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Emerson E & S Division's Management Technique: An Exploratory Survey Into the Benefits of an Integrated Business Environment

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Emerson Electric E & S Division's Management Technique:

An exploratory survey into the benefits of an integrated business environment

Timothy Fitzsimmons Carr, B.S.C.S.

A Culminating Project Presented to the Faculty of the Graduate School
of the Lindenwood Colleges in Partial Fulfillment of
the Requirements for the Degree of
Master of Business Administration

1986

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COMMITTEE IN CHARGE OF CANDIDACY

Professor E. Jack Kirk, Chairperson and Faculty Advisor

Professor Clark C. Compton, Faculty Lindenwood College

Professor Terrence G. Peterson, Faculty Lindenwood College

DEDICATION

To

my inspiration

Christine Angeli Setser

ACKNOWLEDGEMENTS

I am grateful to my employer and committee members for their time and contribution to this research project.

LIST OF TABLES

LIST OF FIGURES

Schedule of Critical Events

February 14, 1986

Event	Due Date	Status
1. The Project Idea	- November 7, 1985	Accepted
2. Preliminary Outline	- November 7, 1985	Accepted
Approval	- January 19, 1986	Accepted
3. The Introduction	- January 28, 1986	Accepted
4. Rough Draft	- February 14, 1986	Accepted
5. Draft	- March 18, 1986	Accepted
6. Draft Erratum	- March 29, 1986	Accepted
7. Final	- April 12, 1986	Accepted

Status Key

* - No Activity

Active - Task in work with complete date listed.

Review - Material submitted to committee for comment.

Complete - Review comments incorporated.

Accepted - Committee has approved material.

Emerson Electric E & S Division's Management Technique:

An exploratory survey into the benefits of an integrated business environment

Timothy Fitzsimmons Carr, B.S.C.S.

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of the Lindenwood Colleges in Partial Fulfillment of
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DIGEST

SYNOPSIS

Over the past few years, integrated business environments have become popular in the defense industry. An integrated business environment is a method used to unify all management and engineering activities required for a company to perform on a contract. The following research provides an introduction to the concepts of managing technological business through streamlining the efforts of all human and non-human resources involved, and secondarily, an exploratory survey into some of the important benefits and open issues that are being explored and debated among users, developers and maintainers of test program sets.

SUMMARY

What benefits are derived from integrating the technological work place? Can these benefits be justified? This thesis analyzes the productivity enhancements achieved by the management disciplines currently under evaluation by Emerson Electric Electronics and Space Division.

The information presented throughout this research was obtained from field experimentation and published material. Recommendations, analysis, and conclusions are those of the author acting as an independent researcher.

The research presents measurements of performance, schedule, and cost effectiveness of the environment and determines whether this approach met the business goal of increased productivity. The analysis focuses on the defense industry's test program set market place. Three key areas requiring improvement will be addressed:

- Performance traceability throughout the project
- Management -- controlling human and non-human resources
- Reduced project risk

The research includes published business and technical reports, trade journals, magazines, software and test reports. In addition to experimentation, survey research methods were used to measure the general perspective of the division's culture.

The hypothesis tested and presented follows:

Hypothesis

> It is feasible to improve management and engineering productivity using an integrated business environment. The gains in productivity are realized through automatic performance traceability throughout the project life cycle, reducing overall project risk without compromising product quality, and enhancing management awareness for controlling the various financial, schedule, and performance requirements connected with defense-industry contracts.

The primary research measures the productivity gains through integrating the environment. The gains in productivity are tested using four methods of experimentation:

1. Nonexperimental Research
2. Lab Experimentation
3. Field Experiments
4. Survey Research

The four methods are required due to the complex nature of measuring the environment's effect on productivity. In each experiment, productivity measurements are made in units of dollars. The units of measure are then common between all experiments.

The nonexperimental research measures performance, traceability and project communications. Initial results indicate a significant correlation between performance and project communication. Additionally, communication and project risk indicate some level of significance.

Lab experimentation evaluates the effects of consolidating the test program set life cycle activities. The consolidation activities deal with centralizing management information and not the hardware. The findings indicate a significant benefit is gained by distributing the hardware architecture between main frames, mini

computers and personal computers. Adaptability and reliability of system software is paramount to consolidating the business environment.

Field research deals with management awareness and control. Early results demonstrate that the level of project visibility is improved. Control is measured relative to configuration, schedule, quality and cost management techniques.

The final correlation explores the relationships between project risk and level of productivity of all affected groups. Survey methods were used to measure the overall division culture and its impact on productivity.

The technical conclusion derived from this research indicates overall system productivity gains could exceed a seven to one improvement ratio when one hundred percent operational. However, the research also indicates that for the gain in productivity to be realized, a fundamental change in the division's culture must occur. The report concludes by recommending areas of further research to improve division productivity.

Chapter 1: Introduction and Statement of Problem

General

This research project explores those elements that influence the success of a company doing business in the test program set defense industry market place. This report measures the effects of integrating the business environment to improve productivity.

To evaluate productivity we must first understand something about the products, the companies and profits of the businesses operating in the government market segment referred to as test program set life cycle.

Background

A test program set is a tool used to repair and test electronic and mechanical equipment. For example: Suppose your car is not operating correctly. You decide to take it to a service station for a check up. You arrive at the service station and explain the problem to the attendant. The attendant, being knowledgeable in new car maintenance, connects a car repair device to test points on the vehicle and performs diagnostic checks. Finding the problem, the attendant tells you the estimated cost for the repairs and hands you a bill for the diagnostic tests. This every day occurrence helps to explain two key elements of the test program set market. First, all mechanical and electronic

equipment eventually fails and second, the owner of the equipment ends up paying.

The test program set market includes those equipment and services required to support all systems operating in the military services. The total defense test and measurement industry market contains three distinct elements [1]:

1. Test stations. The hardware used to diagnose the problem, as illustrated in the example above. Figure 1 represents the hardware referred to as a Test Station or more technically the automatic test equipment (ATE).

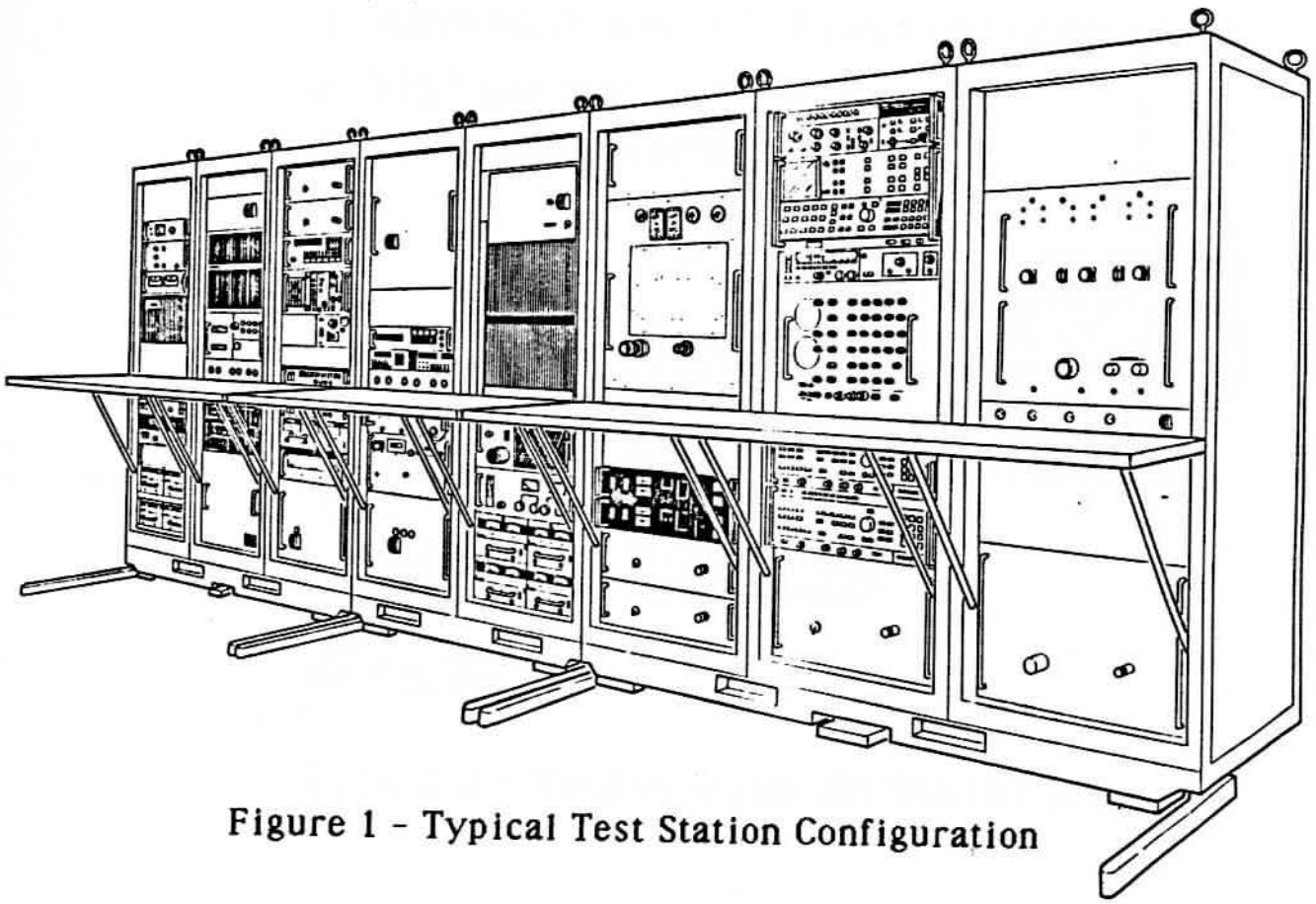


Figure 1 - Typical Test Station Configuration

2. Test program sets. The TPS consists of those items of hardware, software, and documentation which enable the unit under test (UUT) to be connected to and tested by the designated test station. The TPS is used to effectively test the UUT in accordance with the design requirements [2]. Figure 2 depicts the three elements which comprise a TPS.
3. Support. The logistics and management associated with the design, operation and maintenance of the equipment.

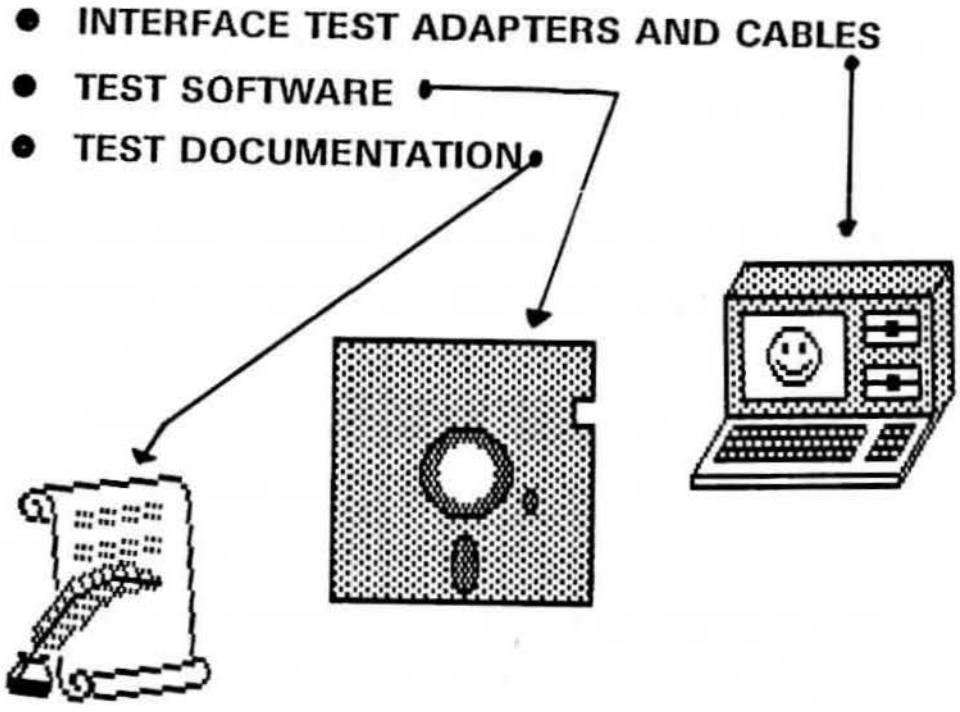


Figure 2 - Test Program Set Definition

The following report will limit its analysis to one of these market segments referred to above as test program sets.

Captain J. P. Hall, commander of the, Naval Air Systems Command writes, "TPS are a big investment necessary to weapon system performance, TPS development has been a "art form" that differed in quality, performance, cost, and schedule" [3]. He continues by explaining the dilemma facing the government and industry with the procurement, development and deployment of TPS. "Planned TPS development projects in the next decade severely extend government resources and imply increasing reliance on contractor support services for on-site monitoring and review increasing emphasis on cost, competition, and firm fixed price contracts place severe constraints on the 'Business-as-usual' Phased State Development Approach" [3a]. He continues to point out that TPS acquisitions are absolutely critical to weapons systems performance and require effective review, testing, and follow on evaluation to ensure that what is fielded is operationally effective and suitable [3b].

Captain Hall concludes his report by urging a proper balance of government/industry participation, risk sharing, and investment.

The new way of doing business described by Captain Hall sounds critical, but is there a market with the funds to

support a large amount of risk sharing and investment? The market, as seen by Frost and Sullivan [4], is projected to be 800 million plus for 1985, up 66 percent from 1984. The future growth rate is expected to rise at an annual twelve to seventeen percent and continue through the year 1996. Lt. Colonel Steven Butcher, commander of the United States Army TPS acquisitions, claims the army spends 70 percent of its support equipment budget on TPS acquisition and only 30 percent of its budget on station hardware [5]. Chapter two literature research further investigates the market value and clearly indicates the marketplace is latent with lucrative market opportunities for years to come.

With the establishment of a lucrative market, the risk sharing and investments required by industry are justifiable and required for a company to commit to supplying products and services to this market [6]. A company failing to invest in bettering its product will face the same dilemma that the United States steel and automotive companies are facing with increased off-shore competition.

For example, David Clutterbuck indicates that the Japanese Mitsubishi Motors Corporation maintains a high productivity rate which gives it leverage over the the international automobile market. He further elaborates that Mitsubishi uses innovative automation, streamlined assembly methods, and workers' total involvement in cost reductions and efficiency improvements, to maintain this leverage or

productivity rate to advance its market share [7]. The TPS industry should learn from the perils of the car and steel industries and act to preserve and increase their market share.

Emerson Electric, realizing the commitment level required to meet the increasing market challenge, began evaluating approaches to automating the TPS product life cycle in 1977 as a research and development project refered to as the ATLAS Engine. Other key milestones included [8]:

- 1980 Model 8 Development Environment
- 1981 DS-ATSS Proposal Effort
- 1982 ETS Unix Based Utilities
- 1983 ATSS contract award
- 1984 Integrated Business Environment Concept Study
- 1985 Integrated Business Environment Implementation.

The colloquial of this research is to evaluate Emerson Electric's current participation, risk sharing, and investment in funding the Emerson integrated business environment project.

Hypothesis

It is feasible to improve management and engineering productivity using an integrated business environment. The gains in productivity are realized through automatic performance traceability throughout the project life cycle, reducing overall project risk without compromising product quality, and enhancing management awareness for controlling the various financial, schedule, and performance requirements connected with defense-industry contracts.

Definitions

Integrated business environment - A system for creating and using the information resulting from the tasks performed by managers, engineers, and other professionals within a company.

Computer software - A combination of associated computer instructions and computer data definitions required to enable the computer hardware to perform computational or control functions [9].

Electronic messaging - A way of moving and storing information electronically; a form of nonsimultaneous interpersonal communication [10].

Time management - The efficient use of the time allotted for completion of a specific task [11].

Test program set development - The engineering disciplines and tools responsible for creating the components of a test program set [12].

Test program set (TPS) - A TPS consists of a test program, documentation and an interface adapter. The TPS is divisible into two major sections, the first being the performance tests and the second being the diagnostic test series.

Word and document processing - The generating of text through the use of computers and specialized software.

Personal computers - Individually used microcomputers with the ability to communicate within the integrated business environment.

Division culture - The policies, traditions and attitudes of an organization.

Unit under test - The device or system being tested. A device could range from a printed circuit board to an aircraft's radar. A system could range from a missile to a F-15 fighter aircraft.

Contribution to productivity - Gains in productivity measured in dollars saved over the current method of work. The results from each experiment are net dollars saved from integrating the environment.

Productivity - The amount of output achieved by managers and staff members as a result of the performance associated with the development of test program sets.

Risk profile - The test program set profitability profile currently is plagued with support problems arising from a lack of understanding of modern test program set development procedures.

Computer-Aided Design - An engineering tool designed to aid the engineer in developing the details of the product being produced.

Market value - Funds available in the market place.

Project management - Tasks performed by manager to minimize risk in the workplace.

Product life cycle - The period of time from product inception till the time it is no value.

Chapter 2: Review of Literature

The first step in evaluating the effect of an integrated business environment on productivity is understanding the skills and talents used to produce test program sets.

Test program set (TPS) development has proven to be a labor intensive task with few productivity/technology advancements over the past decade [13]. Test program sets and associated documentation are still generated manually. These labor intensive tasks have affected the schedule and cost of several recent Emerson programs. This in turn has caused the procuring agencies to require more detailed documentation, only adding to an already over-tasked work environment [14].

As a result of the enormous cost overruns with the deployment and maintenance of the high tech weapon systems, the United States Department of Defense is trying to get control of these costs by mandating a set of requirements to be conformed with during the procurement, development, and maintenance of test program sets [15]. The enforcement of these standards has generated a market which requires highly technical services and products.

In an effort to study the productivity improvements which are derived from the synergistic effect of integration, research was extracted from numerous

publications. Secondary research was conducted via industry interviews and surveys.

The literature research has shown that significant improvements in productivity are achieved by the corporations which have actively pursued integrated solutions. A significant number of this population believe that a failure to invest in the equipment and technology required to adapt the business environment to meet the market requirement is admitting that it is no longer a going concern [16].

The integrated business environment assists in the tasks associated with the procurement, design, development, maintenance, and management of test program set life cycle [17]. It is subdivided into several functional areas or class domains as defined in Chapter 1. The following sections contain differing ideas concerning the impact of each of these facts on productivity.

Electronic Messaging

Electronic messaging is a way of moving and storing information electronically--a form of nonsimultaneous interpersonal communication. As electronic messaging systems become more accepted as a medium for office communication, they are becoming a more prominent factor in the way that day-to-day activities are conducted. Electronic message handling offers two improvements over other forms of

business communication: Improved movement of information and improved access to information [18].

This medium of communication can take several forms: A notepad, electronic mail, computer conferences, bulletin boards, and electronic journals, all displayed on a computer screen [19].

Organizational productivity can be increased using this method by consolidating office disruptions, such as telephone calls and meetings, into passive rather than active interruptions. It can produce changes in time management, managerial effectiveness, and conversational behavior, and it can also be used to make decisions [20].

Many major corporations have begun to utilize electronic messaging systems. In 1984, more than 100 million electronic messages were sent through the computer systems of public service companies such as Western Union, ITT, General Electric, and MCI. This figure is double that for the previous year. Electronic mail can improve productivity by allowing better control of time, faster dissemination of information, and a more open communications flow. Studies by Booz, Allen and Hamilton have shown that it takes an average of four tries to complete a phone call and 100 phone calls to arrange a meeting between six business professionals. Electronic mail has been shown to provide a five percent to ten percent gain in office productivity [21].

Most experts agree that for an electronic mail system to be successful, it must be endorsed and actively supported by top management [22]. But, ironically, managers and executives are generally the last within their companies to have computer terminals on their desks. The main reason for this is that many executives have been put off from using office automation tools by the difficulty in learning to use the computers and associated software. Once an office automation system is implemented and utilized by all levels of personnel, including top management, the initial orientation time is seen to have been well worth the effort [23].

Recently, Environetics International implemented office automation systems in the law department of a large corporation. Everyone in the firm, from attorneys to clerks, has a terminal and uses text processing systems to draft and edit documents. The organization is pleased with the advantages of its new system, which permits all staff members to use such tools as electronic research and electronic mail. Productivity has improved at all levels, and acceptance has been 100 percent. Users have become proficient in using the system in ways that go beyond the usual scope of their jobs [24].

Whether used for the purpose of scheduling meetings, distribution memos, hooking up to important databases, or any of the many other possible applications, electronic

messaging systems have proven to be an effective way of increasing productivity.

Time Management

A key factor concerning productivity is efficient utilization of company time, and two problem areas include inefficient use of management time and the way that meetings are conducted.

In many firms, the productivity of middle management resources is neglected, and this neglect could be costly [25].

Organizational impediments are responsible for this oversight, the most common being unnecessary bureaucracy, wasted time, lack of involvement, inefficient delegation of responsibility, and lack of positive reinforcements [26].

There are ways that managerial productivity can be improved, such as elimination of unnecessary paper flows and the appropriate channeling of important information. Also, managers must be encouraged to use their time efficiently and to develop objectives and priorities. Ofner says another effective approach to improving managerial productivity is to establish a senior management task force which will [27] review organizational structure and processes, assess information flows and how they may be automated, develop a time-management program, and review organizational policies and procedures.

Meetings are another example of poorly spent time. They are typically no more than 25 percent efficient. This is discouraging since many managers spend as much as 75 percent of their time in meetings [29].

Thus, planning efforts should be directed at eliminating unnecessary meetings and making productive use of those that must be held. The first elements in planning a meeting are to understand the meeting size, purpose, protocol, and attendance. The leader, while perhaps not the person initiating the meeting, is responsible for setting the agenda, scheduling the meetings, and making all arrangements. For the meeting to be worthwhile, minutes should be taken for future reference or review. The meeting should be held in an orderly fashion, adhering to the subject matter as much as possible, and all points should be addressed. Comments about subjects not in the scope of the meeting should be withheld in the interest of expedition [30].

If company time is better utilized by managers and those conducting meetings, then it logically follows that more can be accomplished in a given time period, thereby increasing productivity.

Test Program Set Development

The future test program sets (TPS) will have to incorporate the latest state-of-the-art technologies in order to be able to provide the required functional performance [31]. As a result, new types of engineering design tools will be needed. Creativity and the innovative use of these new automated design tools will be basic in the development of a test program set.

A wide variety of software tools and design aids are available to address the increased complexity and rising costs associated with TPS development. A growing need for a cohesive, integrated system of TPS work tools to consolidate the productivity gains is long overdue [32].

An environment rich in aids would include, but not limited to the following types of tools: test requirements data (TRD) to ATLAS code generator, ATLAS language editors and compiler, and an ATLAS program simulator [33].

This allows full development and logic verification prior to integrating the TPS with the ATE [34]. Documentation support should include flowchart generators, wire-list, parts list generators, graphics for interconnect diagrams and test diagrams, templates for specifications, and generation of parts requisitions [35].

The Maintenance support includes a history of all documents for design change proposal (DCP)/ engineering change proposal (ECP) generation, cost accounting utilities,

and the maintenance of the TPS project development logbook, including problem reports [36].

All functional areas are equally important to success of the project life cycle (the design, development, documentation, and maintenance support functions).

Word and Document Processing

Documentation has always been a time consuming task for any engineering project. Not just the generation of the information itself, but the clerical process involved consumes a significant amount of time [37].

Until a few years ago, the only method by which to generate text was the typewriter (or pencil and paper). The typewriter has been found to be a not-so-accommodating piece of equipment when it comes to making revisions in a document, such as correcting mistakes, re-formatting certain sections, adding or deleting material [38].

Fortunately, a technological advancement entered the marketplace which revolutionized the business world the word processor [39].

With a word processor, corrections, additions, and deletions can be done with ease. Moving blocks of text from one location to another can easily be done by electronically cutting and pasting. Formatting of the document is easier and not predefined [40].

Word processors possess many other capabilities, such as automatic page numbering and table of contents generation.

In any engineering endeavor there is a need for adequate documentation throughout the system life cycle. Government contracts in particular have specific documentation requirements. One way to improve productivity of an engineering project is to improve documentation productivity using an automated software engineering documentation system [41].

The overall quality of a test program set is directly related to the quality of the TPS documentation. Automatic tools ensure high quality as well as significantly reduce the cost of TPS documentation. The use of a common UUT (unit under test) data base for the generation of the elements of a TPS has the following advantages [42]:

a. Consistency between all TPS elements generated from the data base. A single change to the data base will be reflected in all documents.

b. TPS quality is improved by automatic generation of documentation.

c. TPS quality assessment is available automatically. This essentially guarantees that the TPS engineer does a complete and thorough job.

d. Data entry is reduced significantly, and redundant entry for data repeated in various documents is totally eliminated [43].

Wilkins futher states many companies are under-utilizing this incredibly time-saving innovation and are thereby missing an opportunity for increased productivity.

Computer-Aided Design

Considering the highly technical nature of test program set development, and the utmost importance of its end application, the method by which the system is designed must be the latest that technology has to offer. Nothing, not even a human being, can be as precise as a computer. This is why computer-aided design must be implemented.

For example, the F-18, a United States Navy fighter plane whose base is on an aircraft carrier, has a 1500-gallon fuel cell, which is manufactured to the Navy's exacting standards by the Engineered Systems department of Uniroyal's Plastic Products division. Design and production problems associated with the project have led Uniroyal to purchase General Electric's Calma Computer-Aided Design System, in order to facilitate the design process and to ensure more exacting standards [44].

The Australian Department of Defense Support also has made a substantial investment in computer-aided

design/manufacturing. The Australian Department of Defense is one of the largest manufacturing operations in Australia, the introduction of this technology was vital to its success. According to DDS Secretary Charles Halton, computer-aided design/manufacturing would allow a major production increase if needed because of changed military circumstances [45].

Another example of a company that realizes the advantages of computer-aided design is the AAI Corporation, which has 15 years experience in developing test programs using many of the commercial digital simulator systems. Having utilized these types of packages, AAI realizes the economic advantages of computer-aided testing techniques [46].

As illustrated, it is clear that computer-aided design is vital in a highly technical field, particularly the defense industry, where the test system can make the difference between life and death.

Market Value

According to Lt. Colonel Steven Butcher, the Army spends 70 percent of its support equipment budget on TPS acquisition and only 30 percent of its budget on station hardware. For the Air Force, B-1B depot stations will be about 37 percent of the budget while TPS will require 63 percent of the budget [47].

To cut costs and to test more effectively, the military is developing standards for its automatic test equipment. Sperry Systems Management won the $54.8 million contract for the Modular Automatic Test Equipment (MATE) program, a set of five guidelines covering ATE acquisition, development of hardware and software, test program sets, instructions for use, and design of units to be tested [48].

The Navy F/A-18 total procurement cost presented in the fiscal year 1984 budget is projected to be $39,827 billion. Of this total, $35.5 billion is for the weapon system, $1.83 billion for initial spares, $2.405 billion for development, and $54.3 million for support facilities.

The Navy has adopted a series of cost control procedures for the F/A-18, held competition for test program sets, and selected the weapons tactical trainer and operational flight trainer by competition. It has also adopted practices and procedures in spares and supply acquisition to improve control of spares programs [49].

Sanders Associates has won a $61.7 million follow-on production contract from the United States Air Force for AN/USM-464 automatic test equipment. The contract calls for production of 40 mobile computer-operated electronic warfare test sets and 27 test program sets, comprised of antenna coupler, cables and software. The AN/USM-464 program is designed to increase the operational readiness of all Air Force EW systems on the flight line [50].

The U.S. Air Force also awarded Sanders a 28.2 million contract for design, test and qualification of automatic test equipment for checkout of air-borne electronic countermeasures (ECM) systems. The award includes provisions under which the Air Force can order additional test sets that could bring the total value of the contract to $200 million-plus.

A new firm, Technology Development of Arlington, Texas, has been formed to make test program sets for ATE. The company is involved in in providing both hardware and software for test program sets. Its customers will be primarily the government and aerospace contractors [51].

The United States government is not the only customer with a need for this type of technology. Harris has been awarded an $18.5 million contract by the Canadian government for test program sets for CF-18 aircraft. Software for the system will be developed by seven companies [52].

Clearly, the marketplace is latent with lucrative market opportunities for years to come. With the increase in start-up companies entering the scene, the need for an effective business environment is critical in order for a company to survive. This can be exemplified by the auto and steel industries, in that the increase in foreign competition has caused them to become highly automated in order to compete.

Project management

According to Burkhart, TPS development contracts are low risk. The reasoning used here is that the TPS developer has the management advantage.

Burkhart further elaborates that the start of TPS development is certain, since the government must provide both UUT data and test stations in a timely manner. It is unlikely that the government can impose special purchase order conditions that require the contractor to accept all changes in the UUT baseline data up to sell-off without cost impact [53].

The key to controlling cost impacts is assessing contract risk. Historical research has shown that performance risk is driven by;

- Integrity of UUT baseline data
- Maturity of ATE system hardware an software
- UUT complexity
- Special purchase order conditions
- Availability of tester equipment and software tools
- Maintenance on all equipment involved
- Personnel skill level
- Availability of TPS development guide
- Availability of station programming manual

TPS developments for ongoing projects have had considerable cost growth due to a common thread. These programs have had the scope of work increase without a corresponding increase in contract price. In general, the cost growth can be traced to the business environment not acting in real time to effectively deal with contract changes [54]. Untimely availability of testers and expensive instrumentation additionally affect the cost picture.

Emerson's performance historically has shown differences in development conditions which produce significantly different contract cost and profitability profile.

Providing the proper development requirement and including risk cost into TPS estimates significantly improved contract performance [55]. The key difference between the successful training and the others is personnel training, TPS development environment and estimated scope of work. Both testers available and UUT baseline changes are conditions that must be managed to prevent cost growth [56].

Chapter 3: Research

Section I: Hypothesis Statement and Summary of Research

Hypothesis

It is feasible to improve management and engineering productivity using an integrated business environment. The gains in productivity are realized through automatic performance traceability throughout the project life cycle, reducing overall project risk without compromising product quality, and enhancing management awareness for controlling the various financial, schedule and performance requirements connected with defense-industry contracts.

Primary Research

Measurements of productivity gains through the integrated business environment are tested using four methods of experimentation [57]:

Part A. Nonexperimental Research

Part B. Lab Experimentation

Part C. Field Experiments

Part D. Survey Research

The four methods are required due to the complex nature of measuring the environmental effect on productivity. In each experiment, productivity measurements are made in units of dollars. The units of measure are then common between all experiments.

Defining productivity in measurement units of numerals in each experiment is critical to the overall goal of assessing the net gain of using an integrated business environment. To calculate the net gain or increase in production of the environment, it becomes necessary to sum the results of the nonexperimental research, lab experimentation, field experiments, indicating the net outcome of integrating the business environment.

Survey methods were used to determine the culture of the Emerson Electronics and Space Division. Previous research on the technological businesses has shown that in order to realize increased production through integrated business environment, the individuals making up the business population must adapt to using the tools provided by the environment [58].

The Hunt study evaluates those traits in a population necessary to adapt and benefit from an integrated business environment. This population mix is then compared with the results of the Emerson survey.

Secondary Research

Published readings such as trade journals, articles, books, interviews, computer database searches, as well as published Emerson materials will supply support of the primary research.

Test and Measurement Purpose

"In its broadest sense, measurement is the assignment of numerals to objects or events according to rules [59]." This definition expresses the basic rule of measurement in the following research:

Dollars Saved = Increases in Productivity

The purpose of the experimentation is to quantify productivity gains using dollars saved as the common unit of measurement.

Research Summary

The following elements of the integrated business environment are to be tested for their contribution to raising the level of productivity involved test program set life cycle tasks.

Independent Variables

1. Electronic Messaging
   Electronic messaging is a way of moving and storing information electronically--a form of nonsimultaneous interpersonal communication [60].

2. Time Management
   The efficient use of the time allotted for completion of a specific task [61].

3. Test Program Set Development
   The engineering disciplines and tools responsible for creating the components of a test program set.

4. Word & Document Processing
   The generating of text through the use of computers and specialized software.

5. Personal Computers
   Individually used microcomputers with the ability to communicate within the integrated business environment.

6. Corporate Culture
   The policies, traditions and attitudes of an organization.

The independent variables' (1 thru 5 above) contribution to productivity gains are measured in dollars saved over the current method of work. The results from each experiment are totaled resulting in net effect of integrating the environment. The sixth independent variable investigates the attitudes towards full deployment of the environment.

Dependent Variable

Productivity

The amount of output achieved by managers and staff members as a result of the performance associated with the development of test program sets.

The normalized totals of all independent variable experiments equals the net gain in productivity.

Experimentation Instruments

The following lists of experiment assets were the instruments used to generate, collect, and analyze the data resulting from the experiments:

a. Twenty four individuals selected at random from engineer, management, administrative, and support groups
b. Twenty two individuals subdivided into two experimental groups
c. ALL-IN-1 integrated software
d. AppleWorks integrated software
e. Microsoft Chart
f. Apple Access II telecommunication software
g. Vax 11/780 super minicomputer
h. Apple Machintosh microcomputer
i. Apple IIc microcomputer
j. VT-220 computer terminals
k. Smart Team Modem
l. EtherNet local communication network
m. Southwestern Bell communication network

Section II: Research Methods

Test Methodology

Developing and selecting the types of experiments that cover the contributory effect of the independent variables on the dependent variable of productivity requires four research methods. A structure was developed for each experiment which reveals the contribution of each of the environmental elements to production. The following four research experiments were designed to test the primary hypothesis.

Part A. Nonexperimental Research

In order to test the effects of electronic message types on productivity, it was necessary to design a nonexperimental research method. Kerlinger [62] defines nonexperimental research as a systematic empirical inquiry in which the researcher has no direct control of the independent variables because their manifestations have already occurred [62a]. To study the types of messages sent within the environment, the researcher has no control of the generation of these messages. Available to the researcher was an instrument to collect and type classify the electronic messages being sent. Appendix A contains a complete listing of the raw data gathered during the experiment. The collection and typing of the messages was conducted between November 6, 1985 and March 14, 1986.

The instruments used to generate, categorize, and send the messages were controlled throughout the experiment in an effort to minimize the danger of post hoc assumptions [63]. The instrument used to generate the messages was a computer terminal directly linked to the central computer facility operating under the control of ALL-In-1TM[64]. Figure 3 represents this configuration.

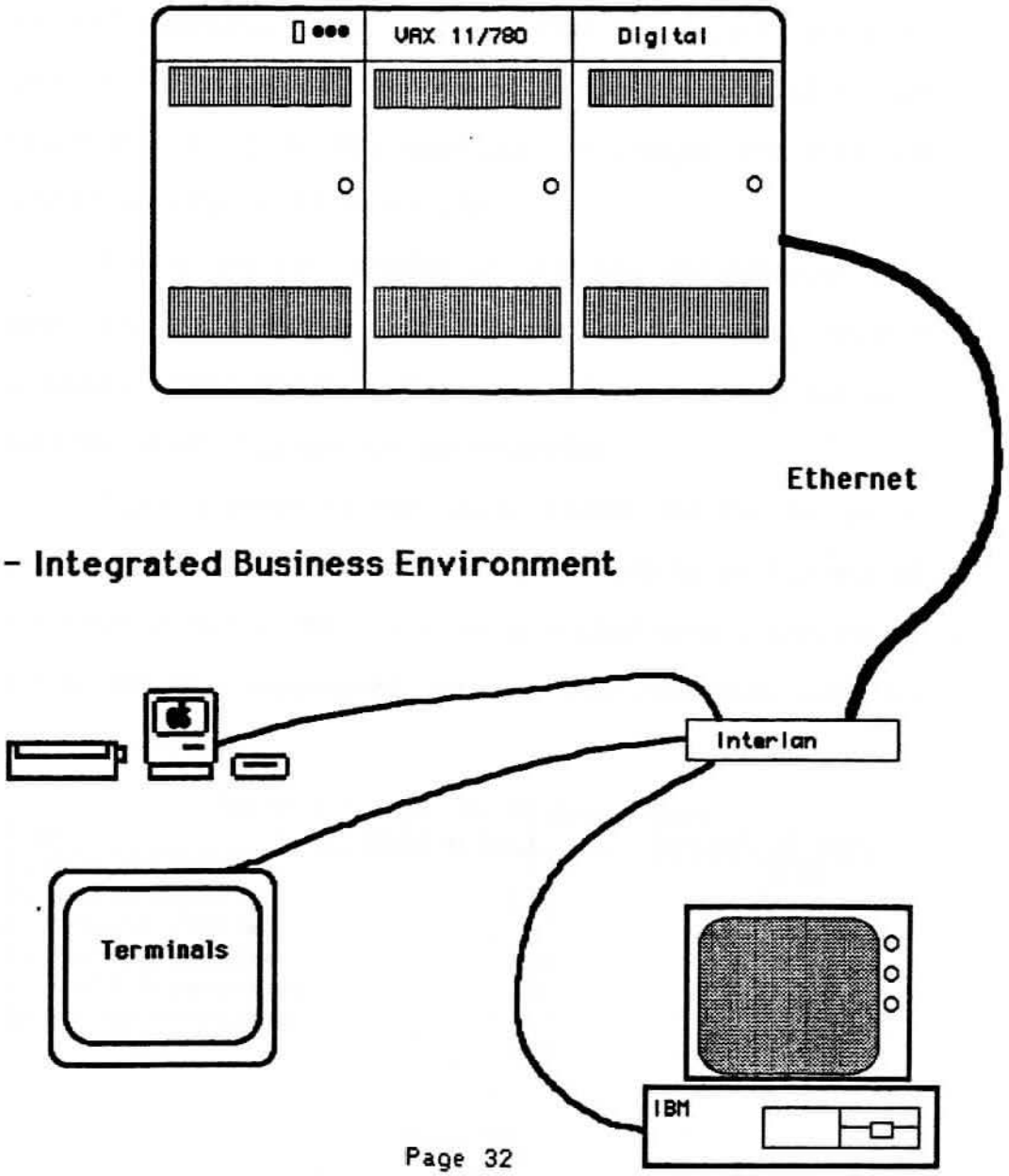


Figure 3 - Integrated Business Environment

The classification of the message content was performed in two methods. The first method was to automatically classify message content by the environment tool used to generate the message. An example of this would be types of messages generated by the Time Management System and Electronic Messaging. The Time Management System classifies message contents into meeting notices and responses, the Electric Messaging System classifies replies to sent messages. The second method of classification is left to the user, and, therefore, out of the control of the research. In this case messages are categorized into two types: personal and work-related.

During the four months of testing, 628 messages were sent and classified into the following types; meeting notices, status reports, message replies, meeting agendas, problem reporting, and non work-related.

Table 1 presents the types, number and percentage of messages sent. In this analysis, we looking at the mix of information sent. To arrive at a productivity contribution value for this experiment, we are only concerned with the meeting notices.

Table 1 - Types of Messages Sent

Type	Number Sent	Percent of Total
1. Meeting notices	57	9.07
2. Status reports	135	21.49
3. Message replies	67	10.66
4. Meeting agendas	31	4.93
5. Problem reporting	121	19.26
6. Non work-related	217	34.55
Total	628	100.00

This nonexperimental research indicates a time-savings of 235.1 hours resulting in a contribution of $8,578.50.

Part B. Lab Experimentation

Two lab experiments were performed to determine the contribution of the test program set Development domain and the mechanics of the Electronic messaging system [65].

Test Program Set Development Experiment

The productivity gain realized is calculated using the percentages listed in TPS Work Breakdown, Figure 4. Those tasks associated with the compiler are entries 5, 7, and 9. Using the figure of 2754 hours required for a typical TPS completion, the compiler is involved in 53.8 percent of the total activity which results in 1481.6 hours. Of course, the compiler is not the only driving force involved here [66]. Applying a five to one performance increase a savings of 395.1 hours is realized.

Appendix B contains a detailed technical description of the methods used to test of the performance of the ATLAS compiler. The result of the experimentation indicate a five to one improvement in overall domain performance [67].

TPS WORK BREAKDOWN

	MATE GUIDELINES	EMERSON AVERAGE ESTIMATE		TPSWB SAVINGS ESTIMATE	PROJECTED SAVINGS
1. REVIEW TRD ETC.	2%	5%		—	—
2. TPS FLOWCHART & SPEC		3.5%		15%	.52%
3. PDR		2.3%		5%	.115%
4. DESIGN ITA	40%	10.7%		10%	1.07%
5. GENERATE INITIAL & TEST PROGRAMS		5.5%	43%	25%	1.325%
6. CDR		4.2%		5%	.21%
7. CODE PROGRAM		16.8%		20%	3.36%
8. FABRICATE TPS HARDWARE	15%	7.7%		—	—
9. INTEGRATE ON ATE	33%	31.5%	40.5%	10%	3.15%
10. UPDATE DOCUMENTS		9%		25%	2.25%
11. SELL OFF	10%	3.88%		—	—
				TOTAL	12.0%

Figure 4 - TPS Work Breakdown

The productivity contribution of this experiment to the overall system is derived as follows:

HS X VH = Gain

Where:

HS = number of hour saved derived Scheurer Study = 395.1

VH = dollar value of one an hour of engineering this value also includes all direct management effort. This constant is globally defined and used by all experiments = $35.00.

Gain = $13,828.50 dollar gain in productivity

Mechanics of the Electronic Messaging Experiment

A simple test was performed to quantify the benefit of an electronic messaging. An intra-company correspondence memo was written requesting the recipient to notify the sender after receiving the information.

The procedure followed was to send this message via two different communication systems and to record the time of recipient's response. This experiment was repeated twenty times due to the large variance in recipient's response time. The electronic transmissions were constant within 10 percent variance over 20 tests. However, the traditional method had better than 157 percent variance recorded over 20 tests. Therefore, a average was used as the result. The

productivity contribution of this experiment to the overall system is derived as follows:

HS X VH = Gain

Where:

HS = number of hour saved derived from the laboratory experiment which calculated the time saved in using an electronic mail delivery system as opposed to the traditional method (the result of experiment 2) = 4.3.

VH = dollar value of one an hour of engineering this value also includes all direct management effort. This constant is globally defined and used by all experiments = $35.00.

Gain = $150.5 dollar gain in productivity

This lab experimental research resulted in a contribution of $150.5.

Part C. Field experimentation

Three field experiments [68] were performed to determine the contribution of the word and document processing system, time management system effectively coordinating the meeting of the 22 subjects, and distributing the processing power to personal computers.

Word and Document Processing Experiment

This experiment evaluates the software necessary to support test requirements document (TRD) to ATLAS generator and flowcharting activities of the document processing element of a TPS program. This software satisfies the critical needs of the TPS engineer in the areas of TRD generation, ATLAS code generation, and tool availability [69]. Preliminary tests indicate productivity improvements of forty to one over current methods could be realized if the system is 100 percent deployed.

The TRD to ATLAS translation software provides a significant improvement in the development time of TPSs. For the tasks of initial generation of code, ECF changes, and high-quality documentation generation, it is easy to see a ten to one improvement over current methods. In a test case recently performed using this software, the above collection of tasks that normally take an estimated two weeks took two hours. This indicates a forty to one improvement. However, the complexity of the test case was

lower than average so the improvement factor has been derated by a factor of four to account for this. Six major areas are to be addressed; test requirement document generation, TRD to ATLAS generator, ATLAS to TRD generator, ATLAS Flow Chart generator, functional flow chart generator, test strategy flow chart generator. The package utilizes existing division resources and integrates directly with the current integrated business environment.

A conservative estimate of 20 percent would be saved over the development time. This is based on a ten to 1 performance improvement on the following four tasks listed in the TPS Work Breakdown, Figure 4.

Task Description	Average*	Savings
2. TPS Flowchart & Specifications	3.5	3.15
5. Generation of initial test program	5.5	4.95
7. Code Program	16.8	15.12
10. Update Documents	9.0	8.1
Total	34.8	31.27

* MATE averages were derived from Sperry System Management, MATE TPS Acquisition, Guide 5, Volumes 3,4,5 Rev. B.

To be conservative, the following cost analysis uses a 20 percent improvement instead of the 31.27 percent improvement stated above.

The direct savings in productivity increase on a typical TPS could total $20,000. Using a 20 percent figure to be conservative, the cost recovery due to effective time savings would be:

$$TPS \times VH \times EF = Gain$$

Where:

TPS = number of hour currently spent on TPS development derived from the Burkhart study = 2754

VH = dollar value of one an hour of engineering this value also includes all direct management effort. This constant is globally defined and used by all experiments = $35.00

EF = Efficiency gain factor derived from above experiment = 0.20

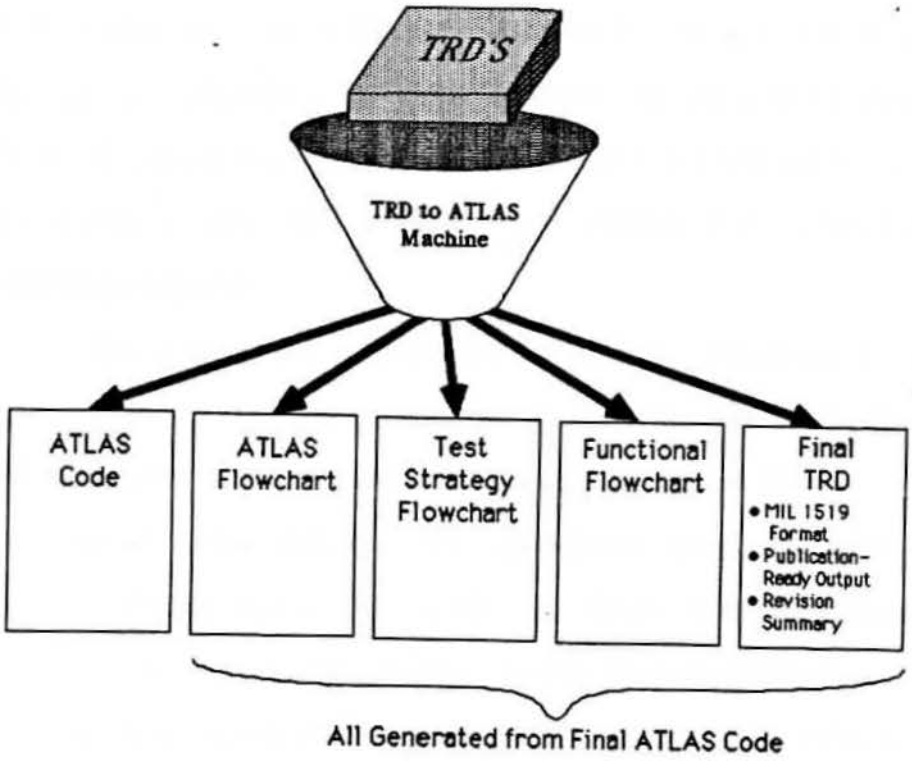
Gain = $19,278 gain in productivity

This lab experimental research results in a contribution of $19,278 (productivity gain on a typical TPS).

Figure 5 shows the proposed software configuration.

Figure 5

Proposed Software System



Time Management Experiment

To test the effectiveness of the time management system, the following experiment was performed.

1) If group A was informed of a meeting then 60 percent attendance would occur.

2) If group A was informed of a meeting then 60 percent attendance would occur.

Group A contained 7 professionals trained in the use of the integrated business environment. This included techniques for resolving schedule conflicts and the ability to use a computer terminal to learn of scheduled events. Group B contained 15 professionals with no exposure to the environment and relied upon the traditional information exchange methods.

The experiment was conducted between February 2, 1986 at 2:58 P.M. and February 3, 1986 at 4:00 P.M. The method of experimentation followed the following flow plan:

1) An Intra-Company correspondence memo was generated on February 2, 1986 at 2:58 P.M. Figure 6 represents the written communication generated.

2) The correspondence was sent to Group A through the environment and to Group B through the traditional system.

3) The meeting was held from 3:00 P.M. to 4:00 P.M. on the afternoon of February 3, 1986.

4) During the meeting, attendance was taken. Neither group was aware of the experiment in progress.

5) The attendance record was reviewed, and the results are listed in Table 2.

INTRA-COMPANY CORRESPONDENCE

Date: 2-Feb-1986 02:58p CST
From: Tim Carr
A43_CARR
Dept: ATE
Tel No: 4534

TO: John Doe

Subject: Meeting notice

You are invited to the following meeting:

Scheduled by : A43_CARR
Purpose : The First TPS WorkBench User Conference
On : 3-Feb-1986
From : 3:00p To : 4:00p
At : Lower HH Auditorium South
Priority : A1

Figure 6 Intra-Company Correspondence

Time Management Experiment Table 2

	Members	Attendance	Percent Within Group	Percent Deviation
Group A	7	5	71.4	+11.4
Group B	15	1	6.6	-53.4

The hypothesis deviation indicates a loss of 53.4 percent in effective time utilization. This resulted in a loss of productive time equalling 15 (number of member in Group B) X 2 (total time in hours involved in attending and preparing for the meeting) X 53.4 * $35 (cost per hour) = $560.7.

The typical TPS projected flow time equals .75 years [70]. During this time, if one meeting is held per week (39 meetings), the loss in productivity would equal: 39 (number of meeting) * $560.7 (loss in dollars) = $21,867.30

This field experimental research results in a contribution of $21,867.30.

Personal Computer Experiment

To measure the effects of introducing personal computers into the integrated business environment [71] measurements of CPU usage, connect time, and disk usage were collected. The method used to test performance of the personal computer follows:

1. The environment was utilized between October 1985 and January 1986 (inclusive) without personal computers. A detailed usage and cost impact data can be found in Appendix C items B, C, D, E.

2. During the month of February 1986, personal computers were introduced into the environment. Detailed usage and cost impact data can be found in Appendix C item A.

3. The CPU usage data for the months of October thru February was then plotted. Figure 6a indicates a sharp reduction in the cost incurred from corporate resources during the month of February. It is also significant to note that the corporate computer resources were not eliminated, but the cost incurred was reduced.

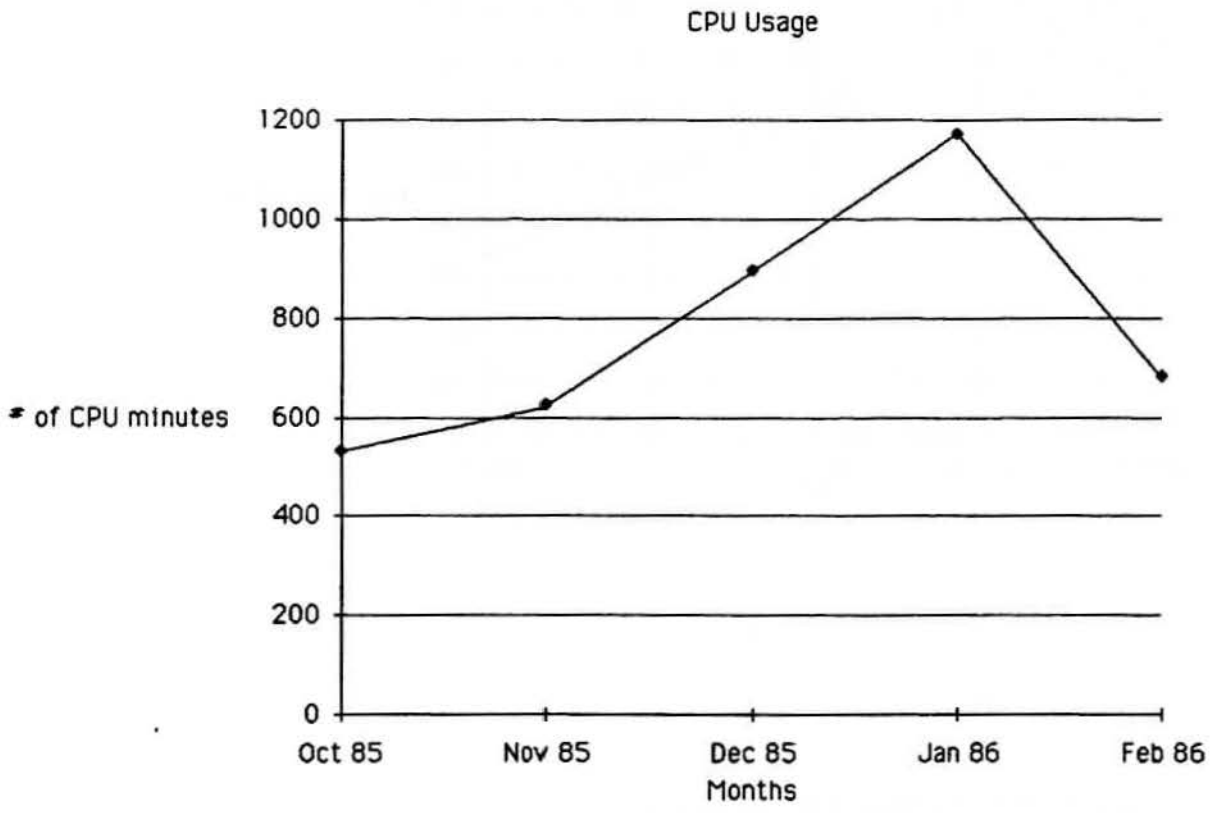


Figure 6a - Personal Computer Study

4. The connect time data for the months of October thru February was then plotted. Figure 6b indicates a sharp reduction in the cost incurred from corporate resources during the month of February. It is also significant to note that the corporate computer resources were not eliminated, but the cost incurred was reduced.

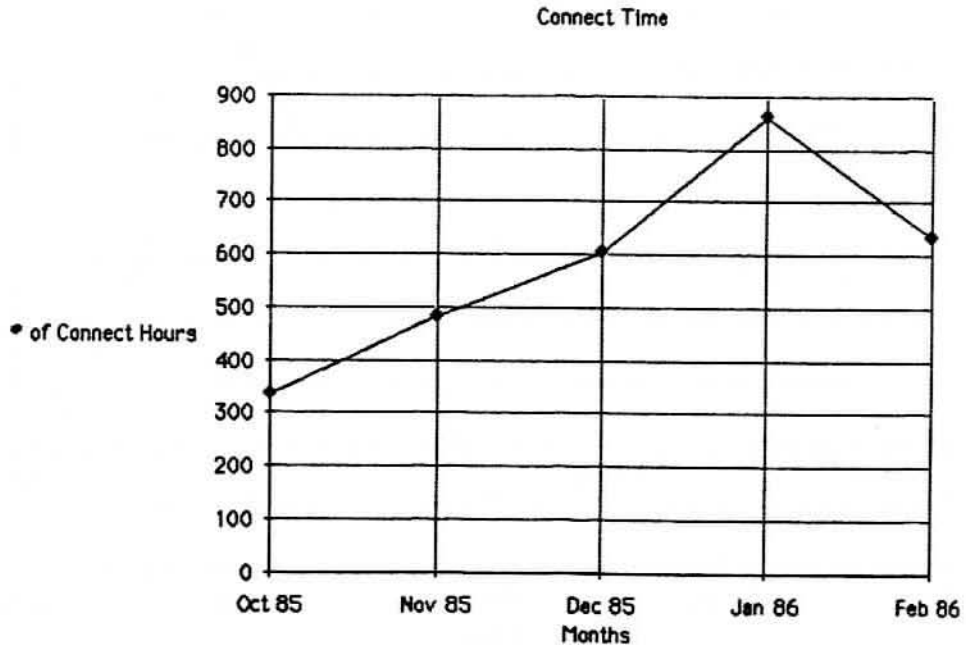


Figure 6b - Personal Computer Study

5. The disk usage data for the months of October thru February was then plotted. Figure 6c indicates a a reduction in the cost growth incurred from corporate resources during the month of February.

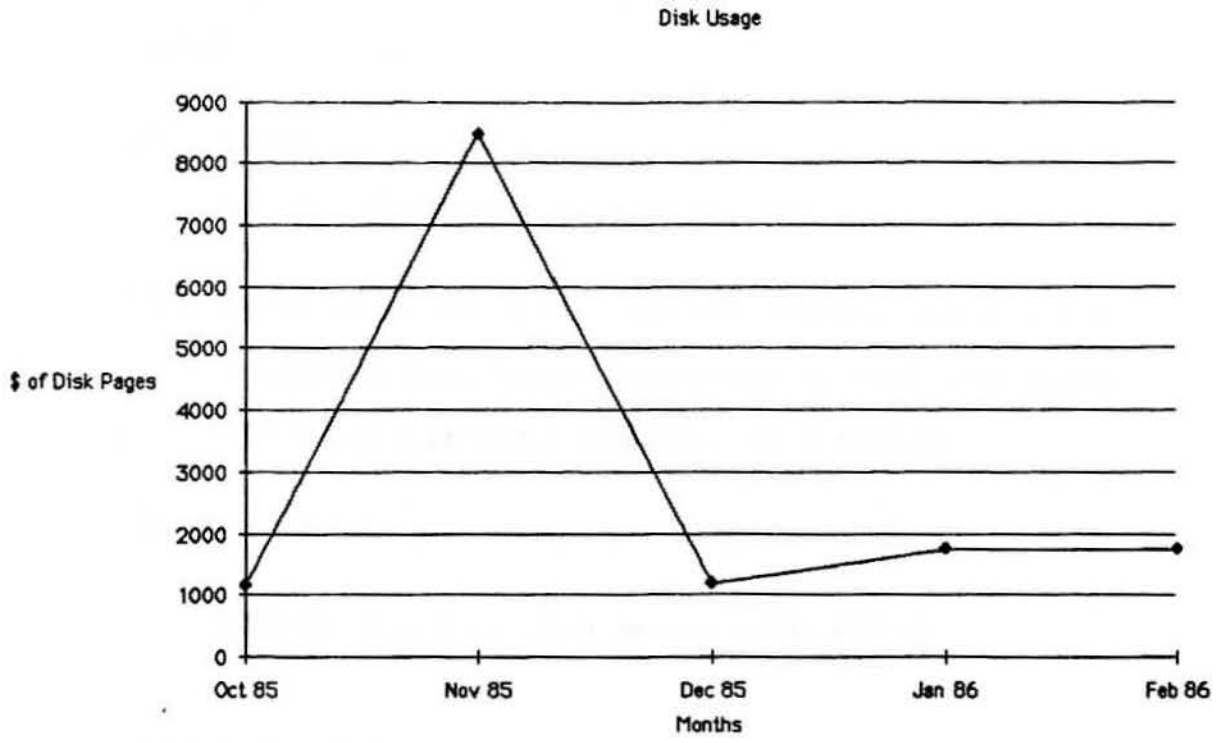


Figure 6c - Personal Computer Study

Table 3 summarizes the net monthly savings.

Table 3 - Personal Computer Experiment

		Connect	CPU	Disk Allocation
Savings	%	26.06	58.06	.724
Savings	$	224.19	491.63	12.80

Total savings per month $728.62

Given that TPS flow time is equal to .75 years or nine months, the productivity gain would equal:

NM X PG = GAIN

Where:

NM = number of months currently spent on TPS development derived from the Burkhart study. NM = 9

PG = dollar value avoided in network computer charges, due to distributing local processing to the individuals site using a personal computer. PG = $728.62

Gain = $6,557.58 gain in productivity

Results indicate a contribution of $6,557.58.

Part D. Survey Research

Population Culture Experiment

This personal interview research [73] was conducted to study the population culture of Emerson Electric by selecting and studying a random sample of 24 individuals of the population. The design of this experiment is based on a pilot study performed by Richard Hunt [74]. The Hunt study

investigated a technology based corporation to determine its apparent priorities in terms of perceived needs. The breakdown is based on a sampling of the general population, with special topics based on specialized population subgroups. The Hunt study was completed in September 1981. This is significant when evaluating the perceived needs of an integrated business environment of the 1990s.

The results of the Hunt study serve as the measuring instrument to evaluate the population's perceived needs and the ability for the culture to adapt to full deployment of the integrated business environment.

The interview schedule was designed as a fixed-alternative questionnaire [75]. An example of the interview schedule can be found in Appendix F. All twenty-four interviews were taken on February 21, 1986, between 8 A.M. and 10:30 A.M.

The results of the Carr Survey are listed in Table 4. Totals for all questions are shown in the original groupings as they were asked. The percent within group indicates the number of positive response.

Table 4 - Carr Survey General Population

Characteristic	Total Positive	Percent Within Group
Background		
Computer Science Major	1	4
Computer Science Minor	1	4
Electrical Engineering Major	13	54
Electrical Engineering Minor	0	0
Other Major	4	17
On-the-Job Computer Training	7	29
Vocational School Courses	1	4
No Prior Computer Training	3	13
Previous Computer Usage		
Used Computer in College or School	14	58
Have Home Hobby Computer	10	42
Used Emerson Scientific Computer Center	12	50
Used other Emerson Computer	13	54
Used Emerson Word processor PC's	5	21
Used IBM or Apple PC's	8	33
Used other PC's	5	21
Never used computer	4	17
Employed at Emerson		
Less than six months	0	0
Six to twelve months	1	4
One to two years	3	13
Two to five years	13	54
More than five years	7	29
Intended Applications		
Program Development	11	46
Computation	9	36
Documentation	10	42
Data Retrieval/Manipulation	14	58
Personal Interests	8	33
Applications Time-Frame		
Immediate	8	33
Within three months	6	25
Within six months	2	8
Within one year	2	8
Longer than one year	6	25
Unsure	7	29

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The background characteristic is designed to measures the ability of the population to adapt to interfacing with computer on a day-to-day bases. If the population's backgound does not include the type of concept knowledge gained through software literacy then the ability for the population to gain from integrating the environment will not be realized. Figure 7 indicates the the wide range of the populations computer background.

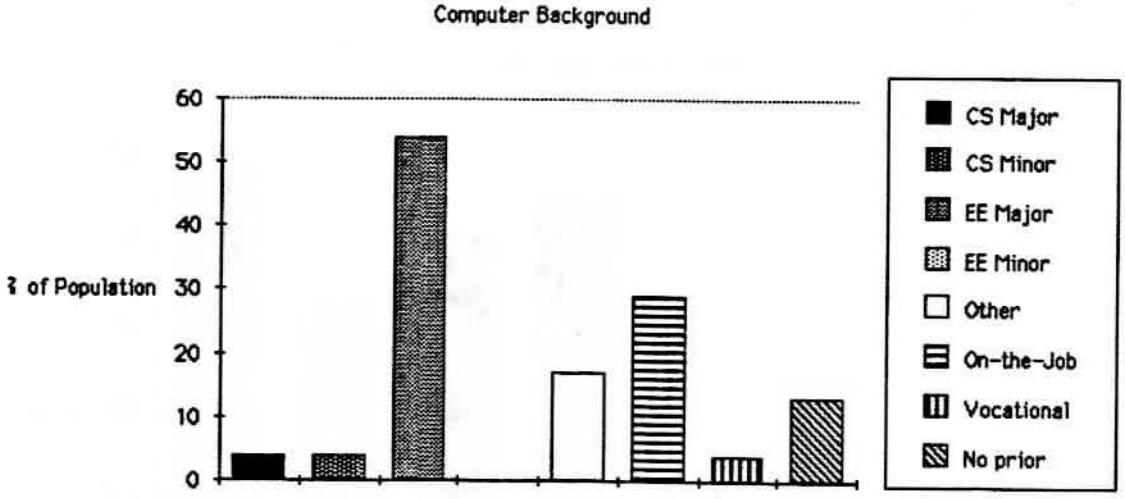


Figure 7 - Population Distribution Study

Like the background measurement, the previous computer usage characteristic is designed to measure the ability of the population to take advantage of the tools provided by the environment. If the population has previous computer experience, the fear of the keyboard, the primary environment input device, is reduced. With reduced fear the higher level of acceptance. Figure 8 shows that less than half of the population uses a computer during working hours and that seventeen percent of the population has never use a computer at work or home.

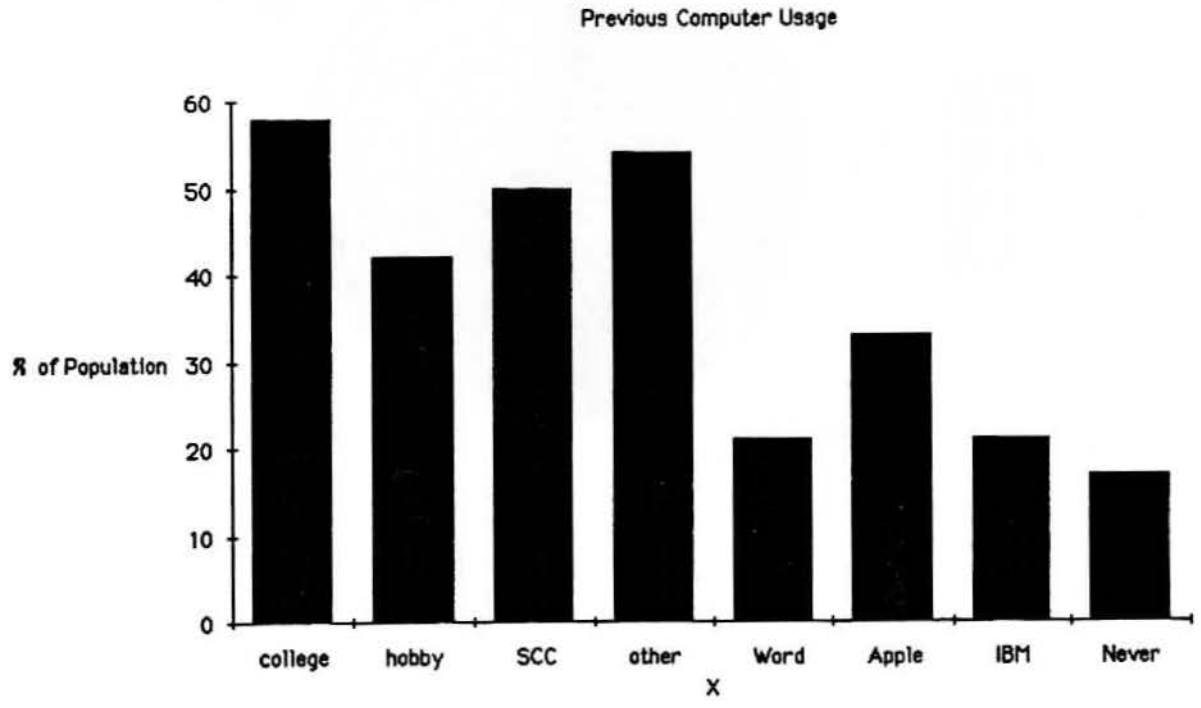


Figure 8 - Population Distribution Study

The length of employment characteristic is designed to measure the populations dynamics for change and the influx of new ideas and concepts. Figure 9 reveals that the population contains the dynamics required to benefit from integrating the environment.

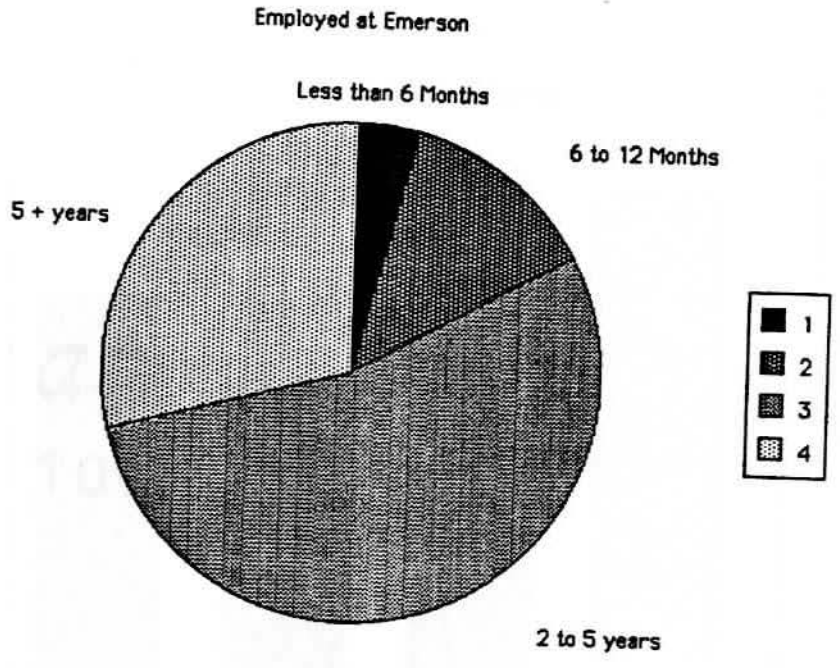


Figure 9 - Population Distribution Study

Measurements of intended applications are used to evaluate the real needs and types of computing resources required by the population. Figure 10 shows that Data base applications are indicated as the populations real needs.

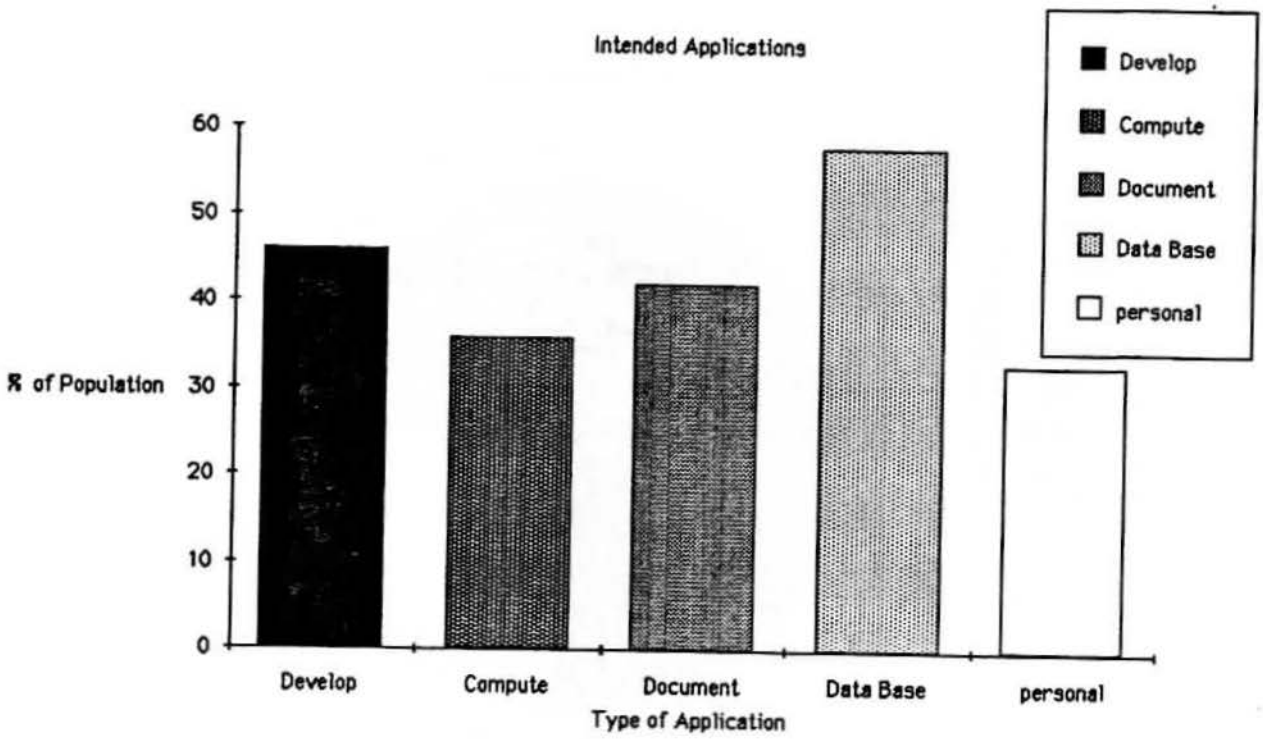


Figure 10 - Population Distribution Study

Measurements of application time-frame are used to evaluate the real needs and urgency of computing resources required by the population. Figure 11 shows that forty eight percent of the population has a real need for computer resources within the next three months.

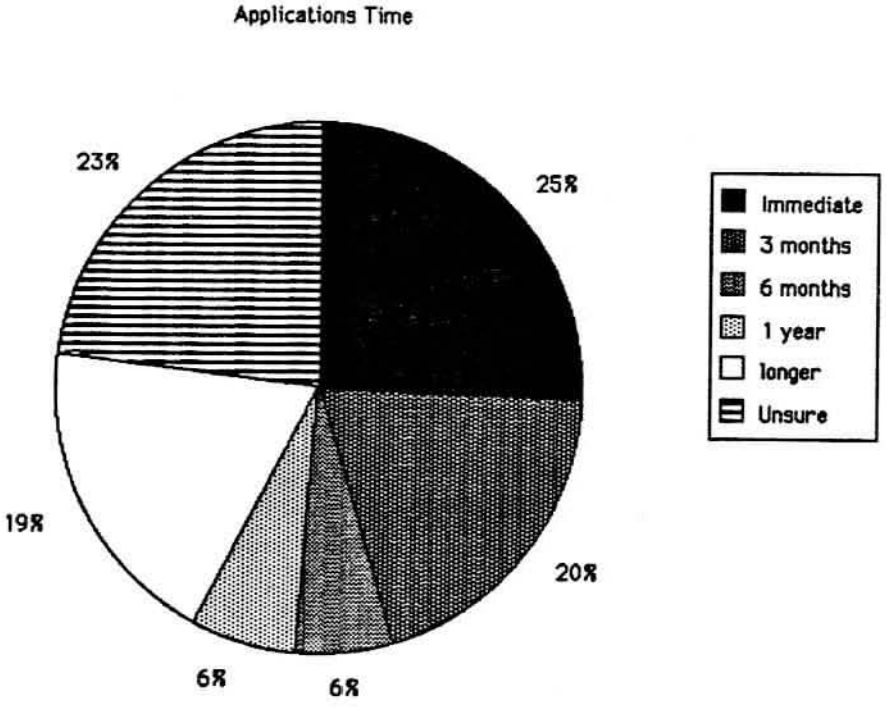


Figure 11 - Population Distribution Study

Table 5 shows the deviations between the current Emerson population culture and the culture described in the Hunt study. Table 6 summaries the deviation study report. The total absolute variance of 600 indicates that the two populations being compared significantly differ in their cultural make-up. The previous computer subgrouping represents the most critical element of the study.

Table 5 - Hunt/Carr General Population Deviation Analysis

Characteristic	Emerson % Within Group	Hunt % Within Group	Total Group Deviation
Background:			
Computer Science Major	4	68	64
Computer Science Minor	4	0	-4
Electrical Engineering Major	54	27	-27
Electrical Engineering Minor	0	0	0
Other Major	17	9	-8
On-the-Job Computer Training	29	32	3
Vocational School Courses	4	4	0
No Prior Computer Training	13	0	-13
Previous Computer Usage			
Used Computer in college or school	58	92	34
Have Home Hobby Computer	42	32	-10
Used Emerson Scientific Computer Center	50	60	10
Used other Emerson Computer	54	76	22
Used Emerson Word processor PC's	21	80	59
Used IBM or Apple PC's	33	48	15
Used other PC's	21	16	-5
Never used computer	17	0	-17
Employed at Emerson			
Less than six months	0	24	24
Six to twelve months	4	4	0
One to two years	13	44	31
Two to five years	54	20	-34
More than five years	29	8	-21
Intended Applications			
Program development	46	76	30
Computation	36	52	16
Documentation	42	60	18
Data Retrieval/Manipulation	58	56	-2
Personal Interests	33	44	11
Applications Time-Frame			
Immediate	33	88	55
Within three months	25	12	-13
Within six months	8	4	-4
Within one year	8	8	0
Longer than one year	25	0	-25
Unsure	29	4	25

Table 6 - Total Variance Between Populations

Group	The within group variance
Background	119
Previous Computer Usage	172
Employed at Emerson	110
Intended Applications	77
Applications Time-Frame:	122
Total absolute variance	600

Chapter 4: Summary and Recommendations

Summary

The research presented an analysis of management techniques being investigated to more effectively manage technological business through streamlining the efforts of all human and non-human resources involved.

The research has indicated a significant cost benefit is derived from integrating the technological work place. The benefits were justified throughout the experimentation as listed in Table 6 with a net productivity gain of $70,109.88.

Table 6 - Total Experiment Gain

Part A: Nonexperimental Research	$ 8,578.50
Part B: Lab Experimentation	
Test Program Set Development	$13,828.50
Mechanics of the Electronic Messaging Experiment	$150.50*
Part C: Field experimentation	
Word and Document Processing Experiment	$19,278.00
Time Management Experiment	$21,867.30
Personal Computer Experiment	$ 6,557.58
Total	$70,109.88

* The result of this experiment used as constant.

The focus of this research presented measurements of the performance, schedule, and cost effectiveness of the environment and determined that this approach met and exceeded the business goal of increased productivity as outlined in TPS Work Breakdown Figure 4. The three key areas requiring improvement were addressed. The four methods of experimentation used succeeded in measuring the complex nature of the environment's effect on productivity. In each experiment, productivity measurements were made in units of dollars. The units of measure were common between all experiments resulting in a gain of 73 percent over current methods a 61 percent above the business goal as stated in Figure 4. The percentage gain of 73 percent was derived by:

$$E \times VH = PC$$

$$(GAIN \times 100) / PC = PG$$

Where:

E = Current Engineering Manhour Requirements per TPS. E = 2754

VH = dollar value of one an hour of engineering this value also includeds all direct management effort. This constant is globally defined and used by all experiments = $35.00

PC = Total TPS manhour dollar cost. PC = 96,390.00

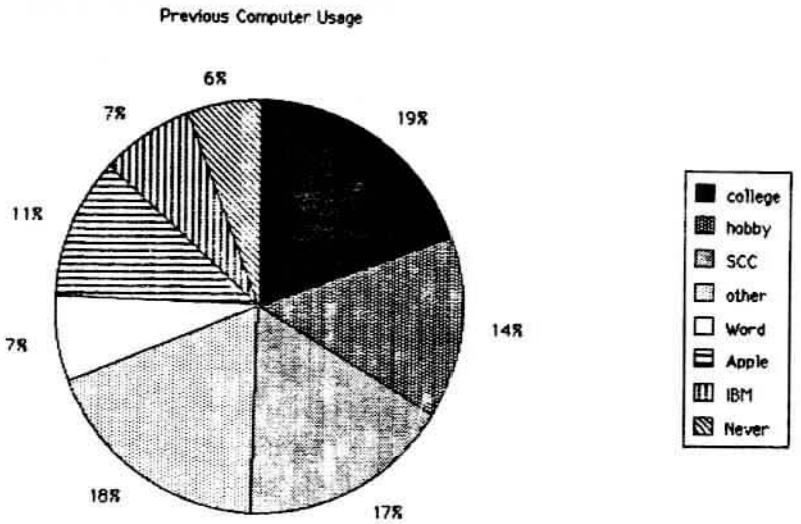
PG = Total percentage project cost avoidance.

PG = $70,1109.88

The technical conclusion derived from this research indicates overall system productivity gains could exceed a seven to one ratio when one hundred percent operational. However, the survey research indicated that for the gain in productivity to be realized, a fundamental change in the division's culture must occur. This report indicates that the integrated business environment succeeded in improving productivity by providing; a common interface, a reduction in TPS development manhours and machine time through increases in compiler throughput and improvements in documentation generation, efficient use company assets, use of personal computers, and improved product quality.

The Emerson population study indicates that to improve division productivity a change in the division's culture would have to occur. This could be accomplished by increasing the populations awareness of computers and how these technological resources could benefit them. The computer usage analysis indicates that less than 14 percent of the working population has gained computer knowledge from the employer. The value of SCC is the indicator.

Requires Changing the Corporate Culture



Computer Usage Analysis

It must be noted, the domestic competition (Honeywell, McDonnell Douglas, AAI, Grumman and Rockwell) has already committed to the use of integrated solution to increase important market share.

The last important point to consider is the difficulty of keeping trained TPS developers. Using the current work methods, the task of generating a TPS and all the associated documentation is undesirable. If the tasks that involve non-thinking processes are automated, it leaves the most challenging core of the technical work to accomplish. Valuable people will, therefore, be less inclined to evaluate other employment options because there is a greater percentage of enjoyable.

Conclusions

- This method will be recovered in under one year in savings on one in-house project; benefits to other anticipated programs increase the rate of payback even within the first year, and amounts of subsequent cost savings year by year.

- The software configuration is necessary and sufficient to achieve the schedule and operational status goals of this project and support the cost reductions shown.

- None of the wide range of alternatives considered offers as effective a performance/cost ratio during the immediate lifetime of this project.

Recommendation

To further the populations awareness of the computer revolution and once the resource is developed exploit it.

Appendix "A"
Communication Data

Mail Box Read

1	628	MANAGER	14-Mar-1986 05:14p AR1
2	627	MANAGER	14-Mar-1986 05:11p AR2
3	626	A43_GALLOWAY	14-Mar-1986 14:28 upload of files
4	625	_A43_MUNN	15-Mar-1986 03:06 Important Communications
5	623	A43_GALLOWAY	13-Mar-1986 16:50 Year One Accomplishments
6	622	A43_GALLOWAY	12-Mar-1986 19:19 Meeting notice
7	621	A43_SCHEURER	12-Mar-1986 04:02p Meeting notice
8	619	MANAGER	11-Mar-1986 08:29p i think this was for you
9	618	A43_GALLOWAY	10-Mar-1986 22:34 Meeting notice
10	616	A43_SCHEURER	10-Mar-1986 07:43p Meeting notice
11	612	A43_GALLOWAY	7-Mar-1986 12:04 Meeting notice
12	611	A43_SCHEURER	7-Mar-1986 11:04 Meeting notice
13	609	_A43_MUNN	6-Mar-1986 01:08p Oh No!
14	608	_J10_SHANDS	6-Mar-1986 01:08p ALL in 1 user
15	607	MANAGER	3-Mar-1986 04:49p 785 update possible disaster
16	606	A43_SCHEURER	3-Mar-1986 10:41 AR Urgency
17	605	A43_MUNN	28-Feb-1986 04:37p Test Program Set WorkBench Background Survey
18	604	A43_MUNN	28-Feb-1986 04:21p Meeting notice
19	602	_A43_MUNN	3-Mar-1986 09:06 TPSWB functions
20	601	_A43_GALLOWAY	3-Mar-1986 09:06 Put this in my file
1	600	A43_SCHEURER	28-Feb-1986 02:59p RE: Phase II AR equipment list
2	599	_A43_MUNN	28-Feb-1986 03:25p All
3	596	_J10_SHANDS	28-Feb-1986 10:30 RE: login coded message
4	592	_A43_SCHEURER	28-Feb-1986 07:46 RE: Disk usage...
5	590	A43_CARR	27-Feb-1986 02:56p Phase II AR equipment list
6	587	MANAGER	27-Feb-1986 08:19 Problems after SCC directory change
7	585	MANAGER	25-Feb-1986 11:05 Meeting notice
8	584	A43_GALLOWAY	25-Feb-1986 10:55 RE: Mike Holmes A
9	583	A57_CHRISCO	25-Feb-1986 08:59 SURVEY REPLY
10	581	A43_GALLOWAY	24-Feb-1986 23:08 RE: 615 question and answer period
11	579	A43_GALLOWAY	24-Feb-1986 16:43 Mac to TYX
12	578	A43_GALLOWAY	24-Feb-1986 16:20 RE: TYX demo comments
13	577	_A43_MUNN	24-Feb-1986 04:21p Ailing
14	576	_A43_MUNN	24-Feb-1986 04:21p brighter futures???
15	575	A43_SCHEURER	24-Feb-1986 02:24p TYX demo comments
16	574	A57_CHRISCO	24-Feb-1986 08:35 lost the survey due to lack of expertise wrt this system
17	573	A43_GALLOWAY	24-Feb-1986 08:34 Report on AV8B Atlas Compiler
18	572	A57_CHRISCO	24-Feb-1986 08:26 Meeting notice
19	567	A43_CHAPMAN	21-Feb-1986 06:44p Meeting notice
20	566	A43_SPENCER	21-Feb-1986 05:19p Meeting notice
1	565	A43_SCHEURER	21-Feb-1986 04:38p AutoTestCon
2	564	A38_HAYDEN	21-Feb-1986 03:30p Meeting notice
3	562	_A43_MUNN	21-Feb-1986 04:37p
4	561	_A43_MUNN	21-Feb-1986 04:37p All

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5     560  _A43_MUNN          21-Feb-1986 04:37p hunting season
6     556  A43_GALLOWAY       21-Feb-1986 09:36  Atlas compiler evaluation
7     553  A43_GALLOWAY       20-Feb-1986 23:17  Meeting notice
8     552  A43_CARR           20-Feb-1986 08:59p this is a test
9     540  A43_SPENCER        13-Feb-1986 10:55  joe security
10    539  A43_CARR           12-Feb-1986 08:39p System Security
11    538  _J10_SHANDS        13-Feb-1986 01:37p A43_allin1
12    536  A43_SCHEURER       12-Feb-1986 03:33p Hours
13    532  A43_CARR           10-Feb-1986 11:51p February 10, 1986
14    529  A43_MUNN           10-Feb-1986 02:10p All-in-1 size (!!!!)
15    528  MANAGER             7-Feb-1986 06:34p mail address
16    527  A43_SPENCER         7-Feb-1986 01:03p Meeting notice
17    526  _A43_MUNN          10-Feb-1986 02:22p Terminal
18    525  _A43_MUNN          10-Feb-1986 02:22p slowness
19    519  _A43_GALLOWAY       7-Feb-1986 11:25  OUTSIDE STUFF
20    518  MANAGER             6-Feb-1986 06:24p Meeting notice

1     517  A43_SCHEURER        6-Feb-1986 05:04p Status Update
2     516  A38_HAYDEN          6-Feb-1986 01:04p ETHERNET WORK AROUND
3     515  A43_CHAPMAN         6-Feb-1986 12:59p Meeting notice
4     514  A38_HAYDEN          6-Feb-1986 12:51p Meeting notice
5     513  _A43_CARR           7-Feb-1986 10:25  Continue Failure of the Lower HH annex
                               Terminal Server
6     512  A43_SCHEURER        6-Feb-1986 11:15  Meeting notice
7     510  A43_SPENCER         6-Feb-1986 10:27  Meeting notice
8     509  MANAGER             5-Feb-1986 09:34p SOURCE CODE JUNK
9     508  MANAGER             5-Feb-1986 08:41p music&macintosh
10    507  A43_GALLOWAY        5-Feb-1986 14:24  Meeting notice
11    505  _A43_MUNN           5-Feb-1986 12:53p M-GRASS
12    504  _J10_SHANDS         5-Feb-1986 12:53p A43_ALLIN1 Privs
13    503  A43_MUNN            5-Feb-1986 12:47p RE: Training Seminar Handout - First TPSWB
                               User Conference
14    502  A43_CHAPMAN         5-Feb-1986 10:41  Meeting notice
15    500  A43_CHAPMAN         5-Feb-1986 10:41  Meeting notice
16    498  A43_MUNN            5-Feb-1986 08:51  RE: Training Seminar Handout - First TPSWB
                               User Conference
17    497  A43_CARR            4-Feb-1986 10:10p TPSWB overview to be included in TPS
                               Competitivenss Study
18    496  MANAGER             4-Feb-1986 08:51p Meeting notice
19    494                                        Review Minutes
20    492                                        timothy carr

1     489                                        TPS Workbench overview
2     488  A43_CARR            4-Feb-1986 05:23p Training Seminar Handout - First TPSWB User
                               Conference
3     483  A43_MUNN            4-Feb-1986 02:34p Latest/Orlando Rumor & Misc items of note
                               FYI
4     482  A43_MUNN            4-Feb-1986 01:19p RE: Sorted, A-, Son of
5     480  A43_MUNN            4-Feb-1986 09:10  Sorted, A-, Son of
6     479  A43_MUNN            3-Feb-1986 04:58p Sorted, A-
7     478  _A43_ALLIN1         3-Feb-1986 08:03p Account Logging
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8     475  A43_SCHEURER          3-Feb-1986 02:04p SCC CONSPIRACY
9     474  MANAGER               3-Feb-1986 02:02p Meeting notice
10    473  A43_MUNN              3-Feb-1986 01:30p All-N-1 problem-of-the-day
11    471  A43_MUNN              3-Feb-1986 10:44  More raw random type rumors for the mill
12    470  A43_SCHEURER          3-Feb-1986 09:28  Mysterious User
13    469  A43_SCHEURER          3-Feb-1986 09:22  Meeting notice
14    468  A43_MUNN              3-Feb-1986 08:40  Meeting Notice PS
15    467  A43_MUNN              3-Feb-1986 08:38  Meeting notice
16    466  A43_LOSS              2-Feb-1986 11:32p r26 usage of tpswb
17    464  _A32_SUDA             3-Feb-1986 12:20p Network Security Issue
18    463                                          First TPS WorkBench User Conference Training
Slides
19    460                                          Status Report
20    459  A43_SCHEURER          31-Jan-1986 09:52p January 31,1986 status

1     458  A43_MUNN                31-Jan-1986 08:52  PC Cheepie Rumor of 1/31/86  --Have Fun,
Kiddies!--
2     457  A43_SCHEURER          30-Jan-1986 10:36p Jan 30,1986 Evening Results
3     456  A43_GALLOWAY          30-Jan-1986 09:55p ADDITIONAL SOFTWARE NEEDED
4     454  A43_MUNN              30-Jan-1986 08:53  mail form of guehne comp 1/30/86
5     451  A43_LOSS              28-Jan-1986 10:52p what i did this night
6     450  A43_CARR              27-Jan-1986 11:22p using TPSWB
7     448  _J10_SHANDS           27-Jan-1986 06:46p RE: A43_ALLIN1
8     446  _J10_SHANDS           27-Jan-1986 01:04p RE: A43_ALLIN1
9     444  A43_SCHEURER          27-Jan-1986 11:12  RE: DEC product announcement
10    443  A43_SCHEURER          27-Jan-1986 11:10  RE: DEC product announcement
11    441  A43_GALLOWAY          26-Jan-1986 21:49  RE: DEC product announcement
12    440  A43_CARR              26-Jan-1986 02:06p DEC product announcement
13    437  A43_GALLOWAY          24-Jan-1986 21:49  Meeting notice
14    436  A43_SCHEURER          24-Jan-1986 02:28p Meeting notice
15    435  A43_CARR              24-Jan-1986 01:39p Datsa Vax Situation
16    430  A43_CARR              24-Jan-1986 10:10  Vax concerns
17    427  A43_SCHEURER          23-Jan-1986 10:17p Interested potential TPSWB customer
18    426  A43_SCHEURER          23-Jan-1986 02:18p Meeting notice
19    425  A43_SCHEURER          23-Jan-1986 02:09p Meeting notice
20    424  A43_GALLOWAY          23-Jan-1986 12:26  Meeting notice

1     423  A43_CHAPMAN           23-Jan-1986 11:43  Meeting notice
2     421  A43_GALLOWAY          22-Jan-1986 22:34  RE: I'm so pisss.....
3     420  A43_GALLOWAY          22-Jan-1986 22:26  Meeting notice
4     416  A43_MUNN              22-Jan-1986 04:01p Incubators
5     414  A43_SCHEURER          22-Jan-1986 03:18p Status News
6     413  A43_MUNN              22-Jan-1986 08:52  concerts
7     412  A43_SCHEURER          21-Jan-1986 10:30p Update
8     411  A43_GALLOWAY          21-Jan-1986 10:19p SLOW BUT SURE
9     410  A43_GALLOWAY          21-Jan-1986 10:15p Meeting notice
10    409  A43_GALLOWAY          21-Jan-1986 10:15p Meeting notice
11    408  A43_GALLOWAY          21-Jan-1986 10:14p Meeting notice
12    407  A43_GALLOWAY          21-Jan-1986 10:14p Meeting notice
13    406  A43_SCHEURER          21-Jan-1986 09:40p Meeting notice
14    405  A43_SCHEURER          21-Jan-1986 09:39p Meeting notice
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15    400  A43_SCHEURER        21-Jan-1986 09:19p Meeting notice
16    399  A43_SCHEURER        21-Jan-1986 09:18p Meeting notice
17    394  A43_GALLOWAY        21-Jan-1986 02:43p RE: All problem -- time management area
18    393  A43_MUNN            21-Jan-1986 11:03  Govern-Controlled News Item
19    392  A43_MUNN            21-Jan-1986 10:06  All problem -- time management area
20    391  A43_MUNN            21-Jan-1986 09:01  tools and users

1     389  A43_CHAPMAN         20-Jan-1986 04:05p RE: Interrupt menu
2     387  A43_CHAPMAN         20-Jan-1986 10:36  Interrupt menu
3     386  A43_SCHEURER        17-Jan-1986 06:55p Optimum Meeting Times
4     385  A43_MUNN            17-Jan-1986 04:45p DAT'S a VAX?
5     384  A43_CHAPMAN         17-Jan-1986 02:55p DATSA VAX and the TPS WorkBench
6     383  A43_MUNN            17-Jan-1986 11:07  items of interest from Guehne & misc
7     382  _A43_MUNN           17-Jan-1986 11:08  chargin' on
8     379  A43_SCHEURER        16-Jan-1986 10:26p Thursday Nite Progress
9     377  A43_MUNN            16-Jan-1986 03:15p N-IFTE?
10    376  A43_GALLOWAY        16-Jan-1986 14:38  some progress
11    374  A43_CHAPMAN         16-Jan-1986 09:59  Meeting notice
12    373  A43_CHAPMAN         16-Jan-1986 09:58  Meeting notice
13    372  A43_CARR            15-Jan-1986 04:27p DATSA VAX  and the TPS WorkBench
14    369  A43_GALLOWAY        15-Jan-1986 14:54  Meeting notice
15    368  A43_GALLOWAY        15-Jan-1986 14:51  Meeting notice
16    367  A43_SCHEURER        14-Jan-1986 10:32p Evening's Results
17    366  A43_SCHEURER        14-Jan-1986 10:23p Meeting notice
18    363  A43_SCHEURER        14-Jan-1986 03:43p RE: Meeting notice
19    362  A43_GALLOWAY        14-Jan-1986 14:17  Meeting notice
20    361  A43_SCHEURER        14-Jan-1986 01:52p Meeting notice

1     357  A43_GALLOWAY        13-Jan-1986 22:15  STATUS
2     356  A43_SCHEURER        13-Jan-1986 03:26p Resumption of Classes
3     355  _A43_MUNN           14-Jan-1986 09:07  cable loan
4     352  A43_MUNN            10-Jan-1986 04:16p RE: User Gripes
5     351  _A43_MUNN           12-Jan-1986 01:15p charges
6     348  A43_MUNN            10-Jan-1986 01:21p Son of Gripes
7     347  _A43_MUNN           10-Jan-1986 10:58  P/N
8     346  A43_SCHEURER        10-Jan-1986 09:56  Electronic messaging mod. leftovers
9     345  A43_SCHEURER        10-Jan-1986 09:47  Interview with Bill Liese
10    344  A43_GALLOWAY         9-Jan-1986 09:15p Current Activity
11    342  _A43_MUNN            9-Jan-1986 05:05p Offlisted?
12    341  A43_GALLOWAY         8-Jan-1986 21:13  more done
13    339  A43_CARR             8-Jan-1986 05:45p Charlie Macrenna conversation follow-up
                                (C/Vax MAC Version)
14    336  A43_SCHEURER         8-Jan-1986 04:53p Speedy Emerson Paper Mail
15    335  A43_GALLOWAY         8-Jan-1986 14:07  STUFF DONE
16    334  A43_CARR             8-Jan-1986 01:42p Concerns with TPSWB use.  "Unhappy User"
17    332  A43_MUNN             8-Jan-1986 10:41  Potential User
18    331  A43_SCHEURER         8-Jan-1986 10:40  TPSWB ISSUES
19    328  _A43_MUNN            7-Jan-1986 03:38p PAWS
20    325  A43_GALLOWAY         6-Jan-1986 21:33  List generators

1     320  A43_CARR             6-Jan-1986 02:54p Monday Meeting schedule change
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2     316  A43_MUNN          6-Jan-1986 01:53p Forms and Voids
3     315  A43_MUNN          3-Jan-1986 04:21p CDC Express Demo Invitation
4     314  A43_GALLOWAY      3-Jan-1986 15:50  Meeting notice
5     313  A43_GALLOWAY      3-Jan-1986 15:48  Meeting notice
6     312  A43_GALLOWAY      3-Jan-1986 15:48  Meeting notice
7     311  A43_GALLOWAY      3-Jan-1986 15:47  Meeting notice
8     310  _A43_SPENCER      6-Jan-1986 12:33p DECALC
9     293  A43_CARR          3-Jan-1986 11:53  B Shift concerns
10    283  A43_GALLOWAY     30-Dec-1985 02:39p User display listing generator
11    282  A43_GALLOWAY     30-Dec-1985 01:36p ATLAS COMPILER
12    281  A43_GALLOWAY     28-Dec-1985 21:39  Atlas Menus
13    276  A43_CARR         26-Dec-1985 03:58p Time away from the office - Vacation
14    273  A43_MUNN         26-Dec-1985 02:06p Tools in Boxes
15    270  A43_MUNN         26-Dec-1985 12:12p MacIntosh Notes of 12/26/85
16    269  A43_MUNN         26-Dec-1985 08:26  file space
17     268  A43_MUNN            23-Dec-1985 04:52p re: Summary Minutes -- 12/19/85 Review
                              finished! (I hope)
18    266  A43_MUNN         23-Dec-1985 03:47p RE: Summary Minutes -- 12/19/85 Review
19    260  A43_MUNN         23-Dec-1985 12:04p Summary Minutes -- 12/19/85 Review
20    259  _A43_MUNN        23-Dec-1985 08:37  Saints N Sinners

1     258  A43_GALLOWAY     20-Dec-1985 16:31  Glorious news
2     257  A43_SCHEURER     20-Dec-1985 04:30p HAPPY HOLIDAYS
3     256  A43_MUNN         20-Dec-1985 01:34p Reminders
4     255  A43_MUNN         19-Dec-1985 01:45p comments and assertions
5     254  A43_CARR         19-Dec-1985 10:10  TPS Workbench demo
6     253  A43_MUNN         19-Dec-1985 08:42  mail prompt
7     251  _J10_SHANDS      19-Dec-1985 07:58  tyx
8     249  A43_MUNN         18-Dec-1985 01:34p Spank Me with a Ruler
9     247  A43_MUNN         18-Dec-1985 01:03p Sitting it out for a SPELL
10    246  _A43_MUNN        18-Dec-1985 01:03p Indiana Namecaller
11    245  _A32_GUENTHER    18-Dec-1985 10:16  FMS,CDD,DTR Manuals
12    244  A43_CARR         18-Dec-1985 10:00  J10_shands schedule
13    243  A43_GALLOWAY     18-Dec-1985 09:18  Questions For Al
14    242  A43_MUNN         18-Dec-1985 08:40  Inspector Namecalling
15    241  A43_CARR         18-Dec-1985 00:02  Morning meeting
16    239  _J10_SHANDS      18-Dec-1985 09:51  RE: New TYX release
17    236  A43_MUNN         17-Dec-1985 04:28p getting out of it all
18    235  A43_CHAPMAN      17-Dec-1985 04:22p great names
19    234  A43_CARR         17-Dec-1985 03:33p Al. H  visit tommarrow
20    232  A43_MUNN         17-Dec-1985 02:19p return to namecalling place

1     231  A43_CARR         17-Dec-1985 02:11p TXY
2     230  A43_CARR         17-Dec-1985 02:07p SCC Accounting System
3     226  A43_MUNN         17-Dec-1985 09:26  Where to Go
4     225  A43_MUNN         17-Dec-1985 09:21  Doom and Despair and other recreations
5     224  A43_CARR         17-Dec-1985 08:32  Tuesday's morning meeting December 17, 1985
6     220  A43_MUNN         16-Dec-1985 09:06  jammin'
7     219  A43_GALLOWAY     16-Dec-1985 09:05  Part List System
8     218  A43_MUNN         16-Dec-1985 08:51  1 in all
9     216  MANAGER          16-Dec-1985 08:31  New Editor
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10    214  _J10_SHANDS      16-Dec-1985 07:38  wps+
11    210  A43_CARR         14-Dec-1985 10:50  Saturdays Agenda December 14, 1985
12    209  A43_GALLOWAY      13-Dec-1985 11:49  RE: Modification to TPS WorkBench estimate
                             of December 6, 1985
13    208  A43_MUNN         13-Dec-1985 10:01  mislaid message
14    207  A43_CARR          13-Dec-1985 09:58  Modification to TPS WorkBench estimate of
                             December 6, 1985
15    204  A43_MUNN         12-Dec-1985 02:30p biographical sketch
16    203  A43_MUNN         12-Dec-1985 09:27  Beach-Blanket Namecalling
17    202  A43_MUNN         12-Dec-1985 09:07  trial run
18    201  A43_CARR         12-Dec-1985 08:50  TYX Shipment
19    200  A43_CARR         12-Dec-1985 07:29  Thursday Morning Meeting
20    196  A43_CARR         11-Dec-1985 07:52  Wednes. Morning's Meeting Agenda

1     195  _A43_MUNN        11-Dec-1985 08:56  Name-calling meets the Smog Monster
2     194  _A43_MUNN        11-Dec-1985 08:56  effect on the Company
3     191  _J10_SHANDS      11-Dec-1985 07:38  RE: CCU change
4     190  _A43_CHAPMAN     10-Dec-1985 11:01  names again!!!!
5     189  _A43_CHAPMAN     10-Dec-1985 11:00  more names...
6     188  _A43_CHAPMAN     10-Dec-1985 11:00  LEname 7
7     187  _A43_CHAPMAN     10-Dec-1985 11:00  LEname 6
8     186  _A43_CHAPMAN     10-Dec-1985 11:00  LEname 5
9     185  _A43_CHAPMAN     10-Dec-1985 11:00  LEname 4
10    184  _A43_CHAPMAN     10-Dec-1985 10:35  LEname 3
11    183  _A43_CHAPMAN     10-Dec-1985 10:35  LEname 2
12    182  _A43_CHAPMAN     10-Dec-1985 10:34  LEname 1
13    181  _A43_CHAPMAN     10-Dec-1985 10:34  LEnames...
14    180  A43_CARR         10-Dec-1985 08:37  Tuesday Morning's Meeting Agenda
15    176  MANAGER           9-Dec-1985 04:21p RE: VT220 owners
16    174  MANAGER           9-Dec-1985 04:15p RE: VT220 owners
17    171  MANAGER           9-Dec-1985 01:17p VT220 owners
18    170  _A43_MUNN         9-Dec-1985 03:28p noose
19    169  _A43_MUNN         9-Dec-1985 03:28p FFB
20    166  _A43_MUNN         9-Dec-1985 11:34  phinques

1     165  _A43_MUNN         9-Dec-1985 11:34  M-M
2     164  _A43_MUNN         9-Dec-1985 11:34  return of name-calling
3     163  A43_CARR          9-Dec-1985 08:40  Monday Morning Meeting
4     162  A43_SCHEURER      6-Dec-1985 05:24p ABSENCE
5     161  A43_CARR          6-Dec-1985 02:41p TPSWBench estimate December 6, 1985
6     160  A43_CARR          6-Dec-1985 09:51  agenda for friday december 6, 1985 meeting
                             at my desk!
7     159  A43_SCHEURER      5-Dec-1985 01:55p Dec. 5, 1985 pm meeting
8     157  _A43_MUNN         9-Dec-1985 08:32  rumors
9     154  _A43_MUNN         6-Dec-1985 09:52  unowot
10    153  _A43_MUNN         6-Dec-1985 09:52  name calling
11    152  _A43_MUNN         6-Dec-1985 09:52  sbir
12    151  _A43_MUNN         6-Dec-1985 09:52  PN & status
13    150  _A43_MUNN         6-Dec-1985 09:52  luncheon with the Boys
14    146  MANAGER           5-Dec-1985 11:00  System Janitor
15    144  A43_SCHEURER      2-Dec-1985 05:46p Proper Mail Service
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16    143  A43_SCHEURER          2-Dec-1985 05:40p DEC. 2, 1985 SESSION WITH AL H.
17    142  A43_GALLOWAY          2-Dec-1985 16:36  Access to workbench
18    141  _A43_MUNN             4-Dec-1985 09:08  s-brrrrr
19    140  _A43_MUNN             4-Dec-1985 09:08  here it is in case you still can't read it!
20    139  _A43_MUNN             4-Dec-1985 09:08  Din-din with the Purdy People

1     138  _A43_MUNN             4-Dec-1985 09:08  terminal illness
2     137  _A43_MUNN             4-Dec-1985 09:08  bio
3     136  _A43_MUNN             4-Dec-1985 09:08  concert data
4     135  _A43_MUNN             2-Dec-1985 03:58p file reading
5     134  A43_CARR              2-Dec-1985 09:03  revised meeting date
6     131  A43_SCHEURER          2-Dec-1985 08:27  Meeting notice
7     130  A43_CARR              1-Dec-1985 11:09p November 27th morning meeting agenda
8     128  A43_GALLOWAY         28-Nov-1985 21:14  Meeting notice
9     126  _A43_MUNN            27-Nov-1985 03:10p Proofing Old English
10    125  A43_GALLOWAY         27-Nov-1985 09:27  Meeting notice
11    124  _A43_CHAPMAN         27-Nov-1985 10:56  pname
12    123  _A43_MUNN            27-Nov-1985 08:48  musical event
13    122  _A43_MUNN            27-Nov-1985 08:48  SB
14    120  A43_SCHEURER         27-Nov-1985 08:38  Meeting notice
15    119  A43_CARR             27-Nov-1985 08:07  November 27th morning meeting agenda
16    116                                          November 27th morning meeting agenda
17    114  A43_CARR             26-Nov-1985 11:09  vax conservation
18    111  A43_SCHEURER         26-Nov-1985 09:31  One more time.....
19    110  A43_CARR             26-Nov-1985 08:40  Tuesday November 26 morning meeting
20    108  A43_GALLOWAY         24-Nov-1985 11:07  Modem at home

1     107  A43_CARR             22-Nov-1985 08:32  Friday's morning meeting location
2     105  _A43_CHAPMAN         26-Nov-1985 08:23  WorkBENCH accessibility
3     104  _J10_SHANDS          26-Nov-1985 08:23  correction
4     103  _J10_SHANDS          26-Nov-1985 08:23  VAX usage.
5     102                                          headersample
6      99  A43_CARR                 22-Nov-1985 08:09  Friday Naovember 22, 1985 8:57a meeting
                                  agenda
7      98  A43_SCHEURER         21-Nov-1985 02:52p INTERLACE LISTER TEST RESULTS
8      97  A43_SCHEURER         21-Nov-1985 12:52p PHONE TRANSFERS
9      96  A43_SCHEURER         21-Nov-1985 12:42p CLASS
10     94  _A57_HARRISON        21-Nov-1985 03:11p Help and CBI
11     93  _A57_HARRISON        21-Nov-1985 03:11p Snotty remarks about the WORKbench...
12     92  _A57_HARRISON        21-Nov-1985 03:11p Addressing error...
13     91  _A57_HARRISON        21-Nov-1985 03:11p Mailing address
14     90  _A57_HARRISON        21-Nov-1985 03:11p Alpha BENCH testing
15     89  _A43_MUNN            20-Nov-1985 02:53p DATSA WAYTOGO
16     88  _A43_MUNN            20-Nov-1985 02:52p DATSA Boy
17     87                                          marketing pitch
18     86  _A43_MUNN            20-Nov-1985 01:14p male cajuins
19     85  A43_CARR             20-Nov-1985 08:54  meeting location change
20     83  _A43_MUNN            20-Nov-1985 11:06  name calling

1      80  A43_CARR             19-Nov-1985 03:44p wed. nov 20, 1985 morning meeting
2      78  A43_GALLOWAY         19-Nov-1985 09:14  DECALC
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3     76                                    tpswb specification
4     75  A43_GALLOWAY      18-Nov-1985 08:43  Atlas program development menu
5     74  A43_CARR          18-Nov-1985 08:12  Monday November 18, 1985 meeting notice
6     73                                    TPSWB Marketing Plan
7     71  A43_SCHEURER      15-Nov-1985 04:23p RE: engineer's notebook
8     66  A43_SCHEURER      15-Nov-1985 09:51  Meeting notice
9     64  A43_SCHEURER      14-Nov-1985 11:17  Missed meeting
10    63  A43_CARR          14-Nov-1985 08:02  seminar
11    62  _A43_MUNN         15-Nov-1985 09:39  mail
12    61  _A43_MUNN         15-Nov-1985 09:39  HITS vsn 7.0 requirements
13    57  A43_CARR          13-Nov-1985 05:13p ARTIFICIAL INTELLIGENCE SATELLITE SYMPOSIUM
14    56  A43_GALLOWAY      13-Nov-1985 16:24  Meeting notice
15    50                                    ARTIFICIAL INTELLIGENCE SATELLITE SYMPOSIUM
16    49  A43_SCHEURER      12-Nov-1985 02:35p Meeting notice
17    48  A43_SCHEURER      12-Nov-1985 02:33p Meeting notice
18    46  A43_SCHEURER      12-Nov-1985 09:07  Meeting notice
19    45  A43_SCHEURER      12-Nov-1985 09:03  Meeting notice
20    44  _A43_MUNN         12-Nov-1985 09:50  s;lightly-off-time

1     39                                    Agenda November 12
2     35  _A43_MUNN          7-Nov-1985 03:42p terminal availability
3     31  _A43_GALLOWAY      7-Nov-1985 01:29p new disk pack
4     30  _J10_SHANDS        7-Nov-1985 01:29p move of dirs
5     28  A43_SCHEURER       6-Nov-1985 05:19p Session with Wash. U. Advisor
6     25  A43_GALLOWAY       6-Nov-1985 14:17  Decalc
7     24  A43_GALLOWAY       6-Nov-1985 14:04  Things for Al H. to show/do for us.
8     23  A43_GALLOWAY       6-Nov-1985 13:30  Allin1 menus
9     22  A43_GALLOWAY       6-Nov-1985 13:15  Calendar Management
10    20  A43_GALLOWAY       6-Nov-1985 12:48  RE: mail mistake
11    19  _A43_MUNN          6-Nov-1985 12:48p SW usefulness
12    15  A43_GALLOWAY       6-Nov-1985 10:50  To Do  VS. Action Item
13    14                                    Appropriation Request
14    11  A43_CARR           6-Nov-1985 08:44  Meeting Agenda
15     9                                       Technical Strategy Meeting of Wendnesday
                                    6,1985
16     8  _A43_SCHEURER      5-Nov-1985 03:22p LOCATING YOU
17     7  _A43_MUNN          5-Nov-1985 02:04p TPSWB Files
18     3  SCHEURER           5-Nov-1985 11:15  Meeting notice
19     2  SCHEURER           5-Nov-1985 11:13  Meeting notice
20     1  SCHEURER           5-Nov-1985 11:06  Meeting notice
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MBR - 8

Mail Box Sent

1	624	Jeff Galloway	14-Mar-1986 02:17 thesis
2	620	Kim Harrison	12-Mar-1986 03:56p Meeting notice
3	617	Bob Scheurer	10-Mar-1986 08:30p Agenda for phone conversation
4	615	Kim Harrison	10-Mar-1986 07:27p Meeting notice
5	614	Looey Munn	7-Mar-1986 02:55p Sign-up
6	613	Bob Scheurer	7-Mar-1986 12:40p AR parts list
7	610	Kim Harrison	7-Mar-1986 09:02 Meeting notice
8	603	_A43_MUNN	3-Mar-1986 11:05 RE: TPSWB functions
9	598	Jeff Galloway	28-Feb-1986 11:13 IRAD brown bag lunch
10	597	Jeff Galloway	28-Feb-1986 10:53 Encrypted login message translation
11	595	Bob Scheurer	28-Feb-1986 08:34 AR thing....
12	594	B. LEISE	28-Feb-1986 08:17 Disk usage control...
13	593	Bob Scheurer	28-Feb-1986 08:09 Disk usage
14	591	Kent Chapman	27-Feb-1986 04:28p AR Thing...
15	589	Bob Scheurer	27-Feb-1986 02:56p Phase II AR equipment list
16	588	MANAGER	27-Feb-1986 08:37 RE: Problems after SCC directory change
17	586	Jeff Galloway	26-Feb-1986 05:48p User news
18	582	Jeff Galloway	25-Feb-1986 09:54 Mike Holmes A
19	580	Jeff Galloway	24-Feb-1986 05:15p 615 question and answer period
20	571	Jeff Galloway	24-Feb-1986 07:53 TYX demo
1	570	A43_CHAPMAN	24-Feb-1986 07:49 RE: Meeting notice
2	569	_A43_MUNN	24-Feb-1986 07:44 RE: hunting season
3	568	A43_SCHEURER	23-Feb-1986 10:39 RE: AutoTestCon
4	563	Kent Chapman	23-Feb-1986 10:23 TYX demonstration 9a February 24, 1986
5	558	Kent Chapman	21-Feb-1986 11:30 Test Program Set WorkBench - TYX status review
6	557	Kent Chapman	21-Feb-1986 10:29 Test Program Set WorkBench Background Survey
7	554	A43_GALLOWAY	21-Feb-1986 08:12 RE: Meeting notice
8	551	Tim Carr	20-Feb-1986 08:59p this is a test
9	550	Jeff Galloway	20-Feb-1986 08:54p Meeting notice
10	549	Kent Chapman	19-Feb-1986 04:22p ALL-IN-1 software extendsions
11	545	Kent Chapman	18-Feb-1986 09:56 General status of MATE work
12	544	Jeff Galloway	16-Feb-1986 11:35p Monday Activities
13	542	Kim Harrison	14-Feb-1986 01:37p SCC to change disk accounting system - TPSWB impact
14	541	A43_SPENCER	14-Feb-1986 11:45 RE: joe security
15	537	Sid Spencer	12-Feb-1986 08:39p System Security
16	535	Kim Harrison	11-Feb-1986 09:54p Autotestcon 86 - Call for Papers
17	534	Kim Harrison	11-Feb-1986 08:24p Autotestcon 86 - Call for Papers "Advancing Test Concepts"
18	531	Bob Scheurer	10-Feb-1986 11:51p February 10, 1986
19	524	TPSWB System Manager	7-Feb-1986 02:13p Meeting notice
20	521	_A43_GALLOWAY	7-Feb-1986 11:43 RE: OUTSIDE STUFF
1	520	A38_HAYDEN	7-Feb-1986 11:30 RE: ETHERNET WORK AROUND
2	511	TPSWB SYSTEM MANAGER	6-Feb-1986 11:10 Meeting notice

3	506	TPSWB System Manager	5-Feb-1986 02:55p Meeting notice
4	501	A43_CHAPMAN	5-Feb-1986 10:58 RE: Meeting notice
5	499	A43_MUNN	5-Feb-1986 10:32 RE: Training Seminar Handout - First TPSWB User Conference
6	495	Kent Chapman	4-Feb-1986 10:45p Review Minutes "better late than never"
7	493	RICHARD BURKHART	4-Feb-1986 10:10p TPSWB overview to be included in TPS Competitivenss Study
8	487	Looey Munn	4-Feb-1986 05:23p Training Seminar Handout - First TPSWB User Conference
9	486	Kent Chapman	4-Feb-1986 03:38p Meeting notice
10	485	Jeff Galloway	4-Feb-1986 03:28p Meeting notice
11	484	Bob Scheurer	4-Feb-1986 02:55p The grape vine is a jammin....
12	481	A43_MUNN	4-Feb-1986 12:22p RE: Sorted, A-, Son of
13	477	Looey Munn	3-Feb-1986 03:00p Just a reminder of the meeting
14	476	A43_SCHEURER	3-Feb-1986 2:06p Read Receipt for SCC CONSPIRACY
15	472	A43_SCHEURER	3-Feb-1986 12:53p Read Receipt for Mysterious User
16	465	Kim Harrison	3-Feb-1986 12:49p Network Security Issue
17	462	TPSWB SYSTEM MANAGER	2-Feb-1986 02:58p Meeting notice
18	455	A43_MUNN	30-Jan-1986 09:00 RE: mail form of guehne comp 1/30/86
19	449	TPSWB Test Account	27-Jan-1986 11:22p using TPSWB
20	447	_J10_SHANDS	27-Jan-1986 01:08p RE: A43_ALLIN1
1	445	A43_SCHEURER	27-Jan-1986 01:04p RE: DEC product announcement
2	442	A43_GALLOWAY	27-Jan-1986 11:07 RE: DEC product announcement
3	439	Kim Harrison	27-Jan-1986 10:48 Meeting notice
4	438	Bob Scheurer	26-Jan-1986 02:06p DEC product announcement
5	434	D. HOPMANN	24-Jan-1986 01:54p Meeting notice
6	433	Kent Chapman	24-Jan-1986 01:39p Datsa Vax Situation
7	432	Kent Chapman	24-Jan-1986 01:20p Note to G. Bremer concerning "the hacker"
8	431	Kim Harrison	24-Jan-1986 01:12p Ogden Quote detailing SCC charges incurred using TPSWB
9	429	A43_ALLIN1	24-Jan-1986 10:10 Vax concerns
10	422	Kent Chapman	22-Jan-1986 11:09p Meeting notice
11	418	Jeff Galloway	22-Jan-1986 08:22p I'm so pisss.....
12	417	A43_MUNN	22-Jan-1986 05:38p RE: concerts
13	415	Kim Harrison	22-Jan-1986 03:43p Meeting notice
14	403	Kim Harrison	21-Jan-1986 09:32p Meeting notice
15	402	Kim Harrison	21-Jan-1986 09:28p Meeting notice
16	401	A43_SCHEURER	21-Jan-1986 09:26p RE: Meeting notice
17	398	Kim Harrison	21-Jan-1986 09:20p Meeting notice
18	397	Kim Harrison	21-Jan-1986 09:18p Meeting notice
19	396	Kim Harrison	21-Jan-1986 09:17p Meeting notice
20	390	A43_CHAPMAN	20-Jan-1986 04:43p RE: Interrupt menu
1	388	A43_CHAPMAN	20-Jan-1986 03:32p RE: Interrupt menu
2	381	Jeff Galloway	17-Jan-1986 10:46 January 17th Beta Test Release
3	380	A43_SCHEURER	17-Jan-1986 10:29 RE: Thursday Nite Progress
4	378	Sid Spencer	17-Jan-1986 10:24 Summary of Vax Charges for the months of Oct. & Nov. 85
5	375	A43_CHAPMAN	16-Jan-1986 01:05p RE: Meeting notice
6	371	Kent Chapman	15-Jan-1986 04:27p DATSA VAX and the TPS WorkBench

7	370	B. LEISE	15-Jan-1986 03:01p Meeting notice
8	365	Kim Harrison	14-Jan-1986 10:03p Meeting notice
9	364	A43_SCHEURER	14-Jan-1986 03:57p RE: Meeting notice
10	360	B. LEISE	14-Jan-1986 02:42p Meeting notice
11	359	Kent Chapman	14-Jan-1986 01:07p Meeting notice
12	358	A43_SCHEURER	14-Jan-1986 09:13 RE: Resumption of Classes
13	354	Jeff Galloway	12-Jan-1986 01:38p return of the time away from engineering
14	353	Jeff Galloway	12-Jan-1986 01:27p time away from engineering
15	350	_A43_MUNN	10-Jan-1986 03:59p RE: P/N
16	349	Looey Munn	10-Jan-1986 03:53p User Gripes
17	343	Bob Scheurer	9-Jan-1986 05:25p Interview of B. Leise
18	338	RICK JENKINS	8-Jan-1986 05:45p Charlie Macrenna conversation follow-up (C/Vax MAC Version)
19	337	A43_SCHEURER	8-Jan-1986 05:24p RE: Speedy Emerson Paper Mail
20	333	Sid Spencer	8-Jan-1986 01:42p Concerns with TPSWB use. "Unhappy User"
1	327	Bob Scheurer	7-Jan-1986 01:29p Tuesday January 7th Agenda
2	326	Bob Scheurer	7-Jan-1986 11:39 Telephone interrupt
3	324	Jeff Galloway	7-Jan-1986 10:36 lunch cancelation, dinner planned
4	323	Jeff Galloway	6-Jan-1986 08:46p schedule impact
5	322	Kim Harrison	6-Jan-1986 08:44p Impact of A and B shift operations on Poject Engineer
6	321	Sid Spencer	6-Jan-1986 08:17p Workbench reinitialization
7	318	Bob Scheurer	6-Jan-1986 02:54p Monday Meeting schedule change
8	317	Bob Scheurer	6-Jan-1986 02:08p January 6th Agenda
9	309	Bob Scheurer	6-Jan-1986 09:43 a43_allin1
10	308	Bob Scheurer	6-Jan-1986 08:31 New Schedule impact
11	303	Kim Harrison	3-Jan-1986 02:08p Meeting notice
12	302	Kim Harrison	3-Jan-1986 02:07p Meeting notice
13	301	Kim Harrison	3-Jan-1986 02:06p Meeting notice
14	300	Kim Harrison	3-Jan-1986 02:01p Meeting notice
15	299	Kim Harrison	3-Jan-1986 01:46p Meeting notice
16	298	Kim Harrison	3-Jan-1986 01:45p Meeting notice
17	297	Kim Harrison	3-Jan-1986 01:44p Meeting notice
18	296	Kim Harrison	3-Jan-1986 01:43p Meeting notice
19	295	Kim Harrison	3-Jan-1986 01:41p Meeting notice
20	292	Bob Scheurer	3-Jan-1986 11:53 B Shift concerns
1	288	Bob Scheurer	3-Jan-1986 08:31 Jan 3 1986 morning meeting Agenda
2	287	Kim Harrison	3-Jan-1986 07:39 Meeting notice
3	286	Jeff Galloway	2-Jan-1986 04:09p errors during ATLAS Compile of matrf
4	274	Bob Scheurer	26-Dec-1985 03:58p Time away from the office - Vacation
5	272	Kent Chapman	26-Dec-1985 01:14p Good Work Memo - For you files and L. Munn review
6	271	A43_MUNN	26-Dec-1985 01:07p RE: MacIntosh Notes of 12/26/85
7	267	L. ALMODOVAR - CLAIMS/TRA	26-Dec-1985 09:42 Amoco 4666080173 Order 1421101 Phonesitter p920 419 Final Req
8	264	A43_MUNN	23-Dec-1985 03:37p RE: Summary Minutes -- 12/19/85 Review
9	262	A43_MUNN	23-Dec-1985 02:52p RE: Lengthy Minutes
10	252	Bob Scheurer	19-Dec-1985 10:10 TPS Workbench demo
11	248	A43_MUNN	18-Dec-1985 01:14p RE: Sitting it out for a SPELL

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12    240  Jeff Galloway      18-Dec-1985 10:00  J10_shands schedule
13    238  Bob Scheurer       18-Dec-1985 00:02  Morning meeting
14    233  Bob Scheurer       17-Dec-1985 03:33p Al. H  visit tommarrow
15    229  Bob Scheurer       17-Dec-1985 02:11p TXY
16    228  Kim Harrison       17-Dec-1985 02:07p SCC Accounting System
17    222  Bob Scheurer       16-Dec-1985 03:05p MAC
18    217  MANAGER            16-Dec-1985 08:35  RE: New Editor
19    215  Jeff Galloway      16-Dec-1985 08:17  WPS+
20    206  Bob Scheurer       14-Dec-1985 10:50  Saturdays Agenda December 14, 1985

1     205  Bob Scheurer        13-Dec-1985 09:58  Modification to TPS WorkBench estimate of
                               December 6, 1985
2     198  Bob Scheurer       12-Dec-1985 08:50  TYX Shipment
3     197  Bob Scheurer       12-Dec-1985 07:29  Thursday Morning Meeting
4     193  Bob Scheurer       11-Dec-1985 07:52  Wednes. Morning's Meeting Agenda
5     179  Bob Scheurer       10-Dec-1985 08:37  Tuesday Morning's Meeting Agenda
6     175  MANAGER             9-Dec-1985 04:18p RE: VT220 owners
7     173  Jeff Galloway       9-Dec-1985 04:15p I'm So P.....
8     172  MANAGER             9-Dec-1985 04:12p RE: VT220 owners
9     168  _A43_MUNN           9-Dec-1985 01:12p RE: phinques
10    167  _A43_MUNN           9-Dec-1985 01:08p RE: M-M
11    158  Bob Scheurer        9-Dec-1985 08:40  Monday Morning Meeting
12    156  B. LEISE            6-Dec-1985 02:41p TPSWBench estimate December 6, 1985
13    149  Bob Scheurer        6-Dec-1985 09:51  agenda for friday december 6, 1985 meeting
                               at my desk!
14    147  A43_SCHEURER        5-Dec-1985 11:14  RE: Proper Mail Service
15    133  Bob Scheurer        2-Dec-1985 09:03  revised meeting date
16    129  Bob Scheurer        1-Dec-1985 11:09p November 27th morning meeting agenda
17    127  Kim Harrison       27-Nov-1985 04:37p Meeting notice
18    121  A43_CARR              27-Nov-1985  8:39a Read Receipt for November 27th morning
                               meeting agenda
19    118  Bob Scheurer       27-Nov-1985 08:07  November 27th morning meeting agenda
20    117  Kim Harrison       26-Nov-1985 02:22p Meeting notice

1     113  Bob Scheurer       26-Nov-1985 11:09  vax conservation
2     112  A43_SCHEURER       26-Nov-1985  9:35a Read Receipt for One more time.....
3     109  Bob Scheurer       26-Nov-1985 08:40  Tuesday November 26 morning meeting
4     101  Bob Scheurer       22-Nov-1985 08:32  Friday's morning meeting location
5     100  A43_CARR            22-Nov-1985  8:19a Read Receipt for Friday Naovember 22, 1985
                               8:57a meeting agenda
6      95  Bob Scheurer          22-Nov-1985 08:09  Friday Naovember 22, 1985 8:57a meeting
                               agenda
7      84  _A43_MUNN          20-Nov-1985 11:16  RE: name calling
8      82  Bob Scheurer       20-Nov-1985 08:54  meeting location change
9      81  A43_CARR            19-Nov-1985  3:44p Read Receipt for wed. nov 20, 1985 morning
                               meeting
10     79  Bob Scheurer       19-Nov-1985 03:44p wed. nov 20, 1985 morning meeting
11     72  Bob Scheurer       18-Nov-1985 08:12  Monday November 18, 1985 meeting notice
12     70  Jeff Galloway      15-Nov-1985 01:49p engineer's notebook
13     67  Jeff Galloway      15-Nov-1985 10:48  canceled MAC session
14     65  A43_SCHEURER       15-Nov-1985  9:49a Read Receipt for Missed meeting
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15	60	Jeff Galloway	14-Nov-1985 08:02 seminar
16	59	A43_CARR	13-Nov-1985 5:30p Read Receipt for ARTIFICIAL INTELLIGENCE SATELLITE SYMPOSIUM
17	58	A43_GALLOWAY	13-Nov-1985 05:25p Meeting notice
18	51	Jeff Galloway	13-Nov-1985 05:13p ARTIFICIAL INTELLIGENCE SATELLITE SYMPOSIUM
19	43	Kim Harrison	11-Nov-1985 06:28p Meeting notice
20	42	Kim Harrison	11-Nov-1985 06:22p Meeting notice
1	41	Bob Scheurer	11-Nov-1985 06:15p Meeting notice
2	40	Jeff Galloway	11-Nov-1985 06:01p Agenda November 12
3	37	Bob Scheurer	9-Nov-1985 03:11p Meeting notice
4	36	Bob Scheurer	8-Nov-1985 03:06p Meeting notice
5	34	Jeff Galloway	7-Nov-1985 03:32p wps
6	29	A43_SCHEURER	6-Nov-1985 05:25p RE: Session with Wash. U. Advisor
7	27	A43_GALLOWAY	6-Nov-1985 4:20p Read Receipt for Things for Al H. to show/do for us.
8	26	A43_GALLOWAY	6-Nov-1985 4:19p Read Receipt for Allin1 menus
9	18	Jeff Galloway	6-Nov-1985 12:34p mail mistake
10	17	Jeff Galloway	6-Nov-1985 11:01 L. Munn
11	16	A43_GALLOWAY	6-Nov-1985 10:54a Read Receipt for To Do VS. Action Item
12	12	Bob Scheurer	6-Nov-1985 08:52 agenda
13	10	Bob Scheurer	6-Nov-1985 08:44 Meeting Agenda
14	6	SCHEURER	5-Nov-1985 02:02p Meeting notice
15	5	SCHEURER	5-Nov-1985 02:00p Meeting notice
16	4	SCHEURER	5-Nov-1985 01:58p Meeting notice

Appendix "B"
Compiler Study

```
      78        'FINISH $
      84      END, IF   $
      90    END, IF $
C     $
C           REST OF WAVEFORM ANALYZER TESTS     $
C     $
E638000     OUTPUT,
                                SYSTEM STATUS
                        WAVEFORM ANALYZER TEST CONTINUED

            $
      05    REMOVE, ALL $
      10    APPLY, AC SIGNAL USING 'WT178-AC1-1',
                  FREQ 10000 HZ,
                  TEST-EQUIP-IMP 50 OHM,
                  VOLTAGE-PP 2.0 V,
                  CNX HI A13-1$
      15    VERIFY, (VOLTAGE-P INTO 'MEASUREMENT'),
                  AC SIGNAL USING '17612-VP2-AC',
                  UL 1.25 V LL 0.75 V,
                  VOLTAGE-P MAX 2.0 V,
                  FREQ 10000 HZ,
                  TEST-EQUIP-IMP 10000000 OHM,
                  CNX HI A9-1$
      20    IF, 'PRINTER', THEN $
      25       OUTPUT, USING '/dev/cp', ('PRINT-RESULTS', C'638000', 'UL',
                                         'LL', 'MEASUREMENT', C'VOLTS')  $
      30    END, IF $
      35    IF, NOGO, THEN $
      40       OUTPUT, ('FAULTY-UNIT VOLTS', C'638000', 'LL', 'UL',
                        'MEASUREMENT', C'1A3-A5') $
      45       IF, 'PRINTER', THEN $
      50          OUTPUT, USING '/dev/cp', ('PR-FAIL-V', C'638000', 'LL',
                                            'UL', 'MEASUREMENT', C'1A3-A5') $
      55       END,IF $
      60       INPUT, GO-NOGO  $
      65       IF, NOGO, THEN  $
      70          FINISH $
      75       END, IF   $
      80    END, IF $
C     $
 639000     SETUP, AC SIGNAL USING 'WT178-AC1-1',
                  FREQ 100000 HZ,
                  TEST-EQUIP-IMP 50 OHM,
                  VOLTAGE-PP 1.5 V,
                  CNX HI A13-1$
      06    VERIFY, (VOLTAGE-P INTO 'MEASUREMENT'),
                  AC SIGNAL USING '17612-VP2-AC',
                  UL 0.85 V LL 0.65 V,
                  VOLTAGE-P MAX 0.75 V,
                  FREQ 100000 HZ,
                  TEST-EQUIP-IMP 10000000 OHM,
                  CNX HI A9-1$
      12    IF, 'PRINTER', THEN $
      18       OUTPUT, USING '/dev/cp', ('PRINT-RESULTS', C'639000', 'UL',
                                         'LL', 'MEASUREMENT', C'VOLTS')  $
      24    END, IF $
      30    IF, NOGO, THEN $
      36       OUTPUT, ('FAULTY-UNIT VOLTS', C'639000', 'LL', 'UL',
                        'MEASUREMENT', C'1A3-A5') $
      42       IF, 'PRINTER', THEN $
      48          OUTPUT, USING '/dev/cp', ('PR-FAIL-V', C'639000', 'LL',
                                            'UL', 'MEASUREMENT', C'1A3-A5') $
      54       END,IF $
      60       INPUT, GO-NOGO  $
      66       IF, NOGO, THEN  $
      72          FINISH $
      78       END, IF   $
      84    END, IF $
C     $
 640000     SETUP, AC SIGNAL USING 'WT178-AC1-1',
                  FREQ 1000000 HZ,
                  TEST-EQUIP-IMP 50 OHM,
                  VOLTAGE-PP 1.0 V,
                  CNX HI A13-1$
      04    VERIFY, (VOLTAGE-P INTO 'MEASUREMENT'),
                  AC SIGNAL USING '17612-VP2-AC',
                  UL 0.60 V LL 0.40 V,
                  VOLTAGE-P MAX 0.50 V,
                  FREQ 1000000 HZ,
                  TEST-EQUIP-IMP 10000000 OHM,
                  CNX HI A9-1$
      08    IF, 'PRINTER', THEN $
      12       OUTPUT, USING '/dev/cp', ('PRINT-RESULTS', C'640000', 'UL',
                                         'LL', 'MEASUREMENT', C'VOLTS')  $
      16    END, IF $
      20    IF, NOGO, THEN $
```

MATE ATLAS COMPILER (MAC)

SUMMARY FOR STATION SELF-TEST*

(MIN:SEC)

FILE NAME	ATLAS (COMPILE) TIME	FLOW TIME	ALLOC TIME	TOTAL TIME
matla	24:14	6:21	8:24	38:59
matlb	23:12	6:36	9:49	39:37
mat2b	20:59	6:43	12:27	40:09
mat3a	22:24	8:24	13:54	44:42
mat3b	20:02	7:59	19:49	47:50
mat3c	10:47	3:59	9:31	24:17
mat3d	21:30	6:58	10:08	38:36
mat4a	17:09	5:40	7:42	30:31
mat4b	7:50	3:01	4:03	14:54
mat4c	3:22	1:41	2:58	8:01
mat5b	13:15	6:04	4:45	24:04
mat5c	34:48	12:12	8:45	55:45
mat5d	27:33	11:11	7:19	46:03
mat5e	18:36	7:48	6:04	32:28
mat5f	19:51	8:06	6:34	34:31
mat5g	14:20	7:46	13:59	36:05
mat5h	12:33	6:41	12:39	31:53
mat5i	12:46	6:54	13:17	32:57
mat5j	12:30	6:40	12:38	31:48
mat6a	4:55	2:00	1:21	8:16
mat6b	12:54	3:55	4:36	21:25
matdwg	50:33	18:32	35:21	104:26
matrf	2:54	1:09	1:26	5:29
	408:57 (6:48:57)	156:20 (2:36:20)	227:29 (3:47:29)	792:46 (13:12:46)

BITA selftwl (switch processing) - 4:59

Total Required Operation Time - 797:45
(13:17:45)

* Processing performed on PDS Serial No. 008
MAC VERSION 3.0.0 - BSDB/BITA
MAC VERSION 3.0.1 - AC
MAC VERSION 3.0.0 - FLOW
MAC VERSION 3.0.1 - ALLOC
IEEE-716-1982

WORKBENCH MATE ATLAS COMPILER

SUMMARY FOR STATION SELF-TEST **

FILE NAME	ATLAS(COMPILE) TIME 1	FLOW TIME 2	ALLOC TIME 3	TOTAL TIME 4
matla	4:27	1:10	1:32	7:09
matlb	4:20	1:10	1:47	7:17
mat2b	3:52	1:05	2:16	7:13
mat3a	4:21	1:20	2:32	8:13
mat3b	3:33	1:01	3:36	8:10
mat3c	2:08	0:33	1:44	4:25
mat3d	4:06	1:08	1:51	7:05
mat4a	3:31	0:54	1:24	5:49
mat4b	1:46	0:33	0:44	3:03
mat4c	0:54	0:17	0:32	1:43
mat5b	2:50	1:10	0:52	4:52
mat5c	5:51	2:34	1:35	10:00
mat5d	5:14	2:19	1:20	8:53
mat5e	3:45	1:35	1:06	6:26
mat5f	3:56	1:38	1:12	6:46
mat5g	3:03	1:24	2:33	7:00
mat5h	2:43	1:09	2:18	6:10
mat5i	2:46	1:12	2:25	6:23
mat5j	2:42	1:09	2:18	6:09
mat6a	1:19	0:30	0:15	2:04
mat6b	2:43	0:42	0:50	4:15
matdwg	7:12	2:18	6:26	15:56
matrf	0:48	0:18	0:16	1:22
	77:50 (1:17:50)	27:09 (0:27:09)	41:24 (0:41:24)	146:23 (2:26:23)

SWITCH DATABASE PROCESSING TIME: 1:00 (EST.)

TOTAL REQUIRED OPERATION TIME: 147:23
(2:27:23)

** PROCESSING PERFORMED ON VAX 11/780
USING PERSONAL ATLAS WORKSTATION (PAWS) VERSION

PROCESSING DATES:

ATLAS (COMPILE):	THRUSDAY, SEPTEMBER 5, 1985	2:00 AM
FLOW	: FRIDAY, SEPTEMBER 6, 1985	2:00 AM
ALLOC	: TO BE COMPLETED AT LATER DATE	

REPORT DATE: SEPTEMBER 6, 1985

NOTES: 1) ATLAS (COMPILE) ERROR WITH: MAT3B
MAT3C
MAT3D
MAT4A
MAT6A
(SYNTAX VARIATIONS IN TYX COMPILER)

2) FLOW ERROR WITH: MATDWG
(SOURCE FILE SIZE PROBLEM)

3) ALLOCATE NOT POSSIBLE AT TIME OF REPORT DUE TO NEW SWITCH DATABASE REQUIREMENT (TIMES SHOWN ARE INTERPOLATED)

4) TOTAL TIME WILL VARY WITH USER LOAD. AT TIME OF PROCESSING, NO OTHER USERS WERE BELIEVED TO BE ON THE VAX.

DIVISION

STATION SELF-TEST SOURCE CODE

COMPILATION RATE COMPARISON

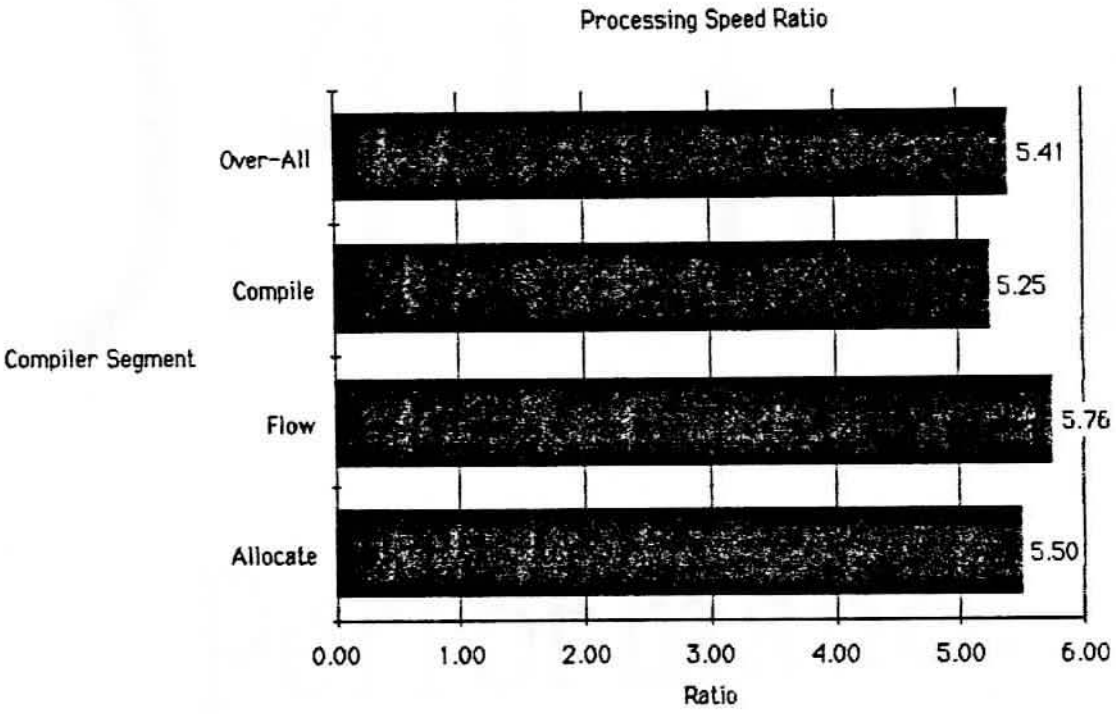
FILE NAME	NUMBER OF LINES	MATE ATLAS COMPILER TOTAL TIME (MIN:SEC)	MATE ATLAS COMPILER LINES RATE (MIN.)	TPS WORKBENCH COMPILER TOTAL TIME (MIN:SEC)	TPS WORKBENCH COMPILER LINES RATE (MIN.)
matla	1044	38:59	26.8	7:09	146.0
matlb	995	39:37	25.1	7:17	136.6
mat2b	950	40:09	23.7	7:13	131.6
mat3a	1089	44:42	24.2	8:13	132.5
mat3b	1047	47:50	21.9.	8:10	128.2
mat3c	680	24:17	28.0	4:25	154.0
mat3d	1358	38:36	35.2	7:05	191.7
mat4a	1149	30:31	37.7	5:49	197.5
mat4b	557	14:54	37.4	3:03	182.6
mat4c	367	8:01	45.8	1:43	213.8
mat5b	797	24:04	33.1	4:52	163.8
mat5c	1540	55:45	27.6	10:00	154.0
mat5d	1208	46:03	26.2	8:53	136.0
mat5e	901	32:28	32.4	6:46	140.1
mat5f	1117	34:31	32.4	6:46	165.1
mat5g	911	36:05	25.3	7:00	130.1
mat5h	692	31:53	21.7	6:10	112.2
mat5i	699	32:57	21.2	6:23	109.5
mat5j	693	31:48	21.8	6:09	112.7
mat6a	415	8:16	50.2	2:04	200.8
mat6b	608	21:25	28.4	4:15	143.1
matdwg	1696	104:26	16.2	15:56	106.4
matrf	352	5:29	64.2	1:22	257.6
	20,865	792:46	26.32	146:23	142.5

AVERAGE PERFORMANCE RATIO: $\frac{142.5}{26.32} = 5.41:1$

SUMMARY OF
COMPILER PERFORMANCE

(COMPARISON USING MATE ATLAS COMPILER (MAC)
AS REFERENCE STANDARD)

COMPILER SEGMENT	PROCESSING SPEED RATIO
ATLAS (COMPILE)	5.25:1
FLOW	5.76:1
ALLOC	5.50:1 (INTERPOLATED)
OVER-ALL	5.41:1


Processing Speed Ratio
Over-All
Compile
Flow
Allocate
5.41
5.25
5.76
5.50
Compiler Segment
0.00
1.00
2.00
3.00
4.00
5.00
6.00
Ratio

5.41 to 1

Performance Improvement

Appendix "C"

Detailed Network Accounting Records

February 1986 - Item A

	CONNECT TIME				CPU TIME				DISK		TAPE	MISC.	TOTAL
	PRIME	EVENING	NITE	COST	PRIME	EVENING	NITE	COST	PAGES	COST	COST		
										.00	.00	-1155.71	-965.98
A43_ALLIN1	19.90	29.07	22.74	80.30	37.05	25.28	20.10	109.43			6.00	.00	518.33
A43_CARR	99.96	14.22	14.58	221.07	52.58	18.16	12.95	129.82	6457	161.44	.00	.00	2.46
A43_COLLINS	.00	.00	.00	.00	.00	.00	.00	.00	98	2.46	.00	.00	554.38
A43_GALLOWAY	23.51	9.50	.87	56.94	26.26	22.23	1.03	75.23	16888	422.21	.00	.00	344.27
A43_LOSS	4.47	2.01	.00	10.98	4.53	7.08	.00	16.13	12686	317.16	.00	.00	161.99
A43_PAWS	.00	.00	.00	.00	.00	.00	.00	.00	6479	161.99	.00	.00	12.47
A43_PAWSDEMO	.00	1.33	.00	1.33	.00	.84	.00	.84	412	10.30	.00	.00	1256.09
A43_SCHEURER	126.22	10.92	.00	263.26	125.33	93.36	.00	343.97	25874	646.86	2.00	.00	18.36
A43_TYX	.00	.00	.00	.00	.00	.00	.00	.00	734	18.36	.00	.00	.16
A43_TYXDEMO	.00	.00	.00	.00	.00	.00	.00	.00	6	.16	.00	.00	.14
A57_CHRISCO	.00	.03	.00	.03	.00	.11	.00	.11		.00	.00	.00	1.97
A57_HOLMES	.19	.01	.00	.37	.72	.13	.00	1.60		.00	.00	.00	.90
J10_ALLIN1	.08	.00	.03	.17	.31	.00	.25	.73		.00	.00	.00	4.56
J10_BIONDO	.86	.00	.00	1.71	1.44	.00	.00	2.85		.00	.00	.00	
TOTAL	275.19	67.09	38.22	636.16	248.22	167.19	34.33	680.71	69634	1740.94	8.00	-1155.71	1910.10

January 1986 - Item B

	CONNECT TIME				CPU TIME				DISK		TAPE	MISC.	TOTAL
	PRIME	EVENING	NITE	COST	PRIME	EVENING	NITE	COST	PAGES	COST	COST		
										.00	.00	-3458.53	-3007.88
A43_ALLIN1	125.93	14.25	1.33	266.78	77.06	25.24	9.72	184.17			.00	.00	504.11
A43_CARR	125.94	1.76	2.19	254.70	60.50	1.64	2.97	124.20	5008	125.21	.00	.00	2.40
A43_COLLINS	.00	.00	.00	.00	.00	.00	.00	.00	96	2.40	.00	.00	473.40
A43_GALLOWAY	6.63	3.75	1.16	17.59	14.05	16.85	1.39	45.45	16414	410.36	.00	.00	2.20
A43_LEONARDO	.00	.00	.00	.00	.00	.00	.00	.00	88	2.20	.00	.00	265.80
A43_PAWS	11.17	.00	.00	22.28	32.94	.00	.00	65.93	7103	177.59	.00	.00	51.89
A43_PAWSDEMO	7.80	2.47	.00	18.14	11.34	2.10	.00	24.79	358	8.96	.00	.00	2017.69
A43_SCHEURER	131.84	17.29	.00	280.80	259.03	209.84	.00	727.70	40367	1009.19	.00	.00	17.60
A43_TYX	.00	.00	.00	.00	.00	.00	.00	.00	704	17.60	.00	.00	.12
A43_TYXDEMO	.00	.00	.00	.00	.00	.00	.00	.00	4	.12	.00	.00	
TOTAL	409.31	39.52	4.68	860.29	454.92	255.27	14.08	1172.24	70142	1753.63	.00	-3458.53	327.63

December 1985 - Item C

	CONNECT TIME				CPU TIME				DISK		TAPE	MISC.	TOTAL
	PRIME	EVENING	NITE	COST	PRIME	EVENING	NITE	COST	PAGES	COST	COST		
A43_ALLIN1	105.19	3.01	3.38	215.11	285.28	15.18	16.14	593.79		.00	.00	.00	808.90
A43_CARR	111.51	3.17	8.76	230.40	59.44	3.98	9.82	127.74	4297	107.43	.00	.00	465.57
A43_COLLINS	.00	.00	.00	.00	.00	.00	.00	.00	95	2.40	.00	.00	2.40
A43_GALLOWAY	28.03	.56	1.20	57.16	37.39	1.00	3.94	77.72	22554	563.86	.00	.00	694.74
A43_LEONARDO	.00	.00	.00	.00	.00	.00	.00	.00	90	2.25	.00	.00	2.25
A43_MUNN	3.55	.00	.00	7.10	4.40	.00	.00	8.81		.00	.00	.00	15.91
A43_PAWS	.29	.00	.00	.61	.96	.00	.00	1.93	5704	142.61	.00	.00	145.15
A43_PAWSDEMO	.00	.00	.00	.00	.00	.00	.00	.00	75	1.89	.00	.00	1.89
A43_SCHEURER	47.92	.00	.00	95.79	42.63	.00	.00	85.29	13168	329.22	.00	.00	510.30
A43_TYX	.00	.00	.00	.00	.00	.00	.00	.00	579	14.50	.00	.00	14.50
A43_TYXDEMO	.00	.00	.00	.00	.00	.00	.00	.00	5	.15	.00	.00	.15
TOTAL	296.49	6.74	13.34	606.17	430.10	20.16	29.90	895.28	46567	1164.31	.00	.00	2665.76

November 1985 - Item D

	CONNECT TIME				CPU TIME				DISK		TAPE	MISC.	TOTAL
	PRIME	EVENING	NITE	COST	PRIME	EVENING	NITE	COST	PAGES	COST	COST		
A43_ALLIN1	54.01	.00	.00	108.00	113.83	.00	.00	227.63	296074	7401.86	.00	.00	7737.49
A43_CARR	93.35	3.96	10.44	195.76	68.41	4.04	5.34	143.80	2681	67.03	2.00	.00	408.39
A43_COLLINS	.00	.00	.00	.00	.00	.00	.00	.00	96	2.40	.00	.00	2.40
A43_GALLOWAY	26.25	.00	.00	52.50	36.85	.00	.00	73.64	21323	533.09	.00	.00	659.32
A43_LEONARDO	.02	.00	.00	.05	.13	.00	.00	.27	44	1.10	.00	.00	1.42
A43_LOSS	2.77	1.48	.00	7.12	9.00	2.33	.00	21.77	4043	101.08	.00	.00	129.97
A43_MUNN	8.55	.00	.00	17.10	8.30	.00	.00	16.58	410	10.25	2.00	.00	45.93
A43_PAWS	3.45	.00	.00	6.91	1.40	.00	.00	2.82	4051	101.28	.00	.00	111.01
A43_PAWSDEMO	.38	.00	.00	.75	.27	.00	.00	.54	104	2.60	.00	.00	3.89
A43_SCHEURER	45.58	.00	.00	91.04	65.78	.00	.00	131.57	9762	244.06	.00	.00	466.67
A43_TIA	.00	.00	.00	.00	.00	.00	.00	.00	495	12.38	.00	.00	12.38
A43_TYXDEMO	.00	.00	.00	.00	.00	.00	.00	.00	4	.12	.00	.00	.12
A57_HARRISON	.04	.00	.00	1.29	1.98	.00	.00	3.97	94	2.36	.00	.00	7.62
J10_BIONDO	.48	.00	.00	.98	1.12	.00	.00	2.24		.00	.00	.00	3.22
TOTAL	235.48	5.44	10.44	481.59	307.07	6.57	5.34	624.83	339181	8479.61	4.00	.00	9589.83

October 1985 - Item E

	CONNECT TIME				CPU TIME				DISK		TAPE	MISC.	TOTAL
	PRIME	EVENING	NITE	COST	PRIME	EVENING	NITE	COST	PAGES	COST	COST		
A32_SAMS	.00	.00	.00	.00	.00	.00	.00	.00	121	3.04	.00	.00	3.04
A32_STEIN	.00	.00	.00	.00	.00	.00	.00	.00	2532	63.32	.00	.00	63.32
A43_CARR	34.29	9.65	1.25	78.84	15.61	1.57	.54	33.10	2348	58.71	.00	.00	170.65
A43_COLLINS	5.98	.02	.00	11.93	5.23	.08	.00	10.54	50	1.25	.00	.00	23.72
A43_CULLY	.35	.00	.00	.70	.96	.00	.00	1.90	538	13.45	.00	.00	16.05
A43_GALLOWAY	43.98	.00	.00	88.10	24.18	.00	.00	48.41	17987	449.68	.00	.00	586.19
A43_GAMN	.14	.00	.00	.28	.29	.00	.00	.57	94	2.37	.00	.00	3.22
A43_LEONARDO	.00	.00	.00	.00	.00	.00	.00	.00	88	2.20	.00	.00	2.20
A43_LOSS	3.23	.00	.00	6.45	14.94	.00	.00	29.87	5928	148.22	.00	.00	184.54
A43_MUNN	2.32	.00	.00	4.63	1.91	.00	.00	3.81	736	18.40	.00	.00	26.84
A43_PAWS	38.15	.00	.00	76.31	131.76	.00	.00	263.47	4481	112.04	.00	.00	451.82
A43_PAWSDEMO	.73	.00	.00	1.43	1.51	.00	.00	3.04	106	2.66	.00	.00	7.13
A43_SCHEURER	31.76	.00	.00	63.56	67.54	.00	.00	135.10	10061	251.53	.00	.00	450.19
A43_TYX	.04	.00	.00	.07	.18	.00	.00	.37	388	9.72	.00	.00	10.16
A43_TYXDEMO	.01	.00	.00	.03	.08	.00	.00	.16	4	.12	.00	.00	.31
A57_HARRISON	.15	.69	.00	.99	.49	.20	.00	1.17	20	.50	.00	.00	2.66
J10_BIONDO	.25	.00	.00	.51	1.19	.00	.00	2.36		.00	.00	.00	2.87
TOTAL	161.28	10.36	1.25	333.83	265.87	1.85	.54	533.87	45482	1137.21	.00	.00	2004.91

Appendix "D"

Interview Survey

n an effort to evaluate the impacts of the computer usage here at Emerson the
ollowing survey has been developed to further understand the user community.
lease complete and return to: 4534 - Timothy Fitzsimmons Carr. Your
ooperation is greatly appreciated.

lease Check all appropriate circles.

Background:

mputer Science Major	O
mputer Science Minor	O
lectrical Engineering Major	O
lectrical Engineering Minor	O
ther Major	✓
n-theJob Computer Training	O
ocational School Courses	O
o Prior Computer Training	O

Previous Computer Usage:

sed Computer in college or school	✓
ave Home Hobby Computer	O
ave used Emerson Scientific Computer Center	✓
ave used other Emerson Computer	✓
ave used Emerson Word processor PC's	O
ave used IBM or Apple PC's	O
ave used other PC's	O
ave never used computer	O

Employed at Emerson:

ess than 6 months	
to 12 months	O
to 2 years	O
to 5 years	O
ore than 5 years	✓

Intended Applications:

rogram development	O
omputation	✓
ocumentation	O
ata Retrieval/Manipulation	O
ersonal Interests	O

Applications Time-Frame:

mmediate	O
ithin 3 months	O
ithin 6 months	O
ithin 1 Year	O
onger than 1 Year	✓
nsure when	O

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