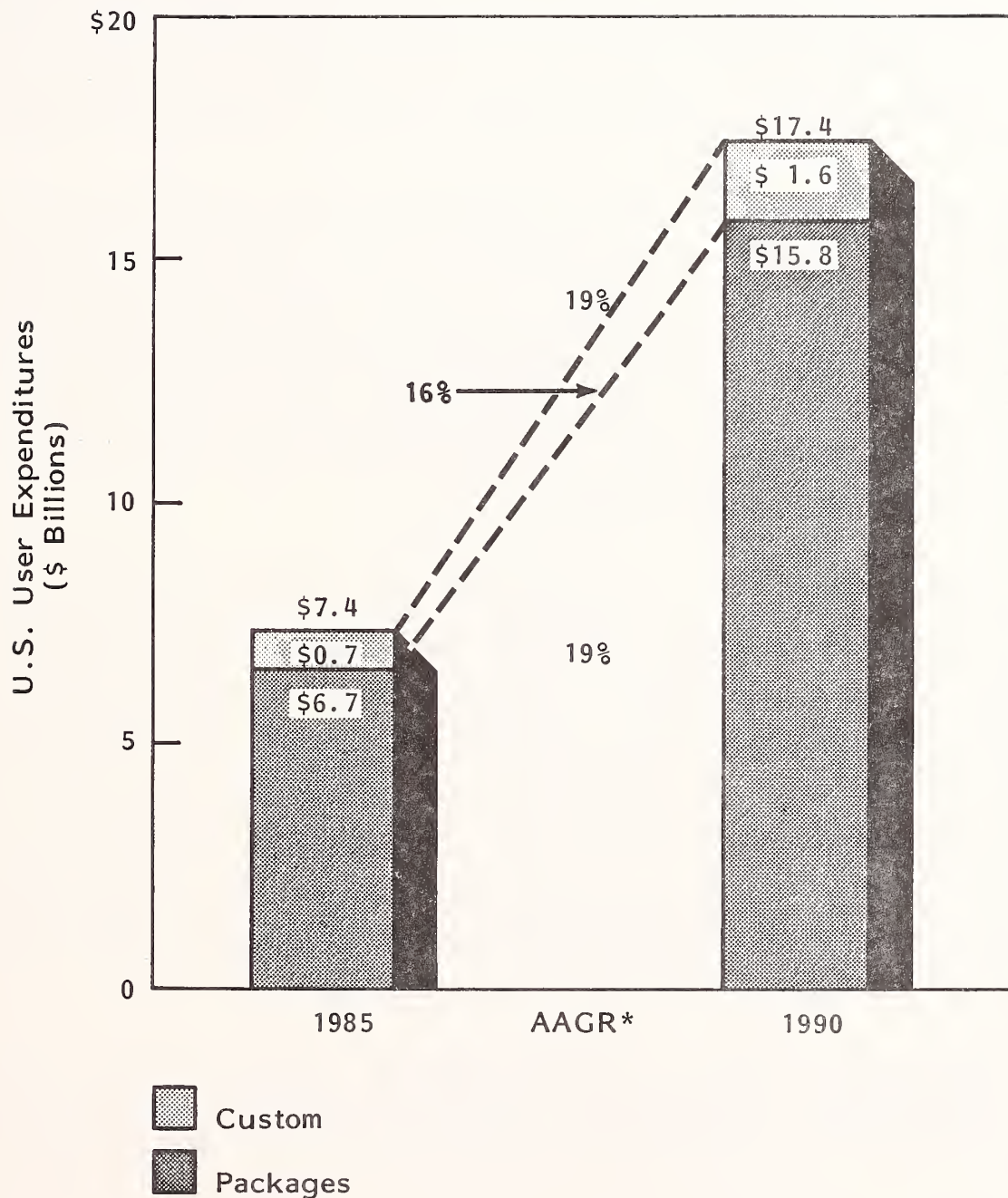
differences are largely a function of the characteristics of the buyer and the applications that the vendors are addressing.

• The largest turnkey systems vendors comprise a higher share of the total marketplace than is found in most other information services delivery modes. As shown in Exhibit III-7, the 10 largest turnkey vendors constitute 22% of the total market while the top 20 suppliers make up almost one-third of all expenditures. This concentration is primarily due to the character of the CAD/CAM/CAE marketplace where economies of scale are needed to cover the huge R&D investments and aggressive marketing requirements.

• Value-added resellers, on the other hand, exist by the thousands and in the aggregate contribute an estimated $2.4 billion (31%) of the marketplace. For the most part, they are selling to smaller businesses that until recently were largely ignored. Extremely favorable hardware price/performance advances combined with the enthusiasm generated by the creation of suppliers with a low overhead/high entrepreneurial flavor have enabled these sellers to create tens of thousands of customers.

• VARs are creating a major upheaval from a market structure point of view. The power of their applications solutions for the price they charge has placed great pressure on many of the traditional mini-based turnkey vendors. Whereas these mini vendors historically could rely upon their higher priced products to cover the enormous cost of national direct sales, the new economies of micro-based solutions placed in the hands of the locally-oriented VARs is forcing many of mini vendors to consider alternate distribution channels and/or reconfigure and reprice their offerings. This is especially true in the "services and other" market segment.

• Value-added resellers typically respond to the cost of sales challenge by selling direct in geographically restricted areas and/or by using storefronts.

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EXHIBIT III-7

TWENTY LARGEST TURNKEY SYSTEMS VENDORS

1984 CALENDAR YEAR REVENUES ($ Millions)	RANK 1984	RANK 1983	COMPANY
$306	1	1	Computervision Corporation
283	2	2	Intergraph Corporation
135	3	3	Calma Company
113	4	4	Triad Systems Corporation
109	5	11	McDonnell Douglas Information Services
101	6	6	Gerber Scientific
91	7	5	Computer Consoles
89	8	12	Ultimate Corp. (The)
89	8	10	HBO & Co.
86	10	8	Reynolds & Reynolds
72	11	7	Applicon
71	12	15	Control Data Corp.
69	13	9	C3
62	14	17	Ask Computer Systems, Inc.
61	15	13	Auto-Trol Technology Corp.
59	16	37	Daisy Systems
58	17	16	Evans & Sutherland
50	18	19	Shared Medical Systems
45	19	30	Symbolics
45	19	18	ADP

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- Exhibit III-7 also illustrates the impact of vendors who are dedicated to a turnkey marketplace. Only 6 of the top 20 vendors listed are firms which have parent corporations in other businesses. Vendors who concentrate their entire corporate resources solely to the challenges of the turnkey marketplace are better able to rise to the upper echelons of turnkey market size and influence.

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IV ISSUES AND TRENDS

IV   ISSUES AND TRENDS

- The turnkey systems marketplace is undergoing major changes in terms of economics, user requirements, and competiive responses. These changes will have significant long-term impacts on the nature and character of the environment in which turnkey vendors will battle for the rest of the decade.

- Advances in technology is one of the key underlying driving forces that is shaping the turnkey systems marketplace. Technology is:

    - Driving down the price of hardware while greatly increasing its functionality.

    - Improving the productivity of software development.

    - Enabling formerly disparate computing units within an organization to link together efficiently for improved information exchange.

- A second major driving force shaping the character of the turnkey market is awakening of non-computing professionals (i.e., end users and top management) to the strategic business payoffs available from creative automation of critical business functions.

- These two driving forces are working in concert to redefine distribution channels, create major pricing pressures, and change the nature of the "value added" that vendors use to establish product differentiation. Each of these impacts is discussed below.

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A. THE VALUE-ADDED RESELLER PHENOMENON

- Technology, in combination with end-user automation demands, is enabling value-added resellers to provide very powerful systems solutions at a price that is often one-third to one-tenth that of traditional minicomputer-based vendors. One of the most visible and dramatic examples of this phenomenon is the CAD/CAM marketplace where Autodesk, a Sausalito (CA) software developer, has sold over 35,000 micro-based CAD software systems called AUTOCAD (at a retail price of approximately $2,000 each), primarily on an OEM or dealer basis.

    - These packages, when combined with hardware by dozens of VARs around the country, provide a $10,000+ alternative to existing minicomputer-based systems that cost $100,000+.

    - AUTOCAD does not claim to provide all the functionality of these higher priced systems, but it offers enough capability to have caused many leading vendors to scramble to respond with their own micro-based versions.

- VARs provide an enormously useful service by offering total systems support to users who lack either the time or the expertise (or both) to define, select, and install such a system.

- The pervasiveness of the VAR opportunity is reflected in the variety of organizations that have elected to become VARs. In addition to independent firms, many of which were organized specifically to become VARs, many computer retailers are signing up.

    - Silicon Valley-headquartered Businessland, for example, operates as a VAR in addition to maintaining storefront locations.

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- Many computer retailers, however, have elected to shift to a regionally-oriented VAR operation and have shuttered their walk-in locations.

- An especially significant development is the decison by numerous information systems (IS) departments within larger corporations to become VARs. Two types of strategies are emerging here.

  - Some IS units are focusing exclusively on serving their own corporation's end users. They obtain OEM discounts for volume purchases from the hardware vendors and then bundle in software, service, and support. Users get an attractive price and the promise of ongoing support, while the "vendor" (IS) is better able to maintain business control over the nature and type of system that its users are implementing.

  - Many corporations are establishing turnkey units to sell systems to their dealers. Caterpillar Tractor, for example, provides turnkey solutions to their retailers around the nation. This approach provides the dealer with systems that are known to be compatible with and supported by their supplier, Caterpillar. Caterpillar itself has the advantage of obtaining greater control over its dealers while simultaneously helping them implement a more professional approach to business management. A key consideration for Caterpillar, and other similarly inclined corporations, is that the business control aspect can be of sufficient importance to even justify losing money on the overall turnkey activity.

- Many VARs are local or regional, which greatly speeds up response time and keeps travel costs reasonable. The VAR approach, however, is not without its challenges. The nature of the VAR business involves very thin margins. User demands for support are high, as is user price sensitivity.

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B.   PRICE PRESSURES

- Price pressures on turnkey systems have been great during 1985 and will continue until at least late 1986. A number of factors have contributed to this, including:

  - Slowdown in capital spending by prospective buyers. Many turnkey buyers are first-time users who underestimate the necessity of getting automated, especially when business conditions become tougher and more competitive.

  - Panic pricing by vendors living with high expense levels that have not been adjusted to account for slowing in buying rates. Faced with high inventories and other fixed expenses, they have taken the short-term view and cut prices, thereby forcing other competitors to follow suit and thus changing the buyer's expectations concerning value.

  - Dumping of inventory by hardware vendors. While this would appear to benefit vendors by allowing them additional margins, in fact many vendors passed these temporary savings onto the customers in an attempt to get the business. This approach set new standards in terms of value expectations that will outlast the temporary hardware discounts vendors have received. Thus, buyers will demand a continuance of the "good deals" of 1985 even though such deals threaten the viability of many vendors over the long run. Only as demand picks up in mid-1986 will some of this pricing pressure ease. Meanwhile, vendors will experience continued squeezes on their profit margins such as have been in effect for the past 18 months (see Exhibit III-3).

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C.   EVOLUTION TO SERVICE

- With the willingness to commit to ever more complex automated solutions, the chance for system failure increases. Over the next several years, the primary question to the turnkey vendor from the prospective buyer will no longer be "How many features do you have over your competitor?" Instead, the buyer will want assurances that whatever is accepted and installed will work to the user's satisfaction. The buyer wants to know that the selected system will be accepted by the people who must make it work and that it will interface with other systems now in place and/or that are likely to be acquired in the future.

- As a result, the successful turnkey vendor will realize that it will become less important what type of hardware and software is provided and will become of paramount importance how the offered system will be supported day after day.

- Because of the future heightened role of service, the value-added reseller (VAR) of the future would more appropriately be called a value-added servicer (VAS).

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V COMPETITIVE DEVELOPMENTS

V COMPETITIVE DEVELOPMENTS

A. GROWTH STARS

- The top three turnkey revenue growth stars among publicly-held vendors are shown in Exhibit V-1. Although already substantial in terms of revenue size (none is less than $80 million on an annual basis), these vendors are consistently increasing their sales at a faster rate than their smaller peers.

- For a detailed picture of the quarterly revenue and net income trends since mid-1983 for publicly-held turnkey systems vendors, see Exhibits B-3 and B-4 in Appendix B.

1. HBO

- This medical market segment specialist outperformed all other public turnkey vendors. Active in the marketplace for over eight years, HBO received a significant revenue boost from its acquisition activities during 1985.

2. DAISY SYSTEMS

- Had it not been for HBO, Daisy Systems would have been the number one turnkey systems star for two years in a row. However, a "slowing" of Daisy's revenue increases from 366% one year ago to the 84% shown in Exhibit V-1 enabled HBO to just barely exceed Daisy's continually impressive sales rates.

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EXHIBIT V-1

TURNKEY SYSTEMS REVENUE GROWTH STARS

RANK	VENDOR	REVENUE GROWTH*	NET INCOME GROWTH*	ANNUAL REVENUES† ($ Millions)
1	HBO	86%	66%	$89
2	Daisy Systems	84	84	82
3	Intergraph	37	33	404

*Percentage increase for nine-month period ending June 1985 versus the same period a year earlier.

†For calendar year 1984.

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- Daisy is the leading supplier of computer-aided engineering (CAE) turnkey systems that target electrical design engineers.

- Its primary markets include engineers working for hardware vendors, semiconductor vendors, and system houses. Daisy is an IBM VAR and includes in its product line a PC/AT-based CAE offering.

3.   INTERGRAPH

- Intergraph has achieved impressive growth given its large revenue base. Ranked as the number two growth star in last year's INPUT report, Intergraph has still been able to maintain visibility in the top three growth star listing. Whereas the previous INPUT report showed Intergraph with a 69% revenue increase, this year's analysis reveals a 37% growth.

- Intergraph pursues the computer-aided design (CAD) marketplace with emphasis on the civil engineering and mechanical design segment. Its systems utilize 32-bit workstations that integrate with the DEC VAX minicomputer. Intergraph has recently introduced a workstation that uses the 32032 microprocessor from National Semiconductor. This system runs Intergraph's CAD software and can run under UNIX or MS-DOS for access to IBM mainframes. Recently, the company has invested in Tangent Systems Corporation in order to expand into the CAE marketplace.

B.   MICRO-RELATED TURNKEY VENDOR RANKINGS

- Exhibit V-2 shows the top 20 turnkey systems vendors in terms of microcomputer revenue. The influence of the CAD/CAM/CAE market is felt here also as four of the top seven firms target this segment.

EXHIBIT V-2

VENDORS WITH LARGEST MICROCOMPUTER-RELATED
TURNKEY SYSTEMS REVENUE

TIER	MICROCOMPUTER 1984 CALENDAR YEAR REVENUES ($ Millions)	RANK	COMPANY
A	$107	1	Triad Systems Corp.
	92	2	Computervision Corp.
B	59	3	Daisy Systems
	55	4	Auto-Trol Technology Corp.
	45	5	Symbolics
	40	6	Gerber Scientific
	37	7	Lundy Electronics & Systems, Inc.
C	24	8	Safeguard Business Systems
	21	9	C3
	21	10	United Telecommunications, Inc.
	18	11	Manufacturing Data Systems, Inc.
	18	12	Baron Data Systems
	17	13	Telesis Systems Corp.
	15	14	Sycom
	15	15	Cadlinc, Inc.
	15	16	National Computer Systems
	13	17	Moore Data Management Systems
	11	18	Direct, Inc.
	10	19	Three P.M.
	9	20	Electronic Data Systems

- The rankings of Exhibit V-2 segregate easily into three tiers according to revenue size. The top tier (A) includes two of the oldest and largest of the leading turnkey vendors, Triad and Computervision. Both of these firms have encountered tough times in 1985 as revenue growth declined while expense levels were still high. Adapting to new technologies and changing user demands have caused these vendors to lose some market momentum. However, their innate strengths, not the least of which is substantial market position, hold promise for improved results during 1986.

- The second tier includes vendors typically less than one-half the size of the top tier. Toping the B list is growth star leader Daisy Systems.

- The third tier has 13 close-in-size suppliers, all less than $30 million in revenue.

- A number of vendors in this list initially entered the marketplace with minicomputer-based systems (e.g., Computervision, Auto-trol, Gerber, and C3). However, the dynamics of micro technology has demanded that turnkey vendors embrace these smaller systems or face severe competitive sequences.

C.   OTHER COMPETITIVE ISSUES

- Many large corporations will impact the competitive structure of the market-place when they themselves provide turnkey systems offerings to their end users, dealers, and/or suppliers. As discussed in Chapter IV, these large firms will have two significant advantages over "traditional" turnkey vendors:

    - They have instant credibility with their market due to their already established business affiliation.

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- They may be willing to price lower than normal turnkey business margins would allow because of the high value to them of establishing tighter control over their targeted customers.

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APPENDIX A: DEFINITIONS

APPENDIX A: DEFINITIONS

- <u>INFORMATION SERVICES</u>--Computer-related services involving one or more of the following:

    - Processing of computer-based applications using vendor computers (called "processing services").

    - Services that assist users in performing functions on their own computers or vendor computers (called "software products" and/or "professional services").

    - Services that utilize a combination of hardware and software, integrated into a total system (called "turnkey systems").

A. <u>USER EXPENDITURES</u>

- All user expenditures reported are "available" (i.e., noncaptive, as defined below).

- <u>NONCAPTIVE INFORMATION SERVICES USER EXPENDITURES</u> - Expenditures paid for information services provided by a vendor that is not part of the same parent corporation as the user.

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- <u>CAPTIVE INFORMATION SERVICES USER EXPENDITURES</u> - Expenditures received from users who are part of the same parent corporation as the vendor.

B. <u>DELIVERY MODES</u>

- <u>PROCESSING SERVICES</u> - This category includes remote computing services, batch services, processing facilities management, and value-added networks (VANs).

  - <u>REMOTE COMPUTING SERVICES (RCS)</u> - Providing computer processing to a user by means of terminal(s) at the user's site(s) connected by a data communications network to the vendor's central computer. There are four submodes of RCS, including:

    - <u>Interactive</u> - Characterized by the interaction of the user with the system for the purpose of problem-solving, data entry, and/or transaction processing. The user is on-line to the program/files. Computer response is usually measured in seconds or fractions of a second.

    - <u>Remote Batch</u> - A service in which the user hands over control of a job to the vendor's computer, which schedules job execution according to priorities and resource requirements. Computer response is usually measured in minutes or hours.

    - <u>Data Base</u> - Characterized by the retrieval and processing of information from a vendor-provided data base. The data base may be owned by the vendor or a third party.

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- • <u>User Site Hardware Services (USHS)</u> - Offerings provided by RCS vendors that place programmable hardware on the user's site (rather than in the vendor's computer center). USHS offers access to a communications network, access through the network to the RCS vendor's larger computers, and significant software as part of the service.

- <u>BATCH SERVICES</u> - This includes computer processing performed at vendors' sites of user programs and/or data that are physically trans-ported (as opposed to electronically by telecommunications media) to and/or from those sites. Data entry and data output services, such as keypunching and computer output microfilm processing, are also included. Batch services include those expenditures by users who take their data to a vendor site that has a terminal connected to a remote computer for the actual processing.

- <u>PROCESSING FACILITIES MANAGEMENT (PFM)</u> (also referred to as "resource management" or "systems management") - The management of all or a major part of a user's data processing functions under a long-term contract (more than one year). This would include both remote computing and batch services. To qualify as PFM, the contractor must directly plan, control, operate, and own the facility provided to the user, either on-site, through communications lines, or in a mixed mode.

- <u>VALUE-ADDED NETWORKS (VANs)</u> - VANs typically involve common carrier network transmission facilities that are augmented with computerized switching. These networks have become associated with packet-switching technology because the public VANs that have received the most attention (e.g., Telenet and TYMNET) employ packet-switching techniques. However, other added data service features such as store-and-forward message switching, terminal inter-facing, error detection and correction, and host computer interfacing are of equal importance.

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- Processing services are further differentiated as follows:

    • Cross-industry services involve the processing of applications that are targeted to specific user departments (e.g., finance, personnel, sales) but that cut across industry lines. Most general ledger, accounts receivable, payroll, and personnel applications fall into this category. Cross-industry data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are included in this category. General-purpose tools such as financial planning systems, linear regression packages, and other statistical routines are also included. However, when the application, tool, or data base is designed for specific industry use, then the service is industry-specific (see below).

    • Industry-specific services provide processing for particular functions or problems unique to an industry or industry group. Specialty applications can be either business or scientific in orientation. Industry-specific data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are also included under this category. Examples of industry-specific applications are seismic data processing, numerically controlled machine tool software development, and demand deposit accounting.

    • Utility services are those for which the vendor provides access to a computer and/or communications network with basic software that enables users to develop and/or process their own systems. These basic tools often include terminal-handling software, sorts, language compilers, data base management systems, information retrieval software, scientific library routines, and other systems software.

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- <u>SOFTWARE PRODUCTS</u> - This category includes users' purchases of applications and/or systems software that is sold by vendors as standard products intended for use by different organizations. Included as user expenditures are lease and purchase expenditures as well as fees for work performed by the vendor to implement and maintain the package (when such fees are either bundled as part of the product price or offered on an annual subscription basis). Fees for work related to education, consulting, and/or custom modification of software products are counted as professional services, provided such fees are charged separately from the price of the software product itself. There are several subcategories of software products, including:

  - <u>APPLICATIONS SOFTWARE PRODUCTS</u> - Software that performs a specific function directly related to solving a business or organizational need. Applications software provides information directly for use by the end user. Applications software products classifications are:

    - <u>Cross-Industry Products</u> - Used in multiple user industry sectors. Examples are payroll, inventory control, and financial planning.

    - <u>Industry-Specific Products</u> - Used in a specific industry sector such as banking and finance, transportation, or discrete manufacturing. Examples are demand deposit accounting, airline scheduling, and materials resource planning.

  - <u>SYSTEMS SOFTWARE PRODUCTS</u> - Software that enables the computer/communications system to perform basic functions, which are interim steps to providing the end user with "answers" sought. Systems software product classifications are:

    - <u>Systems Control Products</u> - These products function during applications program execution to manage the computer system

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resource. Examples include operating systems, communication monitors, and emulators.

- Data Center Management Products - These products are used by operations personnel to manage the computer system resources and personnel more effectively. Examples include performance measurement, job accounting, computer operations scheduling, and utilities.

- Application Development Products - These products are used to prepare applications for execution by assisting in design, programming, testing, and related functions. Examples include languages, sorts, productivity aids, data dictionaries, data base management systems, report writers, and retrieval systems.

- **PROFESSIONAL SERVICES** - This category is made up of modes in the following categories:

    - **SOFTWARE DEVELOPMENT** - This service develops a software system on a custom basis. It includes one or more of the following: user requirements, system design, contract, and programming.

    - **EDUCATION AND TRAINING SERVICES** - These services help people acquire new skills, techniques, or knowledge related to computers. This definition does not include services to educational institutions. (This latter market is included in the education (industry-specific) segment.)

    - **CONSULTING SERVICES** - Consultants advise clients on computer-related issues that are usually management oriented. Feasibility studies and computer audits are examples of services provided.

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- <u>PROFESSIONAL SERVICES FACILITIES MANAGEMENT (PSFM)</u> - This is counterpart to processing facilities management, except that in this case the computers are owned by the client, not the vendor; the vendor provides human resources to operate and manage the client facility.

- <u>TURNKEY SYSTEMS</u> (also known as Integrated Systems) - A turnkey system is an integration of systems and applications software with CPU hardware and peripherals, packaged as a single applications solution. The value added by the vendor is primarily in the software and support. Most CAD/CAM/CAE systems and many small business systems are turnkey systems. This does not include specialized hardware systems such as word processors, cash registers, or process control systems, nor does it include Embedded Computer Resources for military applications. Turnkey systems are available either as custom or packaged systems.

    - Hardware vendors that combine software with their own general purpose hardware are not classified by INPUT as turnkey vendors.

    - Turnkey systems revenue is divided into two categories.

        - <u>Industry-specific</u> systems--that is, systems that serve a specific function for a given industry sector such as automobile dealer parts inventory, CAD/CAM/CAE systems, or discrete manufacturing control systems.

        - <u>Cross-industry</u> systems--that is, systems that provide a specific function that is applicable to a wide range of industry sectors such as financial planning systems, payroll systems, or personnel management systems.

    - Revenue includes hardware, software, and support functions.

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- <u>SYSTEMS INTEGRATION</u> - Services associated with systems design, integration of computing components, installation, and acceptance of computer/communication systems. Systems integration can include one or more of the major information services delivery modes—professional services, turnkey systems, and software products. System components may be furnished by separate vendors (not as an integrated system by one vendor, called the prime contractor); services may be furnished by a vendor or by a not-for-profit organization. Integration services may be provided with related engineering activities, such as SE&I (Systems Engineering and Integration) or SETA (Systems Engineering and Technical Assistance).

C.   HARDWARE/HARDWARE SYSTEMS

- <u>HARDWARE</u> - Includes all computer communications equipment that can be separatedly acquired, with or without installation by the vendor, and not acquired as part of a system.

    - <u>PERIPHERALS</u> - Includes all input, output, communications, and storage devices, other than main memory, that can be locally connected to the main processor and generally cannot be included in other categories, such as terminals.

    - <u>INPUT DEVICES</u> - Includes keyboards, numeric pads, card records, bar-code readers, lightpens and trackballs, tape readers, position and motion sensors, and A-to-D (analog-to-dialog) converters.

    - <u>OUTPUT DEVICES</u> - Includes printers, CRTs, projection television screens, microfilm processors, digital graphics, and plotters.

    - <u>COMMUNICATION DEVICES</u> - Modems, encryption equipment, special interfaces, and error control.

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- STORAGE DEVICES - Includes magnetic tape (reel, cartridge, and cassette), floppy and hard disks, solid state (integrated circuits), and bubble and optical memories.

- TERMINALS - There are three types of terminals:

  - USER PROGRAMMABLE (also called "intelligent terminals"):

    - Single-station or standalone.

    - Multistation-shared processor.

    - Teleprinter.

    - Remote batch.

  - USER NONPROGRAMMABLE:

    - Single-station.

    - Multistation-shared processor.

    - Teleprinter.

  - LIMITED FUNCTION - Originally developed for specific needs, such as POS (point of sale), inventory data collection, controlled access, etc.

- HARDWARE SYSTEMS - Includes all processors, from microcomputers to super (scientific) computers. Hardware systems require type- or model-unique operating software to be functional, but the category excludes applications software and peripheral devices, other than main memory and processor or CPUs not provided as part of an integrated (turnkey) system.

-   <u>MICROCOMPUTER</u> (or personal computer or PC) - Combines all of the CPU, memory, and peripheral functions of an 8- or 16-bit computer on a chip, in the form of:

    .   Integrated circuit package.

    .   Plug-in board with more memory and peripheral circuits.

    .   Console—including keyboard and interfacing connectors.

    .   Personal computer with at least one external storage device directly addressable by CPU.

-   <u>MINICOMPUTER</u> - Usually a 12-, 16- or 32-bit computer, which may be provided with limited applications software and support, and may represent a portion of a complete large system.

    .   Personal business computer.

    .   Small laboratory computer.

    .   Nodal computer in a distributed data network, remote data collection network, connected to remote microcomputers.

-   <u>MAINFRAME</u> - Typically a 32- or 64-bit computer, with extensive applications software and a number of peripherals in standalone or multiple CPU configurations for business (administrative, personnel, and logistics) applications, also called a General-Purpose Computer.

    .   Large computer mainframes are presently centered around storage controllers but likely to become bus-oriented and to consist of multiple processors (CPUs) or parallel processors;

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they are intended for structured mathematical and signal processing, and are generally used with general-purpose von-Newmann-type processors for system control.

- Supercomputer mainframes are high-powered processors with numerical processing throughout that is significantly greater than the largest general-purpose computers, with capacities in the 10-50 MFLOPS (million floating point operations per second) range, in two categories:

- <u>REAL TIME</u> - Generally used for signal processing.

- <u>NONREAL TIME</u> - For scientific use, with maximum burst-mode (but sustained speed) capacities of up to 100 MFLOPS, in one of three configurations:

    - Parallel processors.

    - Pipeline processors.

    - Vector processors.

- Newer supercomputers--with burst modes approaching 300 MFLOPS, main storage size up to 10 million words and on-line storage in the one-to-three gigabyte class--are also becoming more common.

- <u>EMBEDDED COMPUTER</u> - Dedicated computer system designed and implemented as an integral part of a weapon or weapon system, or platform, that is critical to a military or intelligence mission, such as command and control, cryptological activities, or intelligence activities. Characterized by MIL SPEC (military specification) appearance and operation, limited but reprogrammable applications software, and permanent or semipermanent interfaces. May vary in capacity from

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microcomputers to parallel-processor computer systems. Information services forecasts in this report do not include applications for this type of computer.

D.   TELECOMMUNICATIONS

- NETWORKS - Interconnection services between computing resources. Provided on a leased basis by a vendor to move data and/or textual information from one or more locations to one or more locations.

    - COMMON CARRIER NETWORK (CCN) - Provided via conventional voice-grade circuits and through regular switching facilities (dial-up calling) with leased or user-owned modems (to convert digital information to voice-grade tones) for transfer rates between 150 and 1,200 baud.

    - VALUE-ADDED NETWORK (VAN) - (See listing under Section B, Delivery Modes.)

    - LOCAL AREA NETWORK (LAN) - Restricted limited-access network between computing resources in a relatively small (but not necessarily contiguous) area, such as a building, complex of buildings, or buildings distributed within a metropolitan area. One of the two types:

        - BASEBAND - Voice bandwidth at voice frequencies (same as telephone, teletype system) limited to a single sender at any given moment and limited to speeds of 75 to 1,200 baud, in serial mode.

        - BROADBAND - Employs multiplexing techniques to increase carrier frequency between terminals, to provide:

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- Multiple (simultaneous) channels via FDM (Frequency Division Multiplexing).

- Multiple (time-sequenced) channels via TDM (Time Division Multiplexing).

- High-speed data transfer rate via parallel mode at rates of up to 96,000 baud (or higher, depending on media).

- TRANSMISSION MEDIA - Varies with the supplier (vendor) and with the distribution of the network and its access mode to the individual computing resource location.

  - MODE - may be either:

    - ANALOG - Typified by the predominantly voice-grade network of AT&T's DDD (Direct Distance Dialing) and by operating telephone company distribution systems.

    - DIGITAL - Where voice, data, and/or text are digitized into a binary stream.

  - MEDIA varies with distance, availability, and connectivity:

    - WIRE - Varies from earlier single-line teletype networks to two-wire standard telephone (twisted pair) and balanced line to four-wire full-duplex balanced lines.

    - CARRIER - Multiplexed signals on two-wire and four-wire networks to increase capacity by FDM.

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- COAXIAL CABLE - HF (High Frequency) and VHF (Very High Frequency), single frequency, or carrier-based system that requires frequent reamplification (repeaters) to carry the signal any distance.

- MICROWAVE - UHF (Ultra High Frequency) multichannel, point-to-point, repeated radio transmission, also capable of wide frequency channels.

- OPTICAL FIBER - Local signal distribution systems employed in limited areas, using light-transmitting glass fibers, and using TDM for multichannel applications.

- SATELLITES - Synchronous earth-orbiting systems that provide point-to-point, two-way service over significant distances without intermediate amplification (repeaters), but requiring suitable groundstation facilities for up- and down-link operation.

- CELLULAR RADIO - Network of fixed, low-powered, two-way radios that are linked by a computer system to track mobile phone/data set units; each radio serves a small area called a cell. The computer switches service connection to the mobile unit from cell to cell as the unit moves among the cells.

E.   OTHER CONSIDERATIONS

- When questions arise about the proper place to count certain user expenditures, INPUT addresses them from the user viewpoint. Expenditures are then categorized according to what users perceive they are buying.

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- The standard industrial classification (SIC) codes are used to define the economic activity contained in generic sectors such as process manufacturing, insurance, or transportation.

- The specific industries (and their SIC codes) included under these generic industry sectors are detailed in Exhibit A-1.

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INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Discrete Manufacturing	23	Apparel
	25	Furniture
	27	Printing
	31	Leather
	34	Metal
	35	Machinery
	36	Electronics
	37	Transportation
	38	Scientific and Control Instruments
	39	Miscellaneous Manufacturing
Process Manufacturing	10	Metal Mining
	11	Anthracite Mining
	12	Coal Mining
	13	Oil and Gas Extraction
	14	Mining/Quarying of Non-Metallic Minerals, except Fuels
	20	Food Products
	21	Tobacco
	22	Textile Products
	24	Lumber and Wood Products
	26	Paper Products
	28	Chemicals
	29	Petroleum
	30	Rubber and Plastics
	32	Stone, Glass, Clay
	33	Primary Metals

INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Transportation	40	Railroads
	41	Local Transit
	42	Motor Freight
	43	U.S. Postal Service
	44	Water Transportation
	45	Air
	46	Pipelines
	47	Transportation Services
Utilities	49	Electric, Gas, and Sanitary
Telecommunications	48	Communications
Wholesale Distribution	50	Durable Goods
	51	Nondurable Goods
Retail Distribution	52	Building Materials, Hardware
	53	General Merchandise
	54	Food
	55	Automotive and Gas Stations
	56	Apparel
	57	Furniture
	58	Eating and Drinking
	59	Miscellaneous Retail

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INDUSTRY SECTOR DEFINITIONS

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INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Banking and Finance	60	Banks
	61	Credit Agencies
	62	Security and Commodity Brokers
	67	Holding and Investment Offices
Insurance	63	Insurance (Life, Health, Etc.)
	64	Insurance Agents
Medical	80	Health Services
Education	82	Educational Services
Services	73	Business Services (excluding information services companies themselves)
	89	Miscellaneous Services
Federal Government	N/A	As Appropriate
State and Local Government	N/A	As Appropriate

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INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Other Industries	01-09	Agriculture, Forestry, and Fishing
	15-17	Construction
	65	Real Estate
	66	Combinations of Real Estate, Insurance, Loans, Law Offices
	70	Hotels, Rooming Houses, Camps, and Other Lodging Places
	72	Personal Services
	75	Automotive Repair, Services, and Garages
	76	Miscellaneous Repair Services
	78	Motion Pictures
	79	Amusement and Recreation Services, Except Motion Pictures
	81	Legal Services
	83	Social Services
	84	Museums, Art Galleries, Botanical and Zoological Gardens
	86	Membership Organizations

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APPENDIX B: DATA BASE

APPENDIX B: DATA BASE

A.   FORECAST AND VENDOR DATA BASE

- Exhibits B-1 and B-2 contain INPUT's market sizes and growth rates for each
  year from 1984 through 1990 for the key delivery modes of the information
  services market as well as for the segments of the turnkey systems market-
  place analyzed in this report.

- Exhibits B-3 and B-4 provide a listing of the revenue and net income of each
  of 16 publicly-held companies that specialize in turnkey systems.

B.   RECONCILIATION

- This reconciliation analysis compares turnkey market forecasts made by
  INPUT at the end of 1984 to the forecasts made for this report. Key differ-
  ences are discussed below.

- The annual growth rate for the overall turnkey systems marketplace for the
  year ending 1985 was forecasted to be 30% at the end of 1984. A number of
  subsequent events resulted in a lowering of that growth rate in this report to
  16%. Reasons include:

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EXHIBIT B-1

TOTAL INFORMATION SERVICES USER EXPENDITURE FORECAST BY DELIVERY MODE, 1985-1990

SEGMENTATION BY DELIVERY MODE	($M) 1984	84-85 GROWTH	($M) 1985	($M) 1986	($M) 1987	($M) 1988	($M) 1989	($M) 1990	AAGR 85-90
REMOTE COMPUTING/BATCH									
INDUSTRY SPECIFIC	6787	15%	7827	9211	10843	12709	14943	17512	17%
CROSS INDUSTRY	4254	14%	4852	5614	6542	7659	8953	10408	16%
UTILITY PROCESSING	1789	6%	1896	2029	2171	2301	2416	2537	6%
SUBTOTAL	12830	14%	14575	16854	19556	22669	26312	30457	16%
FACILITIES MANAGEMENT									
INDUSTRY SPECIFIC	1864	15%	2151	2488	2890	3363	3865	4436	16%
CROSS INDUSTRY	57	5%	60	62	63	64	67	71	3%
UTILITY PROCESSING	142	10%	156	181	211	242	281	332	16%
SUBTOTAL	2063	15%	2367	2731	3164	3669	4213	4839	15%
TOTAL PROCESSING/NETWORK SERV.									
INDUSTRY SPECIFIC	8651	15%	9978	11699	13733	16072	18808	21948	17%
CROSS INDUSTRY	4311	14%	4912	5676	6605	7723	9020	10479	16%
UTILITY PROCESSING	1931	6%	2052	2210	2382	2543	2697	2869	7%
VANS	290	27%	368	467	595	762	982	1270	28%
TOTAL	15183	14%	17310	20052	23315	27100	31507	36566	16%
SOFTWARE PRODUCTS									
MAINFRAME/MINICOMPUTER									
INDUSTRY SPECIFIC	2248	22%	2751	3637	4810	6123	7820	9750	29%
CROSS INDUSTRY	1948	17%	2275	2808	3414	3994	4518	5087	17%
SUBTOTAL	4196	19%	5026	6445	8224	10117	12338	14837	23%
MICROCOMPUTER									
INDUSTRY SPECIFIC	352	34%	473	702	1049	1530	2125	3034	45%
CROSS INDUSTRY	1193	23%	1465	1868	2340	2786	3217	3679	20%
SUBTOTAL	1545	23%	1938	2570	3389	4316	5342	6713	32%
TOTAL APPLICATIONS SOFTWARE	5741	21%	6964	9015	11613	14433	17680	21550	25%
SYSTEMS SOFTWARE									
MAINFRAME/MINICOMPUTER	4685	19%	5569	7034	8985	11124	13284	15540	23%
MICROCOMPUTER	648	16%	753	979	1392	2034	2923	4111	40%
TOTAL SYSTEMS SOFTWARE	5333	19%	6322	8013	10377	13158	16207	19651	25%
TOTAL SOFTWARE	11074	20%	13286	17028	21990	27591	33887	41201	25%
PROFESSIONAL SERVICES									
SOFTWARE DEVELOPMENT	5307	17%	6232	7327	8723	10546	12817	15253	20%
CONSULTING	1425	20%	1717	2069	2542	3055	3676	4351	20%
EDUCATION	834	26%	1049	1329	1708	2173	2691	3352	26%
FACILITIES MANAGEMENT	660	11%	730	814	905	1000	1096	1197	10%
SYSTEMS INTEGRATION-FED	630	27%	800	984	1220	1489	1801	2162	22%
TOTAL PROFESSIONAL SERVICES	8856	19%	10529	12543	15098	18263	22081	26315	20%
TURNKEY SYSTEMS									
INDUSTRY SPECIFIC	4325	17%	5070	6017	7207	8724	10490	12646	20%
CROSS INDUSTRY	2055	13%	2327	2653	3063	3539	4135	4721	15%
TOTAL TURNKEY SYSTEMS	6380	16%	7397	8670	10270	12263	14625	17367	19%
GRAND TOTAL	41493	17%	48522	58293	70673	85217	102100	121449	20%

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TURNKEY SYSTEMS USER EXPENDITURE FORECAST
BY MARKET SECTOR, 1985-1990

SEGMENTATION	($M) 1984	84-85 GROWTH	($M) 1985	($M) 1986	($M) 1987	($M) 1988	($M) 1989	($M) 1990	AAGR 85-90
INDUSTRY-SPECIFIC SECTORS									
DISCRETE MANUFACTURING	1242	19%	1481	1792	2155	2655	3191	3810	21%
PROCESS MANUFACTURING	301	13%	340	388	442	508	580	655	14%
TRANSPORTATION	109	13%	123	146	174	209	252	305	20%
UTILITIES	35	14%	40	46	55	66	80	98	20%
TELECOMMUNICATIONS	169	18%	199	237	285	342	413	500	20%
DISTRIBUTION	361	17%	422	494	583	700	847	1041	20%
BANKING AND FINANCE	560	15%	644	753	897	1067	1259	1473	18%
INSURANCE	145	13%	164	193	230	281	342	411	20%
MEDICAL	445	16%	516	604	713	841	992	1181	18%
EDUCATION	77	18%	91	107	127	149	179	215	19%
SERVICES	303	17%	355	443	567	732	951	1256	29%
FEDERAL GOVERNMENT	412	22%	503	588	712	854	1016	1232	20%
STATE AND LOCAL GOVERNMENT	80	16%	93	110	130	156	188	227	20%
OTHER INDUSTRY-SPECIFIC	86	15%	99	116	137	164	200	244	20%
SUB-TOTAL	4325	17%	5070	6017	7207	8724	10490	12646	20%
CROSS INDUSTRY SECTORS									
PLANNING AND ANALYSIS	210	15%	242	281	332	420	510	602	20%
ACCOUNTING	325	16%	376	413	459	500	545	590	9%
HUMAN RESOURCES	187	17%	218	242	285	327	373	414	14%
ENGINEERING/SCIENTIFIC	235	19%	280	322	390	465	552	650	18%
EDUCATION/TRAINING	103	18%	122	140	162	187	205	235	14%
OTHER CROSS-INDUSTRY	995	9%	1089	1255	1435	1640	1950	2230	15%
SUB-TOTAL	2055	13%	2327	2653	3063	3539	4135	4721	15%
GRAND TOTAL	6380	16%	7397	8670	10270	12263	14625	17367	19%

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EXHIBIT B-3

REVENUES OF PUBLIC TURNKEY SYSTEMS COMPANIES

COMPANY NAME	FISCAL YEAR END	---1983---		----------1984----------					----1985----			1984/1983 %(+/-)	LAST 3 ROLLING QUARTERS	LAST 2 ROLLING QUARTERS
		Q4	TOTAL	Q1	Q2	Q3	Q4	TOTAL	Q1	Q2	Q3			
ASK	06-30	15114	51213	17561	19941	18003	21282	76787	19187	20761	12780	50	-5	-12
AUTO-TROL	12-31	17129	54129	16272	17157	16773	18725	68927	18901	16383	14286	27	-1	-10
AVANT-GARDE	04-30	4106	12870	4987	5713	4901	5276	20877	3690	5555	3118	62	-21	-18
C3	03-31	12870	68735	15100	15496	18467	19700	68763	18758	19068	23300	0	25	25
COMTEK RES.	05-31	5491	19508	6218	5986	6055	6315	24574	6685	6723	7185	26	13	16
COMP CONSL	12-31	38657	103550	27237	36088	33321	34543	131189	25976	35076	25386	27	-11	-13
COMP DESGN	08-31	612	1921	610	574	504	720	2408	768	639	967	25	41	49
COMPUTERVSN	12-31	111648	399942	121759	133589	137133	163861	556342	105871	112288	105752	39	-17	-19
DAISY SYS	09-30	13060	28320	15700	18538	21810	25484	81532	29042	32511	35511	188	73	69
DIMIS INC	12-31	606	4109	571	718	236	323	1848	345	182	149	-55	-56	-65
GERBER	04-30	42423	159053	53733	54586	52615	52530	213464	64427	48341	45089	34	-2	-13
HBO	12-31	19339	67624	20407	21807	22384	24084	88682	44171	46400	49320	31	117	117
INTERGRAPH	12-31	84604	244046	78702	98769	105480	120811	403762	108973	130556	131406	65	31	28
NAT DTA COM	10-31	1544	11428	1967	1646	1780	1689	7082	1606	1667	1600*	-38	-10	-5
PENTA SYS	12-31	6040	21716	5692	5981	6322	6059	24054	4395	5484	4959	11	-18	-15
REYNOLDS & R	09-30	67163	263821	72827	74247	75571	74602	297247	82501	83215	85012	13	13	12
SAI	01-31	6557	20049	6598	6628	8188	9719	31133	8710	8505	6946	55	13	4
TERA CORP	06-30	4059	16812	3688	5343	6439	8257	23727	7215	1781	5872	41	-4	-35
TRIAD	07-30	24126	92097	31230	29949	35100	23905	120184	22431	27522	33400	30	-13	-6
TOTALS		475148	1640943	500859	552756	571082	617885	2242582	573652	602657	592038	37	9	6

* INPUT ESTIMATE

18 COMPANIES

LAST UPDATED: 12-15-85

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NET INCOME OF PUBLIC TURNKEY SYSTEMS COMPANIES

COMPANY NAME	FISCAL YEAR END	1983		1984					1985			1984/ 1983 %(+/-)QUARTERS	LAST 3 ROLLING QUARTERS	LAST 2 ROLLING QUARTERS
		Q4	TOTAL	Q1	Q2	Q3	Q4	TOTAL	Q1	Q2	Q3			
ASK	06-30	1906	5139	1759	1487	1706	2138	7089	1788	2317	694	38	-3	-6
AUTO-TROL	12-31	968	-3276	773	1143	222	614	2752	-251	-4974	-3897	184	-527	-750
AVANT-GARDE	04-30	402	1048	527	626	396	245	1794	392	-269	-1293	71	-176	-253
C3	03-31	436	8289	-400	1404	1303	742	3049	873	768	1400	-63	32	-20
COMPTEK RES.	03-31	271	917	432	330	338	322	1422	1323	268	240	55	66	-24
COMP CONSL	12-31	5691	10392	1314	2835	1390	751	6290	-5505	-4610	-4216	-39	-359	-309
COMP DESGN	08-31	5	75	17	14	246	98	375	73	74	63	400	-24	-47
COMPUTERVSN	12-31	10439	35340	10750	7363	4692	14921	37726	-18766	-19510	-20723	7	-359	-434
DAISY SYS	09-30	2307	4845	2600	2785	3297	3954	12636	4685	5532	5882	161	85	88
DIMIS INC	12-31	-780	-1767	-724	-256	-529	-718	-2227	-307	-357	-272	-26	38	20
GERBER	04-30	3698	11251	5197	5796	6424	6293	23710	6546	4331	4206	111	-13	-30
HBO	12-31	2751	10001	3229	3420	3608	3639	13896	5857	6107	5903	39	74	71
INTERGRAPH	12-31	10649	29342	10304	16470	17366	18796	62936	14340	16735	18018	114	11	3
NAT DTA COM	10-31	-617	-3260	-14	-447	7125	-209	6455	-272	-1073	-675 #	298	-130	-126
PENTA SYS	12-31	265	1719	100	111	-482	-1273	-1544	-482	-1307	-1870	-190	-1250	-756
REYNOLDS & R	09-30	3693	13816	4201	4462	4789	4121	17573	4784	4984	7182	27	26	32
SAI	01-31	717	1671	461	546	747	1000	2754	528	50	-1001	65	-124	-174
TERA CORP	06-30	-717	-1811	-1720	-1251	30	66	-2875	-1389	-3099	292	-59	-43	-130
TRIAD	09-30	430	1439	1651	1262	1500	-1623	2790	-3574	207	-517	94	-188	-111
TOTALS		42514	125170	40456	48100	54168	53877	196601	10653	6174	9416	57	-82	-85

INPUT ESTIMATE

18 COMPANIES

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- Prospective turnkey buyers' knee-jerk reaction to capital spending budget cuts which resulted in cancelled system acquisitions.

- A major downturn in the CAD/CAM/CAE marketplace that saw Computervision and other major suppliers experience major declines in their historical growth rates. Heavy competition combined with delayed user buying decisons due to decreased capital spending resulted in significant vendor financial disappointments.

- Unusually heavy price pressures throughout the turnkey systems marketplace. These pressures were a reflection of such factors as hardware vendor discounting due to swollen inventories of mini and microcomputers and panic pricing by turnkey vendors as they sought to maintain cash flow to cover excessive expense levels.

● The five-year average annual growth rate forecast for turnkey systems has been lowered by INPUT from 27% to 19%. Factors contributing to this adjustment include:

- Slowdown of inflation. Whereas inflation was forecasted last year to average 6% annually through the rest of the decade, a better than anticipated improvement to overall performance of the U.S. economy has resulted in a 3-5% forecast for the next several years. (See Chapter I for INPUT's year-by-year inflation assumptions.)

- Implementation bottleneck. A plethora of new systems acquisitions in the past three years has taxed the ability of organizations to change internal methods fast enough to implement these systems on schedule. Their planned new purchases have been delayed.

- Vendor recovery cycle. Many turnkey vendors took a major financial bloodbatch in 1985 that resulted in staff reductions, lowered marketing expenses, and cutbacks in R&D investments. It will require several

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years for these suppliers to recover to a state where they have suffi-
cient cash flow to reinvest in all of the critical business functions
required for long-term success.

- Accelerated drive toward recurring revenues. Alert turnkey vendors
  are recognizing that financial stability can be greatly enhanced by
  placing more emphasis on lease and rental licenses, rather than on one-
  time payments. The recurring revenue approach has much appeal also
  to many prospective buyers with short-term budget pressures. This
  shift in revenue volume lowers total user expenditures in the early
  years of its adoption.

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APPENDIX C: RELATED INPUT REPORTS

APPENDIX C: RELATED INPUT REPORTS

ANNUAL MARKET ANALYSES

- U.S. Software Products Markets, 1985-1990
- U.S. Professional Services Markets, 1985-1990
- U.S. Processing Services Markets, 1985-1990
- Processing and Turnkey Systems Markets, 1984-1989

INDUSTRY SURVEYS

- Eighteenth Annual Survey of the Computer Services Industry, 1985

1985 MAPS REPORTS

- Acquisition Strategies for Information Services Firms
- Turnkey Systems Pricing
- Medical Turnkey Systems Markets

SOFTWARE MARKETS

- Fourth Generation Languages Markets
- Computer Integrated Manufacturing Markets
- Applications Software Development Tools
- Data Base Management Systems Markets
- Information Services in A.I., 1985-1990

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- Micro-Mainframe: Market Analysis
- Selling Micro Software to Corporate America
- New Opportunities in Integrated Software
- Analysis of Corporate User Needs
- Microcomputer Software Dealer Survey
- Microcomputer Operating System Directions
- Multi-user Microcomputers

PROFESSIONAL SERVICE MARKETS

- New Professional Service Opportunities
- Professional Service Marketing Opportunities
- Systems Integration Opportunities and Challenges
- Systems Integration in the Federal Government

OTHER 1985 REPORTS

- Annual Information Systems Planning Report, 1985

CORPORATE SYSTEMS PLANNING (CSP Program)

- Market Analysis Forecasts - TPM
- Market Analysis Forecasts - Large Systems
- Market Analysis Forecasts - Small Systems
- Market Analysis Forecasts - Office Products

INFORMATION SYSTEMS PLANNING (ISP Program)

End User

- Integrated Office Systems
- Multiuser Systems
- Destiny of the Information Center

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- Micro-Mainframe End-User Experiences
- Training: Prerequisite to End-User Computing
- Office Videotex
- Intelligent Workstations

Software

- Micro-Mainframe Software
- Simulation and Prototyping
- Fourth Generation Language Tools
- Artificial Intelligence
- Applications Software Development Tools
- Data Base Management Systems
- Decision Support Evolution: Data to Knowledge

Telecommunications

- Integrating Voice/Data Communications
- Telecommunications Security
- Micro-Mainframe Connectivity
- LAN/CBX Update
- Network Management Systems
- Telecommunications Support Strategies
- Economics of Telecommunications

Corporate Systems

- Information Systems Planning
- Micro-Mainframe: Corporate Impact
- Changing Dynamics of IS Organizations
- Large-Scale Systems Directions: Residual Value-Peripheral
- Large-Scale Systems Directions: Residual Value-Update
- Large-Scale Systems Directions: Residual Value-Mainframe
- Distributed Data Processing

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OTHER INPUT SUBSCRIPTION PROGRAMS

- Company Analysis and Monitoring Program (CAMP) for the Information Services Industry
- Customer Service Programs (CSP)
- Information Systems Planning (ISP)
- Federal Information Systems and Services Program (FISSP)

INPU