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Possible Approaches for the Application of Decision Support Systems Within the Nonprofit Organization

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POSSIBLE APPROACHES FOR THE APPLICATION OF DECISION SUPPORT SYSTEMS WITHIN THE NONPROFIT ORGANIZATION

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COMMITTEE IN CHARGE OF CANDIDACY

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DEDICATION

To those who have dedicated themselves to working for the betterment of their fellowmen through charitable nonprofit organizations.

ACKNOWLEDGEMENTS

The advise, consultation, instruction and moral support of staff and instructors given me during my tenure in graduate studies at Lindenwood Colleges' College for Individualized Education is greatfully acknowledged.

In particular, my appreciation is given to Arlene V. Taich, Ph.D., Director of LCIE, who shares my interest, or I hers, in gerontology; and who was my mentor and Faculty Administrator for most of my tenure.

Additionally, my sincere gratitude is given to Daniel Henroid, B.A., M.S.W., M.A., who was my Faculty Sponsor for half of my graduate studies, and of great assistance in preparing this paper.

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I. Introduction

A. An Overview. This paper addresses the potential use of high technology in the nonprofit sector; more specifically, the charitable nonprofit sector.

Because the high technology field is so dynamic and in constant evolution, the author has chosen a snapshot at a contemporary point in the action to lay a foundation for future recommendations and conclusions of this work.

A discussion of where we have been since 1952 in the area of data processing will contribute to the reader's comprehension of why we are where we are in the development of management systems today. The cursory tour through times past will take the route leading to decision support systems, as opposed to a number of other development routes we could have followed, i.e., robotics, aeronautics, etc. Decision support systems are computer based systems which interactively support the making of decisions by providing relevant answers to "what if?" and goal seeking interrogations.

Decision support systems will be generally considered, followed by a basic presentation of a specific system. The capabilities and more salient features of the specific decision support system will be demonstrated.

The author will next consider possible ways for charitable nonprofit organizations to economically tap into the benefits of decision support system resources.

This paper reflects the author's experience with a decision support system known as the Interactive Financial Planning System (IFPS), pronounced "eye-fips", and explores viable alternatives for making IFPS available to nonprofit organizations on an affordable basis.

While there is extensive literature available in the area of data processing, the literature concerning decision support systems is extremely limited. The author is not aware of any literature which specifically addresses the application of high technology and decision support systems in the nonprofit sector. The author is searching for ways to use decision support systems effectively in the nonprofit sector, since this application has not been addressed.

And finally, comtemplation of near years' trends and events in the high tech arena and their impact on the subject of this paper will be made, with conslusions being offered.

B. Background. Not only have knowledge and information been increasing at staggering rates during the

past few decades, but so have the costs incurred in collecting and maintaining the information is some usable form. Computers have been largely responsible for the quantum leaps forward in the areas of science and the ability to process business data in previously unthought of volumes. At the same time, the computer has become both friend and foe. Our pace of living has quickened to keep pace with the electronic devices which we depend upon to accomplish much of our work. The necessity to have answers to complex questions and to see into the future has become more of a requirement today than in times past due to the uncertainty of current times. The captains of business find that there is a daily correction to what was once able to be planned and followed without change. More and more the managers of business and industry have required ways of obtaining reliable answers to their complex questions, and to do so in less and less time, and at reasonable cost.

Both the expansion of knowledge and the quest for even greater knowledge with the ability to project outcomes of future events have brought us to the development of decision support systems (DSS). Decision support systems, as referred to in this paper, are those computer-based programs (software) which have been dubbed as executive mind support systems.

II. Management: The 'Why' of DSS

Since the days of Dr. Herman Hollerith's calculating the 1910 Census for the United States government using hole-punched cards and electrically operated machines to manipulate them, data processing technicians have been giving managers what the technicians believed useful.

A. Pros and Cons of Data Processing. Traditionally, data processing, management information services, and operations research/management science have contributed superbly to organization data flows, improved operations, and development of analytical methods for decision-making. All have employed technology (the means) to develop applications (the end). Where reporting and control are concerned, they have applied their procedures and rules with marked success overall. Yet, from a manager's point of view, something very essential is missing.

Central management activities were untouched by traditional computer systems. The manager's personal choices, which cannot be routinely performed or delegated, were never addressed. The need for fast responses in unanticipated situations, "fire fighting" support, and flexible, interactive planning capabilities were overlooked by the technologist.[1]

Due to the lead time required for writing computer programs, exploratory decision-making is not

feasible in the traditional computer/data processing environment. Information needs and methods of analysis evolve in a free-flowing decision-making process. Traditional data processing cannot support the manager's daily decision-making function in a timely, reliable manner.

III. In The Beginning

Beginning in the early 1970s there was a considerable interest being generated among computer manufacturers, educators, and business managers for computer systems which were more user-oriented. Managers wanted a personal tool which could respond with lightening speed and provide accurate answers to "what if?" and goal-seeking type questions. This seemed necessary in the face of ever increasing volumes of paperwork and information stored in computer data bases. It took days, weeks, months, or even years to write computer programs and develop systems to produce the answers management sought back then. Not only was such development expensive, it often was only the first step in the decision-making process for the executive or manager who was supplied with the data in report form. Traditional data processing systems analysis and development lent itself to those tasks which were repetitive and required little user

interaction. Managers wanted an extension to their mind: something that could quickly supply answers to aid their decision-making responsibilities. They wanted systems which would allow them to converse directly with the computer without the intermediary in the form of a data processing specialist. The decision support system is the outgrowth of this need for direct personal support for managerial decisions across many disciplines.

A. First Steps. As one might suspect, the number one (largest, best known, etc.) computer vendor was in the forefront of decision support systems development, i.e., International Business Machines (IBM). During 1970 to 1974, an IBM research group in San Jose, California, developed the General Analysis and Display System (GADS).[2] This decision support system was somewhat limited in application by comparison to systems of today. Nonetheless, some 200 individuals with no previous computer experience, and who worked for 17 different businesses, were able to use the system very effectively.[3]

GADS was the result of indepth study of managerial behavior in decision-making situations. It was discovered that traditional systems analysis was indeed poorly suited to the nature of decision-making from

the non-computer oriented person's point of view.[4]

Compounding the decision support system development process was the fact that managers didn't know how they made decisions; and those rare few who had some insight on the subject were reluctant to reveal what they were aware of as it tended to expose important details of their operations.[5]

Undaunted, the IBM research group formulated a series of simple questions based on the premise that they didn't know what was needed for a decision support system. The success of the end product (GADS) was no doubt due to the wisdom of the simple questions and their analysis by the IBM research group.

IV. Growth and Maturity

At the time of IBM's activity with GADS, the term "decision support" had not come into use. The term was coined in 1977 by Peter G. Keen, who holds a Ph.D. in business administration from Harvard, and is an associate professor at the MIT Sloan School of Management.[6]

The term aptly fits, for these systems consist of computer-based data base management systems or financial models which are personally used on an ongoing basis to support managers and their staffs in their activities -- the making of decisions.

At the heart of a decision support system is a model of variables, e.g., sales, contributions, taxes, etc., and a statement which defines or quantifies the variable over consecutive periods of time, e.g., days, weeks, months, quarters, or years.[7]

The decision support system (DSS) allows one to inquire of the model about the effects certain changes in a variable statement might have upon the results of the model solution. This inquiry is referred to as a "what if?" command.

Additionally, if a certain goal is being sought, one may specify a variable to be changed in order to achieve the desired goal. The DSS will provide output to indicate the change required in the variable selected as well as the impact such a change will have on all other variables in the model.[8] For example, if a goal of $20,000,000 in after-tax income is sought, and the variable selected is sales, the result of the goal seek(ing) function would indicate the changes from the base model values for variables such as sales, production, expenses, and taxes. The inquirer would know very specifically what must be done to achieve the goal.

In 1978, Dr. Keen published a book on the subject of decision support systems titled, Decision Support Systems: An Organizational Perspective. DSS became the latest buzzword in "computereese", and a whole new

world for managers and decision makers.

At the same time in another part of the United States, and independently from Dr. Keen, Gerald (Jerry) R. Wagner, created a modeling language which fully supported the decision-support concept.[9] Wagner holds a Ph.D. in statistics from Iowa State University, and was then a professor of operations research at the University of Texas. Wagner had developed a software package which provided a simple method of creating models and using them on a continuing basis through a range of manipulations as both a learning and decision-support process. Wagner called his software an interactive financial planning system. Wagner's software package is formally known today as the Interactive Financial Planning System, or IFPS, pronounced "eye-fips". IFPS currently enjoys the first place position among DSS packages in terms of the number of copies of the system which have been sold and installed world-wide on main-frame computers (large computers).

The current cost of the main-frame IFPS software package is $80,000, which includes the installation and some initial training. This cost is obviously prohibitive for acquisition by the vast majority of nonprofit organizations.

There are other DSS packages on the market today. Many of them are excellent. None of them, however,

enjoys the success that IFPS enjoys. This can be attributed to the fact that IFPS is so simple to learn and to use, and has such a wide base of application that any discipline can make profitable use of the system in one way or another.

IFPS is marketed by EXECUCOM Systems Corporation of Austin, Texas. Wagner is the president and chairman of the board of EXECUCOM. He and his staff of professionals are sensitive to the needs of their clients and the changing business environment. To cope with the user needs, EXECUCOM encouraged and aided in the founding of the IFPS Users Association. The Association meets semi-annually to discuss uses of IFPS, new developments, desired enhancements, and future plans.

V. Management Decisions

An understanding of how managers make decisions and the nature of decisions is crucial to developers of computer-based decision support systems. These subjects are addressed here to provide a meaningful foundation for the comprehension and appreciation of decision support systems.

A. Management's Modus Operandi. Senior managers rarely spend more than an hour on any given problem; and solutions come only after a number of fragmented

sessions over a period of time.[10] Many varied tasks are addressed each day. Although managers prefer concrete facts and rely on person-to-person discussions they often base their decisions on intuition. Standardized, computer-based reporting systems lack the scope, relevance, and flexibility to deal with immediate problems. Additionally, operations research/management science models fail to fit specific problems. Though they are conceptually adequate, there is an inability to cope with qualatative issues and exceptions.

B. The Need: The Answer. What managers needed, and now have, are systems which provide direct, personal, real-time support of the decision-making process: decision support systems. Such systems must have: (1) an interactive capability with a data base for sorting and retrieving data, or (2) analysis and modeling capabilities. Some systems, like IFPS, have both.

A manager who has no familiarity with computers is reluctant to use a decision support system unless it is easy to use, has flexibility, and is adaptive to every concievable problem. Again, IFPS fits the criteria exceedingly well.

C. The Nature of Decisions. Decision-making has been described as identifying problems and opportunities; generating alternative solutions; evaluating the alternatives, and selecting the best alternative.[11] We apply decision-making processes in the planning and learning activities of our lives. Planning is setting a course of action for the future based upon assumptions about the future and analysis of past policy.[12] Learning in the business sense is acquiring a better understanding of the business environment; analyzing the outcome of business pland; and making better plans and decisions as a result of our improved understanding. Decisions are the bedrock of a successful business, or the quicksand of the failure.

D. Decision Characteristics. Decisions may be structured, semi-structured, or unstructured. They additionally may be control or planning oriented. The matrix in Figure 1 illustrates how these characteristics fit together, and in what areas they would apply.

1. Structured. A structured decision is one wherein the problem is well-defined and an abundance of relevant data exists concerning the decision.

2. Semi-Structured. The problem definition of a semi-structured decision is very obscure. There is more uncertainty involved because there is too much data available for consideration.

3. Unstructured. The unstructured decision is one in which the criteria are lacking, thus requiring a very subjective decision to be made.

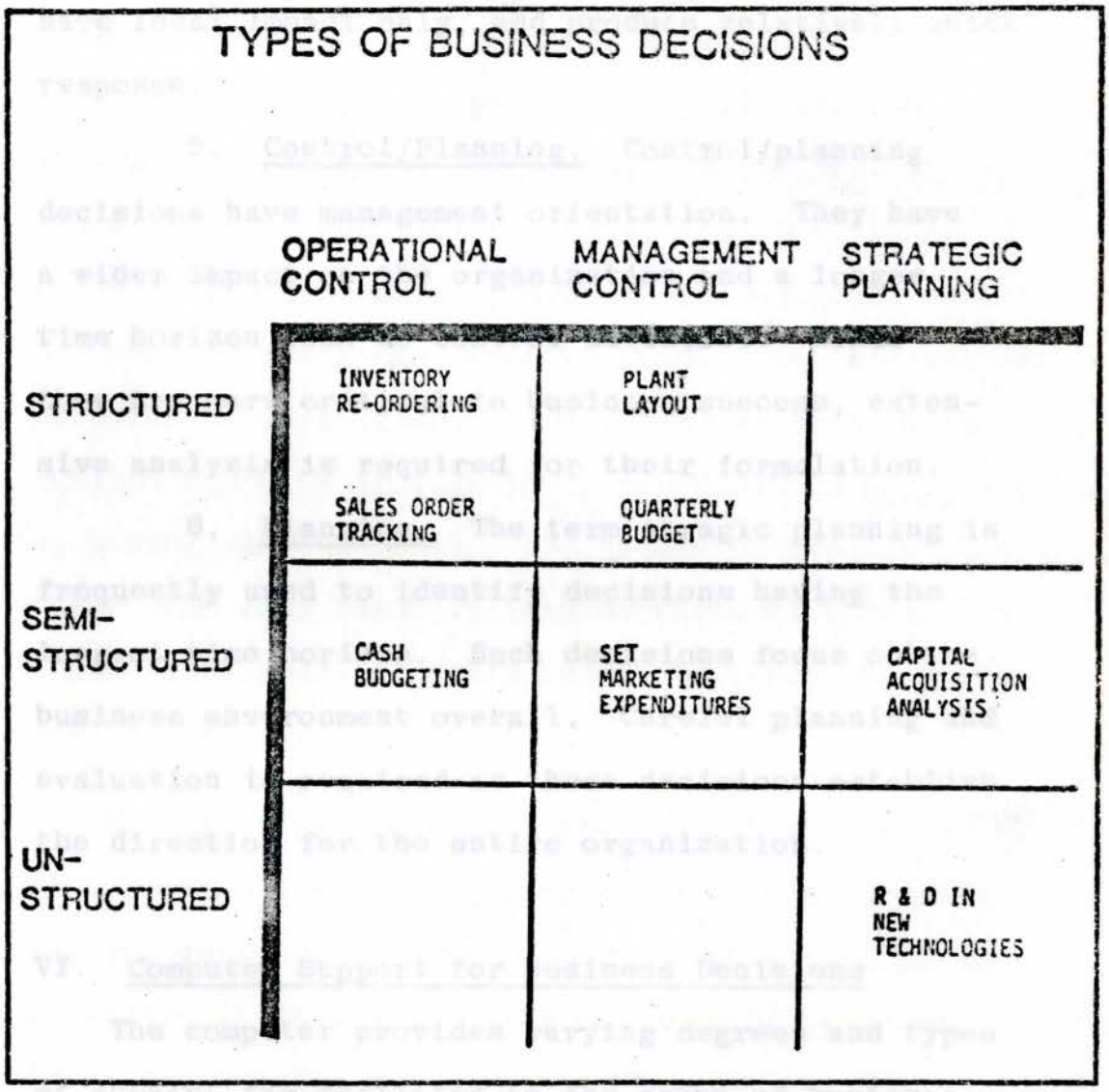


Figure 1

4. Control. Control decisions are those dealing with operational functions. They are for routine matters focusing on internal business events. Major changes are infrequent. Control decisions have local impact only, and produce relatively quick response.

5. Control/Planning. Control/planning decisions have management orientation. They have a wider impact on the organization and a longer time horizon than do control decisions. Since they are more critical to business success, extensive analysis is required for their formulation.

6. Planning. The term stragic planning is frequently used to identify decisions having the longest time horizon. Such decisions focus on the business environment overall. Careful planning and evaluation is required as these decisions establish the direction for the entire organization.

VI. Computer Support for Business Decisions

The computer provides varying degrees and types of support for decisions in the arena of business. Depending upon the size of the computer, e.g., mainframe, mini, or micro, and the software (programs) being used, the degree and type of support will be determined. Three areas of support are addressed in this paper.

They are: (1) data processing, (2) database management systems, and (3) modeling languages.[13]

A. Data Processing. The first and most used computer support is data processing. Data processing is designed to produce routine, historical reports. As such, it focuses on high volume data storage and retrieval transaction processing. The major concerns are efficiency and clerical cost reduction. Data processing uses general programming languages, or sets of coded instructions, such as COBOL (Common Bussiness Oriented Language), RPG (Report Program Generator), FORTRAN (Formula Translation), and BASIC (a basic set of coding instructions). The nature of projects undertaken generally leads to long development periods, e.g., accounts payable, accounts receivable, payroll systems, and the like.

B. Database Management Systems. Database management systems are used to retrieve data and generate reports more effectively and efficiently than do the conventional data processing application programs. They are designed to provide structures which are independent of application programs. They run off large databases associated with data processing applications.

C. Modeling Languages. Modeling languages give management support in the areas of decision-making and planning. They provide a vehicle for answering management's "what if?" questions quickly. They are capable not only of analyzing historical data quickly, but can extrapolate it into the future.

This paper concentrates on the modeling language aspect of computer support for business decisions.

1. What Is A Model? A model is a concise representation or simplification of a real world system or situation whose behavior we want to explain or predict. Decision-making or planning is most usually approached with a mental model structured from our academic disciplines or as the substance from observation and experience.

Some examples of models are: models of financial flows in a business; models of competitive markets; production models; organizational models; flow diagrams; fluid dynamics, etc.

(a) Developing A Model. There are five steps which must be taken in order to develop a model.[14] These steps are: (1) understand the problem situation, (2) define the scope of the problem, (3) determine the goals to be achieved, (4) identify relationships among the factors which impact the situation, and (5) express

all factors and relationships mathematically.

(1) Understand The Problem Situation. An effort must be made to comprehend what is being dealt with -- people, money, time, tangibles.

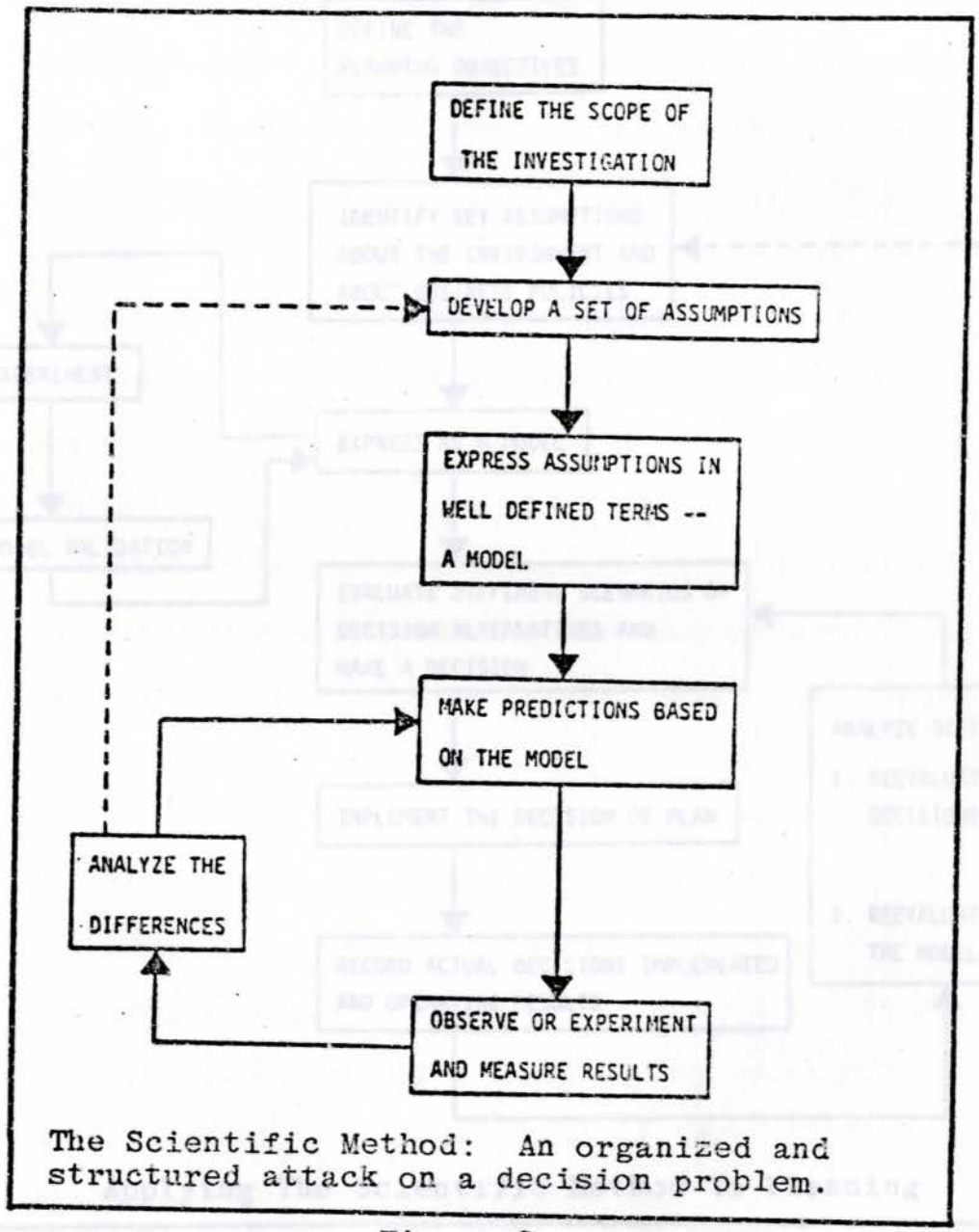
(2) Define The Scope Of The Problem. The problem must be defined in terms of how many, how much, how often -- quantity, quality, frequency, duration, and the like.

(3) Determine The Goals To Be Achieved. What does a good solution look like? What is the accepted level of achievement, and how is it expressed -- people, money, etc.?

(4) Identify Relationships Among The Factors Which Impact The Situation. From a business perspective, consideration must be given to economic factors, business policies, governmental regulations, the competition, and market characteristics, among others. The impact of factors on each other as well as on the given problem situation must be evaluated in the model construction process.

(5) Express All Factors And Relationships Mathematically. This fifth step takes the four preceeding steps and gives them a graphic form which enables a solution to be derived; a goal to be sought and achieved.

2. The Scientific Method. Models are the basis for the scientific method. This is clearly illustrated in Figure 2.[15]



The Scientific Method: An organized and structured attack on a decision problem.

Figure 2

The scientific method can also be applied to planning as illustrated in Figure 3.[16]

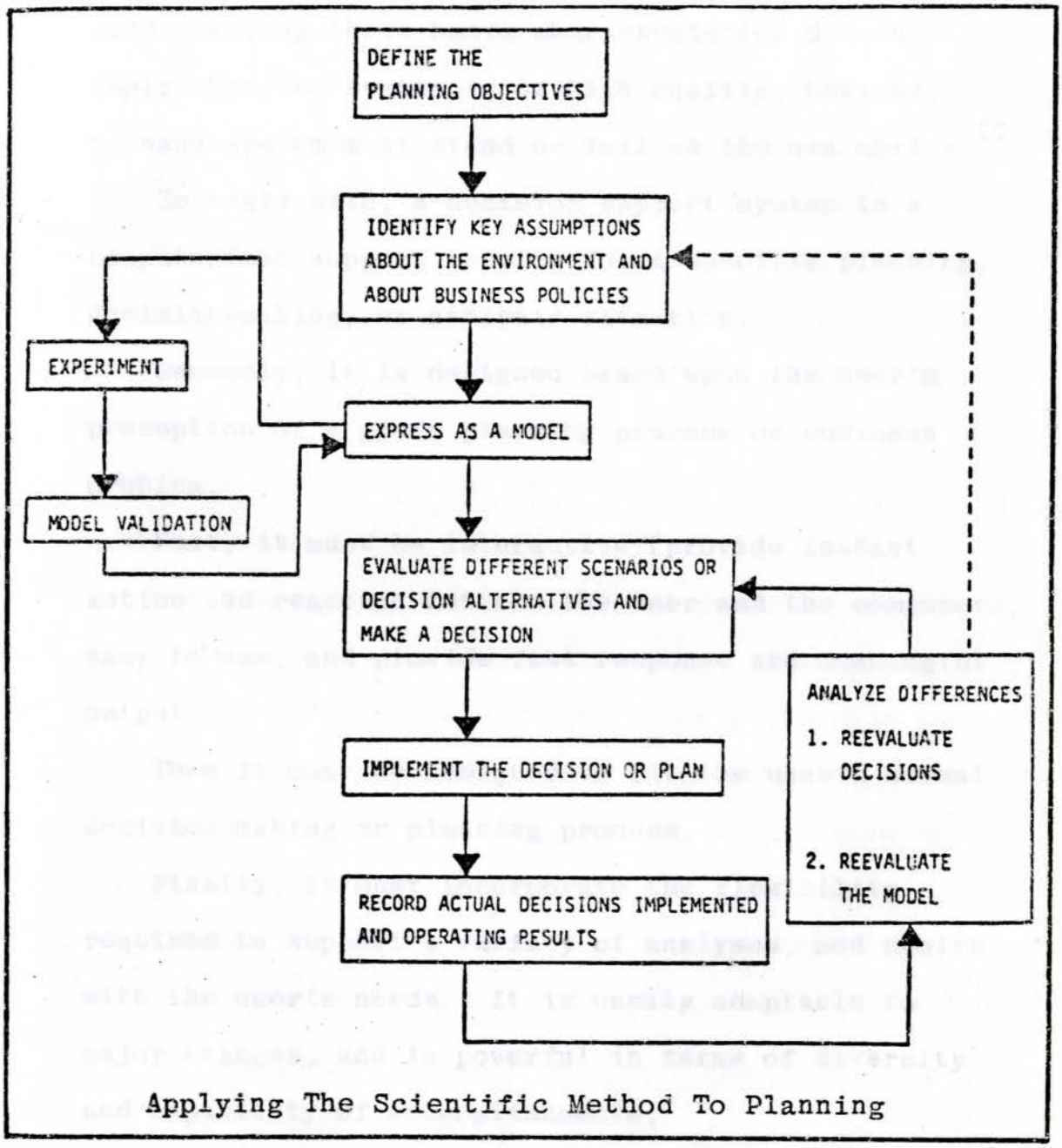


Figure 3

VII. The Anatomy Of A Decision Support System

A decision support system must have a group of well-defined characteristics in order to qualify as such. Having these basic characteristics does not imply that the system is of high quality, however, as each system must stand or fall on its own merits.[17]

To begin with, a decision support system is a computerized support service for a specific planning, decision-making, or analysis situation.

Secondly, it is designed based upon the user's preception of a given planning process or business problem.

Next, it must be interactive (provide instant action and reaction between the user and the computer), easy to use, and provide fast response and meaningful output.

Then it must be designed to fit the user's normal decision-making or planning process.

Finally, it must incorporate the flexibility required to support a variety of analyses, and evolve with the user's needs. It is easily adaptable to major changes, and is powerful in terms of diversity and capability of accomplishments.

A. The Development Process. The development of a decision support system (model or models) is initiated by a manager or analyst (user) in response to a specific

need. The final user provides the design criteria and evaluates the system's results. The designer's (user's) business knowledge is crucial in terms of developing an effective system.

The system developer is usually the final user or a business analyst -- an individual who knows the particulars associated with the problem/situation.

Building a working prototype begins with the first attempt and usually proceeds through several versions before the ultimate system is attained. The prototype is easily modified or reconstructed so that by any other standard or method of comparison, the work is quickly accomplished.

There are necessarily technical support requirements directed toward data processing. The technicians help evaluate decision support system technology such as software and hardware. Additional help is given with interfaces between the decision support system and production or accounting systems. Finally, technicians are called upon to aid system builders and provide design expertise for large-scale systems.

B. The Final Decision Support System. The final decision support system is composed of basic building blocks. These include the business model(s) or projection techniques in simple near-English dialogue.

The result will be easily interpreted reports and graphic plots.

The final decision support system is an integral part of the planning or decision-making process. It reflects the user's business knowledge and leverages the analyst's or manager's thought process by automating calculations and displaying the results.

The final decision support system evolves with the user's needs by allowing new building blocks to be added through high level language use.

The final decision support system supports the decision-maker by automating the structured part of semi-structured tasks, performing calculations, storing and retrieving data, and producing useful, meaningful output.

C. Decision Support Systems For Financial Analysis And Planning. A decision support system for financial analysis and planning provides a high degree of flexibility to traditional accounting procedures. The decision support system allows the use of "what if?" interrogations in budget projections and formulations. It includes business assumptions from various functional areas -- marketing, production, etc.

Variance analysis and reporting are more adaptive to specific needs through a decision support

system for financial analysis and planning.

A decision support system for financial analysis and planning allows the user to easily move from historical data and reporting to projections. The system makes financial and cost analysis more readily accessable to line management.

VIII. IFPS: A Tool For Building Decision Support Systems

The heart of the Interactive Financial Planning System is the model. The major functions of the modeling subsystem are creating and editing models, scenario building and model interrogation, producing results from model solutions, and consolidating and combining model solutions. These functions represent the totality of what decision support is all about, and each will be further discussed and illustrated.

A. IFPS Functional System Structure. The IFPS software is designed so that there are a number of subsystems which perform specific functions. The most used of these subsystems are the modeling subsystem, the datafile subsystem, the command file subsystem, and the report sybsystem. Each of these sybsystems will be further discussed and illustrated

Subsystems which will not be illustrated in this paper are: (1) the structure subsystem, which is used to create and edit structures and consolidate hierarchial networks, (2) the formula subsystem, which is used to create, edit and test formulas, and (3) the subtask subsystem which is used to create, edit and test subtasks. A graphic illustration of the IFPS functional system structure is shown in Figure 4.[18]

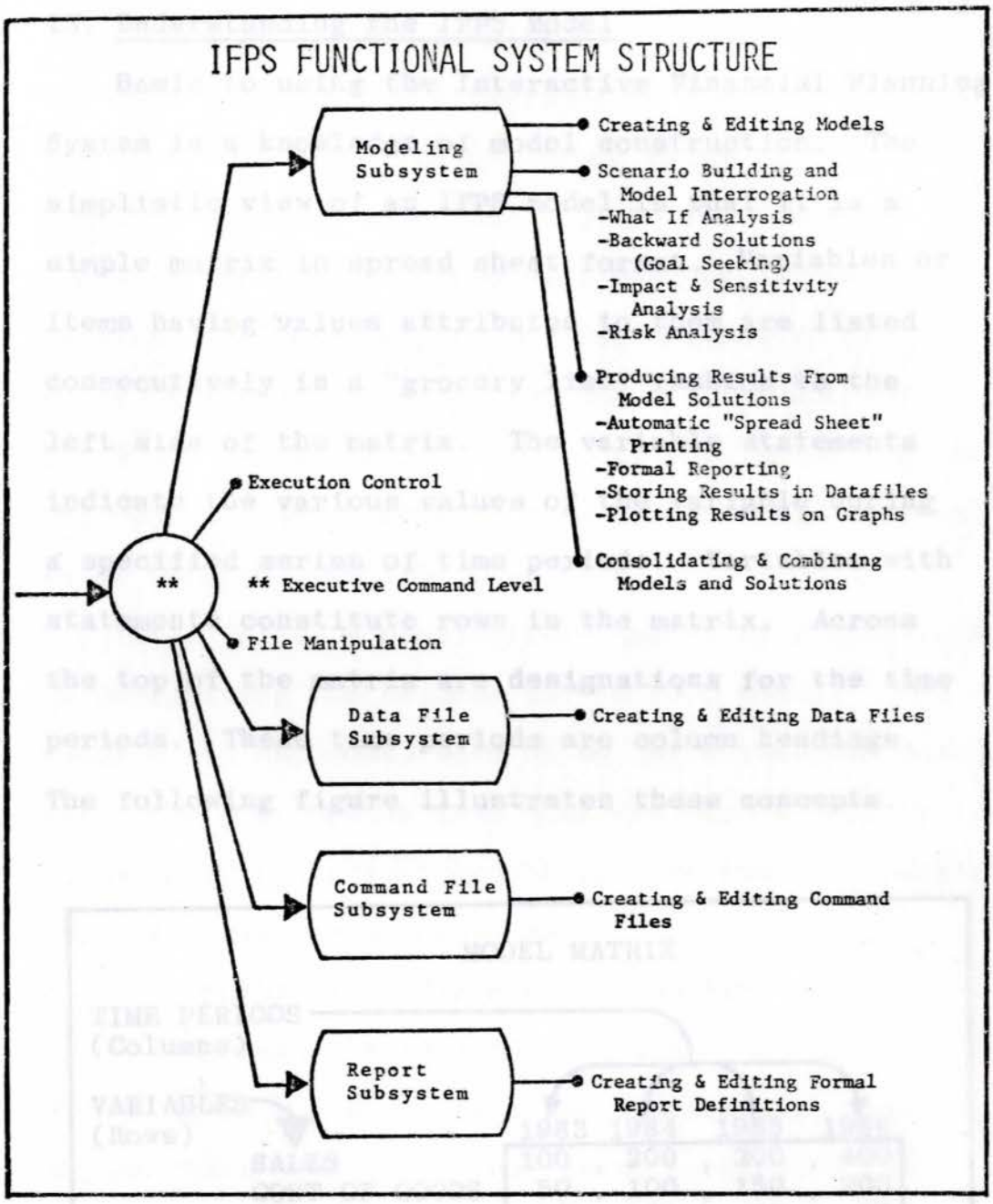

IFPS FUNCTIONAL SYSTEM STRUCTURE
Modeling Subsystem
Creating & Editing Models
Scenario Building and Model Interrogation
-What If Analysis
-Backward Solutions (Goal Seeking)
-Impact & Sensitivity Analysis
-Risk Analysis
Producing Results From Model Solutions
-Automatic "Spread Sheet" Printing
-Formal Reporting
-Storing Results in Datafiles
-Plotting Results on Graphs
Consolidating & Combining Models and Solutions
Execution Control
**
** Executive Command Level
File Manipulation
Data File Subsystem
Creating & Editing Data Files
Command File Subsystem
Creating & Editing Command Files
Report Subsystem
Creating & Editing Formal Report Definitions

Figure 4

IX. Understanding the IFPS Model

Basic to using the Interactive Financial Planning System is a knowledge of model construction. The simplistic view of an IFPS model is that it is a simple matrix in spread sheet format. Variables or items having values attributed to them are listed consecutively in a "grocery list" fashion to the left side of the matrix. The variable statements indicate the various values of the variable during a specified series of time periods. Variables with statements constitute rows in the matrix. Across the top of the matrix are designations for the time periods. These time periods are column headings. The following figure illustrates these concepts.

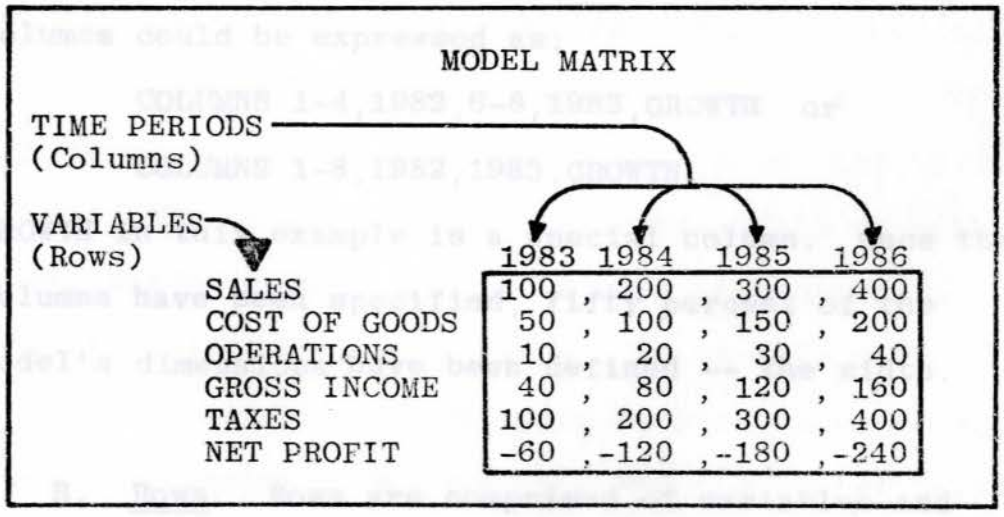


Figure 5

A. Columns. By defining the columns and rows, the user provides the dimensions of the model matrix to the IFPS. The first or second entry made at the cumputer terminal when building an IFPS model is COLUMNS. This is followed by a variety of possible entries. If there are to be four columns in the model, the user may enter COLUMNS 1-4, or COLUMNS 1,2,3,4. If the columns are to be for annual periods, the user may enter COLUMNS 1983-1986, or the user may enter COLUMNS 1983,1984,1985,1986.

There exists a considerable amount of flexibility in designating the columns for an IFPS model.[19] For example, if the model were to be for a two-year period with each year broken into quarters, and a summary column were to reflect growth for the two year period, columns could be expressed as:

COLUMNS 1-4,1982,6-8,1983,GROWTH or

COLUMNS 1-8,1982,1983,GROWTH

GROWTH in this example is a special column. Once the columns have been specified, fifty percent of the model's dimensions have been defined -- the width.

B. Rows. Rows are comprised of variables and statements.[20] A variable is something the value of which can be expressed mathematically, e.g., expenses,

income, contributions, pledges, and the like. A variable statement is the mathematical expression of value(s) attributed to the variable. The statement may have many forms. If constants are given, the variable may appear as:

INCOME = 100,200,300,400

(The variable must be followed by an equal sign, and each value must be separated by a comma).

If the value is the same for all time periods, e.g., RENT = 500,500,500,500, it may be entered into the model as RENT = 500. IFPS will automatically extend the last value given to all remaining columns. In the case cited, the entry RENT = 500 FOR 4 could have also been entered to show that the amount 500 was to be used for all four columns of the model (or the first four columns if the model had more than four columns).

If a variable value is expected or projected to increase at a given rate each time period, the PREVIOUS command may be used in the statement. This is called a lagging reference, and it is used to account for inflation or growth projection. An example would be a situation in which a 5% increase were expected during each time period. The variable statement might be:

INCOME = 100,PREVIOUS * 1.05

This statement would cause the value of the variable

INCOME to increase at the rate of 5% over the value of the previous time period, and to do so for each successive time period. The result in this case would be:

INCOME = 100,105,110.25,115.76

(IFPS would round the results to the nearest whole number giving 100,105,110, and 115).

A variable's value may result from some mathematical operation having been performed on other variables in the model. An example might be NET INCOME = GROSS INCOME - EXPENSES. IFPS would substitute the numeric values for GROSS INCOME and EXPENSES when the SOLVE command is entered, compute the answer, and place the answer in the model solution.

Each variable in the model has a line number (or row number). When building a model, the line number may be referenced in lieu of the variable name. In the case just mentioned, if GROSS INCOME were on line 30, and EXPENSES were on line 50, the entry made at the terminal could have been:

NET INCOME = L30 - L50 (L means Line)

Mathematical expressions are solved algebraically by IFPS. Operations are + for addition, - for subtraction, * for multiplication, and / for division.

When all of the variables and their statements have been entered, the second half of the model matrix dimensions will have been defined for the IFPS software.

This cursory discussion of the IFPS model and some of its characteristics leads to the application of the subject material for demonstration of the manipulation and use of model contents by IFPS.

X. Interactive Financial Planning System Demonstration

The Interactive Financial Planning System developed by EXECUCOM, Inc. is a powerful, versatile, and economically justifiable system. Using the English language and the rules which apply to mathematics and algebra, plus the micros which are automatically programmed into the system, virtually any type of financial model can be constructed by the user of the system. The model can be changed by asking "what if" type questions, or if a known goal is desired, the IFPS can advise which inputs or variables must be changed and how they must be changed in order to achieve the desired goal. Information such as amortization of a loan, the internal rate of return on an investment, or the net present value of money are quickly handled by the IFPS with simple English statements.

A. Nonprofit Organization Budget Sample. In order to provide the reader with a deeper understanding of the IFPS package, a simple application of IFPS in the development of a nonprofit organization budget is presented following, with commentary on what is being accomplished, and how. Additionally, a second budget model will be developed to demonstrate other IFPS capabilities. Report formats for the models will be developed, explained, and demonstrated.

At some point in time, and for various reasons, it may be desirable to consolidate models, such as when the organizations they represent decide to merge in order to perpetuate their work and insure survival. The use of IFPS to consolidate models will be demonstrated in this paper.

Datafiles will be developed, explained, and demonstrated as a means to format input for use with a model. Datafiles would permit a single model to be used to display common data from a number of similar units, such as branch offices of a national organization.

1. The Model. The first step taken to employ IFPS capabilities is to build a model describing the variables and the time periods being considered. The model is constructed and then filed, much like a file folder is placed in the drawer of a letter filing

cabinet in an office. Once constructed and filed, it is available for extraction and use at any time. The user (person using the IFPS system) signs on to the computer, and calls for the IFPS file containing the model. These steps will be explained following. Once the file is made available by the computer system, the user would ask for the model (file folder). In the samples which follow, a symbol like this : will appear as the first character in any line of information which was entered by the user. If this symbol does not appear, the output (printed line, in this case) was generated by the IFPS and printed by the terminal. The samples will be commented on as they appear in this paper.

2. Sign On.

```
READY *B
PROM 7
US700E
>ENTER USERID/PASSWORD:
ROBNOE/BOB
```

The terminal being used to access the mainframe computer during this demostration is a Texas Instruments Silent 700, as shown in Appendices A and B.
The terminal is portable and looks very much like a portable typewriter. It has an acoustical coupler which is used to connect a telephone receiver to the terminal. The user dials the computer, and when a signal is heard

to indicate that the computer has answered, the phone receiver is placed into the acoustical coupler on the TI Silent 700 terminal. The user would enter a code on the keyboard and transmit the information by depressing the carriage return key (CR). The mainframe computer would ask for the user's identification or password. If the mainframe computer didn't recognize the user, he or she would not be able to use the mainframe computer.

```
♦DESTROY USERID/PASSWORD ENTRY
♦UNIVAC 1100 OPERATING SYSTEM  LEV. 37R2C♦01/01 (RSI)♦

RUN NUMBER  66

LAST RUN AT: 022583 133349
DATE: 031183       TIME: 093641
INTERACTIVE FINANCIAL PLANNING SYSTEM - 8.0 V2
ENTER MODELS AND REPORTS FILE NAME
>TEST
FILE TEST PROCESSED
READY FOR EXECUTIVE COMMAND
>CATALOG
NAME      TYPE      NUM
NONPRO1   MODEL     25
CORD      MODEL     24
CUTWOOD   MODEL     19
WOOD      MODEL     24
CHECK     MODEL     16
NPO       REPORT    43
NPO       MODEL     23
>LIST MODEL NPO
```

When the computer recognizes the user, it destroys the user's identification/password entry so that it cannot be known or seen by anyone except the user. The computer then identifies itself, and in effect says,

"User, you are using a Univac 1100 Operating System Level 36R2C." It then assigns a run number to the user, and proceeds to tell the user when he or she was last using the computer. Next, the computer identifies the system the user is using. In the present case, the Interactive Financial Planning System, Release 8.0 V2, or Version 2 of Release 8.0. (A release is a set of enhancements to the software which have a major impact on the system. A version is also a set of enhancements, but of a minor nature. Release 9.0 will be available during April, 1983.) IFPS then takes over and asks the user for the name of the model and reports file he or she wants (What filing cabinet do you need?). In the sample case, the file name (filing cabinet) is Test. The computer gets the file and tells the user that is is ready. It then asks what the user wants out of the file (Which folder?). In the sample the user has replied with the command CATALOG. This in effect says, "Let me see what is in the filing cabinet." IFPS will respond by printing a list of every model and report name, identify them as a model or a report, and indicate the number of lines (rows) in each. The user in the sample case has selected to look at the model called NPO. IFPS will get the model and list it for the user in line number sequence, as shown following.

```
MODEL NPO  VERSION OF  12/10/82  16:34
10 COLUMNS 1982-1985
20 * REVENUE
30 ANNUAL PLEDGES = 25000, PREVIOUS * 1.10
40 SPECIAL EVENTS = 15000,PREVIOUS * 1.15
50 UNITED WAY = ANNUAL PLEDGES * .50
60 ENDOWMENT = (150000 * .18),PREVIOUS * 1.05
65 TOTAL REVENUE = L30 + L40 + L50 + L60
70 * EXPENSES
80 OFFICE RENT = (500 * 12), PREVIOUS * 1.05
90 EQUIP&SUPPLIES = (100 * 12), PREVIOUS * 1.05
100 PRINTING = 2500, PREVIOUS * 1.15
110 POSTAGE = (50000 * .09), PREVIOUS * 1.10
120 SALARIES = (4000 * 12), PREVIOUS * 1.08
130 SALARY EXPENSE = SALARIES * .068
140 TELEPHONE = (200 * 12),PREVIOUS * 1.25
150 TRANSPORTATION = (300 * 12),PREVIOUS * 1.15
159 EXPENSES = L80 + L90 + L100 + L110 + L120 + L130 + L140 + L150
160 MISCELLANEOUS = EXPENSES * .10
170 TOTAL EXPENSES = EXPENSES + MISCELLANEOUS
180 * ANALYSIS
190 REVENUE = TOTAL REVENUE
200 OPERATING COSTS = TOTAL EXPENSES
210 CAPITAL RESERVE = REVENUE - OPERATING COSTS
END OF MODEL
READY FOR EXECUTIVE COMMAND
>LIST MODEL NONPRO1
```

3. Listing The Model. The IFPS software will cause the model being worked with to be listed when the command "LIST" is entered via the terminal keyboard.[21] The list function will identify the model name and when it was created, giving both the date and the time of its creation. The sample model was created on December 10, 1982, at 16:34, which is 4:34 p.m. Once the model is listed, the user may study it to see if it contains the variables and variable statements which he or she desires in conjunction with the problem or decisions sought to be resolved. If satisfied with the model as listed, the user may go on to whatever the desired next step might be. In the case shown, the user has entered the command:

LIST MODEL NONPRO1

This indicates that the contents of a model named NONPRO1 are desired to be listed so that the user may examine them, add to them, delete from them, or change them in some manner. The IFPS software will now get the second model and display or print the contents in line sequence for the user.

```
MODEL NONPRO1  VERSION OF  02/07/83  15:32
10 COLUMNS 1983-1986
20 * REVENUE
30 ABLE FOUNDATION = 50000
40 ENDOWMENT = (125000 * .21),PREVIOUS * 1.05
50 UNITED WAY = ANNUAL PLEDGES * .50
60 SPECIAL EVENTS = 20000, PREVIOUS * 1.15
70 ANNUAL PLEDGES = 25000, PREVIOUS * 1.10
80 TOTAL REVENUE = L30 + L40 + L50 + L60 + L70
90 * EXPENSES
100 OFFICE RENT = (500 * 12), PREVIOUS * 1.05
110 EQUIPMENT = (100 * 12), PREVIOUS * 1.10
120 SUPPLIES = (125 * 12),PREVIOUS * 1.10
130 PRINTING = 2500, PREVIOUS * 1.10
140 POSTAGE = (50000 * .09),PREVIOUS * 1.10
150 SALARIES = (5000 * 12),PREVIOUS * 1.08
160 SALARY EXPENSE = SALARIES * .068
170 TELEPHONE = (250 * 12), PREVIOUS * 1.25
180 TRANSPORTATION = (300 * 12), PREVIOUS * 1.15
190 EXPENSES = SUM (L100 THRU L180)
200 MISCELLANEOUS = EXPENSES * .10
210 TOTAL EXPENSES = EXPENSES + MISCELLANEOUS
220 * ANALYSIS
230 REVENUE = TOTAL REVENUE
240 OPERATING EXPENSES = TOTAL EXPENSES
250 CAPITAL RESERVE = REVENUE - OPERATING EXPENSES
END OF MODEL
READY FOR EXECUTIVE COMMAND
```

This second model (above) is similar to the first. The differences will become apparent when a consolidation is attempted; and they will be dealt with at that juncture in this presentation.

The purpose of constructing a model is to obtain results. To obtain the results the user must enter the command SOLVE after a model has been accessed and is available to be worked with or upon. To access a model the user must enter into IFPS what he or she wants and its name, e.g., MODEL NPO.

```
MODEL NPO
READY FOR EDIT, LAST LINE IS 210
>SOLVE
MODEL NPO  VERSION OF  12/10/82  16:34 -- 4 COLUMNS 19 VARIABLES
ENTER SOLVE OPTIONS
>ALL

                          1982      1983      1984      1985

 REVENUE
ANNUAL PLEDGES           25000     27500     30250     33275
SPECIAL EVENTS           15000     17250     19837     22813
UNITED WAY               12500     13750     15125     16637
ENDOWMENT                27000     28350     29767     31256
TOTAL REVENUE            79500     86850     94980    103981
 EXPENSES
OFFICE RENT               6000      6300      6615      6946
EQUIP&SUPPLIES            1200      1260      1323      1389
PRINTING                  2500      2875      3306      3802
POSTAGE                   4500      4950      5445      5989
SALARIES                 48000     51840     55987     60466
SALARY EXPENSE            3264      3525      3807      4112
TELEPHONE                 2400      3000      3750      4688
TRANSPORTATION            3600      4140      4761      5475
EXPENSES                 71464     77890     84995     92867
MISCELLANEOUS             7146      7789      8499      9287
TOTAL EXPENSES           78610     85679     93494    102154
 ANALYSIS
REVENUE                  79500     86850     94980    103981
OPERATING COSTS          78610     85679     93494    102154
CAPITAL RESERVE          889.6      1171      1486      1828
```

4. Solving The Model. When the IFPS has solved the variable statements, it will tell the user which model and version it has solved, and how many columns and variables there are in the model. The IFPS will then ask the user to enter the solve options. At this point the user may select random variables and columns to have displayed, or he or she may enter the command "ALL" and have IFPS display all of the variables and columns. The "ALL" option was selected in the example on the previous page. Once the "ALL" command is entered via the terminal, IFPS causes the entire solution of the model to be displayed on a CRT screen or printed by a printing device. In the case being demonstrated, the solution was printed on the TI Silent 700 terminal. After printing the solution, IFPS asks the user to enter any additional solve options. Each time the user requests some function to be performed, IFPS will perform it and then ask if there are more solve options. This is comparable to asking, "What do you want me to do next?" In the example following, the user has chosen to solve only the years 1982 and 1983, and to solve only the variables begining with the variable Office Rent and ending with Total Expenses inclusive.

```
ENTER SOLVE OPTIONS
>COLUMNS 1982, 1983
>OFFICE RENT THRU TOTAL EXPENSES

                              1982      1983

OFFICE RENT                   6000      6300
EQUIP&SUPPLIES                1200      1260
PRINTING                      2500      2875
POSTAGE                       4500      4950
SALARIES                     48000     51840
SALARY EXPENSE                3264      3525
TELEPHONE                     2400      3000
TRANSPORTATION                3600      4140
EXPENSES                     71464     77890
MISCELLANEOUS                 7146      7789
TOTAL EXPENSES               78610     85679

ENTER SOLVE OPTIONS
```

After IFPS presents the solution to the options which have been selected, it again asks the user to enter solve options.

Instead of selecting additional solve options, the user has elected to ask to look at something entirely different -- a report format for the model. IFPS will make this report format available and tell the user what the last line in the format is. The user may make additions, deletions, or changes in the format, or ask that it be listed by entering the command "LIST". In the sample the command "LIST" was entered. IFPS accommodated the user as follows on page 41.

```
 REPORT NPO
READY FOR EDIT, LAST LINE IS 420
>LIST

REPORT NPO  VERSION OF  12/13/82  16:21
10 COLUMNS 1-4
20 FORMAT.....   99,999.99   99,999.99   99,999.99   99,999.99
30 CENTER NPO BUDGET
40 CENTER S A M P L E
50 UNDERLINE
60 SPACE 2
70 *DATE:*DATE*
80 *TIME:*TIME*
90 SPACE 2
100 COLUMN TITLES 1982,1983,1984,1985
110 UNDERLINE
120 SPACE
130 *  REVENUE
140 ANNUAL PLEDGES$
150 SPECIAL EVENTS
160 UNITED WAY
170 ENDOWMENT
180 UNDERLINE
190 TOTAL REVENUE$
200 SPACE 2
210 *  EXPENSES
220 OFFICE RENT$
230 EQUIP&SUPPLIES
240 PRINTING
250 POSTAGE
260 SALARIES
270 SALARY EXPENSE
280 TELEPHONE
290 TRANSPORTATION
300 UNDERLINE
310 EXPENSES$
320 MISCELLANEOUS
330 UNDERLINE
340 TOTAL EXPENSES$
350 UNDERLINE=
360 SPACE 2
370 *  ANALYSIS
380 REVENUE$
390 OPERATING COSTS
400 UNDERLINE
405 FORMAT.....  $99,999.99  $99,999.99  $99,999.99 $99,999.99
410 CAPITAL RESERVE
420 UNDERLINE =
END OF REPORT
```

5. Report Format. The purpose of the report format is to describe to IFPS exactly how the user desires the model to be printed in report form. The sample report format was constructed and filed so that it could be recalled and used at any time. The sample report format was constructed and filed on December 13, 1982, at 4:21 p.m. The report format provides editing to the model solution so that it can be presented with all the cosmetics, i.e., dollar signs, underlines, date and time of report preparation, the report headings, and other features which normally appear in a report but are not present in a model solution. Using the report format and the model for which it was developed, IFPS can now generate a well edited report for the user, or whoever the user wishes to present the report to.

6. Printing The Report. The user must be working with a model -- the model he or she desires to have printed in the report format -- and have previously developed and filed a report format for the model in order to print the model solution in the report format. The model can be called by telling IFPS the type and name of the 'file folder' desired. By entering "MODEL NPO" on the keyboard and transmitting this to the IFPS, the model will be accessed and made ready for edit.

Each time a model is made ready for edit, IFPS will also indicate how many lines are in the model, or rather, the number of the last line. Since, in the sample case, the user does not wish to edit the model further, but rather wished to print a report using the model and the report format previously constructed and stored, he or she would enter the command to generate the report. The report format being used in the sample is REPORT NPO. The command GENREPORT NPO will cause IFPS to generate the report for Model NPO in the format prescribed by Report NPO.

On the following page the model is called or asked for. When the model is available, IFPS indicates this status and informs the user that the last line is 210. The user then enters the GENREPORT NPO command rather than doing any editing or solving. IFPS will list the model name and the date and time of its creation. IFPS will also indicate the number of columns and the number of variables in the model. Following the printing or displaying of this information, IFPS will proceed to display the report requested. The results of this particular case are contained on page 44 hereof.

```
 MODEL NPO
READY FOR EDIT, LAST LINE IS 210
>GENREPORT NPO
MODEL NPO  VERSION OF  12/10/82  16:34 -- 4 COLUMNS 19 VARIABLES
```

NPO BUDGET
S A M P L E

DATE:03/11/83
TIME:09:47

	1982	1983	1984	1985
REVENUE				
ANNUAL PLEDGES	$25,000.00	$27,500.00	$30,250.00	$33,275.00
SPECIAL EVENTS	15,000.00	17,250.00	19,837.50	22,813.12
UNITED WAY	12,500.00	13,750.00	15,125.00	16,637.50
ENDOWMENT	27,000.00	28,350.00	29,767.50	31,255.87
TOTAL REVENUE	$79,500.00	$86,850.00	$94,980.00	$103,981.50
EXPENSES				
OFFICE RENT	$6,000.00	$6,300.00	$6,615.00	$6,945.75
EQUIP&SUPPLIES	1,200.00	1,260.00	1,323.00	1,389.15
PRINTING	2,500.00	2,875.00	3,306.25	3,802.19
POSTAGE	4,500.00	4,950.00	5,445.00	5,989.50
SALARIES	48,000.00	51,840.00	55,987.20	60,466.17
SALARY EXPENSE	3,264.00	3,525.12	3,807.13	4,111.70
TELEPHONE	2,400.00	3,000.00	3,750.00	4,687.50
TRANSPORTATION	3,600.00	4,140.00	4,761.00	5,475.15
EXPENSES	$71,464.00	$77,890.12	$84,994.58	$92,867.11
MISCELLANEOUS	7,146.40	7,789.01	8,499.46	9,286.71
TOTAL EXPENSES	$78,610.40	$85,679.13	$93,494.03	$102,153.82
ANALYSIS				
REVENUE	$79,500.00	$86,850.00	$94,980.00	$103,981.50
OPERATING COSTS	78,610.40	85,679.13	93,494.03	102,153.82
CAPITAL RESERVE	$ 889.60	$ 1,170.87	$ 1,485.96	$ 1,827.67

If a report format is used with a model other than the model for which it was designed, the outcome will not be that which is desired in most cases. The variables of each model must be the same. To demonstrate this problem, the author has taken REPORT NPO and used it with Model NONPRO1 to generate a report.

The second printed line under the heading of EXPENSES on the report states, "UNRECOGNIZED NAME OR DIRECTIVE IN REPORT LINE 230," and this message is repeated at the second line under ANALYSIS near the bottom of the report. At first check it can be noted that Model NPO has 19 variables, whereas Model NONPRO1 has 21 variables. These differences were mentioned earlier in this paper with the comment that they would be dealt with. We have come to that point in the paper. First, however, the printed report using Model NONPRO1 and Report NPO must be considered. It appears on the following page.

```
>MODEL NONPRO1
READY FOR EDIT, LAST LINE IS 250
>GENREPORT NPO
MODEL NONPRO1  VERSION OF  02/07/83  15:32 -- 4 COLUMNS 21 VARIABLES

                        NPO BUDGET
                        S A M P L E
                        -----------

DATE:03/11/83
TIME:09:49

                          1982         1983         1984         1985
                       ---------    ---------    ---------    ---------
  REVENUE
ANNUAL PLEDGES      $25,000.00   $27,500.00   $30,250.00   $33,275.00
SPECIAL EVENTS       20,000.00    23,000.00    26,450.00    30,417.50
UNITED WAY           12,500.00    13,750.00    15,125.00    16,637.50
ENDOWMENT            26,250.00    27,562.50    28,940.62    30,387.66
                     ---------    ---------    ---------    ---------
TOTAL REVENUE      $133,750.00  $141,812.50  $150,765.62  $160,717.65

  EXPENSES
OFFICE RENT          $6,000.00    $6,300.00    $6,615.00    $6,945.75
UNRECOGNIZED NAME OR DIRECTIVE IN REPORT LINE 230
PRINTING              2,500.00     2,750.00     3,025.00     3,327.50
POSTAGE               4,500.00     4,950.00     5,445.00     5,989.50
SALARIES             60,000.00    64,800.00    69,984.00    75,582.72
SALARY EXPENSE        4,080.00     4,406.40     4,758.91     5,139.62
TELEPHONE             3,000.00     3,750.00     4,687.50     5,859.38
TRANSPORTATION        3,600.00     4,140.00     4,761.00     5,475.15
                     ---------    ---------    ---------    ---------
EXPENSES             $86,380.00   $94,066.40  $102,543.41  $111,913.32
MISCELLANEOUS         8,638.00     9,406.64    10,254.34    11,191.33
                     ---------    ---------    ---------    ---------
TOTAL EXPENSES       $95,018.00  $103,473.04  $112,797.75  $123,104.65
                     =========    =========    =========    =========

  ANALYSIS
REVENUE             $133,750.00  $141,812.50  $150,765.62  $160,717.65
UNRECOGNIZED NAME OR DIRECTIVE IN REPORT LINE 390
                     ---------    ---------    ---------    ---------
CAPITAL RESERVE      $38,732.00   $38,339.46   $37,967.87   $37,613.01
                     =========    =========    =========    =========
```

Referring to page 41 and Report NPO it will be observed that line 230 is EQUIP&SUPPLIES, and line 390 is OPERATING COSTS. Looking at Model NPO on page 35 it will be observed that line 90 is EQUIP&SUPPLIES. Model NONPRO1 on page 37, however, has line 110 as EQUIPMENT and line 120 as SUPPLIES. Again looking at Model NPO on page 35 it will be noted that line 200 is OPERATING COSTS, whereas Model NONPRO1 on page 37 uses the variable OPERATING EXPENSES on line 240. OPERATING EXPENSES does not appear in the format of Report NPO on page 41. The statements in the report on the preceeding page to the effect that there is an UNRECOGNIZED NAME OR DIRECTIVE IN REPORT LINE 230 and again in line 390 points to the differences mentioned above.

Two choices confront the user for obtaining a report format for Model NONPRO1 which will accommodate all of the variables in Model NONPRO1. The user can construct an entire report format, or the user may make a copy of Report NPO and change it as required to accommodate Model NONPRO1. The latter is the quickest and simplest approach. The user would copy Report NPO, change the name of the copy to Report NONPRO1, list Report NONPRO1 and change it as required to accommodate Model NONPRO1.

The preceeding steps are illustrated following.

```
>COPY REPORT NPO TO NONPRO1
REPORT NONPRO1 CREATED WITH 43 LINES
>LIST REPORT NONPRO1
```

Report NONPRO1 has been created and will contain the exact contents of Report NPO when listed. Lines 230 and 390 will require some changes in order to enable Model NONPRO1 to be properly listed.

```
REPORT NONPRO1  VERSION OF  03/14/83  12:47
10 COLUMNS 1-4
20 FORMAT.....   99,999.99   99,999.99   99,999.99   99,999.99
30 CENTER NPO BUDGET
40 CENTER S A M P L E
50 UNDERLINE
60 SPACE 2
70 *DATE:*DATE*
80 *TIME:*TIME*
90 SPACE 2
100 COLUMN TITLES 1982,1983,1984,1985
110 UNDERLINE
120 SPACE
130 *  REVENUE
140 ANNUAL PLEDGES$
150 SPECIAL EVENTS
160 UNITED WAY
170 ENDOWMENT
180 UNDERLINE
190 TOTAL REVENUE$
200 SPACE 2
210 *  EXPENSES
220 OFFICE RENT$
230 EQUIP&SUPPLIES
240 PRINTING
250 POSTAGE
260 SALARIES
270 SALARY EXPENSE
280 TELEPHONE
290 TRANSPORTATION
300 UNDERLINE
310 EXPENSES$
320 MISCELLANEOUS
330 UNDERLINE
340 TOTAL EXPENSES$
350 UNDERLINE=
360 SPACE 2
370 *  ANALYSIS
380 REVENUE$
390 OPERATING COSTS
400 UNDERLINE
405 FORMAT.....  $99,999.99  $99,999.99  $99,999.99 $99,999.99
410 CAPITAL RESERVE
420 UNDERLINE =
END OF REPORT
```

It will be necessary to reenter line 230 as EQUIPMENT, add a new line 235 as SUPPLIES, and reenter line 390 as OPERATING EXPENSES in order to accommodate Model NONPRO1. After entering these changes, the report format should be listed to insure its correctness.

```
 REPORT NONPRO1
READY FOR EDIT, LAST LINE IS 420
>230 EQUIPMENT
>235 SUPPLIES
>390 OPERATING EXPENSES
>LIST
```

(The listed report follows on page 50.)

```
REPORT NONPRO1  VERSION OF  03/14/83  13:00
10 COLUMNS 1-4
20 FORMAT.....    99,999.99   99,999.99   99,999.99   99,999.99
30 CENTER NPO BUDGET
40 CENTER S A M P L E
50 UNDERLINE
60 SPACE 2
70 *DATE:*DATE*
80 *TIME:*TIME*
90 SPACE 2
100 COLUMN TITLES 1982,1983,1984,1985
110 UNDERLINE
120 SPACE
130 *  REVENUE
140 ANNUAL PLEDGES$
150 SPECIAL EVENTS
160 UNITED WAY
170 ENDOWMENT
180 UNDERLINE
190 TOTAL REVENUE$
200 SPACE 2
210 *  EXPENSES
220 OFFICE RENT$
230 EQUIPMENT
235 SUPPLIES
240 PRINTING
250 POSTAGE
260 SALARIES
270 SALARY EXPENSE
280 TELEPHONE
290 TRANSPORTATION
300 UNDERLINE
310 EXPENSES$
320 MISCELLANEOUS
330 UNDERLINE
340 TOTAL EXPENSES$
350 UNDERLINE=
360 SPACE 2
370 *  ANALYSIS
380 REVENUE$
390 OPERATING EXPENSES
400 UNDERLINE
405 FORMAT.....  $99,999.99  $99,999.99  $99,999.99 $99,999.99
410 CAPITAL RESERVE
420 UNDERLINE =
END OF REPORT
```

The logical next step in this process would be to generate the report using Model NONPRO1 in order to ascertain that our efforts are going to produce the results sought. Following is the report generation step.

```
 MODEL NONPRO1
READY FOR EDIT. LAST LINE IS 250
>GENREPORT NONPRO1
MODEL NONPRO1  VERSION OF  02/07/83  15:32 -- 4 COLUMNS 21 VARIABLES

                    NPO BUDGET
                    S A M P L E
                    -----------

DATE:03/14/83
TIME:13:01

                        1982         1983         1984         1985
                    ---------    ---------    ---------    ---------

  REVENUE
ANNUAL PLEDGES    $25,000.00   $27,500.00   $30,250.00   $33,275.00
SPECIAL EVENTS     20,000.00    23,000.00    26,450.00    30,417.50
UNITED WAY         12,500.00    13,750.00    15,125.00    16,637.50
ENDOWMENT          26,250.00    27,562.50    28,940.62    30,387.66
                   ---------    ---------    ---------    ---------
TOTAL REVENUE    $133,750.00  $141,812.50  $150,765.62  $160,717.65

  EXPENSES
OFFICE RENT        $6,000.00    $6,300.00    $6,615.00    $6,945.75
EQUIPMENT           1,200.00     1,320.00     1,452.00     1,597.20
SUPPLIES            1,500.00     1,650.00     1,815.00     1,996.50
PRINTING            2,500.00     2,750.00     3,025.00     3,327.50
POSTAGE             4,500.00     4,950.00     5,445.00     5,989.50
SALARIES           60,000.00    64,800.00    69,984.00    75,582.72
SALARY EXPENSE      4,080.00     4,406.40     4,758.91     5,139.62
TELEPHONE           3,000.00     3,750.00     4,687.50     5,859.38
TRANSPORTATION      3,600.00     4,140.00     4,761.00     5,475.15
                    ---------    ---------    ---------    ---------
EXPENSES           $86,380.00   $94,066.40  $102,543.41  $111,913.32
MISCELLANEOUS       8,638.00     9,406.64    10,254.34    11,191.33
                    ---------    ---------    ---------    ---------
TOTAL EXPENSES     $95,018.00  $103,473.04  $112,797.75  $123,104.65
                   ==========   ==========   ==========   ==========


  ANALYSIS
REVENUE          $133,750.00  $141,812.50  $150,765.62  $160,717.65
OPERATING EXPEN    95,018.00   103,473.04   112,797.75   123,104.65
                   ---------    ---------    ---------    ---------
CAPITAL RESERVE   $38,732.00   $38,339.46   $37,967.87   $37,613.01
                   ==========   ==========   ==========   ==========
```

While IFPS will print messages when there are differences in variables named in the report format and those which are in the model, it will not call the

user's attention to differences in column titles or tell the user to check them for accuracy. The user must remember to do this. In our sample we have now printed a report which appears to accommodate the model with which it is used. The column titles, however, are not the same as those in the model. Referring to page 50, the report format shows on line 100 that the column titles are to be 1982, 1983, 1984, and 1985. Looking at the Model NONPRO1 on page 37 we discover that the columns in the model are 1983, 1984, 1985, and 1986. Another correction to Report NONPRO1 is now required in order to make it agree with the model. The user must call up the report and edit line 100, after which the Model NONPRO1 is reaccessed and a correct report generated. The steps are illustrated following.

```
>REPORT NONPRO1
READY FOR EDIT, LAST LINE IS 420
>100 COLUMN TITLES 1983,1984,1985,1986
```

(The listing of the report NONPRO1 follows on page 53.)

```
 MODEL NONPRO1
READY FOR EDIT, LAST LINE IS 250
>GENREPORT NONPRO1
MODEL NONPRO1  VERSION OF  02/07/83  15:32 -- 4 COLUMNS 21 VARIABLES

                    NPO BUDGET
                    S A M P L E
                    -----------

DATE:03/14/83
TIME:13:04

                      1983         1984         1985         1986
                    ---------    ---------    ---------    ---------
  REVENUE
ANNUAL PLEDGES      $25,000.00   $27,500.00   $30,250.00   $33,275.00
SPECIAL EVENTS       20,000.00    23,000.00    26,450.00    30,417.50
UNITED WAY           12,500.00    13,750.00    15,125.00    16,637.50
ENDOWMENT            26,250.00    27,562.50    28,940.62    30,387.66
                    ---------    ---------    ---------    ---------
TOTAL REVENUE      $133,750.00  $141,812.50  $150,765.62  $160,717.65

  EXPENSES
OFFICE RENT          $6,000.00    $6,300.00    $6,615.00    $6,945.75
EQUIPMENT             1,200.00     1,320.00     1,452.00     1,597.20
SUPPLIES              1,500.00     1,650.00     1,815.00     1,996.50
PRINTING              2,500.00     2,750.00     3,025.00     3,327.50
POSTAGE               4,500.00     4,950.00     5,445.00     5,989.50
SALARIES             60,000.00    64,800.00    69,984.00    75,582.72
SALARY EXPENSE        4,080.00     4,406.40     4,758.91     5,139.62
TELEPHONE             3,000.00     3,750.00     4,687.50     5,859.38
TRANSPORTATION        3,600.00     4,140.00     4,761.00     5,475.15
                    ---------    ---------    ---------    ---------
EXPENSES             $86,380.00   $94,066.40  $102,543.41  $111,913.32
MISCELLANEOUS         8,638.00     9,406.64    10,254.34    11,191.33
                    ---------    ---------    ---------    ---------
TOTAL EXPENSES       $95,018.00  $103,473.04  $112,797.75  $123,104.65
                    =========    =========    =========    =========
```

B. Consolidation. Business functional organizations often consist of a headquarters operating in an overall management capacity with stores, plants, or branch offices geographically dispersed. Each store, plant, or branch is an operating unit of the business and a separate entity contributing to the success or

failure of the total business structure.

For reasons of computing taxes on the total business and similar requirements of law and management, it becomes necessary to combine or consolidate the accounting data of the headquarters operation with those of the operating units.

Mergers of business entities may additionally give rise to the need for consolidation of financial data. Currently there is an abnormal number of mergers taking place in the financial industry due to the poor state of the economy nationally.

Mergers by nonprofit organizations which have similar missions and goals are also receiving more than the usual amount of consideration due to the sharp reduction of financial support during the past several years.

The Interactive Financial Planning System can ease the demands of time and effort normally expierenced in constructing consolidated reports for tax purposes, management requirements, and mergers. Whatever the need might be for consolidating data from two or more units, IFPS easily effects the consolidation.

Following is a demonstration of the IFPS consolidation capability using the models NPO and NONPRO1; the sample models of this paper.

```
>CONSOLIDATE NPO, NONPRO1
ENTER MORE MODEL NAMES OR NONE
>NONE
CONSOLIDATION COMPLETED 2 MODELS
>SOLVE
ENTER SOLVE OPTIONS
>ALL
```

	1983	1984	1985	1986
REVENUE				
ABLE FOUNDATION	50000	50000	50000	50000
ENDOWMENT	53250	55912	58708	61644
UNITED WAY	25000	27500	30250	33275
SPECIAL EVENTS	35000	40250	46287	53231
ANNUAL PLEDGES	50000	55000	60500	66550
TOTAL REVENUE	213250	228662	245746	264699
EXPENSES				
OFFICE RENT	12000	12600	13230	13891
EQUIPMENT	1200	1320	1452	1597
SUPPLIES	2700	2910	3138	3386
PRINTING	5000	5625	6331	7130
POSTAGE	9000	9900	10890	11979
SALARIES	108000	116640	125971	136049
SALARY EXPENSE	7344	7932	8566	9251
TELEPHONE	5400	6750	8438	10547
TRANSPORTATION	7200	8280	9522	10950
EXPENSES	157844	171957	187538	204780
MISCELLANEOUS	15784	17196	18754	20478
TOTAL EXPENSES	173628	189152	206292	225258
ANALYSIS				
REVENUE	213250	228662	245746	264699
OPERATING EXPENSES	173628	189152	206292	225258
CAPITAL RESERVE	39622	39510	39454	39441

1. The Results. The consolidation above combines the model solutions of Model NPO and Model NONPRO1. The model solutions which were consolidated appear on the following page. Note that ABLE FOUNDATION is a variable in Model NONPRO1 only. Unique variables will appear in the consolidation results. The values of like-named variables will be added together and the result will appear in the consolidation.

```
 MODEL NPO
READY FOR EDIT, LAST LINE IS 210
>SOLVE
MODEL NPO  VERSION OF  03/17/83  12:39 -- 4 COLUMNS 19 VARIABLES
ENTER SOLVE OPTIONS
>ALL
```

	1982	1983	1984	1985
REVENUE				
ANNUAL PLEDGES	25000	27500	30250	33275
SPECIAL EVENTS	15000	17250	19837	22813
UNITED WAY	12500	13750	15125	16637
ENDOWMENT	27000	28350	29767	31256
TOTAL REVENUE	79500	86850	94980	103981
EXPENSES				
OFFICE RENT	6000	6300	6615	6946
SUPPLIES	1200	1260	1323	1389
PRINTING	2500	2875	3306	3802
POSTAGE	4500	4950	5445	5989
SALARIES	48000	51840	55987	60466
SALARY EXPENSE	3264	3525	3807	4112
TELEPHONE	2400	3000	3750	4688
TRANSPORTATION	3600	4140	4761	5475
EXPENSES	71464	77890	84995	92867
MISCELLANEOUS	7146	7789	8499	9287
TOTAL EXPENSES	78610	85679	93494	102154
ANALYSIS				
REVENUE	79500	86850	94980	103981
OPERATING EXPENSES	78610	85679	93494	102154
CAPITAL RESERVE	889.6	1171	1486	1828

```
 MODEL NONPRO1
READY FOR EDIT, LAST LINE IS 250
>SOLVE
MODEL NONPRO1  VERSION OF  02/07/83  15:32 -- 4 COLUMNS 21 VARIABLES
ENTER SOLVE OPTIONS
>ALL
```

	1983	1984	1985	1986
REVENUE				
ABLE FOUNDATION	50000	50000	50000	50000
ENDOWMENT	26250	27562	28941	30388
UNITED WAY	12500	13750	15125	16637
SPECIAL EVENTS	20000	23000	26450	30417
ANNUAL PLEDGES	25000	27500	30250	33275
TOTAL REVENUE	133750	141812	150766	160718
EXPENSES				
OFFICE RENT	6000	6300	6615	6946
EQUIPMENT	1200	1320	1452	1597
SUPPLIES	1500	1650	1815	1996
PRINTING	2500	2750	3025	3327
POSTAGE	4500	4950	5445	5989
SALARIES	60000	64800	69984	75583
SALARY EXPENSE	4080	4406	4759	5140
TELEPHONE	3000	3750	4688	5859
TRANSPORTATION	3600	4140	4761	5475
EXPENSES	86380	94066	102543	111913
MISCELLANEOUS	8638	9407	10254	11191
TOTAL EXPENSES	95018	103473	112798	123105
ANALYSIS				
REVENUE	133750	141812	150766	160718
OPERATING EXPENSES	95018	103473	112798	123105
CAPITAL RESERVE	38732	38339	37968	37613

C. Datafiles. Datafiles are what their name implies. They provide a means of providing data to a model or of saving the solution of a model or consolidation of one or more models, datafiles, or a combination of these. To demonstrate this capability or feature of IFPS, a datafile will be constructed using the results of the consolidation of the models NPO and NONPRO1.

To create a datafile from the model solution or a consolidation, the user must enter the command STORENT followed by a name to be given the datafile. In our sample the datafile will be named CONPRO. (COnsolidation of NonPROfits.)

A datafile may be created from selected variables and columns of a solution, or all variables and columns. In the sample, the user has chosen to store the full solution into a datafile, thus the option ALL was entered.

Datafiles contain only variables and their values. There are no variable statements -- only values derived from their solution. A model will always be automatically solved when the command STORENT is entered in the IFPS via a terminal.

In the sample following, the datafile was created or stored from a consolidation solution.

Following this accomplishment, IFPS asks for additional solve options. The user has entered DATAFILE CONPRO on the terminal keyboard and transmitted the entry to IFPS. IFPS has accessed the new datafile and indicated that the last line in the datafile (DF) is number 21. The user has entered the command LIST. Immediately, IFPS displays the line number, name, and values of every variable in the datafile CONPRO. This evidences that the file was created.

A comparison of the variables in CONPRO, and the values associated with them, to those of the consolidation solution will verify the effectiveness of this IFPS capability.

```
ENTER SOLVE OPTIONS
>STORENT CONPRO
NEW DATA FILE WILL BE CREATED
ENTER STORE OPTIONS
>ALL

STORE UPDATE COMPLETE
ENTER SOLVE OPTIONS
>DATAFILE CONPRO
READY FOR EDIT, LAST LINE IS 21
>LIST
1 ABLE FOUNDATION=50000 FOR 4
2 ENDOWMENT=53250,55912.5,58708.1,61643.5
3 UNITED WAY=25000,27500,30250,33275
4 SPECIAL EVENTS=35000,40250,46287.5,53230.6
5 ANNUAL PLEDGES=50000,55000,60500,66550
6 TOTAL REVENUE=213250,228662,245746,264699
7 OFFICE RENT=12000,12600,13230,13891.5
8 EQUIPMENT=1200,1320,1452,1597.2
9 SUPPLIES=2700,2910,3138,3385.65
10 PRINTING=5000,5625,6331.25,7129.69
11 POSTAGE=9000,9900,10890,11979
12 SALARIES=108000,116640,125971,136049
13 SALARY EXPENSE=7344,7931.52,8566.04,9251.32
14 TELEPHONE=5400,6750,8437.5,10546.9
15 TRANSPORTATION=7200,8280,9522,10950.3
16 EXPENSES=157844,171957,187538,204780
17 MISCELLANEOUS=15784.4,17195.7,18753.8,20478
18 TOTAL EXPENSES=173628,189152,206292,225258
19 REVENUE=213250,228662,245746,264699
20 OPERATING EXPENSES=173628,189152,206292,225258
21 CAPITAL RESERVE=39621.6,39510.3,39453.8,39440.7
```

1. Datafile Construction and Use. Datafiles are additionally capable of being built or constructed by entering the word DATAFILE followed by a name, as shown following.

```
*DESTROY USERID/PASSWORD ENTRY
*UNIVAC 1100 OPERATING SYSTEM  LEV. 37R2C*01/01 (RSI)*

RUN NUMBER  73

LAST RUN AT: 031783 132507
DATE: 031783          TIME: 143647
INTERACTIVE FINANCIAL PLANNING SYSTEM - 8.0 V2
ENTER MODELS AND REPORTS FILE NAME
>TEST
FILE TEST PROCESSED
READY FOR EXECUTIVE COMMAND
>DATAFILE SAMPLE
BEGIN ENTERING NEW DATA FILE
>BAKER FOUNDATION=25000,68000,75000,23000
>ENDOWMENT=23467,12468,921,583
>UNITED WAY=500,200,300,600
>SAVE
DATAFILE SAVED
>DATAFILE SAMPLE2
BEGIN ENTERING NEW DATA FILE
>CHARLIE FOUNDATION=30000,12,15000,12000
>ENDOWMENT=18273,182,1986,27834
>UNITED WAY=500,800,700,400
>SAVE
DATAFILE SAVED
```

Two datafiles have been constructed -- SAMPLE and SAMPLE2. These will be consolidated into a third datafile by using the command CONSOLDF (consolidate datafiles) and naming the datafiles to be consolidated. Following consolidation, the newly constructed datafile will be listed by the user. Note that when the values of SAMPLE and SAMPLE2 for the variable UNITED WAY are added they equal 1000 for each of the four periods. IFPS recognizes this and instead of displaying 1000, 1000, 1000, 1000 it displays 1000 FOR 4.

```
CONSOLDF SAMPLE,SAMPLE2
ENTER DATA FILE NAMES OR NONE
>NONE
ENTER OUTPUT FILE NAME (STOREOPT OR NAOUTPUT)
>SAMPLE3
DATA FILES CONSOLIDATED AND SAVED ON FILE SAMPLE3
READY FOR EXECUTIVE COMMAND
>DATAFILE SAMPLE3
READY FOR EDIT, LAST LINE IS 4
>LIST
1 BAKER FOUNDATION=25000,68000,75000,23000
2 ENDOWMENT=41740,12650,2907,28417
3 UNITED WAY=1000 FOR 4
4 CHARLIE FOUNDATION=30000,12,15000,12000
>
```

A small model will be needed to demonstrate the use of datafiles with models. Following is the construction of the model SAMPLE. Note that the first entry is AUTO 10,10. This entry instructs IFPS to number the first line of the model as number 10 and to increment subsequent line numbers by 10. Note also that all variables have a value of zero. After the model is constructed, it is listed to verify its contents. The user has then solved the model, as seen in the samples following.

```
 MODEL SAMPLE
BEGIN ENTERING NEW MODEL
>AUTO 10,10
 10 >COLUMNS 1983,1984,1985,1986
 20 >BAKER FOUNDATION = 0
 30 >CHARLIE FOUNDATION = 0
 40 >ENDOWMENT = 0
 50 >UNITED WAY = 0
 60 >END
READY FOR EDIT
>LIST
```

```
MODEL SAMPLE  VERSION OF  03/17/83  14:46
10 COLUMNS 1983,1984,1985,1986
20 BAKER FOUNDATION = 0
30 CHARLIE FOUNDATION = 0
40 ENDOWMENT = 0
50 UNITED WAY = 0
END OF MODEL

>SOLVE
MODEL SAMPLE  VERSION OF  03/17/83  14:46 -- 4 COLUMNS 4 VARIABLES
ENTER SOLVE OPTIONS
>ALL
                          1983      1984      1985      1986

BAKER FOUNDATION             0         0         0         0
CHARLIE FOUNDATION           0         0         0         0
ENDOWMENT                    0         0         0         0
UNITED WAY                   0         0         0         0

ENTER SOLVE OPTIONS
```

The model SAMPLE is next solved using the data-file SAMPLE3. Note that the data from SAMPLE3 is over-laid on the values in the model variable by variable. This demonstrates how one model may be used with data from many datafiles to create a number of unique reports. The number of time periods in the model and the data-file should be equal -- there may not be more time periods in a datafile, but there may be more in a model. In such a situation, the last value given is repeated in any excess columns. For instance, should a model have a variable of SALES and six time periods or columns, and a datafile should have only four time periods or values for the variable SALES, the amount of the fourth value would be entered in the fifth and

sixth time periods.

```
>SOLVE USING SAMPLE3
MODEL SAMPLE  VERSION OF  03/17/83  14:46 -- 4 COLUMNS 4 VARIABLES
ENTER SOLVE OPTIONS
>ALL
```

	1983	1984	1985	1986
BAKER FOUNDATION	25000	68000	75000	23000
CHARLIE FOUNDATION	30000	12	15000	12000
ENDOWMENT	41740	12650	2907	28417
UNITED WAY	1000	1000	1000	1000

D. Decision Support. At the heart of the decision support capabilities of IFPS are the "What If" and "Goal Seek(ing)" features. Using these features enables one to determine in advance the effects of various changes upon the model contents, or to know what must be done in order to achieve a desired goal.

1. What If. In the sample what if case following the user asks the question, "What if the miscellaneous expenses are equal to twenty percent of the total other expenses instead of ten percent as stated in the base model? Notice additionally that the user has elected to look at the column for 1982 only.

```
READY FOR EXECUTIVE COMMAND
>MODEL NPO
READY FOR EDIT, LAST LINE IS 210
>SOLVE
MODEL NPO  VERSION OF  03/17/83  12:39 -- 4 COLUMNS 19 VARIABLE
ENTER SOLVE OPTIONS
>WHAT IF
WHAT IF CASE 1
ENTER STATEMENTS
>MISCELLANEOUS = EXPENSES * .20
>SOLVE
ENTER SOLVE OPTIONS
>COLUMN 1982
>OFFICE RENT THRU TOTAL EXPENSES
```

```
♦♦♦♦♦ WHAT IF CASE 1 ♦♦♦♦♦
1 WHAT IF STATEMENT PROCESSED

                              1982

OFFICE RENT                   6000
SUPPLIES                      1200
PRINTING                      2500
POSTAGE                       4500
SALARIES                     48000
SALARY EXPENSE                3264
TELEPHONE                     2400
TRANSPORTATION                3600
EXPENSES                     71464
MISCELLANEOUS                14293
TOTAL EXPENSES               85757
```

Having obtained the information requested of IFPS, the user now wishes to know what effect the 20 percent increase in miscellaneous expense will have on operating expenses and capital reserve. The user would make the following entries and obtain the results displayed below.

```
ENTER SOLVE OPTIONS
>WHAT IF
WHAT IF CASE 2
ENTER STATEMENTS
>MISCELLANEOUS = EXPENSES ♦ .20
>SOLVE
ENTER SOLVE OPTIONS
>COLUMN 1982
>MISCELLANEOUS, REVENUE THRU CAPITAL RESERVE
```

```
♦♦♦♦♦ WHAT IF CASE 2 ♦♦♦♦♦
1 WHAT IF STATEMENT PROCESSED

                              1982

MISCELLANEOUS                14293
REVENUE                      79500
OPERATING EXPENSES           85757
CAPITAL RESERVE              -6257
```

Observing the results, the user reaches the conclusion that the capital reserve being a negative $6,257.00 is a grave situation for his/her agency. What is desired is a capital reserve of at least $20,000.00. The user wonders what would have to be done to achieve this through annual pledges of support. Additionally, the user would like to know what would be necessary in terms of annual pledges to maintain a 20 percent increase in annual pledges for succesive years represented in the model. Since the goal seek will be done within What If Case 2, the parameters of the What If case will control, i.e., column 1982 was specified as a solve option for What If Case 2, and that specification is still in effect as the user performs the goal seeking function for annual pledges. the following entries and results would be made and obtained.

```
ENTER SOLVE OPTIONS
>GOAL SEEK
GOAL SEEKING CASE 1
ENTER NAME OF VARIABLE TO BE ADJUSTED TO ACHIEVE PERFORMANCE
>ANNUAL PLEDGES
ENTER COMPUTATIONAL STATEMENT FOR PERFORMANCE
>CAPITAL RESERVE = 20000, PREVIOUS * 1.20

***** WHAT IF CASE 2 *****
1 WHAT IF STATEMENT PROCESSED


***** GOAL SEEKING CASE 1 *****

                              1982

ANNUAL PLEDGES               42505

ENTER SOLVE OPTIONS
>ALL

                              1982

 REVENUE
ANNUAL PLEDGES               42505
SPECIAL EVENTS               15000
UNITED WAY                   21252
ENDOWMENT                    27000
TOTAL REVENUE               105757
 EXPENSES
OFFICE RENT                   6000
SUPPLIES                      1200
PRINTING                      2500
POSTAGE                       4500
SALARIES                     48000
SALARY EXPENSE                3264
TELEPHONE                     2400
TRANSPORTATION                3600
EXPENSES                     71464
MISCELLANEOUS                14293
TOTAL EXPENSES               85757
 ANALYSIS
REVENUE                     105757
OPERATING EXPENSES           85757
CAPITAL RESERVE              20000
```

Notice that IFPS provided a specific answer to the goal seeking objective; annual pledges must be $42,505.00 for 1982 in order to have a capital reserve of $20,000.00 at year end. This answer allows for the 20 percent increase in miscellaneous expenses of the What If Case 2 within which the goal seeking was performed.

To check out the overall effect, the user has asked IFPS to display all of the variables in the model. Visually checking the changes in the variables from the base model (see page 38) and the goal seeking solution, it can be observed that annual pledges increased from $25,000.00 in the model to $42,505.00 in the goal seeking solution; capital reserve increased from $889.60 in the model to $20,000.00 in the goal seeking solution; miscellaneous was increased by ten percent of total expenses, which caused it to double. As is apparent, and perhaps unexpected, an increase of ten percent of total expenses in the miscellaneous expense calculation has in fact increased miscellaneous expenses by 100 percent.

2. Sensitivity. Outside influences, such as inflation, can impact the variables in a model. Other variables can be impacted or changed by the user. It would seem to be a prudent course of conduct to determine the effect of changes before putting them into effect.

In demonstration of this point, the variable of salaries will be dealt with to determine the sensitivity of the model to changes to be made in salaries. In the terminology of IFPS, the user would inquire as to the sensitivity of the model variables to the impact of percentage changes of a single variable. In the sample following, the user is seeking to know the sensitivity of the budget to salaries. IFPS asks the user to provide the range of the changes to be made and the increment of change to be effected over the range. The user must enter the beginning percentage, the percentage at the end of the range, and the percentage of the increment or step. The user has indicated a beginning percentage of 2% and an ending percentage of 8% with increments of change at 2%, e.g., 2%, 4%, 6%, and 8%. In addition to salaries, the impact on the variables of salary expense and capital reserve are desired. The IFPS sensitivity analysis will provide the new values, indicate the change from the base model in actual value (dollars, pounds, etc.), and the percentage of the change from the base model, whether positive or negative.

```
>SENSITIVITY TO SALARIES
ENTER START,STOP,STEP PERCENTAGES
>2,8,2
ENTER VARIABLES TO BE PRINTED
>SALARIES,SALARY EXPENSE,CAPITAL RESERVE


***** WHAT IF CASE 2 *****
1 WHAT IF STATEMENT PROCESSED

SENSITIVITY ANALYSIS FOR     2 PER CENT CHANGE IN SALARIES

     NEW VALUES

                              1982

SALARIES                     48960
SALARY EXPENSE                3329
CAPITAL RESERVE              -7487

     CHANGE FROM BASE

                              1982

SALARIES                     960.0
SALARY EXPENSE               65.28
CAPITAL RESERVE              -1230

     PERCENT CHANGE FROM BASE

                              1982

SALARIES                        2
SALARY EXPENSE                  2
CAPITAL RESERVE             -19.66
```

SENSITIVITY ANALYSIS FOR 4 PER CENT CHANGE IN SALARIES

NEW VALUES

	1982
SALARIES	49920
SALARY EXPENSE	3395
CAPITAL RESERVE	-8717

CHANGE FROM BASE

	1982
SALARIES	1920
SALARY EXPENSE	130.6
CAPITAL RESERVE	-2461

PERCENT CHANGE FROM BASE

	1982
SALARIES	4
SALARY EXPENSE	4
CAPITAL RESERVE	-39.33

SENSITIVITY ANALYSIS FOR 6 PER CENT CHANGE IN SALARIES

NEW VALUES

	1982
SALARIES	50880
SALARY EXPENSE	3460
CAPITAL RESERVE	-9948

CHANGE FROM BASE

	1982
SALARIES	2880
SALARY EXPENSE	195.8
CAPITAL RESERVE	-3691

PERCENT CHANGE FROM BASE

	1982
SALARIES	6
SALARY EXPENSE	6
CAPITAL RESERVE	-58.99

SENSITIVITY ANALYSIS FOR 8 PER CENT CHANGE IN SALARIES

NEW VALUES

	1982
SALARIES	51840
SALARY EXPENSE	3525
CAPITAL RESERVE	-11178

CHANGE FROM BASE

	1982
SALARIES	3840
SALARY EXPENSE	261.1
CAPITAL RESERVE	-4921

PERCENT CHANGE FROM BASE

	1982
SALARIES	8
SALARY EXPENSE	8
CAPITAL RESERVE	-78.66

E. Financial Functions. IFPS software contains eight discounted cash flow functions, 19 mathematical functions, three extrapolation functions, and six probability distribution functions. It is not the intention of the author to demonstrate all of these

functions in this paper. In fact, only their existence will be mentioned to give the reader knowledge of the availability of these functions in IFPS software.

F. Subroutines. IFPS subroutines are similar to IFPS functions. A subroutine differs from other variable definition statements in that several variables may be defined on one line of logic. The variables have no line number associated with their values. There are six subroutines in the IFPS software which address subjects such as amortization and various types of depreciation such as declining balance and straight line forms. A simple amortization sample follows to illustrate the simplicity of using this subroutine. The subroutine format is:

AMORT = (amortized loan, demand loan, interest rate, life, start column, payments per column, payment, interest, principal, balance) The underlined items are those which will be displayed by IFPS in an amortization schedule. In the sample amortization schedule the amortized loan amount is $3,000.00, the interest rate is 12 percent, and the loan is for three years with 12 periods or payments per year.

```
◆DESTROY USERID/PASSWORD ENTRY
◆UNIVAC 1100 OPERATING SYSTEM  LEV. 37R2C◆01/01 (RSI)◆

RUN NUMBER  76

LAST RUN AT: 031883 111621
DATE: 031883       TIME: 111950
INTERACTIVE FINANCIAL PLANNING SYSTEM - 8.0 V2
ENTER MODELS AND REPORTS FILE NAME
>TEST
FILE TEST PROCESSED
READY FOR EXECUTIVE COMMAND
>MODEL AMORT
BEGIN ENTERING NEW MODEL
>COLUMNS 1-36
>  PERIODS 12
>AMORT(3000.0,.12,3,1,1,PAYMENT,INTEREST,PRINCIPAL,BALANCE)
>SOLVE
MODEL AMORT  VERSION OF  03/18/83  11:23 -- 36 COLUMNS 4 VARIABLES
ENTER SOLVE OPTIONS
>OPT,5,12,2
>INVERT
>ALL
```

	PAYMENT	INTEREST	PRINCIPAL	BALANCE
1	99.64	30.00	69.64	2930.36
2	99.64	29.30	70.34	2860.02
3	99.64	28.60	71.04	2788.97
4	99.64	27.89	71.75	2717.22
5	99.64	27.17	72.47	2644.75
6	99.64	26.45	73.20	2571.56
7	99.64	25.72	73.93	2497.63
8	99.64	24.98	74.67	2422.96
9	99.64	24.23	75.41	2347.55
10	99.64	23.48	76.17	2271.38
11	99.64	22.71	76.93	2194.45
12	99.64	21.94	77.70	2116.75
13	99.64	21.17	78.48	2038.28
14	99.64	20.38	79.26	1959.02
15	99.64	19.59	80.05	1878.96
16	99.64	18.79	80.85	1798.11
17	99.64	17.98	81.66	1716.45
18	99.64	17.16	82.48	1633.97
19	99.64	16.34	83.30	1550.67
20	99.64	15.51	84.14	1466.53
21	99.64	14.67	84.98	1381.55
22	99.64	13.82	85.83	1295.72
23	99.64	12.96	86.69	1209.04
24	99.64	12.09	87.55	1121.49
25	99.64	11.21	88.43	1033.06
26	99.64	10.33	89.31	943.75
27	99.64	9.44	90.21	853.54
28	99.64	8.54	91.11	762.43
29	99.64	7.62	92.02	670.41
30	99.64	6.70	92.94	577.48
31	99.64	5.77	93.87	483.61
32	99.64	4.84	94.81	388.80
33	99.64	3.89	95.76	293.05
34	99.64	2.93	96.71	196.33
35	99.64	1.96	97.68	98.65
36	99.64	.99	98.66	.00

G. Analysis Aids. A user who performed a considerable amount of work with IFPS would on occasion have cause to question the contents of a model which he/she had constructed in the past, or perhaps the model of another individual's creation. If the model contained line number references instead of variable names, it would be a complicated chore to trace each one down and make sense of the model. For this reason, IFPS designers have included in the software certain aids which simplify the analysis chore. Among the aids is the command LIST EXPAND, which is employed once the model in question has been accessed from the file in which it normally resides. This command causes the model to be listed with the variable names substituted for the line number references throughout the model. In the sample following, the model NPO has been used to demonstrate the LIST EXPAND command. First the NPO model is accessed. After it has been listed to display the line references to variables (see line 159), it is then relisted under the LIST EXPAND command. In this second listing there are no line number references (see line 159). In larger models this feature of IFPS is a very beneficial time saver, greatly reducing the amount of effort which must be expended to make sense of a model's contents.

```
ENTER SOLVE OPTIONS
>MODEL NPO
READY FOR EDIT, LAST LINE IS 210
>LIST

MODEL NPO  VERSION OF  03/17/83  12:39
10 COLUMNS 1982-1985
20 * REVENUE
30 ANNUAL PLEDGES = 25000, PREVIOUS * 1.10
40 SPECIAL EVENTS = 15000,PREVIOUS * 1.15
50 UNITED WAY = ANNUAL PLEDGES * .50
60 ENDOWMENT = (150000 * .18),PREVIOUS * 1.05
65 TOTAL REVENUE = L30 + L40 + L50 + L60
70 * EXPENSES
80 OFFICE RENT = (500 * 12), PREVIOUS * 1.05
90 SUPPLIES = (100 * 12) , PREVIOUS * 1.05
100 PRINTING = 2500, PREVIOUS * 1.15
110 POSTAGE = (50000 * .09), PREVIOUS * 1.10
120 SALARIES = (4000 * 12), PREVIOUS * 1.08
130 SALARY EXPENSE = SALARIES * .068
140 TELEPHONE = (200 * 12),PREVIOUS * 1.25
150 TRANSPORTATION = (300 * 12),PREVIOUS * 1.15
159 EXPENSES = L80 + L90 + L100 + L110 + L120 + L130 + L140 + L150
160 MISCELLANEOUS = EXPENSES * .10
170 TOTAL EXPENSES = EXPENSES + MISCELLANEOUS
180 * ANALYSIS
190 REVENUE = TOTAL REVENUE
200 OPERATING EXPENSES = TOTAL EXPENSES
210 CAPITAL RESERVE = REVENUE - OPERATING EXPENSES
END OF MODEL
>LIST EXPAND

MODEL NPO  VERSION OF  03/17/83  12:39
10 COLUMNS 1982-1985
20 * REVENUE
30 ANNUAL PLEDGES = 25000, PREVIOUS * 1.10
40 SPECIAL EVENTS = 15000,PREVIOUS * 1.15
50 UNITED WAY = ANNUAL PLEDGES * .50
60 ENDOWMENT = (150000 * .18),PREVIOUS * 1.05
65 TOTAL REVENUE = ANNUAL PLEDGES + SPECIAL EVENTS + UNITED WAY + ENDOWM
ENT
70 * EXPENSES
80 OFFICE RENT = (500 * 12), PREVIOUS * 1.05
90 SUPPLIES = (100 * 12) , PREVIOUS * 1.05
100 PRINTING = 2500, PREVIOUS * 1.15
110 POSTAGE = (50000 * .09), PREVIOUS * 1.10
120 SALARIES = (4000 * 12), PREVIOUS * 1.08
130 SALARY EXPENSE = SALARIES * .068
140 TELEPHONE = (200 * 12),PREVIOUS * 1.25
150 TRANSPORTATION = (300 * 12),PREVIOUS * 1.15
159 EXPENSES = OFFICE RENT + SUPPLIES + PRINTING + POSTAGE + SALARIES +
     SALARY EXPENSE + TELEPHONE + TRANSPORTATION
160 MISCELLANEOUS = EXPENSES * .10
170 TOTAL EXPENSES = EXPENSES + MISCELLANEOUS
180 * ANALYSIS
190 REVENUE = TOTAL REVENUE
200 OPERATING EXPENSES = TOTAL EXPENSES
210 CAPITAL RESERVE = REVENUE - OPERATING EXPENSES
END OF MODEL
```

Now that the model has been listed with the LIST EXPAND command, further analysis may be desired of some variable. If the user wished to know where a variable appeared in the model, he or she would be able to find each occurrence by entering the variable name in quotation marks. IFPS would print the first line in the model containing the variable name. If the user entered a single quotation mark and depressed the carriage return key, or transmit key, IFPS would print the next occurrence of the variable. This procedure could be continued until every occurrence of the variable name in the model were displayed. The user would know when all occurrences had been displayed due to the fact that IFPS would return to the first occurrence. In the sample of this feature the variable EXPENSES has been used for demonstration.

```
 "EXPENSES"
70 * EXPENSES
>"
159 EXPENSES = L80 + L90 + L100 + L110 + L120 + L130 + L140 + L150
>"
160 MISCELLANEOUS = EXPENSES * .10
>"
170 TOTAL EXPENSES = EXPENSES + MISCELLANEOUS
>"
200 OPERATING EXPENSES = TOTAL EXPENSES
>"
210 CAPITAL RESERVE = REVENUE - OPERATING EXPENSES
>"
70 * EXPENSES
>
```

Line 159 in the preceeding example contains many line references to variables. The user would have to refer to the model to determine what each of the variables were. This, again, would be an arduous chore. And, again, the IFPS designers took this into consideration when developing their software. Included in IFPS is an ANALYZE command. This command is entered on a terminal keyboard followed by the name of the variable which the user desires to have analyzed. IFPS will first identify the model with which it is working, and then it will display the main line on which the variable is defined in the model. Following this, IFPS will solve the variable statement and display it in model solution form. The variable EXPENSES has been selected for this demonstration; the sample follows.

```
 ANALYZE EXPENSES
MODEL NPD  VERSION OF  03/17/83  12:39 -- 4 COLUMNS 19 VARIABLES

159 EXPENSES = L80 + L90 + L100 + L110 + L120 + L130 + L140 + L150
```

	1982	1983	1984	1985
EXPENSES	71464	77890	84995	92867
OFFICE RENT	6000	6300	6615	6946
SUPPLIES	1200	1260	1323	1389
PRINTING	2500	2875	3306	3802
POSTAGE	4500	4950	5445	5989
SALARIES	48000	51840	55987	60466
SALARY EXPENSE	3264	3525	3807	4112
TELEPHONE	2400	3000	3750	4688
TRANSPORTATION	3600	4140	4761	5475

A third analysis aid which is integral to the IFPS software is the command CROSSREF. This command is used in conjuction with a model name to list all of the variables in the model, the line number of the line on which the variable is defined, and the line number(s) of every incidence of the variable in the model. For example, the variable ANNUAL PLEDGES is defined on line 30 of the model NPO. The variable appears further in the model on lines 50 and 65. A sample of the results obtained from using the CROSSREF command follows.

```
READY FOR EXECUTIVE COMMAND
>CROSSREF NPO
VARIABLE NAME                DEFN    REFERENCES
ANNUAL PLEDGES                 30      30   50   65
CAPITAL RESERVE               210
ENDOWMENT                      60      60   65
EXPENSES                      159     160  170
MISCELLANEOUS                 160     170
OFFICE RENT                    80      80  159
OPERATING EXPENSES            200     210
POSTAGE                       110     110  159
PRINTING                      100     100  159
REVENUE                       190     210
SALARIES                      120     120  130  159
SALARY EXPENSE                130     159
SPECIAL EVENTS                 40      40   65
SUPPLIES                       90      90  159
TELEPHONE                     140     140  159
TOTAL EXPENSES                170     200
TOTAL REVENUE                  65     190
TRANSPORTATION                150     150  159
UNITED WAY                     50      65
```

H. Sign Off. When the user has completed a session of work with IFPS and wishes to terminate the session, he or she would enter the command QUIT. If any changes were made to the models and reports accessed during the session, or if new models or reports were created, IFPS will ask the user if the models and reports (M&R) file is to be updated by saving these changes, models or reports. The user must enter YES or NO on the keyboard and transmit this to IFPS. IFPS then ends the session and displays END IFPS. The user (on a Univac computer) would enter @FIN. The Univac computer would display the computer account, project and time accounting data and put the terminal in use in an inactive mode. The user would then enter @@TERM, terminating the computer session. A sample of the sign off follows.

```
ENTER SOLVE OPTIONS
>QUIT
SAVE UPDATED M&R FILE TEST (YES OR NO)
>NO
END IFPS
>@FIN


  RUNID: ROBNOE    ACCT: DP0001          PROJECT: IFPS
      ROBNOE FIN
  TIME:     TOTAL: 00:00:34.527       CRSUPS:   017854045
            CPU:   00:00:00.514       I/O:   00:00:07.378
            CC/ER: 00:00:26.635       WAIT:  00:15:26.415

  SUAS USED:          2.67    SUAS REMAINING:          0.00
  IMAGES  READ:    51           PAGES:  5
  START:     11:19:50 MAR 18,1983     FIN:   11:35:41 MAR 18,1983
•TERMINAL INACTIVE•
>@@TERM
```

I. Summary. The preceeding discussion and demonstration of IFPS was intended to provide a cursory presentation of the more salient features of IFPS. By no means does that which has been presented cover all of the features and capabilities of IFPS. On the other hand, the reader should have a comfortable grasp on the subject of decision support systems in general, and of IFPS in particular.

An understanding and appreciation of DSS and IFPS are basic to discerning the significance of their application in the charitable nonprofit sector. IFPS will enable those who have limited resources to accomplish much more than they can now accomplish with those resources due to the highly efficient decision support, financial analysis, mathematical, reporting, data accumulating, data manipulation, and data storage capabilities. Making correct decisions at the time they are needed can both conserve resources and increase the earnings of those which are invested.

XI. Application of Decision Support Systems in the Nonprofit Sector

A variety of hardware and communication network designs are possible for implementing the use of IFPS within the nonprofit sector today. On the basis of cost alone, many of these networks and the related computer hardware would be denied the charitable nonprofit organization.

The challenge is to find viable cost efficient alternatives to make available to charitable nonprofit organizations the computer hardware and communications networks needed to benefit from the employment of IFPS.

A. The Network. The communications network may be housed in the same building in which the mainframe computer and terminal(s) are located. It may, on the other hand, be coast-to-coast with a mainframe located in New York City and a terminal in Los Angeles, Calif. For purposes of this paper, the geographical area addressed would be no larger than that of St. Louis City-County, St. Charles County, Jefferson County, and Franklin County, Missouri. Terminals in this geographical area would be able to use existing telephone lines to link to a host mainframe computer, or host mainframe computers. This network would be

configured as shown in Figures 6 and 7 below.

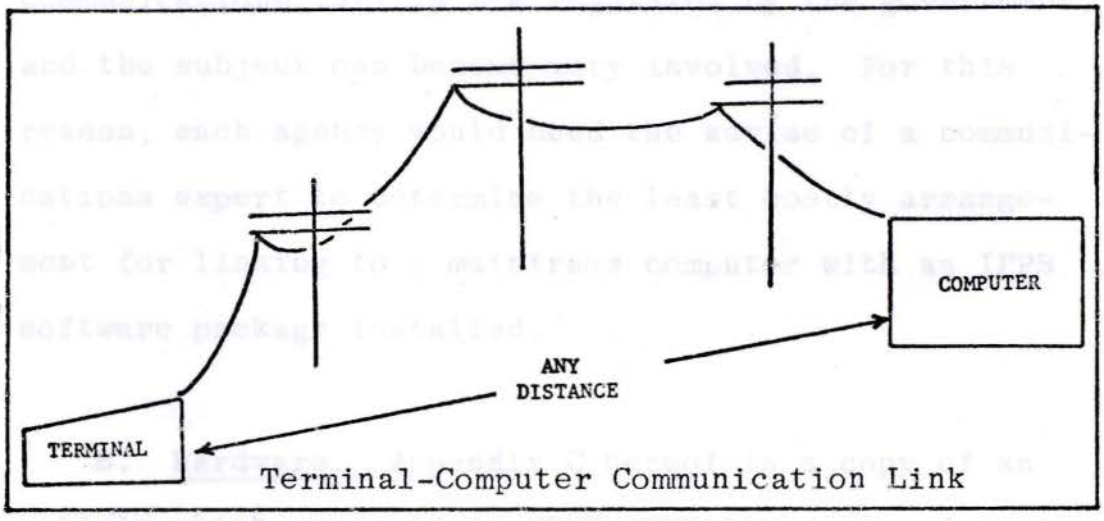


Figure 6

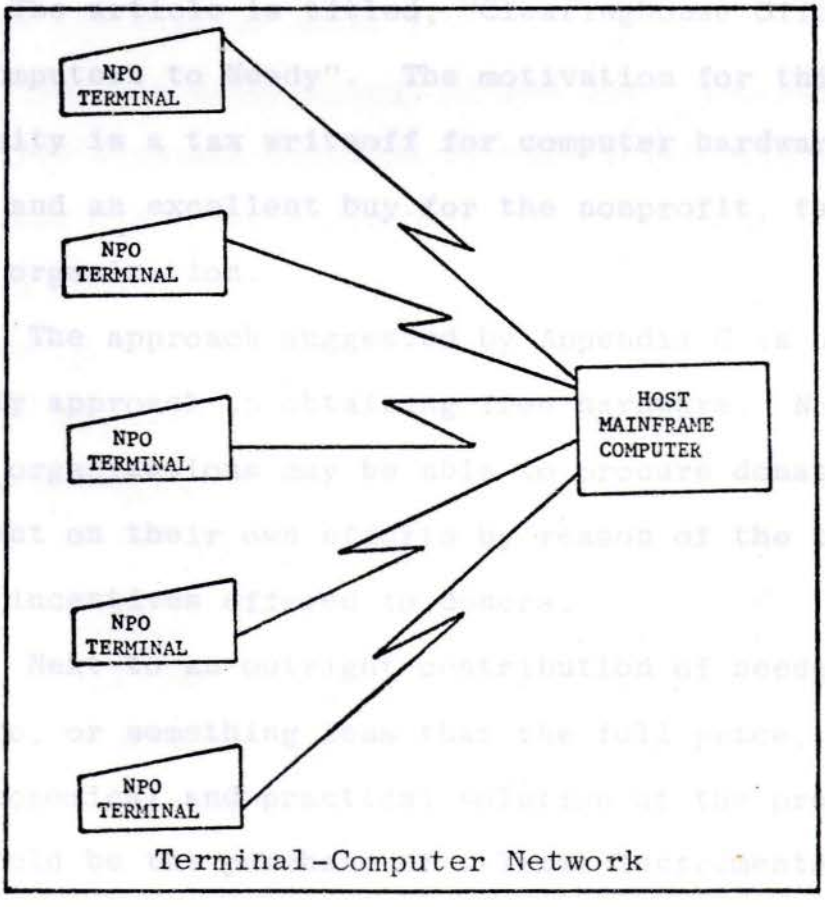


Figure 7

Part of the cost of using this type of communications network would be the telephone line charges. Communications tariffs are regulated by the government, and the subject can become very involved. For this reason, each agency would need the advise of a communications expert to determine the least costly arrangement for linking to a mainframe computer with an IFPS software package installed.

B. Hardware. Appendix C hereof is a copy of an article which appeared in COMPUTERWORLD during August, 1982. The article is titled, "Clearinghouse Offers Free Computers to Needy". The motivation for this generosity is a tax writeoff for computer hardware donors and an excellent buy for the nonprofit, tax-exempt organization.

The approach suggested by Appendix C is not the only approach to obtaining free hardware. Nonprofit organizations may be able to procure donated equipment on their own efforts by reason of the tax saving incentives offered to donors.

Next to an outright contribution of needed hardware, or something less than the full price, the most economical and practical solution at the present time would be the purchase of a Texas Instruments

Silent 700 portable terminal as shown in Appendix A hereof.

Pricing for the Texas Instruments Silent 700 terminal as of November, 1982, is as shown in Appendix B hereof.

The Texas Instruments Silent 700 provides hardcopy printout. A CRT (cathode ray tube) terminal would not provide printout. Any printing would have to be done on an auxillary printer at the nonprofit site or at the location of the host mainframe computer. Printing output in either situation would serve to increase the cost of using IFPS.

The one disadvantage of the Texas Instruments Silent 700 terminal printout is that it is only 80 characters wide (per printed line), whereas computer printers produce reports which are usually 132 characters wide (per print line). This could present a problem, but not one which could not be overcome with some inconvenience.

C. Paying the Bill. The use of a host mainframe computer by a charitable nonprofit organization may be financed in several ways. As seen on page 79, mainframe computer time is judiciously accounted for. A cost is associated with each minute of usage. This

cost may be absorbed by the company providing the host mainframe computer usage and written off as a charitable contribution. If this arrangement were not feasible, perhaps a 50/50 split of the cost could be negotiated wherein the company would receive a tax deduction for the value of 50 percent of the computer time cost and payment from the nonprofit organization for the other 50 percent of the computer usage. A third possibility would be for the nonprofit organization to pay a nominal (actual cost) fee for the use of the mainframe computer.

D. Ideal Configuration. There are eight major corporations, e.g. Monsanto, Purina, McDonnell Douglas, Consolidated Aluminum, etc., which have the IFPS software installed on their mainframe computers. A network as shown in Figure 7 on page 82 hereof could be established with any one or all of these companys. The author's experience dictates, however, that the probability of achieving such an objective would require an extended period of time; perhaps a year or more. At present, this approach is the only one on the horizon which has all of the components available, but it is being joined rapidly by alternatives which will require less effort, less expense, and provide

equal benefits.

The microcomputer has made great strides in recent years. Micro software companies are legion. The competition in the microcomputer/software arena has reached a torrid pace, and personal computers (PCs) are the current focal point of interest. These statements are supported by Appendix D, which touts the Paracalc financial modeling package for IBM's System/34 minicomputer, Appendix E, the "NEWS You Can Use...." article from the March 21, 1983, edition of U. S. News & World Report, and Appendix F, a very comprehensive feature article on home computers subcaptioned, "Ready or Not, Here They Come!" This feature article was not in a technical journal or science magazine, as one might expect. It was in the March, 1983, edition of . . . . Better Homes and Gardens!

EXECUCOM, Inc. realizes that there is an expanding market for IFPS in the microcomputer arena. During November, 1982, EXECUCOM announced their forthcoming entry into the micro arena at the IFPS Users Association conference held at the St. Louis Airport Mariott Hotel in St. Ann, Missouri. The author is a member of the IFPS Users Association and was present when this history-making announcement was made. The micro version of IFPS was in the research and

development phase at the time of the announcement, and was referred to as "little IFPS".

As recently as March 10, 1983, G. R. Wagner, Ph.D., President of EXECUCOM, mailed a "Survey of IFPS Users, Software Integration and Software on Microcomputers" to IFPS Users Association members. The EXECUCOM IFPS entry to the microcomputer arena is nearing development completion, and is now officially called Micro IFPS! Appendix G is a copy of Dr. Wagner's letter and survey. The survey will undoubtedly aid EXECUCOM's market research and pinpoint markets for Micro IFPS.

The author has said all of the foregoing to say that today's best, currently achievable, IFPS configuration will take a year or more to achieve on any scale by charitable nonprofit organizations in the greater St. Louis area. During this same year's time, Micro IFPS will be made available for use with a variety of PCs (personal computers). Thus, the ideal configuration would now appear to be just around the corner -- a PC, the cost of which is reasonable and declining due to heavy competition (See Appendix F).

The question of the cost of Micro IFPS software is not yet answered. Whatever the cost, it will have to be competitive with software such as Apple

Computer's VisaCalc, which is currently priced at $250.00.

The author views the PCs and Micro IFPS as the solution components for putting computing power and decision support systems in the hands of the charitable nonprofit organization. Their acquisition and employment can be realized through a number of practical approaches.

Apple Computer presently donates computers to educational institutions. It is not unthinkable that the United Way of Greater St. Louis could also be a recipient of Apple Computer's generosity, if the donated computer were used to train member agencies and stimulate Apple Computer purchases.

The obvious reason that Apple Computer donates computers to educational institutions is to generate sales of Apple Computers. A case in point is the Adult and Community Education Department of Lewis & Clark Vocational-Technical School of St. Charles, Missouri. The Department is currently installing ten Apple IIe computers which were obtained at a considerable discount through The Computer Station, Westport, St. Louis County, Missouri. The author brought the parties in this transaction together, and will be an instructor for the microcomputer classes during the fall of 1983.

A similar arrangement with Apple Computer ought to be available, if persued, for the United Way of Greater St. Louis and its member agencies.

Due to the market position held by Apple Computer, it is reasonable to expect an Apple IIe version of Micro IFPS to be available in the year 1983. This, then, would be the ideal configuration.

XII. Summary

The majority of charitable nonprofit organizations in the greater St. Louis area are not aware of the existence of computer-based decision support systems, and the myriad benefits to be realized from them. Most directors of these organizations would no doubt think of such systems as being financially out of reach for their organizations even if they were aware of them and their potential.

The objective of this paper is to draw from several bodies of knowledge and present overviews of each in order to build a foundation upon which the final recommendation can be supported. This has been accomlished by considering a history of computer usage in business, the nature of decisions, computer support of decision-making, the salient functions and capabilities of a computer-based decision support system -- IFPS,

and current and near future resources for implementing IFPS in the charitable nonprofit sector.

Particular attention is given to a decision support system known as the Interactive Financial Planning System, or IFPS. The purpose here is to give the reader a grasp of the significance of decision support systems in conjunction with management's responsibilities -- the most important of which is the making of prudent, timely, and value-producing decisions.

Years of experience by IFPS users has produced concrete evidence of increased management productivity in areas associated with planning and decision making. The value of IFPS has been demonstrated through actual use in a wide variety of corporate, governmental, and academic settings. Why not in the nonprofit sector?

Now more than ever the nonprofit sector needs dynamic management of shrinking and limited resources. The author is firmly convinced that the nonprofit sector has been overlooked, or perhaps hasn't looked for itself, where high technology is concerned. The technology is available. It is attainable. The time for charitable nonprofit organizations to benefit from high technology is now!

FOOTNOTES

1. Keen, Peter G. and Wagner, Gerald R., "DSS: An Executive Mind-Support System", Datamation, November, 1979, P. 117

2. Rolph, Sarah, "A Study of Decision Makers", Datamation, November, 1979, P. 119

3. Ibid.

4. Ibid.

5. Ibid.

6. Keen, P. 117

7. EXECUCOM Systems Corporation, IFPS User's Manual, Unpublished, 1982, P. 2-1

8. Ibid., P. 4-27

9. Keen, P, 117

10. Mintzberg, H.,The Nature of Managerial Work, Harper & Row: New York, 1973, P. 137

11. Ibid.

12. Keen, P. 118

13. EXECUCOM Systems Corporation, IFPS Introductory Seminar, Unpublished, 1982, PP. 2,3

14. Ibid., P. 4

15. Ibid., PP. 5,6

16. Ibid., P. 7

17. Ibid., P. 8

18. Ibid., P. 10

19. Ibid., P. 19

20. EXECUCOM Systems Corporation, IFPS User's Manual, Unpublished, 1982, PP. 2-23, 2-27

21. Ibid., PP. 2-8, 2-13

22. Ibid., P. 4-30

APPENDIX A: Model 745 Portable Data Terminal

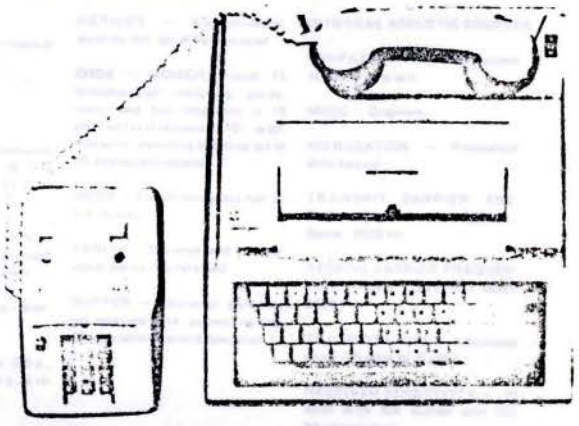
LOONAM COMPUTER TERMINALS
SALES • SERVICE • LEASING

CORPORATE OFFICE
7720 Bush Lake Road Minneapolis, MN 55435 Phone 612/831-1616
TWX 910-5762980 Telex 29-0951

silENT 700
ELECTRONIC DATA TERMINAL

Model 745 Portable Data Terminal

Access to your home office computer can be as close as the nearest telephone and electrical outlet . . . *anywhere.* At just 13 pounds, the Model 745 Portable Data Terminal has that *briefcase mobility* which enables you to get the right information on-the-spot . . . when it counts.



FEATURES

HIGH SPEED
Permanent records are printed at operator selectable speeds of 10 and 30 characters per second. Increased efficiency is achieved with true 30 cps throughput, i.e., no filler characters required after line feed or carriage return characters.

QUIET OPERATION
TI's unique solid state printhead develops characters on thermal sensitive paper and eliminates the undesirable noise associated with impact printing.

MICROPROCESSOR RELIABILITY
TI microprocessor, MOS/LSI integrated circuits, solid state printhead, and a minimum of moving parts are keys to performance and reliable, long life operation.

STANDARD FEATURES
- 5 x 7 dot matrix with print contrast control
- Built-in solid state acoustic coupler for communication via switched telephone network
- Switch selectable half or full duplex
- Briefcase-like carrying case
- Standard ASCII keyboard with calculator-type embedded numeric keypad and two key roll-over feature.

OPTIONAL FEATURES
- AUXILIARY EIA INTERFACE CABLE KIT – Enables operation of the Model 745 with such external devices as modems, data loggers, cassette recorders, minicomputers, etc., as well as in its standard configuration.
- ANSWERBACK MEMORY – Factory set, read-only memory transmits serially up to 21 USASCII characters as a *station identification*. The answerback memory is activated locally by the HERE IS key and is triggered remotely via receipt of the ENQ character.
- FULL ASCII KEYBOARD: Standard Model 745 will decode and print lower case data received from the communications line. The Full ASCII Keyboard option enables the user to generate lower case data from the keyboard for direct transmission. The option provides an UPPER CASE ONLY key which prevents the Full ASCII Keyboard from generating lower case data for those applications where the user does not desire lower case.

APPLICATIONS
- Sales order entry/acknowledgement, inventory reporting, and customer account status for *wholesale* and *manufacturing representatives*.
- Interest rate/payment scale listings, proforma closing statements customer needs–available property matching programs for *real estate salesmen*
- Premium calculations, tax analysis and annuity plans for *insurance salesmen*
- Computer aided instruction for educators
- Computer timesharing systems
- Remote inquiry/retrieval from a computer data base.

silent 700

ELECTRONIC DATA TERMINAL

Model 745 specifications

KEYBOARD
CODE – USASCII, 97 codes generated

CHARACTER SET – 64 printable characters, 33 control characters

NUMERIC KEY PAD – Embedded 12 key calculator-style numeric cluster

PRINTER

METHOD – Non-impact, thermal page printer; 5 x 7 dot matrix electronically heated on thermographic paper

CHARACTER SET – 69 printable characters (received lower case translated to upper case)

CHARACTER SIZE – 0.105 in. x 0.080 in.

LINE LENGTH – 8 inches, 10 characters/inch; 80 characters/line

LINE SPACING – 6 lines/inch

PRINTING RATE – Switch selectable 10 or 30 characters/second

PAPER – TI thermographic printing paper, No. 972603 (white), 8½ in. x 100 ft.; last 10 ft. color coded

PLATEN – Friction-feed

VISIBILITY – At least 50 previous lines of print, including current line and last character printed

CARRIAGE RETURN AND LINE FEED – Automatic at column 81, no code is transmitted. The 81st character received is buffered and printed on the next line.

OPERATOR CONTROLS

SPEED – Low/high (10/30 cps)

DUPLEX – Half/Full

TRANSMIT LEVEL – Low-High

CONTRAST – Light - Dark

PAPER ADVANCE – 30 lines/second while depressed

POWER – On/Off

STATUS – On Line/Local

INDICATORS

CARRIER – Carrier detect

BELL – 250 msec audible tone

PHYSICAL

SIZE – Width: 15.4 in.; Depth: 16.0 in.; Height: 4.6 in.

WEIGHT – 13.5 pounds (including paper)

ENVIRONMENT

TEMPERATURE – Operating 10°C to 40°C, Storage: 30°C to 70°C (without paper), 30°C to 40°C (including paper)

HUMIDITY – Operating: 10% to 90% (no condensation). Storage: 10% to 95% (no condensation)

SHOCK – Operating: 0 g.; Storage: 20 g. for 11 msec.

VIBRATION – Operating: 0.5 g., 10 to 60 Hz., Storage: 1.5 g., 5 to 500 Hz.

POWER REQUIREMENTS

VOLTAGE – 115 volts RMS, + 10% - 15%

FREQUENCY – 47 - 63 Hz.

POWER – 75 watts maximum

DATA TRANSMISSION

METHOD – Asynchronous; serial-by-bit, serial-by-character

CODE – USASCII; 7-level, 11 bits/character including parity, start, and two stop bits at 10 characters/second; 10 bits/character including one stop bit at 30 characters/second

MODE – Switch selectable half or full duplex

PARITY – Optional odd, even, or mark parity (factory set)

BUFFER – Character buffering on received data, permitting true 30 characters/second operation

TRANSMISSION RATES

BAUD RATE – Switch selectable 110 or 300 baud

CARRIAGE RETURN TIME – 195 msec. (no filler characters required)

LINE FEED TIME – 33 msec.

INTEGRAL ACOUSTIC COUPLER

COMPATIBILITY – Bell System 103/113 data sets

MODE – Originate

MODULATION – Frequency shift keying

TRANSMIT CARRIER FREQUENCIES – Mark: 1270 Hz., Space: 1070 Hz.

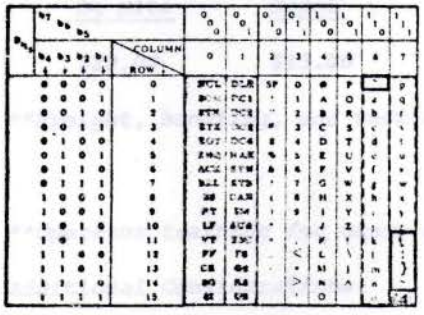
RECEIVE CARRIER FREQUENCIES – Mark: 2225 Hz., Space: 2025 Hz.

TRANSMIT LEVEL – Adjustable from -20 dBm to -5 dBm

RECEIVER SENSITIVITY – -30 dBm with full duplex and 300 baud operation

USASCII Character Set

System (ANSI X3.4-1968)



Non-Printable Characters

Translated to Uppercase Upon Reception

Printed Upon Reception but not Generated

AUXILIARY EIA INTERFACE SPECIFICATIONS

An optional auxiliary EIA interface kit provides for a separate EIA RS-232-C interface to the terminal's printer/keyboard and acoustic coupler. The kit contains a jumper connector for operation in the standard configuration and an interface cable with two legs for operation with external devices. Each leg of the interface cable has a minimum length of 6 feet.

COUPLER EIA INTERFACE LEG

Used to interface the internal acoustic coupler to an external device such as a cassette recorder. Terminates with a 25-pin female connector (Cannon #DB25S or equivalent).

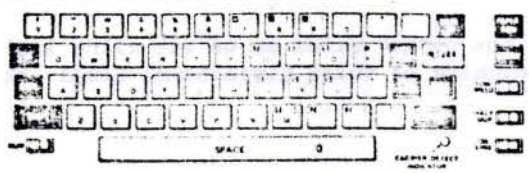
TERMINAL EIA INTERFACE LEG

Used to interface the keyboard and printer to an external device such as a modem or CRT. Terminates with a 25-pin male connector (Cannon #DB25P or equivalent).

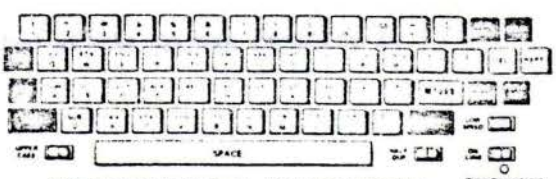
Device Pins	Function	Device Pins	Function
P3-1	Protective Ground	P2-1	Protective Ground
P3-2	Transmitted Data	P2-2	Transmitted Data
P3-3	Received Data	P2-3	Received Data
P3-5	Clear to Send[1]	P2-7	Signal Ground
P3-6	Data Set Ready[1]	P2-8	Data Carrier Detect[2]
P3-7	Signal Ground	P2-20	Data Terminal Ready[1]
P3-8	Data Carrier Detect[2]	P2-4	Request to Send[3]

[1] Held to EIA ON when power is on.
[2] Held to EIA ON by coupler during receipt of carrier – required for data reception.

[1] Held to EIA ON when terminal is ONLINE.
[2] Held to EIA ON by external equipment during receipt of carrier – required for data reception.
[3] Held to EIA ON when terminal power is ON.



MODEL 743/745 LIMITED ASCII KEYBOARD



MODEL 743/745 FULL ASCII KEYBOARD

APPENDIX B: Pricing Letter for Texas Instruments Silent 700

LOONAM COMPUTER TERMINALS
SALES • SERVICE • LEASING

CORPORATE OFFICE 7720 Bush Lake Road, Minneapolis MN 55435 Phone 612/831-1616
BRANCH OFFICE 10784 Indian Head Industrial Blvd. St. Louis, MO 63132 (314) 427-7272

November 3, 1982

Bob Noe
Consolidated Aluminum
P.O. Box 14448
St. Louis, MO 63178

Dear Bob:

Per your request, we are pleased to offer the following information as it pertains to Consolidated Aluminum's requirements for data communications equipment:

Equipment	Mfg. List	Purchase Price Quantities 1-4	5-9	10-24	25-49	50-100
T.I. 745 Std.	$1695.	$1443.	$1421.	$1388.	$1348.	$1308.

Monthly Maintenance On-Site	Depot
$20.00	$15.00

**Freight, handling, and testing -- $20.00/unit to quantity 9
$15.00/unit to quantity 10-49
$10.00/unit to quantity 50-100

**Operator training for users can be organized as a class at no charge.

Additional Considerations:

*Prices include operators manuals.

*Complete 90 day warranty beginning from the time the equipment is shipped to Consolidated Aluminum.

*All units are to be fully tested and inspected at the Loonam facility in St. Louis immediately prior to shipping.

*All warranty and required maintenance work to be performed by Loonam personnel in St. Louis.

*On site maintenance specifies that a Loonam service technician will repair a malfunctioning unit at the user's location. Depot maintenance stipulates that the customer is responsible for transportation of the equipment to the Loonam facility in St. Louis for repair work.

*A unit under service contract which cannot be repaired at the user's site, or in the case of depot maintenance within 24 hours after delivery to our office, will be substituted with a rent free replacement until the original can be repaired and returned.

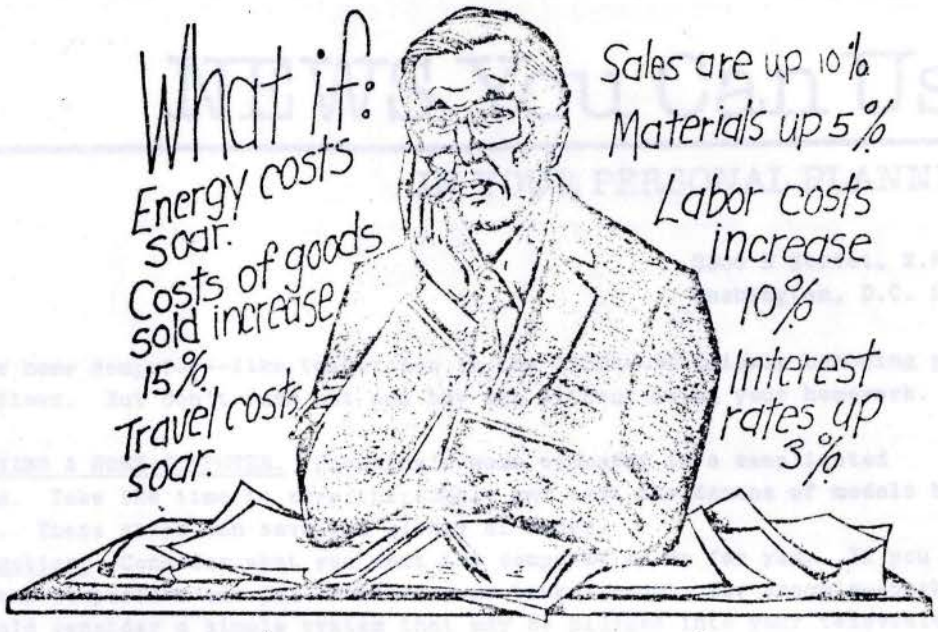
Thank you for the opportunity to submit this information. If any questions remain, or if we can be of additional service please don't hesitate to call.

Cordially,

Lin Meeker

Lin Meeker
Branch Manager

APPENDIX D: Paracalc Advertisement



The IBM System/34 Financial Modeling Package with the answer for only $600

A sales manager needs figures from last quarter to develop a forecasting model. The president needs to know if he will have enough cash within 6 months to acquire more equipment. A distribution manager has to know how a change in volume will affect inventory and warehouse space.

Managers need accurate information. And they need it quickly. But the sheer volume of data, the number crunching and the format requirements can make forecasting time consuming and costly.

Yet, with the right software system you can handle these and other tasks on your System/34. here's where Paracalc can help. A *load* and *go* program, Paracalc offers you virtually unlimited applications. You'll be able to enter, store, and manipulate data for any job and present it in a row/column format.

One model contains 24 columns and 400 rows which amounts to 9600 coordinates. One screen displays 100 coordinates arranged in five columns with twenty rows to a column. Each coordinate contains up to fourteen characters. Formula expressions may be sixty-three characters long.

Paracalc handles the nuts and bolts, all the details. You're free to use your time on decision making.

With Paracalc, when you change one entry, all accompanying amounts are recalculated accordingly. This makes it easy to keep track of inventory, follow cash expenditures, figure production forecasts and calculate time management.

The Paracalc modeling system is completely interactive and accassible through multiple terminals. Security can be applied to stop unapproved use of confidential models. Paracalc costs $600. Take advantage of our money-back guarantee and try Paracalc for thirty days. Send in your check today and answer your "what if" questions tomorrow.

For more information call or write: Software Sales, Dept. SC3, Para Research, Inc., Whistlestop Mall, Rockport, MA 01966 (617) 546-3446.

More than 1500 installations

APPENDIX E: "NEWS You Can Use ...." Article

NEWS You Can Use.

IN YOUR PERSONAL PLANNING

2300 N Street, N.W.
Washington, D.C. 20037

The home computer--like television in the 1950s--is quickly becoming part of our lives. But don't rush out and buy one without doing your homework.

BUYING A HOME COMPUTER. Choosing a home computer is a complicated decision. Take the time to shop thoroughly and test the dozens of models being offered. These steps can save you plenty of money.

Function. Consider what you want the computer to do for you. If you want a computer to perform one job--balance your bank account, for example--perhaps you should consider a simple system that may be plugged into your television set. If you want a computer for games only, you can buy a machine that does that alone. It sells for a fraction of the cost of a home computer, which can range from $500 to $10,000 or more.

Components. With the inexpensive models, you get just the central processing unit, a typewriterlike keyboard and limited memory capability. As prices escalate, more memory and other components--a screen, a cassette recorder, a printer--can be added.

Demonstration models. Most computer retailers have demonstration models set up in their showrooms. Don't be bashful--ask to operate the computer yourself. Only by actually trying your hand at word processing, inserting and using programs and so on, can you really understand the workings of a computer. Be sure to check the warranty. What about servicing? Are software and additional hardware readily available? Does the retailer offer classes or any kind of telephone service to answer questions quickly?

For more information. Additional advice is available in a new booklet, "Tips on Buying a Home Computer." For a copy, send 25 cents and a self-addressed, stamped, business-size envelope to the Council of Better Business Bureaus, 1515 Wilson Boulevard, Arlington, Va. 22209.

(over)

APPENDIX F: Home Computer Feature Article

FEATURES

HOME COMPUTERS

Trying to ignore personal computers these days is a bit like trying to ignore the weather. Ads for home computers fill the media. Computer stores are cropping up everywhere. Several major department stores, national companies like Sears, as well as some drugstores, supermarkets, and discount stores now feature computers. Your children may already be working with computers at their schools—and hinting broadly about one for your home. You may even have taken a firsthand look at a demonstration model.

An estimated 3½ to 4 million personal computers will be sold this year—many for businesses, but many for home use, too. Market estimates are for even more dramatic growth in the years to come. But does that mean your family should have a home computer? What, really, can one do for you? Don't you need a lot of technical savvy? What will it all cost? Can you afford *not* to have a home computer in a world increasingly dependent upon computer know-how?

Whether you're in the market for a home computer now or just thinking about one for the future, here's what to consider.

There's really nothing magical about a computer. Whatever its size, it is a machine that receives, stores, and processes words and numbers according to a series of instructions. What *is* magical—or at least seems that way—is the incredible speed and versatility with which today's typewriter-sized computers operate. In fact, a less-than-$2,000 personal computer today will perform as well as a large $200,000 computer of ten years ago.

Think of how rapidly—almost instantly—a pocket calculator performs its various mathematical functions and stores and retrieves information. A home computer can do much, much more, at an even greater speed.

Simply put, a home computer is a general-purpose machine whose tasks are defined by specific programs, or sets of instructions, also called software. A home computer actually has the flexibility to become hundreds of special-purpose computers: a budget-minder one minute, a reading tutor the next, a video game after that. Put that kind of flexibility together with the color graphics and sounds that most home computers display, and it's little wonder that the kids are enthralled.

It sounds great. But will a home computer be worth the cost? Though some sell for just $100 or $200, most require an initial investment of several hundred dollars and can run well over $1,000 or more when you add the cost of the various extras, called peripherals, and the programs you may want for performing other than the basic tasks. That's a major investment, worth some thoughtful exploration.

What can a home computer really do?

A lot depends on what you want your computer to do, how much time and energy you're willing to spend with the machine, and what equipment and programs you buy.

Even the most basic and inexpensive computers are excellent teachers—patient, forgiving, engaging. A home computer can drill a grade-schooler on math or spelling skills, single out problem areas, gently suggest where more work is needed, and keep a running progress report on the child's work.

Those same teaching techniques apply at any level of education on the computer, from elementary math and French, to advanced chemistry, to preparation for college board exams. There also are programs that teach basic skills like touch typing. One typical course runs progressively tougher exercises to help get your fingers moving correctly on the keyboard and also measures your typing speed at each stage of development. It even determines where you need more practice: "You made three errors on these keys: r,k,p. You were slow on these keys: c,w,x. 45 words per minute at 87 percent accuracy" might be the message on the screen.

Patience isn't the computer's sole virtue as a teacher. Unlike the stereotypical school marm, the computer can be highly entertaining. Colorful designs and cartoon figures, sounds, and written messages (often personalized) all enhance basic concepts and reinforce the learning experience. One elementary math program, for example, greets a correct answer with a tune and flashing cartoon character, while an incorrect answer triggers the voice prompt, "Try again," and the problem is repeated. With another program, correct answers move a rocket into position to "shoot down" another rocket.

That flash-and-dazzle kinship with video game machines is another major attraction of personal computers. Even the most serious, business-minded computer owner occasionally will plug in a game or two. There's also the challenge of writing your own computer game programs—an activity many youngsters tackle with glee.

continued

HOME COMPUTERS
VERSATILE TOOLS

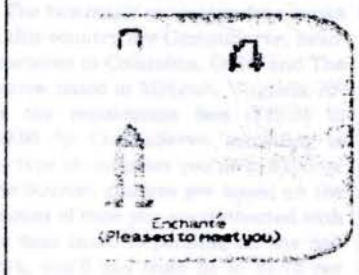
Sheer flexibility sets home computers apart from single-purpose electronic devices such as calculators, game machines, and word processors. You don't have to use a computer for *everything* it can do, but you should start with at least two or three different purposes in mind. Also, the tasks should be those you can't handle easily with pencil and paper or a card-filing system.

The best way to shop for a home computer is to determine what you want to use it for, then check to find out if there are programs available to perform the tasks. Once you've found the software that does what you want, the decision as to which computer to buy will have been largely made for you. That's because specific software usually can run only on the machine for which it was written, or others "compatible" with it.

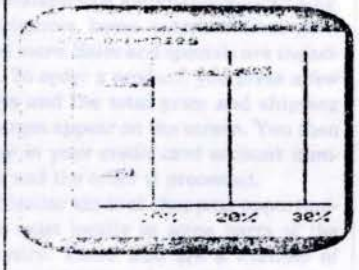
There are plenty of potential uses for home computers that might appeal to various members of your family. We've listed the most common ones below. Don't forget that some tasks require more time with the computer and more equipment and sophisticated programs (therefore more expense) than others.

● **Family financial management.** This can range from fairly simple chores such as tracking the household budget to more complex tasks like projecting yields on investments or determining what changing economic factors will do to your financial position. A typical budgeting program lets you list expenditures by category, compare monthly outgo against your projected budget, locate records of specific payments almost instantly, and separate out all your tax-deductible items.

True, most people can manage all those tasks perfectly well on paper. What the computer provides is an orderly way to record, store, and retrieve data. Some personal finance programs also allow you to compare numbers from a fresh angle—through computer-created bar charts, for example. Other programs take a "what if" approach. What if, for example, the interest rate on your variable rate mortgage goes up one percentage point? What will your new payments be? How much will go to principal and how much to interest? Or what if the value of some stock drops by $2? How does that change the yield on your investment?



STUDY A LANGUAGE at a pace you set as the computer defines, animates, and sounds out foreign words and phrases. Atari's Conversational French uses cartoon figures to drill you on the lessons.



RECORD YOUR INCOME and expenses in a Commodore VIC-20 computer. The computer computes and then charts the percentages of your income going to 15 categories, such as cars and taxes.

THE STORY MACHINE for various computers (from Spinnaker Software) lets a child create stories, which the computer animates. Type: "The tree hops," and a cartoon tree grows legs and hops.

● **Electronic filing.** There has been a lot of hype about home computers performing wonders with recipes, household inventory records, Christmas card lists and such. In most homes, frankly, these chores will be handled faster using the "old-fashioned" ways of pencil and paper or index cards. This may change in the future, perhaps when you need only to speak the information to your computer. But for now, there is little we've seen that offers better efficiency than the minimal amount of manual work involved.

As you get closer to business-related uses, such as maintaining club mailing lists, keeping extensive index card files, or doing office homework, a personal computer can offer immense time savings. That's because of the machine's superfast ability to search and compare files for the information you need.

● **Word processing.** If your work or hobbies involve typing, you know the nuisance of having to correct mistakes or retype pages. A home-computer-turned-word-processor makes the entire job a lot easier. Your errors show up only on the video screen and are corrected by just typing over them. Once your text is typed into the computer, you can make additions and deletions and move words, sentences, and paragraphs around on the screen. In some cases, the computer will even check the text for spelling or typographical errors. When the work is the way you want it, just punch a couple of keys and the computer prints out one or more clean copies at more than 30 characters per second.

● **Business records.** Computers are particularly well suited to the demands of business facts and figures, not only for sideline home businesses, but also for professionals who prepare forecasts,

continued

Illustration: Art Factory

HOME COMPUTERS
VERSATILE TOOLS

budgets, charts, and the like. Electronic "spread-sheet" programs, for example, create special columnar tables on the computer screen and adjust to the insertion of new data instantly. That kind of arithmetic can be extremely time-consuming without the help of a computer—even if you use a calculator.

Many home-business operators also find the computer's word-processing capability essential. Salespeople can keep their own computerized customer files listing birthdays and other data. And, authorized personnel can dial a corporate computer to enter orders or obtain information.

● **"Dial-up" networks.** With the right accessories, your home computer can become a doorway to immense libraries of information stored in several mammoth computers around the country. Your computer uses the telephone line (via a local phone call in about 350 U.S. cities) to communicate with what is known as a data bank—actually just a big library containing up-to-the-minute files like news, airline schedules, financial market quotations, classified advertising, games, and a personalized diet program. Some of these services also offer access to an encyclopedia for research, or electronic "mailboxes" that let you send messages to friends who subscribe to the same data bank.

The two major consumer data banks in this country are CompuServe, headquartered in Columbus, Ohio, and The Source, based in McLean, Virginia. After the registration fees ($19.95 to $39.95 for CompuServe, according to the type of computer you own; $100 for The Source), charges are based on the amount of time you are connected with the data bank. Depending on the network, you'll pay from $5 to $7.75 per hour evenings and weekends, $20.75 to $22.50 during week days, plus the cost of a local phone call.

You also can "shop by computer" on The Source. You receive an electronic catalog on your screen with many types of brand-name merchandise—clothing, appliances, home entertainment gear, and more. Sales and specials are included. To order a product, you press a few keys and the total price and shipping charges appear on the screen. You then type in your credit card account number and the order is processed.

Similar kinds of shopping opportunities exist locally in some parts of the country. There also are a number of two-way banking hookups that allow you to transfer funds, balance your checkbook, examine your budget, and do other financial tasks through a two-way communication with your bank by way of your personal computer.

Some basic considerations before you shop

No doubt at least some of the above possibilities intrigue you. But it's important to realize that owning a computer is *not* like owning a television set: you can't simply turn it on, sit back, and watch it perform. No matter how powerful the program that you're using, you will have to hit a few buttons, answer the screen's questions by pressing more buttons or typing in words or numbers, update information stored in electronic files, or steer a game joystick. You must be prepared to spend time with your system—especially if you decide to try writing your own programs.

It's also important to realize that several home computer functions require more than the basic components. If you want word processing, for example, you'll need to buy a printer; that can be an additional investment of at least several hundred dollars.

Even if you have decided why you'd like to own a home computer, don't go shopping yet. First take the time to become familiar with the components of a home computer and what they do.

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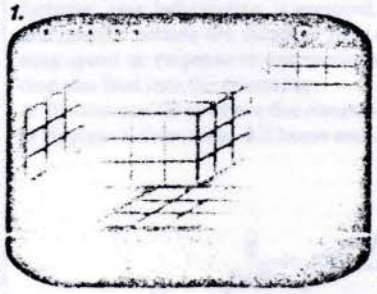

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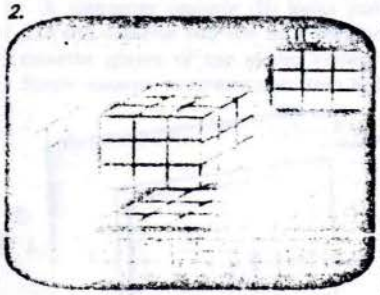

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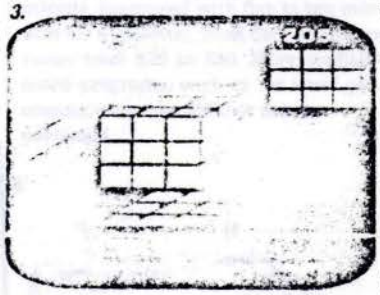

IN ORDER TO OPERATE a home computer, you must guide it through a task with simple commands. Block Buster from Quality Software (written by Alan Griesemer and Stephen Bradshaw) is a variation of the popular cube-type puzzle. The program lets a computer solve a scrambled cube in minutes, despite the 43 quintillion possible combinations.

Screen 1. All six sides of an unscrambled cube appear. When you type "scramble," a puzzle appears for you to solve. Or, type "attract" and the computer automatically solves puzzle after puzzle. *Screen 2.* Each move is indicated by an arrow and is noted by a symbol at the bottom. A timer and a move counter appear on top. *Screen 3.* You can command the computer to solve a puzzle in three ways: with all sides a solid color, with a contrasting cross on each side, or with each side as a checkerboard.

HOME COMPUTERS
EQUIPMENT BASICS

There are three basic components to a personal computer system—the *keyboard console*, the *video monitor*, and *software*. You also can buy additional components (peripherals) that expand the functions of the computer. Some computers will do basic functions without peripherals; others won't. In computer jargon, "hardware" refers to the console, monitor, and other physical equipment that make up the system. "Software" is another word for computer programs. The illustration on this page identifies each component.

● The foundation of any computer system is the *keyboard console* (see A *below*) which can cost from $100 up to $1,500 or more. The console usually, but not always, contains the CPU or central processing unit. That's where all the actual information processing takes place. You enter information and commands through the keyboard, on which letter keys are set up like those on a typewriter. Extra keys command the computer to perform specific functions like erasing words on the screen.

The keys are the connections between you and the circuitry hidden inside the console. This is the "brain" of the computer, where permanent operational instructions have been placed in the machine's "memory" by the manufacturer, new information is received, and specific actions are taken at lightning speed in response to instructions that you feed into the computer.

● The *monitor* (B) is where the computer displays information. All home computers that offer color graphics can be attached to a color TV at the antenna terminals. Some brands offer the option of a special monochrome monitor (about $100) or color monitor (about $500) which provides a sharper image than a TV.

● *Software*, or *programs*, are inserted into the computer to make it perform specific tasks. Just as an actor follows a script to play a particular character, a computer follows a script, or instructions, to function as a special-purpose machine. A new set of instructions creates a new special-purpose machine.

You can buy computer programs, ready for immediate use, in three different forms—*cartridge*, *cassette tape*, and *disk*. Using these various forms of software is as easy as plugging in a video game cartridge or playing a music tape or 45-rpm record.

The *cartridge* (C; $25 to $60) is the fastest way to get some computers going. About the size of a deck of cards, a cartridge simply plugs right into the computer console. Each cartridge has its own built-in electronic circuits that interact with the computer's circuits. However, when you unplug a cartridge, any information you've put into the computer is erased. Also, cartridges are limited in program sophistication.

A computer *cassette* (D) looks just like the cassette you use in a regular cassette player or car stereo system. Single cassette programs cost from $10 to $35. More complicated programs may include three to six cassettes and cost from $40 to $60 or more.

In order to run a cassette, you'll need a *cassette player* (E). A few computers require their own cassette players ($60 to $100). Others are compatible with standard portable cassette players. You may need an adapter ($5 to $15) to hook the recorder to the computer.

When you play a cassette program, the instructions from the cassette tape are stored temporarily in the computer. Depending on the type of program, you also can transfer information from your computer to a cassette tape so that the data won't be lost when you turn off the machine.

Cassettes may be eliminated from most computer systems within the next year or so. One main drawback with them is low speed. Although they can hold much longer programs than those on cartridges, cassette instructions are transferred slowly. Also, cassettes often are susceptible to "glitches" (foul-ups).

A *disk* (F) is like a flexible five-inch record album that spins inside a protective cardboard sleeve. Also called a *floppy diskette*, a disk can store an amazing amount of information and transfer its instructions to the computer at a tremendous speed (in less than a minute, compared with five to ten minutes for a cassette). Most disk programs range from $25 to $50. More sophisticated programs, such as for word processing, may cost $200 or more.

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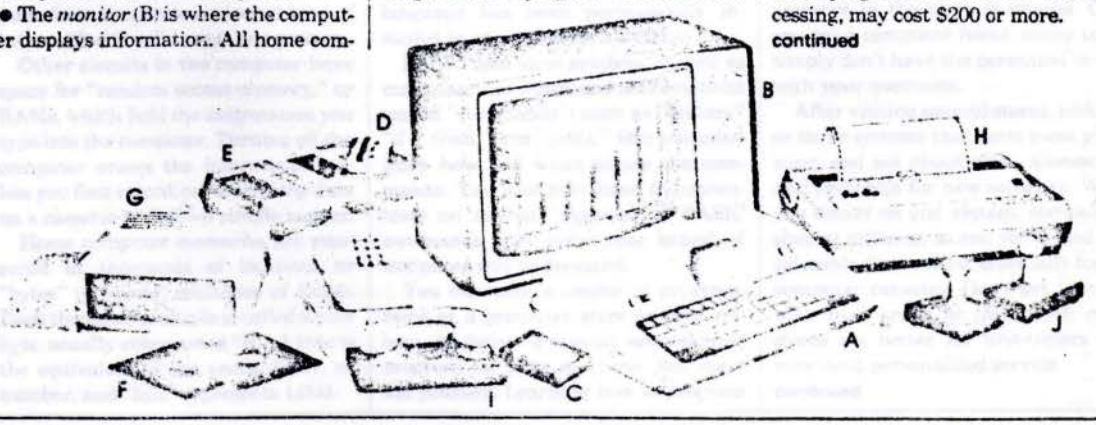

HOME COMPUTERS
EQUIPMENT BASICS

A computer usually needs a *disk drive* (G; under $400 to $800) to transfer instructions from a disk into the computer's temporary memory, as well as to transfer information you have typed into the computer back onto a disk. A few more expensive computers have the disk drive built into the console.

- A *printer* (H) can be useful whenever you need a printout of lists, mailing labels, and such, and it is essential for word processing. Depending on quality of the printed letters, as well as speed, prices range from about $400 all the way up to $3,000. The printer plugs right into the console on some computers. Other systems may require an RS-232 interface connector (under $200).
- In order to use "dial-up" networks, you'll need a *modem* (I; $150 to $250). The generally more costly "direct-connect" modem will accept a standard modular phone plug from the wire that goes into your telephone. An "acoustic" modem has two rubber cups to cradle a standard telephone handset. A modem requires an RS-232 interface.
- You'll need *game joysticks* (J; $20 to $35) for most of your system's action game programs.

What is the computer's memory?

Two types of circuits handle memory within the console. The "read only memory," or ROM, circuit is encoded at the factory with a long list of unalterable instructions. ROM tells the computer how to operate and what kind of information it will accept and process.

Other circuits in the computer have space for "random access memory," or RAMs, which hold the information you type into the computer. Turning off the computer erases the information unless you first record, or "store," the data on a cassette or disk—a simple matter.

Home computer memories are measured in thousands of locations or "bytes" (precisely, multiples of 1,024). Each thousand multiple is called a kilobyte, usually abbreviated "K." A byte is the equivalent of one space, letter, or number, and "kilo" represents 1,000.

Most lower priced home computers start with a 16K RAM and can take on more memory capacity in multiples of 16K. You simply buy add-on memory modules ($50 to $200 each) that either slip into the keyboard console or connect to it. Software packages list the computer brands that will accept each program and the minimum RAM required to accommodate the program. Even for the most complicated home applications, your computer will rarely need to be expanded above 64K RAM, and 48K RAM is quite adequate for most home tasks.

Don't you have to be a technical whiz?

Not really. Many existing computer programs involve little more than inserting the software, typing in information or hitting a few buttons, then responding to various queries that appear on the screen. You don't even have to know how to type. But for applications that require entering a lot of words into the computer (like word processing) typing ability will speed your efforts considerably.

What if you'd like to write your own programs? Then you'll have to learn a particular language that the computer will understand. Almost every home computer comes with a manual to introduce you to the computer's programming language. (The most common is called BASIC.) In most machines, that language has been permanently installed in the computer's ROM.

BASIC uses some symbols, as well as many familiar words and abbreviations (called "commands") such as "return," "if ... then," and "print." But you must learn how and when to use the commands. You also may have to concentrate on special "dialects" of BASIC commands that only your brand of computer will understand.

You can take a course in programming at a computer store or local college, or follow a special self-teaching program for your machine. But don't kid yourself. Learning how to program takes time and effort. It will take at least 20 to 30 hours of practice to get a good foundation in your computer's programming language. Then count on a lot more time and trial and error while you learn to design specific programs. It's an exacting task, requiring you to solve problems by dividing the solutions into precise, logical steps and alternatives. The results can be one of the real satisfactions of computer use, however. In fact, educators are delighted with the kind of mental discipline youngsters learn with computers.

How should you shop?

The only practical way to shop for a computer is to find the software you like first, try it out on the demonstrator model in the store, then buy whatever system best handles the kinds of programs that interest you.

Start by looking through a number of home computer magazines, such as *Popular Computing* and *Creative Computing*, for editorial reviews of new hardware and software, plus lists of software from advertisers. Note the computer brands that accept programs that interest you. Then visit computer stores or departments and ask to try out the programs on your list or similar ones. Note how much time it takes to get the program running and also how much typing must be done.

Don't just let the salesperson demonstrate for you. Your own hands-on experience in the store is crucial. Once you get a computer home, many stores simply don't have the personnel to help with your questions.

After visiting several stores, pick two or three systems that seem most promising, and ask about price, accessories, and prospects for new software. When you decide on one system, comparison shop at different stores; you'll find considerable discounting, especially for the computer consoles. Don't get involved with mail order at this point; retail stores are better for first-timers who may need personalized service.

continued

HOME COMPUTERS BUYER'S GUIDE

We've listed a few of the most popular computers and their suggested retail prices (you'll probably find lower prices) to help you compare features before you shop.

APPLE COMPUTER, INC.

Apple IIe. (64K RAM base price, under $1,400).

Advantages: New model replacing popular Apple II Plus. Perhaps the widest software library for any personal computer. Easily expandable with add-in circuit boards. Attractively priced system packages for small business and professional uses. Owner's manual written for nontechnical user; includes tutorial diskette. Extensive dealer service network.

Disadvantages: High system price if used strictly as an entertainment or home educational computer.

ATARI INCORPORATED

Atari 400 (16K RAM base price, under $300); Atari 800 (48K RAM base price, under $800); Atari 1200XL (64K RAM base price, under $1,000). Popular accessory: disk drive, $750.

Advantages: All three models have excellent color graphics and sound qualities. Growing variety of plug-in cartridge and cassette software for all computers (including first-rate reproductions of arcade games like Pac-Man and Centipede) and disk software for 800 and 1200XL.

Disadvantages: Limited expandability for 400.

COMMODORE BUSINESS MACHINES, INC.

Commodore VIC-20 (5K RAM base price, under $200); Commodore 64 (64K RAM base price, $595). Popular accessories: Cassette player/recorder, $75; disk drive, $399.

Advantages: Low system prices and compact size for both computers. BASIC language instruction book intended for nontechnical user; allows reader to skip ahead to favorite sections (graphics, sound) after first chapter.

Disadvantages: Both computers require Commodore cassette player for cassette programs.

INTERNATIONAL BUSINESS MACHINES

IBM Personal Computer (16K RAM base price, $1,565). Popular accessories: First disk drive, $450 ($650 for high capacity); monochrome monitor, $335.

Advantages: Easily handles home chores—education, budgeting, etc.—yet is expandable to heavy-duty professional applications. Monochrome monitor easy on eyes. Uses newer generation of faster and more powerful circuitry inside. Backed by company with excellent reputation in product support. Enormous activity in software and accessory development by outside sources. Top-quality construction. Most software manuals are well written for layman, some with tutorials, others with detailed examples.

Disadvantages: Expensive system, due partly to quality, built-in computer power, and other "serious computer" engineering features. Education and game software limited.

RADIO SHACK, a division of TANDY CORPORATION

Radio Shack TRS-80 Color Computer (16K RAM base price, $399). Popular accessories: Cassette recorder/player, $60; disk drive, $599.

Advantages: Plug-in cartridge library contains several easy-to-use titles for budgeting and personal filing. Adapts to standard cassette player. Radio Shack Computer Centers usually staffed by well-trained salespeople. Established service network. Perhaps the best BASIC language tutorial packed with any home computer.

Disadvantages: Outside software support not as strong as for Radio Shack's more expensive personal computers.

TEXAS INSTRUMENTS, INC.

Texas Instruments TI-99/4A (16K RAM base price, under $300 with $100 rebate). Popular accessory: peripheral expansion system, $250.

Advantages: The most improved system since its introduction. Broad selection of TI home and educational software in plug-in cartridges, with instructions appearing on the screen. High-quality speech synthesis adds extra dimension to many programs. New programming tools for serious user. Durable construction. Reference guide and well-written BASIC instruction tutorial included.

Disadvantages: Software support from outside sources somewhat limited, but growing quickly.

TIMEX COMPUTER CORPORATION

Timex Sinclair 1000 (2K RAM base price, $100); Popular accessory: 16K RAM expansion module, $50.

Advantages: The least expensive computer available; good for learning BASIC language programming cheaply. Small and lightweight. Uses any standard TV and cassette player.

Disadvantages: No color graphics (but look for new color computer to be introduced at about $150 this year). Small, flat keyboard sometimes frustrating to use. Program execution quite slow compared with other computers. Limited internal memory makes 16K RAM expansion module necessary to run most of the prerecorded program tapes. ■

—Produced in cooperation with Danny Goodman

APPENDIX G: Letter and Survey from EXECUCOM

Execucom Systems Corporation
P.O. Box 9758
Austin, Texas 78766
512-346-4980 TELEX 776497

EXECUCOM

March 10, 1983

Dear IFPS User:

I have been asked to give a talk at the National Planning Executives Institute Conference on the impact of Software Integration and Software on Micros. As always, I much prefer to have actual statistics to present, and that is my reason for writing to you.

Unlike my previous surveys, this questionnaire is designed to discover patterns and trends in today's software world. I am especially interested in those patterns in organizations which support end-user computing with tools such as IFPS.

For me to analyze and summarize the data in time, I need the questionnaire returned to me by March 31. The questionnaire is easy to complete and should not require much of your time. Also enclosed is a self-addressed, stamped envelope.

This letter and questionnaire may have also been sent to others in your company. I would appreciate your completing this questionnaire independently so we can look for possible differences depending upon job responsibilities. If a particular question is not in your area of knowledge, then simply write "N/A".

I promise to send you a copy of the paper which I present. I suspect that the results of the survey will be as interesting to you as they will be to me.

I hope that all is going well for you. As always, I greatly appreciate your continued support of IFPS and EXECUCOM.

Thanks.

Sincerely,

G. R. Wagner, Ph.D.
President

GRW:jlj

Enclosures

EXECUCOM

Survey of IFPS Users

Software Integration and Software on Microcomputers

GENERAL INSTRUCTIONS

Please answer the questions in the space provided for response. If a question is not applicable in your company or is not within your scope of knowledge, respond by placing "NA" in the response space. If you are unable to answer a question, leave the space blank. At the end of the questionnaire there is space for you to provide your name, position, and company name. This is optional, but we would appreciate having this also. You may wish to staple a business card to the questionnaire at this point.

DEFINITIONS / EXPLANATIONS

Personal computer means a single-user microcomputer (or desk top computer) such as the IBM Personal Computer, Apple II, DEC Rainbow, etc.

Micro IFPS is a new personal computer software package. It combines the characteristics of screen-oriented spreadsheet packages such as Visicalc or Multiplan with the powerful modeling capabilities of mainframe IFPS. Thus, for example, the user will be able to view the model description of a problem, the solution matrix, and a graph of the solution all at one time. The package will include a full screen editor for the creation of models and reports. Micro IFPS will communicate directly with the mainframe version of IFPS to send or receive datafiles.

The primary differences between Micro IFPS and currently available spreadsheet programs are: 1. Micro IFPS will support both corporate and individual computing needs by integrating financial modeling between the personal computer and the corporate mainframe environments; 2. Micro IFPS will have most all of the model interrogation capabilities of mainframe IFPS; and 3. Micro IFPS utilizes English-language like problem descriptions in its models rather than technically-oriented programming techniques.

The primary differences between Micro IFPS and mainframe IFPS are: 1. Micro IFPS is designed to handle individual decision support needs, whereas mainframe IFPS is more adaptable to corporate decision support needs; 2. Micro IFPS will not be as suitable for developing decision support applications where no prior experience with computers or IFPS is needed; 3. Micro IFPS will have a more flexible and powerful interface to the user which draws upon the full-screen capabilities of the personal computer; and 4. Micro IFPS will have integrated graphics.

Integration means a sophisticated, serious, tight, and transparent interface between IFPS and another software package such as a general ledger package. The price of such an interface might be $10,000-$15,000.

Mainframe or **mini** means a multi-user CPU that supports simultaneous users in an interactive computing mode.

Senior management refers to vice-presidents and above.

Middle management means those managers at levels such as department managers or division managers.

1. How will personal computers affect mainframe computer **hardware acquisition** and support in your company in 1983 and 1985?

	1983	1985
a. Total budget for **new** hardware	$_____	$_____
b. Estimated percent of MIS/DP budget for **mainframe and mini hardware**	_____%	_____%
c. Estimated percent of MIS/DP budget for **personal computers**	_____%	_____%
d. Number of users supported by **mainframe and mini hardware**	_____	_____
e. Number of users supported by **personal computers**	_____	_____
f. Number of **personal computers replacing other terminals** for communication with mainframe or mini computer	_____	_____
g. Number of data processing, MIS, or other staff consultants responsible for supporting or assisting **mainframe** users	_____	_____
h. Number of data processing, MIS, or other staff consultants responsible for supporting or assisting **personal computer** users	_____	_____

2. Estimate the amount of **personal computer software usage** in your company in 1983 and 1985.

	1983	1985
a. Estimated percent of all corporate **data base** applications on the personal computer	_____%	_____%
b. Estimated percent of all corporate **financial planning**, financial modeling, and budgeting applications on personal computers	_____%	_____%
c. Estimated percent of all corporate **accounting** applications on personal computers	_____%	_____%
d. Estimated percent of all corporate **graphics** applications on personal computers	_____%	_____%
e. Estimated percent of all corporate **word processing** applications on personal computers	_____%	_____%
f. Estimated percent of all corporate **statistical analysis** applications on personal computers	_____%	_____%
g. Total **funding budgeted for software** purchases (all types)	$_____	$_____

3. For the six applications areas listed below, please **rank order** the **increase in usage of software packages for mainframe and mini computers** in your company. A value of "1" indicates you think it will increase the **most**, and a value of "6" indicates you think it will increase the least. Use each number only **once**.

	Rank
a. Accounting	_____
b. Planning and budgeting	_____
c. Data base management	_____
d. Graphics	_____
e. Statistical analysis	_____
f. Word processing	_____

4. For the six applications areas listed below, please **rank order** the **increase in usage of software packages for personal computers** in your company. A value of "1" indicates you think it will increase the most, and a value of "6' indicates you think it will increase the least. Use each number only **once**.

	Rank
a. Accounting	_____
b. Budgeting and planning	_____
c. Data base management	_____
d. Graphics	_____
e. Statistical analysis	_____
f. Word processing	_____

5. At your company, how many people will serve as consultants and trainers to support application software users?

	1983	**1985**
a. Mainframe and mini computer applications	_____	_____
b. Personal computer applications	_____	_____

6. Has your company adopted the Information Center concept?

Not at All						**Completely Adopted**
1	2	3	4	5	6	7

7. How many of each brand of personal computers does your corporation have now (1983)? How many of each do you expect to have in the future (1985)?

	1983	**1985**
a. Apple II, Apple III, Lisa	_____	_____
b. Commodore 64, VIC-20	_____	_____
c. DEC Rainbow or other model	_____	_____
d. Hewlett-Packard 86 or other model	_____	_____
e. IBM Personal Computer	_____	_____
f. Osborne	_____	_____
g. TRS 80	_____	_____
h. Victor	_____	_____
i. Other_____	_____	_____

8. What percent of your managers and analysts now use a personal computer or have expressed an interest in using one?

	Senior Management	**Middle Management**	**Analysts**
a. Currently using a personal computer	_____%	_____%	_____%
b. Expressed interest in using a personal computer	_____%	_____%	_____%

9. In your opinion, how important is it to have only one vendor's software package used throughout the company (including subsidiaries and divisions) for a particular application?

	Not At All Important						Extremely Important
a. Accounting	1	2	3	4	5	6	7
b. Planning and budgeting	1	2	3	4	5	6	7
c. Data base management	1	2	3	4	5	6	7
d. Graphics	1	2	3	4	5	6	7
e. Statistical analysis	1	2	3	4	5	6	7
f. Word processing	1	2	3	4	5	6	7
g. Other_____	1	2	3	4	5	6	7

10. How important is it for a personal computer software package for a particular application to functionally look like the mainframe software package for the same application?

	Not At All Important						Extremely Important
a. Accounting	1	2	3	4	5	6	7
b. Planning and budgeting	1	2	3	4	5	6	7
c. Data base management	1	2	3	4	5	6	7
d. Graphics	1	2	3	4	5	6	7
e. Statistical analysis	1	2	3	4	5	6	7
f. Word processing	1	2	3	4	5	6	7
g. Other_____	1	2	3	4	5	6	7

11. How important is it for a personal computer software package to **interface directly to a mainframe version** of the software? For IFPS, for example, how important is it to have models that can be run on both the personal computer and the mainframe?

	Not At All Important						Extremely Important
a. Accounting	1	2	3	4	5	6	7
b. Planning and budgeting	1	2	3	4	5	6	7
c. Data base management	1	2	3	4	5	6	7
d. Graphics	1	2	3	4	5	6	7
e. Statistical analysis	1	2	3	4	5	6	7
f. Word processing	1	2	3	4	5	6	7
g. Other_____	1	2	3	4	5	6	7

12. On how many personal computers are spreadsheet and financial planning software packages (Visicalc, Supercalc, Multiplan, Micro DSS/Finance, etc. being used within your company? _____

Based on the description of Micro IFPS you read at the beginning of this questionnaire, what percent of the currently available spreadsheet and financial planning software packages might be replaced by Micro IFPS?

1983	1985
_____%	_____%

13. Please **rank order** the importance of these eight functional capabilities of personal computers. A value of "1" indicates you think a functional capability is most important, and a value of "8" indicates you think it is least important. Use each number only **once**.

	Rank
a. Color graphics	_____
b. Communication to mainframes and mini computers	_____
c. Communication to other personal computers	_____
d. Comprehensive service and support for the user	_____
e. Games	_____
f. Printed output	_____
g. Software packages that interface with one another	_____

14. What is the importance of each of the following factors when using **IFPS on a mainframe or mini computer?**

	Not At All Important						Extremely Important
a. Availability	1	2	3	4	5	6	7
b. Control	1	2	3	4	5	6	7
c. Data security	1	2	3	4	5	6	7
d. Data storage area and workspace	1	2	3	4	5	6	7
e. Ease of use, friendliness	1	2	3	4	5	6	7
f. Expense	1	2	3	4	5	6	7
g. Portability	1	2	3	4	5	6	7
h. Privacy of use	1	2	3	4	5	6	7
i. Response time	1	2	3	4	5	6	7
j. Other _____	1	2	3	4	5	6	7

15. What is the importance of each of the following factors when using **IFPS on a personal computer**?

	Not At All Important						Extremely Important
a. Availability	1	2	3	4	5	6	7
b. Control	1	2	3	4	5	6	7
c. Data security	1	2	3	4	5	6	7
d. Data storage area and workspace	1	2	3	4	5	6	7
e. Ease of use, friendliness	1	2	3	4	5	6	7
f. Expense	1	2	3	4	5	6	7
g. Portability	1	2	3	4	5	6	7
h. Privacy of use	1	2	3	4	5	6	7
i. Response time	1	2	3	4	5	6	7
j. Other _____	1	2	3	4	5	6	7

16. Rate the importance of having direct, serious interfaces between IFPS and other software packages.

Interface of IFPS to:	Not At All Important						Extremely Important
a. Accounting	1	2	3	4	5	6	7
b. Data base management	1	2	3	4	5	6	7
c. Graphics	1	2	3	4	5	6	7
d. Statistical analysis	1	2	3	4	5	6	7
e. Word processing	1	2	3	4	5	6	7
f. Other _____	1	2	3	4	5	6	7

17. In your opinion, what is the importance of the following alternatives for providing a full set of DSS (decision support system) tools? A value of "1" indicates you think a statement is most important, and a value of "3" indicates you think a statement is least important.

	Rank
a. One vendor provides all software but is primarily in the data base management system business.	_____
b. One vendor provides all software but is primarily in the financial planning, financial modeling, and budgeting business.	_____
c. Multiple vendors provide software packages with serious interfaces among packages.	_____

18. What effect will personal computers have on each of the following?

	No Effect At All						Very Important Effect
a. Management productivity	1	2	3	4	5	6	7
b. Analyst productivity	1	2	3	4	5	6	7
c. Reduction of employees	1	2	3	4	5	6	7
d. Modeling and simulation in financial analysis	1	2	3	4	5	6	7
e. Corporate statistical analysis	1	2	3	4	5	6	7
f. Information retrieval and display	1	2	3	4	5	6	7
g. Electronic mail	1	2	3	4	5	6	7
h Calendars and scheduling	1	2	3	4	5	6	7
i. Other _____	1	2	3	4	5	6	7

19. Does your company now have or soon expect to have a policy regarding personal computer **hardware** purchases?

Yes_____ **No**_____

Please attach a copy of the policy document, if possible.

20. Does your company now have or soon expect to have a policy regarding personal computer **software** purchases?

Yes_____ **No**_____

Please attach a copy of the policy document, if possible.

21. What do you think are the most important benefits/contributions of personal computer **software?**

a. _____

b. _____

c. _____

22. What are the most serious weaknesses of personal computer **software?**

a. _____

b. _____

c. _____

23. In what ways do you think personal computing has been "oversold" for professional use?

a. _____

b. _____

c. _____

24. If you would like to receive a copy of the survey results, please include your name and address or attach your business card.

Name _____

Title _____

Company _____

Address _____

_____

City _____

State _____ Zip Code_____.

BIBLIOGRAPHY

Connors, Tracy D., The Nonprofit Organization Handbook, McGraw-Hill, Inc.: The Kingsport Press, 1980

Dykeman, Francis C., JD, CPA, Financial Reporting Systems and Techniques, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1971

EXECUCOM Systems Corporation, IFPS User's Manual, Unpublished, 1982

EXECUCOM Systems Corporation, IFPS Supplement for Release 8.0, Unpublished, 1982

Gray, Paul, Ph.D., The Student's Guide To The Interacitve Financial Planning System, Unpublished, 1982

Keen, Peter G., Ph.D., and Wagner, Gerald R., Ph.D., "DSS: An Executive Mind-Support System", Datamation Magazine, November, 1979

Mintzberg, H., The Nature of Managerial Work, Harper & Row: New York, 1973

Rolph, Sarah, "A Study of Decision Makers", Datamation Magazine, November, 1979