Analyzing Implementation of Office Support Systems in an Academic Environment

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PART I: BIJOU

1.0 Introduction: The Bijou Project

INTRODUCTION: THE BIJOU PROJECT

The revolution in office systems technology is proceeding on many fronts. One front is located in the laboratories and production facilities where new equipment is designed and fabricated. Another is found in the variety of places where software is planned and written. A third is in organizations where attempts are made to put equipment and software -- office systems -- to work. This report is about a skirmish on the third front in particularly inhospitable terrain, an experiment in office automation at a large research university.

On campus as elsewhere, the recent proliferation of electronic office support systems can be attributed to the technological 'push' provided by advances in computing and telecommunications technology combined with a demand 'pull' generated by concern over productivity of white-collar workers (Talbert, Bikson, and Shapiro [19]). As with other computer-based technologies, such systems may not produce expected benefits. Such failures may be the result of flaws in design, and they may also be traced to failures of human organization. In other words, the promise of such systems may not be realized, not only because of inherent technological shortcomings, but also because of unsuccessful implementation.

This book studies an experiment in assembly, installation, and implementation of an integrated office system at the University of California at Berkeley (UCB). The experiment was conducted as a joint effort of the University and the International Business Machines Corporation. The Berkeley-IBM Joint Office Utility (BIJOU) project lasted from August 1982 through December 1985. In the chapters that follow BIJOU data are used to investigate problems inherent in successful implementation of large-scale integrated office systems. BIJOU was built around technology that is now somewhat outdated, and no single organization can be representative of the universe of institutions now in the throes of technological change. Nevertheless, the results of BIJOU have many implications for what should and should not be done in adapting organizations to the productivity enhancement inherent in the office systems technology.

Definitions

Before setting out a plan for the book, it is useful to establish definitions for three of the terms -- 'integrated office systems', 'implementation', and 'success' -- used above.

Integrated Office Systems

Integrated office systems (IOS) may be defined as multi-functional, interactive systems which support interpersonal communication, document preparation, document storage and retrieval, and data processing through a single user interface or command language. These systems provide for the collection and dissemination of information that in the absence of office automation are typically not supported by an organization's formal computer-based information facility. These systems differ in several important ways from the previous generation of computer-based information systems, including transaction-oriented data processing systems, management information systems (MIS), and decision support systems. The traditional systems were designed to support decision-making, while integrated office systems exist primarily to support communication activities (Markus [16]; Olson and Lucas [17]). Most traditional information systems are designed for use within the context of a particular task or decision-making situation by a relatively homogenous group of users. In context, use of the tool is generally obligatory -- it goes with the job. In contrast, the use of many IOS functions tends to be more discretionary. Usage patterns are likely to vary based on the ways that individuals choose to substitute new electronic tools for more traditional modes of communication (Culnan and Bair [4]).

Implementation

As a general definition, the term implementation, when applied to an IOS, covers the entire process of introduction of such a system into the life of an organization. The process begins with suggestions for system acquisition and extends through the point at which the system configuration stabilizes and training procedures and use become routinized. Following Lucas, implementation might also be considered complete when the supported organization 'has developed psychological ownership of the system' (Lucas [14], p. 115).

The implementation process has been analyzed by Kolb and Frohman [13] and Lucas [14] in terms of a seven-step model of the interaction between a systems implementing agent (a 'consultant', say) and an adopting organization. The stages are summarized in Table 1.1. The process begins by initiation of interest in system acquisition: either the consultant looks for the organization or the organization develops an interest in acquiring a system. Either way the organization needs outside assistance; skills required for this type of investment are rarely found in house. The entry period sees enunciation of broad goals and establishment of credentials. The organization must be satisfied that the consultant knows what he or she is talking about, and the consultant must be convinced the organization is serious. Once this is accomplished, consultant and organization move to diagnosis of user needs and identification of available alternatives.

Table 1.1

Stages of System Implementation

Scouting	Period of preliminary contacts between implementer and user.
Entry	Period of establishment of initial relationship between implementer and user; broad goals enunciated.
Diagnosis	Period of refinement of definition of user needs, system options.
Planning	Period of system selection, development of installation plans and timetables.
Action	Execution of plan. Organization is 'unfrozen' to permit change, 'moved' into new procedures, and 'refrozen' so that 'the new equilibrium is maintained' (p.112).
Evaluation	'The results of the change are examined honestly'.
Termination	The temporary relationship between implementer and user is ended; the user now 'owns' the system.

Source: Lucas [14]

When needs and alternatives are established, the organization makes choices and a timetable of installation and implementation is established. When this is achieved, the system is brought in, brought 'on line', and operated. Once adjustment is well underway, evaluation is undertaken to identify needed modification in both the system and the organization's use of it. When this is concluded, the consultant's job is done.

A key feature of the Kolb/Frohman/Lucas scheme is the presence of feedback loops between the 'planning' and 'entry' stages and between 'evaluation' and 'planning'. The planning process itself may lead to a change in the organization's goals, just as the experience of system installation may reveal the need for additional planning or system modification. Because of these feedback processes, some of the stages may be entered several times in the course of system implementation.

The differences between IOS and the older computer-based information systems discussed above suggests that IOS implementation may involve significantly different problems than those encountered in conjunction with management information support. Some problems arise simply because integrated systems tend to be more complex, to involve a greater variety of equipment, and to address a greater variety of jobs. In addition, because of the variety of activities potentially requiring support, IOS tend to require more tailoring and user input at the implementation stage to conform to unique requirements associated with particular sites and particular users. As a result 'successful implementation' (to be defined below) requires exceptional attention to feedback and adjustment as part of the startup process. The number of feedback loops to be expected will be greater than has been common with MIS introduction. While more feedback may be required with IOS, obtaining it without interfering with organization activities may be difficult. Developing feedback procedures that are not intrusive poses particular problems with systems that involve communication, since much communication is inherently private.

Success

The criteria for judging implementation are not well established, and even when agreement can be attained on abstract notions of 'success', such concepts are difficult to implement empirically. Nonetheless, without a clear theoretical notion of objectives for IOS implementation, practical evaluation becomes hopelessly confused.

In arriving at a working definition of success, four points should be kept in mind. First, it is not possible to evaluate outcomes without specifying objectives. In most situations involving office support decisions, it is the objectives specified by executive leadership that count in identifying what are benefits, what are costs, and what are irrelevant consequences. Generally executive leadership is interested in maximizing the difference between output or productivity effects of innovations and cost effects for the organization as a whole.

Second, even though the focus of successful implementation should be toward meeting executive objectives, the requirements of other participants can not be disregarded. An important theme in the literature is that implementation can be slowed or even thwarted by users not motivated to participate. Lack of motivation can generally be traced to lack of perceived benefit. If the benefits attributable to organization-wide IOS implementation are to be achieved, they must be recognized and responded to at the individual level. Accordingly, most implementation efforts are deliberately designed to motivate through assuring at least minimum net benefits to all participants.

Third, within any organizational context, an IOS has some potential achievable effect on productivity, and this potential varies with resources devoted to implementation. This system potential is in part a feature of the embodied technology and software and hardware design. But it is possible that the <u>process</u> of introduction of an IOS into an organization can affect its potential productivity effects over all relevant horizons. Thus it is both the amount of resources devoted to implementation and how they are used that count.

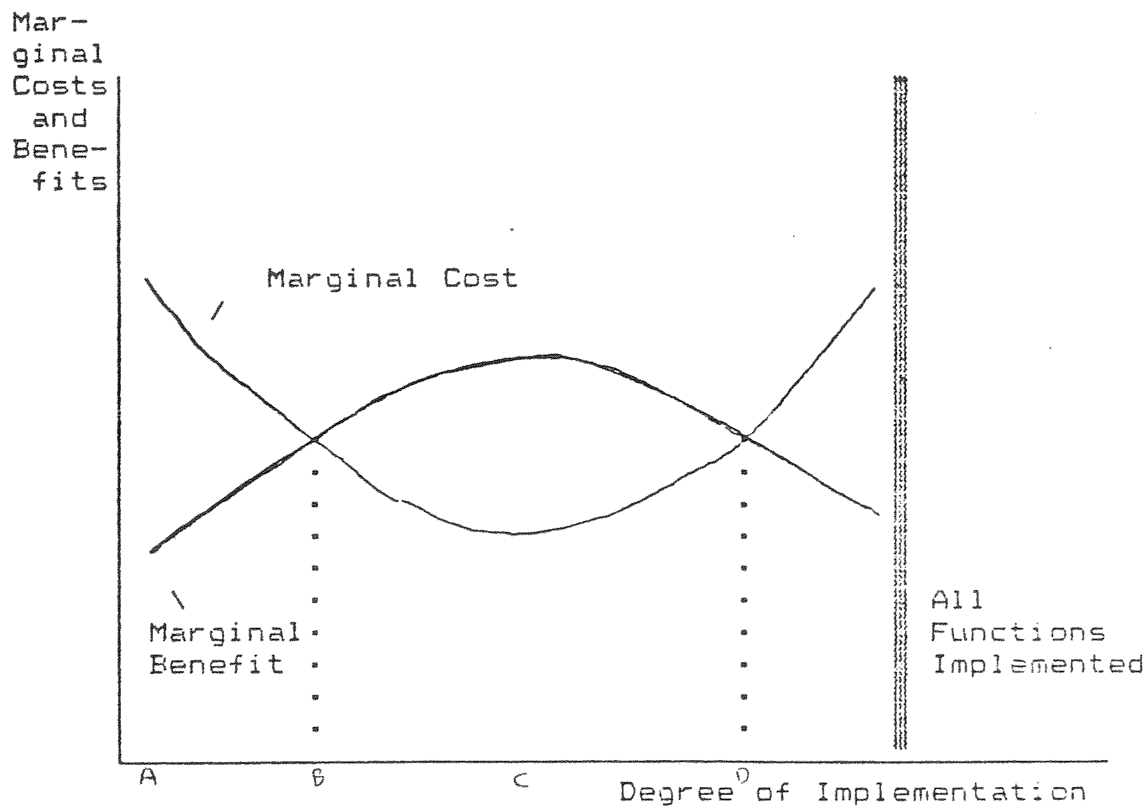
Finally, both costs and benefits of an IOS are related to the degree of implementation of system function.

The last point is usefully expanded, for it provides the basis for the expositional approach of this report as well as insight into what constitutes IOS success. For simplicity assume that office system functions have a natural order of implementation that permits unambiguous discussion about the 'degree' of use of such a system. For example, the first step might include introduction of an electronic mail system, the second minor document processing, the third major document processing plus electronic storage, and so forth. There are, of course, limitations to this evaluative approach. Under ordinary circumstances it is not possible to acquire piecemeal an IOS. Systems are usually packaged and one acquires a complete functioning unit at a certain cost. In addition, it may not be possible to determine the sequence with which automated office functions are made available to users. The sequencing of the implementation may influence the cost and benefits of the system.

Now suppose also that for each incremental step in function acquisition the relevant additional cost and benefit can be identified and plotted as a function in the manner illustrated in Figure 1.1. These functions identify marginal benefits and costs for each step in implementation.

Figure 1.1

Marginal Costs and Benefits of System Implementation


Mar-
ginal
Costs
and
Bene-
fits
Marginal Cost
Marginal
Benefit
All
Functions
Implemented
A
B
C
D
Degree of Implementation

As drawn in Figure 1.1, the marginal cost and benefit functions incorporate several assumptions. On the cost side, it is assumed that the marginal cost of implementation of the very first function is very high -- hardware must be put in place, software installed, etc. -- but that these marginal costs decline over some range of function. Eventually marginal costs begin to rise as functions are added which require exceptional or specialized training. On the benefit side, it is assumed that a key feature of IOS is the fact that combinations of functions are supported. The implication of this is that over some range of implementation marginal benefits rise rapidly through interactive effects. Again, for more advanced degrees of system use marginal benefits decline.

The MC and MB curves in Figure 1.1 suggest an interesting dynamic for IOS implementation. Consider the four degrees of implementation marked in Figure 1.1. Point A is no system. Between point A and point B the cost of every step exceeds the benefits which accrue: Marginal costs exceed marginal benefits. This situation reverses at implementation levels in the range B-C. Here the marginal benefit gained from each increment exceeds costs. Finally, suppose some point D represents full utilization of system function. In the range from C to D each increment is not cost effective, for benefits gained are less than costs.

Now a big assumption: suppose implementation in the organization responds to net gain, that is the difference between marginal costs and benefits. If this is the case, the diagram suggests that if implementation can be pushed beyond B, a threshold, it will proceed to C. If pushed beyond C, it will tend to revert, since for every step backward toward C cost savings exceed benefit losses. Both points B and C are organizational equilibria, but only point C is stable in the sense that if the degree of utilization is pushed either way incentives are generated to move the system back.[1] Given the criteria used to assess costs and benefits, point C is optimal.

Point C is an equilibrium only if in fact implementation in the system responds to net gain. But as already pointed out, in organizations implementation is in part something done through decisions by a host of individual participants. If benefits and costs as perceived by individuals differ from benefits in aggregate, implementation may stop before point C is reached. The difference between individual perceptions and aggregate benefit-cost relationships results in part because of differences between objectives of general users and executives engaged in system implementation. But it also arises because of external effects. The benefits and costs of use of some system functions depends very much on the number of participants. Any one user underestimates the benefits of his or her use because part of the benefits accrue to others. Leadership in such a situation attempts to make such external affects apparent.

In addition to threshold and equilibrium effects, Figure 1.1 illustrates another property of implementation: the optimal stopping point will frequently occur short of full system utilization. The actual stopping point depends on the shapes of the marginal cost and benefit curves.

Figure 1.1 is useful in fixing the idea of successful implementation. The process of implementation affects both the position and shapes of marginal costs and benefits. Success in implementation means that introduction occurs in such a way that the net benefits of the innovation are maximized. In terms of the

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[1] Other configurations of the marginal benefit and cost curves can produce more than two equilibria.

figure, this means that function implementation, training, and incentives are organized so that the resulting point C is associated with the highest net benefit (i.e. total benefits - total costs) for the system. Ineptitude in implementation tends to raise costs of each step and lower benefits. The result is a reduction in the optimum outcome -- point C, in net benefits, and also a reduction in the likelihood of getting the organization to C at all.

1.2 What's To Come

Different systems and organizational circumstances can produce variation in the shapes and positions of the curves sketched in Figure 1.1. This book will argue that for most units at Berkeley the IOS assembled and installed by BIJOU and the process of implementation created a peculiar configuration of costs and benefits that served to produce multiple equilibrium outcomes, some of which were attained at very low levels of utilization. The principal conclusion is that while BIJOU objectives were satisfied, implementation failed. The reasons for BIJOU implementation problems are reasonably clear, thanks to, among other things, data collected by a special monitoring apparatus that is one of the many successful BIJOU products. The results suggest important lessons for future IOS installations. It will be argued that now that monitoring technology is available, the apparatus could be fruitfully used to provide feedback in other applications.

The book is divided into three parts. Part 1 covers the Berkeley project (Chapter 2), the population of project participants (Chapter 3), and the PROFS system as implemented in BIJOU (Chapter 4). Part 2 presents results of analysis of system use. Chapter 5 surveys aggregate measures of use and focuses on changes over time in the number of users and differences among campus units in use frequency. Chapter 6 investigates the amount of system use by participants and the pattern of what we term use 'birth' and 'death'. Chapters 7 and 8 are devoted to more refined study of system functions. The third and final part of the book, Chapter 9, is devoted to drawing conclusions.

It is difficult to make a monograph on 'Integrated Office Systems' exciting reading. An attempt has been made to enliven this one with strong conclusions and innovative analytical techniques. It is important that the reader understand that while support for this work has been provided by the University of California and the International Business Machines Corporation, the opinions expressed and conclusions drawn here are the authors' own. These opinions and conclusions do not represent the official or unofficial position of either organization. The support of, and latitude permitted by, both IBM and UCB are gratefully acknowledged.

PART II: INSTALLING THE BIJOU SYSTEM

2.0 The Berkeley IOS Project

2.0 THE BERKELEY IOS PROJECT

In the last chapter a large university was described as 'particularly in-hospitable terrain' for innovations in office systems technology. In this chapter the BIJOU project and that terrain are described in more detail. In addition, background is provided on the capabilities of the PROFS system used by BIJOU and a special monitoring facility developed as part of the project. These details are intended to give perspective on utilization data presented later and to identify four general problems encountered in getting the system in place and in operation.

2.1 BIJOU Objectives

In September 1982, the University of California, Berkeley and the International Business Machines Corporation began a three-year joint study.[2] The Berkeley-IBM Joint Office Utility (BIJOU) project had two major objectives. The first was to install a prototype distributed office support network at Berkeley based upon available technology and existing campus facilities. The network was to support a variety of workstations and office devices. The second was to evaluate the use of the network and the utility of IBM's software product, the Professional Office System (PROFS) in an academic environment [21, 20].

The Joint Study was proposed by the Berkeley campus based on recommendations made by the Director of the Office of Computing Affairs.[3] Three factors appear to have motivated the proposal.

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[2] The project was originally to run for two years but was extended to a third year.

[3] As is discussed later in the chapter, this unit has been renamed the Office

First, in the absence of central direction, office automation on the campus was largely a 'grassroots' effort, with attendant problems of coordination, compatibility, and support. A number of departments used the campus network of UNIX[4] systems for word processing, and several departments had developed ad hoc office applications under UNIX. However, these UNIX systems were intended primarily for academic (i.e. instructional and research) computing and did not provide the level of service required for office support. While there was a wide variety of IBM peripheral products which could be used to support office work, there was little integration among these products.

Second, the campus was dependent upon a large-scale asynchronous communications network suitable for support of academic computing on inexpensive ASCII terminals which could be connected through telephone company wiring. While IBM had announced its intentions for product integration, its major efforts were not directed at asynchronous communications between devices. It was believed that both IBM and UCB would benefit from the development of a distributed network based largely on the existing ASCII communications environment which would integrate and support a variety of workstations and output devices.

Finally, the project appeared to offer a substantial addition to campus financial and technical resources for supporting modernization of its administrative support systems.

This overview serves to identify one of the four general BIJOU Problems:

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of the Assistant Vice Chancellor for Information Systems and Technology. For brevity and because BIJOU agreements were executed under the old name, the original designation is retained in this book.

[4] UNIX is a trademark of Bell Laboratories.

Problem 1:

The BIJOU Project tried to install a complex software product in an inhospitable environment using facilities and technology that were not matched to the job.

2.2 The Campus Environment

The University of California, Berkeley campus consists of thirteen professional schools and colleges in addition to the College of Letters and Science. Its enrollment of nearly 30,000 students is supported by 1600 faculty and 9000 staff employees. The College of Letters and Science has 44 departments. Some professional schools also have extensive subdivisions. Units are largely governed by faculty, but administrative personnel policies are conducted according to campus-wide guidelines. In addition to professional schools, colleges, departments, and other administrative units contained therein, the campus includes numerous units whose sole function is to support research. The general research function is key to the University's international prestige and its ability to attract outstanding scholars.

Most 'line' units are headed by faculty serving in joint administrative / teaching capacities. Day-to-day administrative work is carried out by non-academic administrators who have in many cases been promoted from within. A consequence of this promotional procedure and the role of the faculty is that few administrators have been exposed to alternative organizational structures or environments. To the outsider, the University's management often appears inept and its administrative structure Byzantine.[5] Why, for example, should the

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[5] For a detailed discussion of the implications of University organization

research activities of faculty in the School of Business Administration be carried out under the auspices of separate 'Organized Research Units' rather than the School itself? This structure is better understood once the importance to the University of budgetary separation of research and teaching activities is appreciated. Maintaining this separation allows the semi-autonomous University to protect its research funds from the depredations of the legislature while at the same time creating at least the impression that monies appropriated for teaching functions are actually spent on teaching functions. Separation of research and teaching functions are features of the University's administrative structure that are, as is shown below, relevant to office systems design.

Budgetary separation of research and teaching is not the only partition relevant to office support at Berkeley. Two others arise in facilities management and unit funding. First, the university attempts as far as possible to allocate all operating expenses save the maintenance of physical plant on a unit-by-unit basis. One implication of this budgeting procedure is that development of campus-wide systems for integrated office support is hindered by an 'externality' problem: for any one unit development costs exceed benefits, because the global value to the university as a whole of interconnection between units is not considered. The efficiency consequences of this fragmented decision making were, as cited above, part of the grounds for initiating the Joint Study.

Second, units are generally given separate personnel and supplies/equipment budgets with little fungibility. A result of this budgeting procedure, which

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for the design, marketing, and implementation of office support systems, see Freeman and Bell [8].

is characteristic of the State's general support of the University, is that few incentives exist for enhancing productivity. In many cases, money saved cannot be reallocated, and conspicuous improvements in service support are likely to signal an opportunity for reallocation of department resources to units judged (from lack of product) to require more input.

Campus-wide administration is the responsibility of the Chancellor, with basic activities subdivided among provinces of various vice-Chancellors, includine, at that time, a Vice Chancellor for Research whose responsibilities include oversight of campus-sponsored research such as BIJOU. At the same time, a separate Vice Chancellor for Facilities Management holds nominal responsibility for campus business and administrative matters. The Office of Computing Affairs is charged with responsibility for support of campus academic and administrative computing. The director of OCA is appointed by, and reports to, the Vice Chancellor for Research.

Office support has not traditionally fallen within the realm of responsibility of the Office of Computing Affairs. The BIJOU proposal thus represented for that unit a substantial new venture and an extension of effort beyond the traditional bounds of academic computing. This venture could be justified on the basis that in an academic environment it is becoming increasingly difficult to separate support of research from administrative and communications-related responsibilities of members of the academic community. Also, there are externalities: the demand for networking is not limited to persons involved in office support, and many of the problems solved in the process of implementing a system like that proposed by BIJOU are problems for distributed support of research activities as well. Nonetheless, it is important to understand that little precedent existed on the Berkeley campus for OCA involvement in departmental support functions, and efforts made for joint support of research and department management run counter to Berkeley's budgeting traditions. This lack of precedent meant also that OCA had little experience in operating computing systems for office support.

Problem 2: The integration required by general office systems planning conflicts with traditional boundaries between the provinces of facilities and unit management, between research and teaching support, and between the personnel and the supplies and equipment budgets.

Accounting conventions and traditions have a way of disappearing in the face of determined executive effort. Problem 2 became important, however, because of the absence of executive support for BIJOU objectives.

2.3 Project Organization

The BIJOU agreement made the Office of Computing Affairs responsible for planning the network installation and for recruiting departments to participate in the joint study. Six organizational units were recruited as original participants in BIJOU: the School of Business Administration (SBA), the Graduate School of Public Policy (SPP), the Economics Department (ECO), the School of Library and Information Studies (LIS), the Chancellor's Office (CHO), as well as the Office of Computing Affairs (OCA). In addition, beginning in early 1984 limited services were provided to the School of Education. These departments were selected because they varied in size, represented both academic and administrative functions, and were interested in participating. However, as the list indicates, the project covers only a part of the campus. Most of the participating units were professional schools, while only one academic department from Letters and Science, Economics, is represented.

The project was administered by a Steering Committee composed of the principal investigators from the University and from IBM, representatives of OCA, and representatives from each participating unit.

The peculiar structural relationship between the project and the campus is worth emphasizing. First, in no instances were vertical links between participating units and higher authorities completely covered by system links. It was impossible to offer to units electronic information exchange with all or even a major fraction of the other offices on campus with which they were routinely in contact. The impetus for the BIJOU project came from a one unit, the Office of Computing Affairs, which is three levels down from the top of the campus administrative hierarchy. By virtue of the administrative structure already cited, this meant that the project was placed within the campus research framework. No representative of campus facilities management sat on the steering committee. For practical purposes one unit, the Chancellor's office, resides above the sponsor in hierarchy and authority. During the project the Chancellor himself showed little interest in office automation or in general campus planning for office systems development.

While each participating unit included individuals who were involved in problems related to office automation and were enthusiastic about the project, unit participation in project planning was extremely limited. This lack of involvement in part resulted from lack of experience with office systems. In only one case did it appear that initiative for unit involvement came from the principal executive. This reflected the fact that office support was in no instance viewed as critical to unit agendas for the near future. This may have resulted from general lack of knowledge of what such systems might accomplish.

The implications of these structural factors were that:

1. Units accepted and assigned equipment to staff in the initial phases of the project under circumstances of extreme uncertainty.
2. In general, requirements for unit participation in the project, and in particular the substantial management commitment required to use the system effectively, were not well understood.
3. Needs of units for services provided by the system were not articulated and, in many cases, not recognized even within the units themselves.
4. The leverage possessed by project administrators for encouraging greater involvement by participating units was extremely small.

Put another way, these factors meant that to a large extent the arrival of IOS on campus was a supply rather than a demand-driven event. The 'scouting', 'entry', and 'diagnosis' phases of the Kolb/Frohman/Lucas scheme were for the most part skipped and planning was largely concentrated on the system, since this fell most clearly within the realm of traditional OCA expertise.

Project development was further complicated by the resignation of the director of the Office of Computing Affairs during the fall of 1983. This director had been the principal mover behind expansion of OCA activities toward systems support and had negotiated the Joint Study agreement. The new director was not named until the following summer, and when he arrived he was not committed to the BIJOU Project, reduced his unit's support for the project, and did not assume the role of Principal Investigator for the project. A new Principal Investigator was appointed, but this person had no financial control over the funds allocated to the project. Needless to say, justified or not, the atmosphere of uncertainty created by these changes acted to hinder the movement of units to full-scale IOS utilization. In summary, we have:

Problem 3: At the campus, OCA, and unit levels, executive commitment to BIJOU objectives and understanding of BIJOU requirements was weak.

This administrative situation interacted with physical problems of installation and the nature of the system itself to substantially inhibit system implementation. One thing should be emphasized: as posed, problem 3 should not necessarily be taken as criticism of campus, OCA, or unit leadership. At each level there is no reason to believe such commitment was justified. The absence of such commitment made other barriers much more formidable that would otherwise have been the case.

2.4 The System and Equipment

This section provides a brief overview of the software and hardware components of the BIJOU system.

2.4.1 The Professional Office System

The BIJOU project sponsored development and adaptation of a variety of software. However, the focus of most effort was IBM's Professional Office System, or PROFS. The project was initiated with a Program Request Price Quotation (PRPQ)[6] version of PROFS. with locally developed enhancements. The system ran under the VM/SP Release 2.0 Operating System.

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[6] A PRFQ version of the system was used because source code for it was made available and, in addition, the starting date of the project proceeded the first release date of the software.

Over the life of the project the campus graduated to the program product version of PROFS. In the BIJOU-supported environment PROFS acts as a context or framework, offering to users a variety of utilities to support office work including document preparation, calendar control, electronic mail, and a special database management system for document storage, retrieval, and exchange.

The database system is the central feature of the PROFS system, since it manages unified storage of documents so that redundancy of storage across users is eliminated. Joint authorship is supported through access exchange, and previous versions of modified documents can be retrieved subject to storage protocols established by the user organization. While designed for storage and exchange of 'softcopy' documents, that is documents created and maintained electronically, the database system also supports identification and cataloguing of documents stored by traditional methods. In addition to document creation, distribution, storage, and retrieval, the database system allows each user to maintain a calendar and allows exchange of calendar access across users. A PROFS database requires careful management, since without management disk space requirements can grow very rapidly.

In a prototype PROFS-supported office environment every staff member would have access to the system via display terminal or through other devices capable of terminal emulation. The system is primarily menu-driven, with each menu selection controlled by function keys from the workstation (a command mode is available for more expert users). These function keys control the execution of programs that carry out the various support functions.

PROFS is designed for use in a wide variety of institutional environments. Given this market, the product comes with considerable latitude for redefining screens and menus so that functions may be added, enhanced, or deleted. But such latitude means that without tailoring, the installed product is unlikely to meet the needs of any particular host organization very well. The presumption is that tailoring will occur when persons responsible for the system, called PROFS 'Administrators', adjust screens, formats, and other functions to fit user needs. However, in the BIJOU project little was known of user needs in advance. Once the project was initiated most staff attention was directed to basic training and the myriad problems generated by installation and operation on heterogeneous equipment. Little tailoring was done, since available staff time was concentrated on dealing with general product problems, documentation, or hardware issues. Exceptions exist, of course: the Department of Economics introduced a business letter format because one faculty member was familiar with the language used for format creation, a special facility was devised for phone message recording for the Chancellor's office, and so on. These were exceptions, and in no instance did it appear that unit staff, guided by unit leadership, met to consider a unified plan of system evolution.[7] No departmental PROFS administrator appeared ever to grasp the management requirements for the unit PROFS databases. This aspect of system 'ownership' (see Lucas [14]) was never successfully transferred to the units, perhaps because there was no training on the matter or the administrators were not qualified to perform the task.

One consequence of lack of attention to PROFS tailoring was that core PROFS functions appeared to many users to be inferior to alternatives. In particular, secretaries with stand-alone word processing systems (such as Displaywriters)

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[7] The most extensive PROFS tailoring was done for the Berkeley Teaching Support System, a PROFS-based system for managing class records for large courses. See Wiseman [22].

found native PROFS document creation capabilities to be clumsy, and faculty already acquainted with common personal computer text processing packages or knowledge of UNIX NROFF and VI resisted the necessity of learning XEDIT and SCRIPT in order to make PROFS document creation support meet their needs. This, too, inhibited acceptance and attention to system improvement.

One perversely positive consequence of neglect of PROFS modification was that it aided analysis of PROFS use patterns. As is discussed later, the BIJOU PROFS monitor operated by recording screens and function key responses. Had unit-to-unit variation in screen configurations developed, the task of interpreting the resulting use patterns would have been much more difficult to decode. Since the precise configuration of PROFS employed at Berkeley is important in evaluating the results, a more detailed review is presented in Chapter 4. Appendix C includes sample BIJOU PROFS screens.

2.4.2 Equipment

According to original project plans, the BIJOU PROFS system was to be operated in a distributed environment on three IBM 4341 mainframes supplied by IBM and located in the School of Business Administration, the Chancellor's Office, and the central campus computing facilities. Because of problems associated with site preparation and remote operation, the Chancellor's office machine was never brought on line, and beginning in early 1985 the Computing Center's 4341 was eliminated and units supported on that machine were transferred to an IBM 3081, also located in the central Campus Computing Facilities.

A separate PROFS database was established for each participating department.[8] The various departmental PROFS databases were distributed across the operating CPU's on the basis of load and connection factors. Access to the system was ultimately provided through the IBM Joint Study funding five types of workstations: IBM Displaywriters, IBM Personal Computers, IBM 3279 color terminals, IBM 3277 Graphics Attachment terminals as well as a large number of ASCII terminals such as Televideo 925's.

Both the types of equipment and the sequence of equipment introduction are important factors in understanding BIJOU outcomes. The Office of Computing Affairs initiated distribution of some terminals and printers in the fall of 1982 in anticipation of the BIJOU agreement. The terminals were allocated principally to the Department of Economics and the Graduate School of Public Policy. They were used mainly to acquaint users with the CMS Operating System and IBM's XEDIT and SCRIPT text editing/processing facilities. The first major equipment deliveries were Displaywriters, an office-grade text processing station which included a high quality printer and a unified text editing/ processing facility. This was followed by allocation of free software to faculty and staff who purchased IBM Personal Computers and compatibles. The software included, among other things, the Multiplan Release 1.0 spreadsheet program and

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[8] The reason for establishing separate databases was to insure security. The consequence of the action was to exacerbate the problem of partitioning users. Had all units used the same database, database control could be exercised by a single PROFS administrator, document storage space would be reduced because any document mailed from one unit to the other would require only one stored copy, and exchange of draft documents could be accomplished across units (draft document exchange in PROFS can occur only within a single database). But in such a system it would be virtually impossible to develop a satisfactory algorithm for assigning charges to each individual unit.

the current version of WordStar, a popular text processor.[9] Then, as data lines could be installed, the IBM 3270 terminals and a large number of 'dumb' ASCII terminals were distributed to remaining worksites. By the end of the project in 1985 the total number of workstations installed exceeded 250.

Despite the presence of a variety of IBM equipment, most of the terminals installed by BIJOU were TeleVideo 925s; by summer of 1983 the TVI925 was the modal workstation for the project. This had important consequences for user frustration levels. While PROFS was modified to support printing of documents on printers attached to the TVI terminals, this arrangement proved generally unsatisfactory since few printers were purchased, those used were only draft-quality dot matrix types, successful execution of long documents was difficult, and concurrent printing of documents while other work was going on was not supported.

As originally planned, printers attached to the TVI terminals were to be used principally for draft copies; the Displaywriter workstations were to handle most important printing. Each Displaywriter was equipped with terminal emulation software and facilities for concurrent printing of documents transmitted from other stations via PROFS while Displaywriter operators carried on their own work. This approach proved unsatisfactory as well, for both hardware and organizational reasons. Problems arose first in modifying the machines to support a terminal emulation mode. By the time the larger network was established Displaywriter operators were wedded to the PROFS-incompatible software supplied with the machines and were reluctant to invest time in learning how to use what appeared to be an inferior document preparation facility on the host machine

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[9] Multiplan is a trademark of Microsoft, Inc.. WordStar is a trademark of MicroPro International Corporation.

Furthermore, the Displaywriters were (in most units) allocated to the best secretaries in the most prestigious positions. For these persons to monitor and print documents mailed from other stations would have required a substantial change in job description that most were unwilling to countenance and which no administrator was brave enough to propose.

One source of pressure for adaptation of Displaywriter operators to roles as printstation operators, the faculty, was inadvertently but effectively sidetracked by distribution of Wordstar to PC users. Wordstar was incompatible with all PROFS/CMS text processing software, and once a faculty member had completed the exhausting task of learning how to use Wordstar, he or she was disinclined to undertake a new investment. A key software/hardware problem, development of a method for creation and printing of technical text, was for practical purposes never solved. This caused significant problems in units which had anticipated accessible technical text support and contributed to faculty disinclination to make a major investment in learning to work within PROFS or the XEDIT/SCRIPT facility.

These problems would have been disastrous had it not been for an alternative printer, made available to the project in 1983, the IBM 6670, Information Distributor. The 6670 is a laser printer that produces output of very high quality. The availability of the 6670 greatly enhanced the attraction of PROFS for routine document creation. Since taking advantage of the machine required access to PROFS, the 6670's also served to lure more faculty into active participation. Availability of the 6670 even prompted discovery of partial solutions to the technical manuscript problem. [18]. But while gluing the project back together, the machines created additional delays and inequities. Five were eventually installed; the last machine was hooked up in the Department of Economics in January of 1984. Because of the unavailability of adequate wiring it was never possible to install a 6670 in the Graduate School of Public Policy. In part because of the 6670 support, more than 350 user-ids were were eventually issued through BIJOU.

The Berkeley campus has many old buildings with inadequate wiring to support a major increase in demand for telephone line connections. All wiring posed a problem, and the difficulties were compounded by the extraordinary demands placed on the Office of Computing Affairs installation and maintenance staff by the contemporary explosion of computing facilities on campus. BIJOU did not operate in a vacuum. At the same time the BIJOU project was struggling to install hardware for office support, the Office of Computing Affairs was installing literally dozens of VAX and other machines and arranging for introduction of a much larger IBM mainframe computer. The Department of Electrical Engineering and Computer Science in the College of Engineering was not party to BIJOU and had an agenda that called for massive expansion of UNIX systems. In the absence of an Office of Computing Affairs leadership that enjoyed the commitment of central campus authorities, conflicts of priorities were certain to produce delays, and they did. The end result was that hookups for BIJOU lines and terminals took an inordinately long time; some were not completed until the summer of 1984. In addition to wiring problems, delivery of some equipment was delayed.

All of this sums up to:

Problem 4: Delays.

Delays, of course, are to be expected, especially given the experimental nature of the project. But at no time was the possibility of delay or engineering problems explicitly considered in planning project operation. The result was enormous uncertainty among participating units concerning what equipment would be installed and when. This variability complicated training and produced a general skepticism concerning the project and the long-run outlook for the system.

2.5 The Timeline

A story is told of a foreign student at Berkeley who, after realizing that his history professor had moved on to other topics after spending two weeks on problems of military strategy for North and South in the American Civil War, timidly approached his teacher with the simple query: 'Who won?' The catalog of problems presented in this chapter raises the same question about BIJOU.

Table 2.1 collects general information on the sequence of BIJOU activities in a single time chart. The conclusion is that by early 1984 most equipment was in place. In Chapter 1 an 'integrated office system' was described as being interactive, multi-functional, and supporting communication, document preparation, document storage and retrieval, and data processing through a single user interface or command language. By 1984 BIJOU had succeeded in creating and installing an IOS at Berkeley. This was the first objective of the project: BIJOU won. However, in the process of implementation the system, BIJOU managed to create an extraordinary number of distractions. While PROFS eventually offered a single user interface, the offer was made to users who had been distracted by alternatives (ironically often provided by the project itself), who were frustrated by delays, and who could not count on unit efforts to tailor the system to their needs. It is a tribute to the intrinsic utility of computer-based office support that most users remained enthusiastic about the project despite these problems and frustrations.[10]

Table 2.1
BIJOU Project Timeline

Date	Activity
June 1982	Project conceived
August 1982	IBM and UCB signed Joint Study agreement
October-December 1982	First equipment arrives (Displaywriters)
December 1982	First IBM 4341 installed in Evans Hall
February 1983	Project Staffing Completed
January-March 1983	109 Offices wired with twisted cable or coaxial cable in Barrows Hall
March 1983	75 Televideo 925's and 46 IBM PC's installed in participants offices
June 1983	IBM 4341 Installed in Barrows Hall
June 1983	Three IBM 6670 and one Sherpa machine installed
September 1983	Two IBM 6670 machines installed
December 1984	Initial Joint Study agreement ends. One year extension approved.
December 1984	Joint Study ends

2.6 The Monitor

Problems encountered in meeting the first objective of the BIJOU project, installation of a 'prototype distributed office support network', complicated

[10] More information on user attitudes toward BIJOU, PROFS, and office automation in general in the next chapter.

attainment of the second goal, that is evaluation of the use of the network and the utility of PROFS in an academic environment. A one year extension of the project was justified in part by the desire to learn how the system was used in a relatively stable environment. The information was gained via a special monitoring utility designed to facilitate study of integrated office system implementation under the project. Much of the data considered in the remainder of this book are derived from the monitor. In this section the monitor is described and approaches to data summary are reviewed. More technical detail is provided in Iorio and Lugo [15].

At the request of the Advisory Committee for the BIJOU project, IBM agreed in 1983 to install and maintain a program called Measurement of Applications System (MAS) which runs under the CMS Operating System and which would allow the utilization of the PROFS system to be recorded during the operation of the project. Each time a user logged onto CMS, this monitoring program was automatically initiated and a table was consulted within the monitor to determine the type and frequency of logging to be done by the system for the user's activities. Depending on the table entry, the user's actions were, or were not, recorded. BIJOU participant actions were recorded.

The MAS program collected monitoring data and transferred it to a CMS account for processing. After a filtering process in which the desired monitoring data are selected from all accumulated data, and a reformatting process in which the record layout was changed for more efficient processing, a file of transaction records suitable for the analysis of PROFS usage was created.

Three types of records were generated by the monitor during a user session, that is the time between logon to the system and termination of the connection.

The first records generated cover user information. These include in each case the account (logon) name and (1) the user's actual name (reported on a query included as part of the session initiation sequence), (2) the terminal type (also reported at session initiation), and (3) the date, time, name of the computer system from which the session was initiated.

Once a session was initiated, the basic unit of monitor output was the action record. Action records are based on the menu/response structure of most PROFS functions. Each menu in the system has a unique number. An action record is generated when a menu is displayed and the user responds to that menu. An action record records the following pieces of information:

1. The user logon name.
2. The time of day that the menu was displayed to the user.
3. The time of day that the user responded to the menu.
4. The number of the menu displayed to the user.
5. The program function (PF) key or other keystroke that the user entered in response to the menu item.

It is possible that the user does not respond to a menu. This could occur, for example, if the terminal is turned off without execution of the usual logoff procedure. In that situation, the monitor created one of two types of records: An Incomplete Action or an Incomplete Menu record. These records signal to analysis programs that the user did not respond.

In addition to action records, certain special function records were generated to support analysis of particular PROFS functions. For each document search a search arguments record was generated which included the terms or fields that the user entered in performing the search. A search results record recorded the number of documents found as a result of the search. If the function that the user performs involves a document, a document record was generated to record the corresponding database identification number. This information allowed the size and distribution of documents to be studied (see Karcher [12]). Finally, a calendar record was generated when one user exercised access to the calendar of another.

Monitoring was initiated in October, 1983 and was terminated June 30, 1985. As each new version of PROFS was released the monitor code was integrated into it. Various problems in the monitor and in processing monitor transactions occurred throughout the experiment. Sampling of user activity occurred throughout the first eighteen months of monitoring, while during the last six months every user action was recorded. Thus during the last six months of the project, a period when the system and the users had reached relative stability and some maturity, monitoring was continuous.

Any project which involves monitoring user behavior has a responsibility to safeguard the privacy of user actions and confidentiality of the messages generated by the users. To insure this, one of the earliest decisions in the project was to not record the content of messages or documents in the logs. The consequence of this decision was that editing activities were not analyzed since they are intimately related to document content. All users were informed that a research project was under way which would result in their activities being monitored. They were given the option of being excluded from the experiment if they wished, but none did.

2.7 Summary

This chapter has provided an historical overview of the BIJOU project and a summary of the components of the project. Four important problems were emphasized:

1. The difficulty of trying to install a complex software product in an inhospitable environment using facilities and technology not matched to the job.

2. The conflict between the integration required by general office systems planning and traditional boundaries between the provinces of facilities and unit management, between research and teaching support, and between the personnel and the supplies and equipment budgets.

3. The weak executive commitment to BIJOU.

4. Delays.

Methods by which these problems might have been avoided are discussed in Chapter 9. All are encountered again in the chapters that follow as various aspects of BIJOU are investigated in more detail.

3.0 The Participants

3.0 THE PARTICIPANTS

Over the life of the BIJOU project over 300 people used the system at one time or another. This chapter provides background information on the units which participated in BIJOU and the characteristics of these users. The organizational environment is discussed first.

3.1 The Units

Participating units differ in functional responsibility, structure, size, physical environment, BIJOU coverage, and employee characteristics. Each of these factors may affect utilization of IOS. Structure is best described by looking at organization charts for the units. Each unit is reviewed below and then a series of general observations on the consequences of various structural features for office automation is presented.

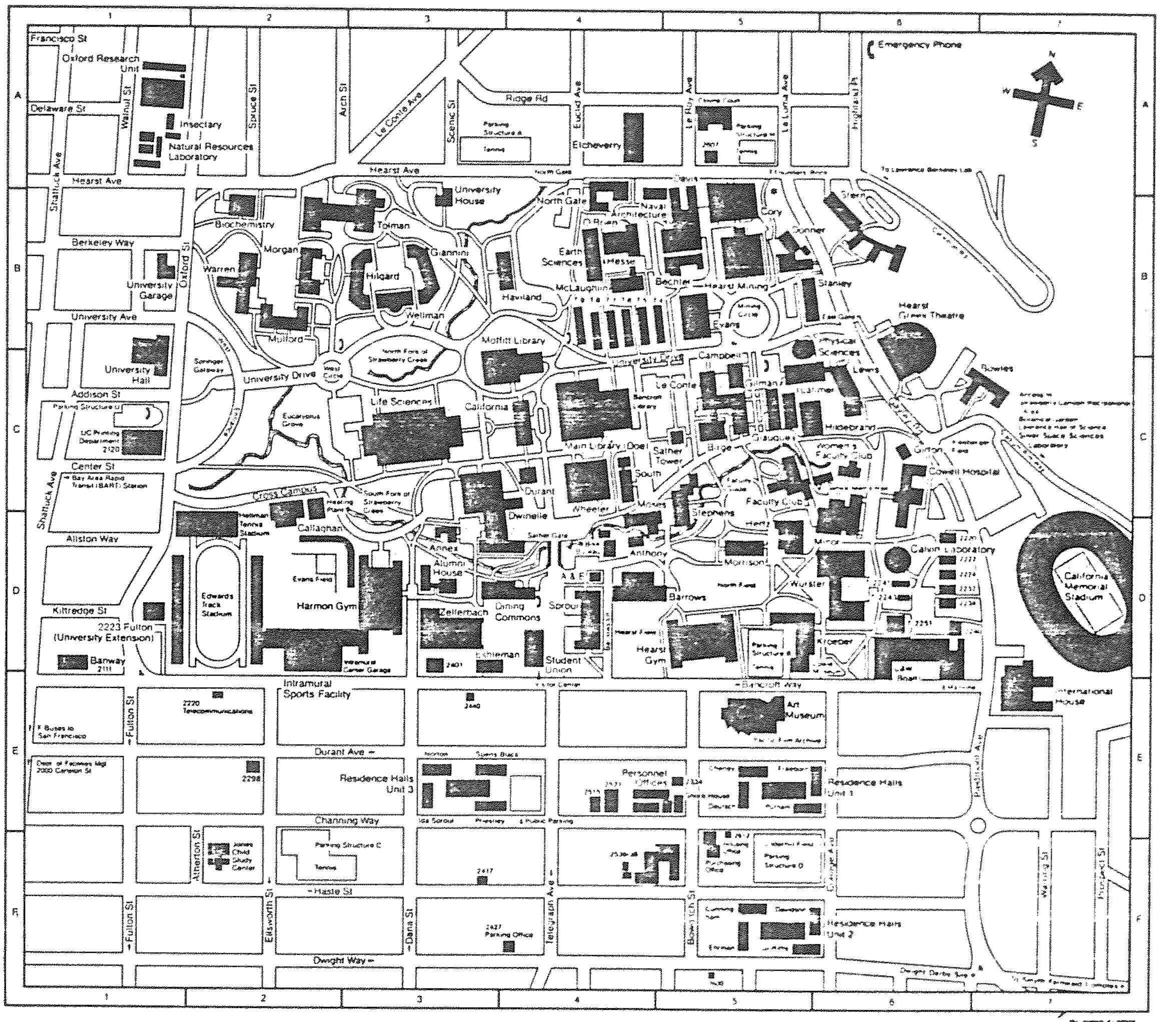
One aspect of the environment that is relevant to communications in an IOS is the physical distance between units. Figure 3.1 reproduces a map of the campus. The locations of BIJOU participating units are marked.

Figure 3.1
BIJOU Participant Locations

Chancellor's Office
California Hall
Campbell Hall

Graduate School of
Public Policy
2607 Hearst Ave.

Office of Computing Affairs
Department of Economics
Evans Hall



Architecture and Engineering
Sproul Hall
Chancellor's Office
(other locations not marked)

Barrows Hall
School of Business Administration
Department of Economics

South Hall
School of Library and Information Studies

3.1.1 The Chancellor's Office

3.1.1.1 The Problems of Boundaries and Information

At the time of this study, campus administration was headed by the Chancellor, I. Michael Heyman. The Chancellor directs a large and complex administrative apparatus. The designation Chancellor's Office is used in this report to cover all campus administrative functions that are not specific to individual academic units. Thus this designation covers everything from the Chancellor's executive secretary to the University Police. Developing an accurate picture of the administrative structure of the Chancellor's office for the purposes of this research proved quite difficult. When the work began there existed no publicly-available organization chart for the Chancellor's Office, and the BIJOU advisory committee was never able to obtain a count of the total number of administrative employees on campus. This difficulty reflects both the fuzziness of the boundaries of administration and a general resistance among CHO staff to outside investigation.

3.1.1.2 Structure

Despite these problems the outlines of the organization of the Chancellor's Office are clear. The structure of the unit is depicted in Figures 3.2a and 3.2b. While total employment data were not available, Figures 3.2a and 3.2b provide, for each branch, an estimate of the number of 'management level personnel', and the number of active and inactive BIJOU accounts. Management level personnel (MLP in the diagram) are defined simply on the basis of who gets listed in the administrative section of the campus phone book.

Figure 3.2a
The Chancellor's Office Organization Chart, 1985
General Structure

Chancellor
2 MLP
2 accounts
CL

- Vice Chancellor for Business & Administrative Services
  53 MLP
  7 accounts (+1 unused)
  CL, WH, SP, AE, 10 MI

- Vice Chancellor for Development
  16 MLP
  0 accounts
  2440 Bancroft Way

- The Vice Chancellor
  See breakdown in Figure 3.2b

- Executive Assistant
  1 MLP, 5 persons
  5 accounts
  CL
  - Chancellor's Communications & Resources Center
    1 MLP, 4 persons
    6 accounts
    CL

- Assistant Chancellor Budget and Planning
  3 MLP
  13 accounts (+4 unused)
  CL

- Assistant Chancellor Legal Affairs
  1 MLP
  2 accounts
  CL

- Assistant Chancellor Affirmative Action and Special Projects
  1 MLP
  2 accounts
  CL

- Public Affairs Officer
  3 MLP
  4 accounts (+1 unused)
  SP, MI

Abbreviations Code

MLP	Management Level Positions
CL	California Hall
CM	Campbell Hall
SP	Sproul Hall
WH	Wheeler Hall
AE	A & E Building
MI	Miscellaneous Locations
TVC	The Vice Chancellor

Figure 3.2b
The Chancellor's Office Organization Chart, 1985
The Office of The Vice Chancellor

The Vice Chancellor
2 MLP
4 accounts
CL

Director, Art Museum
1 MLP
0 accounts
2626 Bancroft Way

Director, CAL Performances
1 MLP
0 accounts
101 Zellerbach

Faculty Assistant to TVC
Academic Affirmative Action
1 MLP
0 accounts (+1 unused)
CL

University Librarian
1 MLP
0 accounts
Library

Provost, Professional
Schools & Colleges
2 MLP
3 accounts
CL

Provost & Dean, College
of Letters & Science
8 MLP, 45 persons
1 account (+4 unused)
CL, CM

Dean, Graduate Division
1 MLP, 51 persons
8 accounts (+6 unused)
CL

Dean, University Extension
1 MLP
0 accounts
2223 Fulton

Director, Summer Session
1 MLP, 6 persons
2 accounts
WH

Faculty Assistant to TVC
Status of Women & Title IX
1 MLP
0 accounts
CL

Coord. - Academic Personnel
1 MLP
4 accounts (+ 2 unused)
CL

Director, Campus Planning
Office
4 MLP, 13 persons
4 accounts
AE

Vice Chancellor for
Research
10 MLP
9 accounts
CL, WH, MI

Vice Chancellor for
Undergraduate Affairs
28 MLP, 228 persons
14 accounts (+14 unused)
CL, SP, 7 MI

What constitutes an 'active' account and active use of an account is considered in Chapter 6. For Figure 3.1 active accounts means accounts associated with the indicated office that were ever logged on. An inactive account is an account which was established but never used. The presence of inactive accounts reveals a problem encountered in planning for system implementation.

The location data are included to illustrate the importance of the communications problem within the Chancellor's office. Closely-related and frequently-communicating offices are often located far apart; this is an environment for which IOS has much to offer.

The organization chart is subdivided between functions assigned to Assistants to the Chancellor and to functions assigned Vice Chancellors. The two groups are considered separately here.

For BIJOU the Executive Assistant to the Chancellor played the most important roll, for four reasons. One was that this person served as the BIJOU liaison for the Chancellor's Office and was responsible for equipment allocation within the unit. The second was that the office includes the Chancellor's Communications and Resources Center, or CCRC. CCRC is important because it contains the most significant PROFS application fostered by the BIJOU project. CCRC is responsible for filing, storage, and retrieval of all communications of campus administrators. The storage and retrieval system was completely converted to PROFS in the course of the experiment. Every letter or other significant communication received or sent by the Chancellor's Office is catalogued by CCRC, and the PROFS maillog facility is used to facilitate search of the Chancellor's office records for previously-received or sent documents. The CCRC PROFS application is considered in more detail in Karcher [12]. Third, it was only for the core of the Executive Assistant's staff and CCRC that complete terminal access was ever achieved; for the other Chancellor's assistant offices by and large only a few accounts were established. Finally, the training coordinator for the Chancellor's Office was located within CCRC. In practice this limited training to PROFS users located within California Hall, where the Chancellor's Office is located. However, training for Chancellor's Office personnel was also provided by BIJOU staff. The executive assistant to the Chancellor was on leave for the 1983-84 academic year. In the interim a faculty member previously unfamiliar with BIJOU or PROFS assumed the duties of the office. Most day-to-day system operations responsibilities devolved to the training coordinator.

With the exception of the Office of Budget and Planning, the various Assistant Chancellor offices are relatively small. The Vice Chancellors are responsible for much larger operations. The office of the Vice Chancellor for Business and Administrative Services is extremely large, including 53 Management Level Positions and spread over 14 campus locations. Nonetheless, only seven BIJOU accounts associated with Budget and Planning were ever active. Business and Administrative Services is in charge of campus operations and, among other things, office systems support. The minor involvement of this unit in the PROFS program meant that little within-unit communication or exchange would involve PROFS and that when used, PROFS terminals would principally be used for sending notes to the offices of the Assistants to the Chancellor. As shallow as BIJOU account assignments in Budget and Planning were, they exceed account assignments to the Development Office. This is particularly unfortunate given that Development was most remote from California Hall.

Figure 3.2b shows the division of the office of the Vice Chancellor. Again, while there are active accounts at the core of the Vice Chancellor's office and in some subunits, others have none at all. Where accounts are cited as 'unused' the original BIJOU plan established accounts that were never in fact opened. Thus while 28 accounts were originally established in the Office of the Vice Chancellor for Undergraduate Affairs, only 14 were ever active. In this case information is available for both management level positions and all employees: the office includes 28 management level personnel (MLP), 228 total employees, spread over 9 locations. Similarly the office of the Provost of the College of Letters and Science included 45 persons, 8 of whom were in management level positions, but only 5 accounts were originally planned for the office and of these only one was ever used.

Space does not permit further analysis of account usage in the Chancellor's Office. However, for later reference note that three of the four remaining BIJOU units, the School of Business Administration, the School of Library and Information Studies, and the School of Public Policy, report to the Provost for Professional Schools and Colleges, and this office included 3 active accounts. The remaining BIJOU unit, the Department of Economics, falls under the office of the Provost and Dean of the College of Letters and Science. All units require regular contacts with the Graduate Division (which handles graduate student matters) and the Office of Admissions and Records, the central repository for student records. The Office of Admission and Records is included under the Office of the Vice Chancellor for Undergraduate Affairs; during the life of the project only 3 Office of Admission and Records accounts out of 16 original assignments were ever used. Two of these accounts were used by the same person.

3.1.1.3 Implications for IOS Implementation

The pattern of BIJOU account use distribution in the Chancellor's Office has three important features relevant to predicting the outcome of the BIJOU experiment.

1. Equipment and accounts were spread very thin. Saturation was achieved only in the Chancellor's immediate support facilities, including the Chancellor's Administrative Assistant, the office of the Executive Assistant, and the Chancellor's Communications and Resources Center. Outside of this, accounts were distributed principally to secretaries of selected higher-echelon officials. No general support offices were completely BIJOU equipped or PROFS active.

2. University managerial offices are spatially dispersed. This is an environment in which an integrated office system with an extensive communications network might have considerable value. But no BIJOU support was provided for many of the administrative communication links that are present on the unit's organization chart.

3. While the Professional Schools administrative unit within the Chancellor's Office was included in the BIJOU system, other important links for Professional School administration -- to the Office of Admissions and Records and the Graduate Division -- appear weak or missing. The many missing links make it unlikely that PROFS-based communication between the Chancellor's Office and other units will significantly displace other methods.

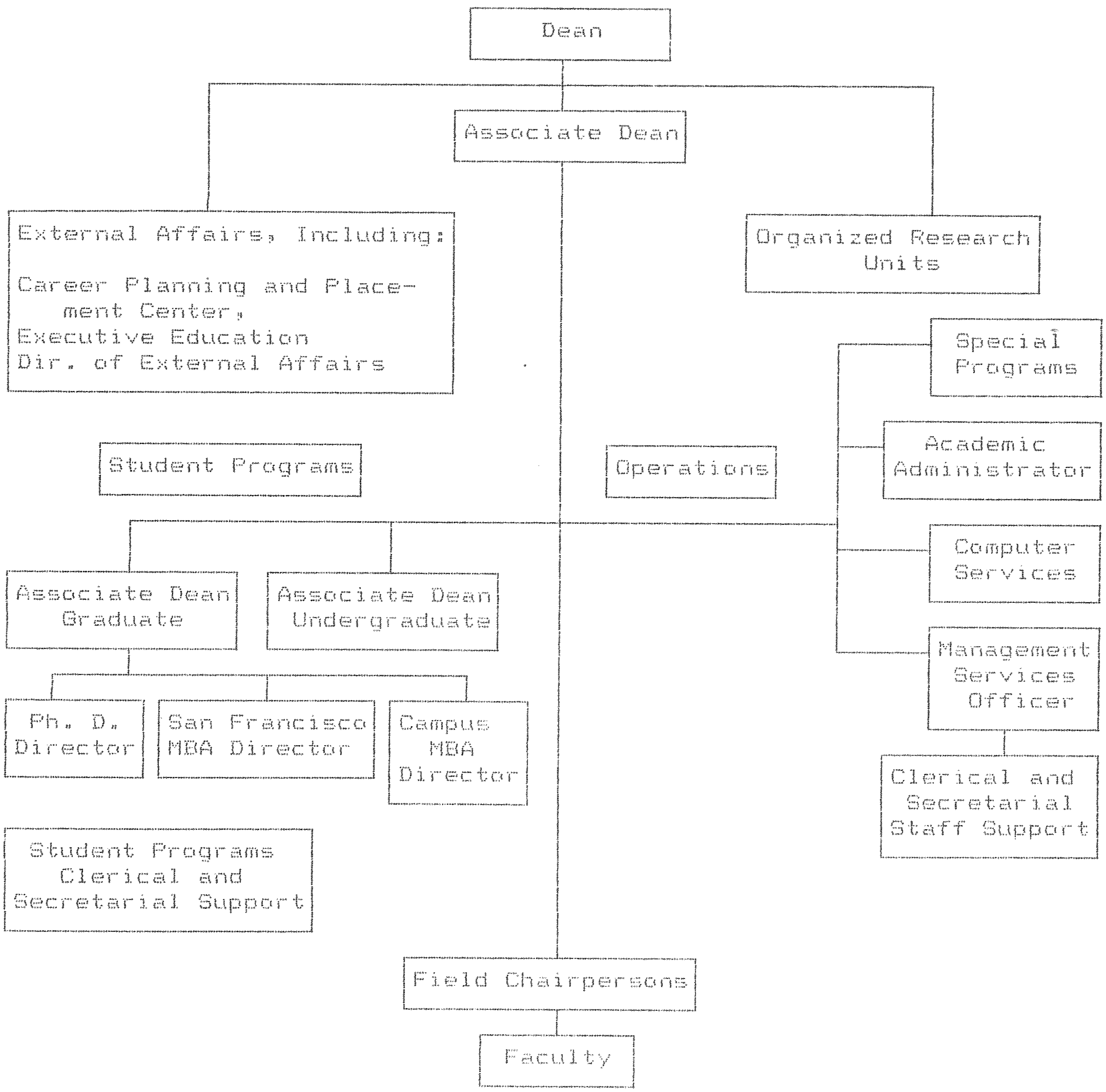
As will be demonstrated later, the core of genuinely active PROFS use in the Chancellor's Office was much smaller than is indicated by the distribution of active accounts. This had significant consequences for the nature of operations in the Chancellor's Communications and Resources Center, for the support of intraunit communications, and ultimately for executive support of the project.

3.1.2 The School of Business Administration

The second largest unit in the BIJOU experiment was the School of Business Administration (SBA). Like all other Professional Schools, SBA is headed by a Dean and has considerable latitude in budget planning and expenditure. This latitude permitted integration of BIJOU support with the long range plans of the School. These plans included expansion of SBA computing facilities and secretarial support. As a result BIJOU equipment was complemented with additional equipment outlays that resulted in relatively widespread PROFS access. Use of the system was inhibited by disk storage limitations brought about by the absence of communications lines and file backup software to allow the PROFS data to be archived in a systematic manner.

Figure 3.3 presents the general organization chart for the School. Broadly speaking, the unit has five components. The external affairs group deals with SBA relations with its business constituency. The student programs units operate the School's graduate and undergraduate programs. The research units are actually administratively linked to the Dean of the Graduate Division. However as described in Chapter 2 the business related Organizational Research Units play an important role in attracting and supporting faculty, and the Dean is regularly involved in their operations. Finally the School has an extensive operations staff organized around the academic administrator (responsible for matters related to curriculum and teaching) and a management services administrator responsible for staff support. The academic administrator was responsible for coordinating the BIJOU implementation and training within the unit.

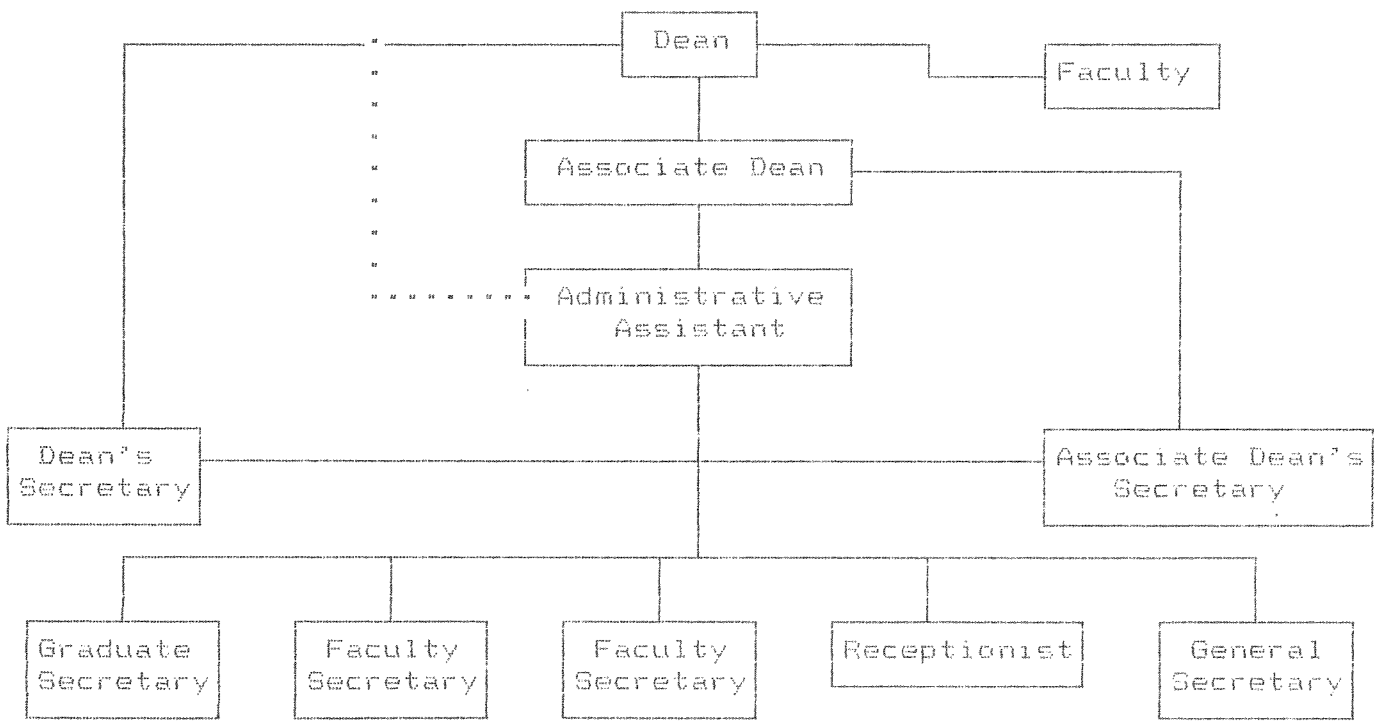
Figure 3.3
School of Business Administration Organization Chart, 1985


Dean
Associate Dean
External Affairs, Including:
Career Planning and Placement Center,
Executive Education
Dir. of External Affairs
Organized Research Units
Special Programs
Academic Administrator
Student Programs
Operations
Computer Services
Associate Dean Graduate
Associate Dean Undergraduate
Management Services Officer
Ph. D. Director
San Francisco MBA Director
Campus MBA Director
Clerical and Secretarial Staff Support
Student Programs Clerical and Secretarial Support
Field Chairpersons
Faculty

3.1.3 The Graduate School of Public Policy

Like the School of Business Administration, almost all of the staff in the Graduate School of Public Policy (SPP) were assigned equipment. The School is wholly housed in a single brown-shingle building that is on the northeast corner of campus. While unified, members of the staff are located in various parts of the building. Communications lines and terminals were installed early in the project. Figure 3.4 presents the organization chart for the unit. In the SPP it is the administrative assistant to the Associate Dean who supervises office equipment. One of the faculty secretaries served as training coordinator.

Figure 3.4
Graduate School of Public Policy Organization Chart, 1985

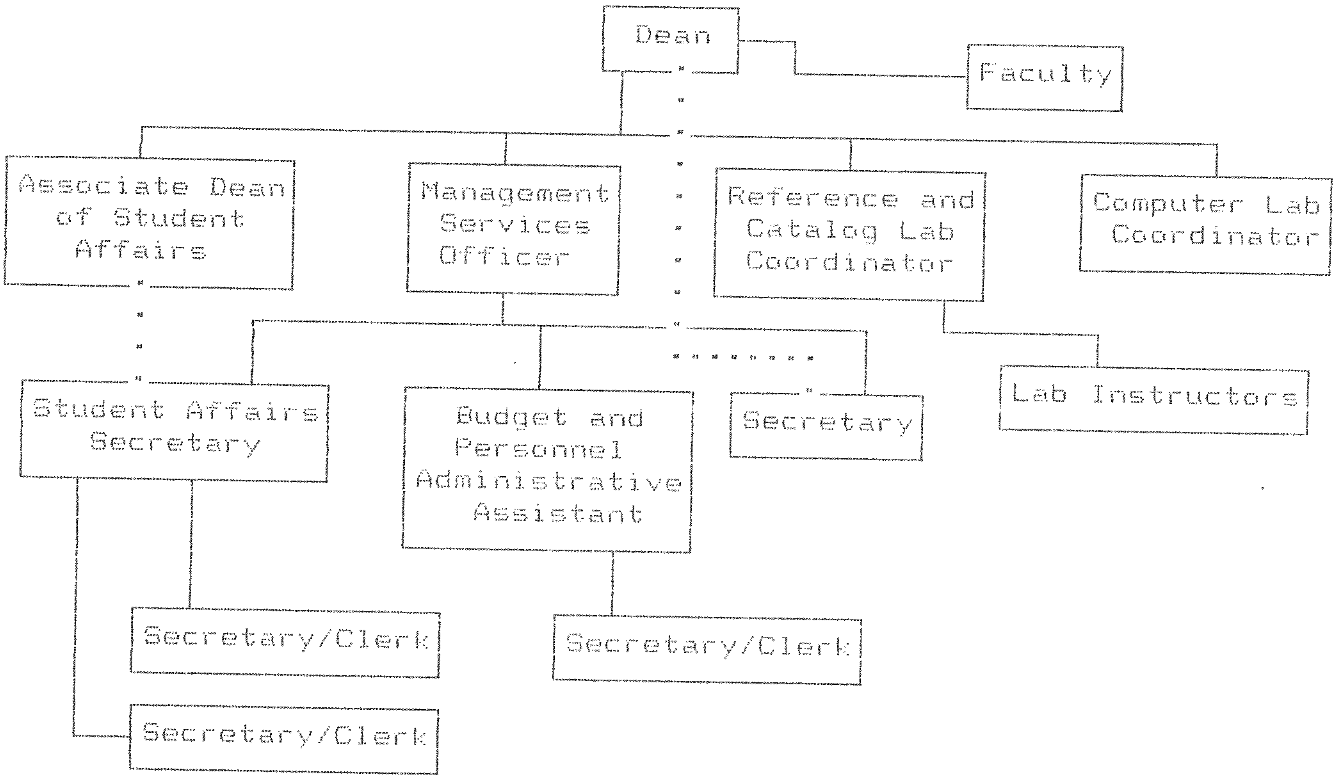

Dean
Faculty
Associate Dean
Administrative Assistant
Dean's Secretary
Associate Dean's Secretary
Graduate Secretary
Faculty Secretary
Faculty Secretary
Receptionist
General Secretary

3.1.4 School of Library and Information Studies

The School of Library and Information Studies was included in the study in part because of the growing involvement of the profession in development of computer-based information systems. Like the other Professional Schools, the unit is headed by a Dean. LIS is the sole occupant of South Hall, a campus landmark built in 1873. While faculty, laboratories, and other facilities are spread throughout the building, staff members are, with few exceptions, located in close physical proximity one to another in a single room. Figure 3.5 presents the organization chart for the unit. The role of training coordinator was assumed by the student affairs secretary.

Figure 3.5

School of Library and Information Studies Organization Chart, 1985

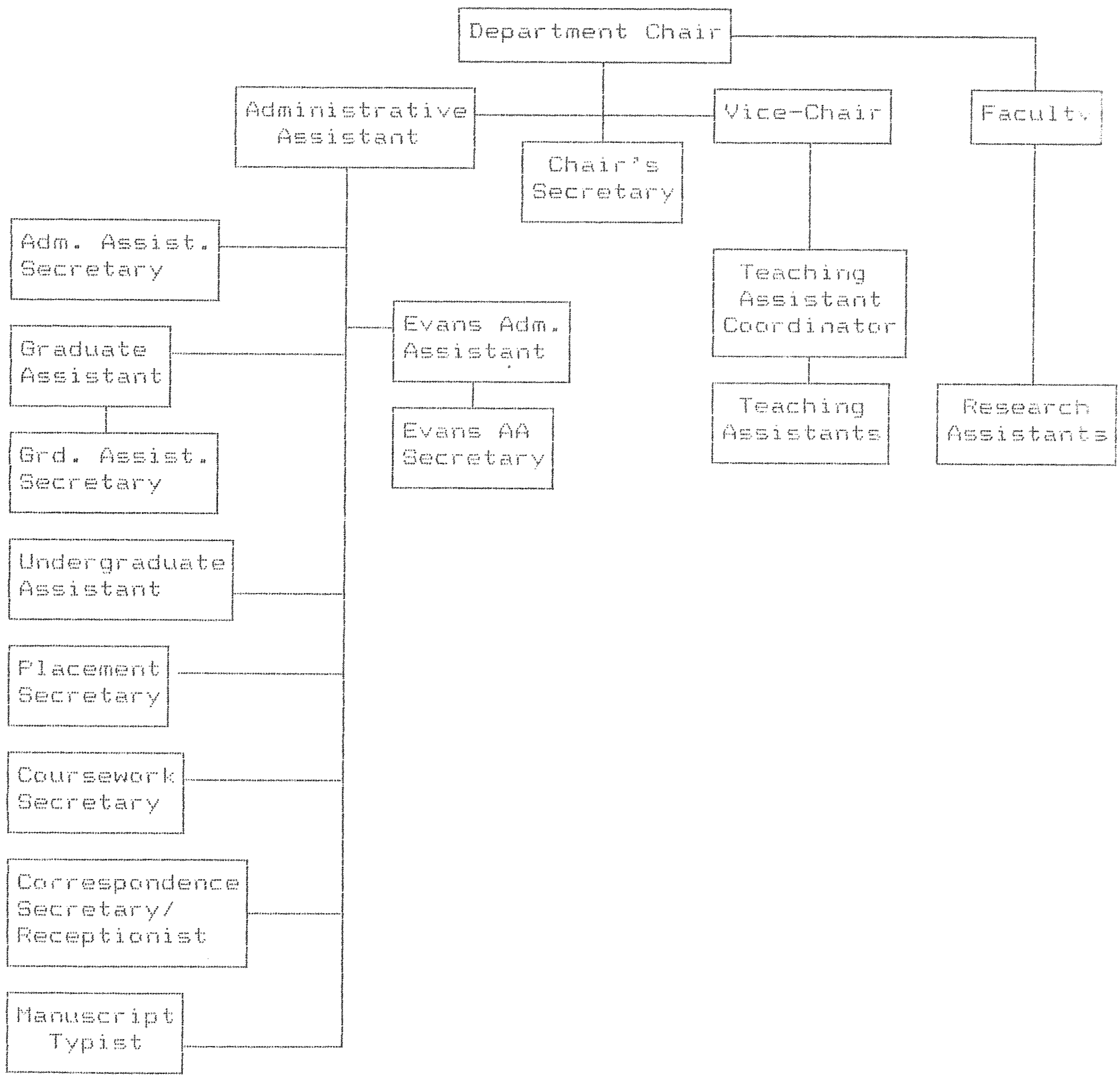

Dean
Faculty
Associate Dean of Student Affairs
Management Services Officer
Reference and Catalog Lab Coordinator
Computer Lab Coordinator
Student Affairs Secretary
Budget and Personnel Administrative Assistant
Secretary
Lab Instructors
Secretary/Clerk
Secretary/Clerk
Secretary/Clerk

3.1.5 The Department of Economics

Economics is the only department within the School of Letters and Science included in the study. As such, the unit is headed by a faculty chairperson (rather than a Dean) and the administrative staff is responsible for a narrower range of function than is true for professional schools. Department offices are divided between Evans and Barrows Halls. This separation, which reflects a shortage of space in either location for full department reunification, creates a demand for communications support. Most major administrative functions are located in the main office in Barrows Hall. The Vice Chairman of the department served as BIJOU liaison for this unit; PROFS administration was carried out by the Chairman's secretary.

Figure 3.6 presents the organization chart for the unit. Note that the Evans hall staff includes only two people; however almost half of all faculty are located there.

Figure 3.6
Department of Economics Organization Chart, 1985


Department Chair
Administrative Assistant
Vice-Chair
Faculty
Chair's Secretary
Adm. Assist. Secretary
Teaching Assistant Coordinator
Graduate Assistant
Evans Adm. Assistant
Grd. Assist. Secretary
Evans AA Secretary
Teaching Assistants
Research Assistants
Undergraduate Assistant
Placement Secretary
Coursework Secretary
Correspondence Secretary/ Receptionist
Manuscript Typist

3.1.6 Summary

In addition to the points made already about the Chancellor's Office, this overview of administration includes the following facts relevant for later evaluation of the implementation of the PROFS system:

1. Almost all of the faculty and staff in the Graduate School of Public Policy, the School of Library and Information Studies, and the Department of Economics received telecommunications lines and terminals to access PROFS.

2. Aside from research or teaching connections among individual faculty, there is no reason to expect much inter-unit communication among the Graduate School of Public Policy, the School of Library and Information Studies, the Department of Economics, and the School of Business Administration. This is in contrast to the potential for intra-unit communication between the academic departments and the Chancellor's Office.

3. The need for intra-unit communication among staff would appear to be greatest within the Chancellor's Office, followed by Business Administration, Economics (because of the Evans/Barrows split), the Graduate School of Public Policy, and Library and Information Studies.

4. The type and physical placement of printers played a crucial part in the perceived satisfaction of users with PROFS. Printer support for PROFS activities was best for the School of Library and Information Studies, followed by the Department of Economics, the School of Business Administration, and the Chancellor's Office. The worst general printer support was available to the Graduate School of Public Policy.

5. Administrative support for system use at the Executive level was greatest for Library and Information Studies and weakest for all units in the Chancellor's Office except the Chancellor's Communications and Resources Center. There was, however, effective support for PROFS in the CCRC.

Overall, it seems clear that while equipment allocation in the Chancellor's office was insufficient to allow all staff to have PROFS access, this was not the case in the other participating units.[11]

3.2 The Participants

Over the life of the project many people in the participating units tested PROFS. In addition, a significant number of persons used PROFS from more than one account. Unfortunately, the PROFS monitoring facility was not active over the entire history of the project, so some information was lost. This deficiency of coverage coupled with the variety of persons and lack of one-to-one correspondence between people and accounts makes identification of the universe of BIJOU participants problematic.

A user database was created for the BIJOU research project that included, among other things, a mapping between accounts and individuals which allowed aggregation of a person's use of the system across all accounts. Table 3.1 presents the total number of accounts and users during the project. Most of the unmatched accounts represent users who tried the system for an extremely short period or temporary accounts established for research assistants or stu-

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[11] After the BIJOU experiment was initiated, one other unit, the School of Education, was included with a minor equipment allocation. Because of the late introduction, this unit is not included in the analysis.

dents. In general the database includes all persons in BIJOU participating units who took advantage of system access.

Table 3.1
The BIJOU Universe of Participants

	Entire Monitored Period	Spring 1985
Number of Active Accounts	327	234
Number of Users by Unit		
Chancellor's Office	87	64
Department of Economics	41	37
School of Library and Information Studies	24	19
School of Business Administration	50	42
Graduate School of Public Policy	24	21
Total	223	183

Source: BIJOU User's Data Base, USERS1B LISTING 7/18/86. Active accounts include only BIJOU accounts related to the five listed units.

What are these people like? What are their jobs? To describe the jobs held by BIJOU participants a special eleven-category classification scheme was developed. These categories are summarized in Table 3.2. Classifications were assigned to jobs based on reported formal job title and individual investigation.

Table 3.2
Job Classifications and Definitions

Job Classification	Definition
Executive	Top management who are the ultimate decision makers of the unit. Examples include the Chancellor, Vice and Associate Chancellors, Deans and Provosts.
Program Officer	These are functional supervisors of the units. Individual jobs which fall in this category include Management Services Officers, Directors of Development, Office Managers, and Administrative Assistants.
Administrative Analyst	Analysts who have decision-making and/or advisory power. May supervise others. This category includes such job titles as Senior Budget Analyst, Facility Planner, and Administrative Budget Analyst.
General Analyst	These jobs are not supervisory or managerial, rather these individuals assist or are directed to perform analyses and organizational support activities. Such job titles include Accounting Clerks, Payroll Clerks, Record Keepers, Budget Clerks.
Administrative Secretary	These are unit staff members whose tasks involve providing assistance to executive administrators (e.g. typing, records management, phone and copying). Job titles include Administrative Assistant III and Dean's Secretary.
Faculty Secretary/Administrative Assistant	These are unit staff members whose tasks involve providing services to faculty (e.g. manuscript typing, phone and copying). Job titles are Faculty Secretary and Word Processing Specialist. Most of these carry official titles of Secretary II.
Student Affairs Secretary	These jobs consist of staff who deal with student services such as applications, registration, or student record keeping. Job descriptions include Admissions Clerks, Student Placement Advisors, and Undergraduate Assistants.
General Secretary	These are secretaries and administrative assistants who perform general secretarial functions such as appointment keeping, reception, scheduling meetings for others, typing and filing.
Administrative Faculty	These are teaching faculty in administrative positions such as department chair, vice-chair, and some deans.
Faculty	This category is for faculty members or teaching associates who are involved directly in teaching courses.
Other	This category was set up to contain all individuals who could not otherwise be categorized. Many individuals in this category are research assistants.

The distribution of users by unit and job classification is presented in Table 3.3. These data do not reveal the cross-section composition of employment in these units. Instead, what is measured is, say, the number of persons who, at some time during the BIJOU monitoring period, held a 'Program Officer' position in the Department of Economics and were involved in the BIJOU project.

Table 3.3
Frequency Distribution of PROFS Users by Job Classification and Organizational Unit

	Organizational Unit					
Job Classification	Chancellor's Office	Economics Department	Library & Information Studies	School of Business Administration	School of Public Policy	Total
Executive	10 5.62 83.33 15.87	0 0.00 0.00 0.00	1 0.56 8.33 5.26	1 0.56 8.33 2.63	0 0.00 0.00 0.00	12 6.74
Program Officer	6 3.37 42.86 9.52	1 0.56 7.14 2.70	1 0.56 7.14 5.26	5 2.81 35.71 13.16	1 0.56 7.17 4.76	14 7.87
Administrative Analyst	14 7.87 93.33 22.22	0 0.00 0.00 0.00	1 0.56 6.67 5.26	0 0.00 0.00 0.00	0 0.00 0.00 0.00	15 8.43
General Analyst	10 5.62 71.43 15.87	1 0.56 7.14 2.70	1 0.56 7.14 5.26	2 1.12 14.29 5.26	0 0.00 0.00 0.00	14 7.87
Administrative Secretary/ Assistant	12 6.74 66.67 19.05	0 0.00 0.00 0.00	1 0.56 5.56 5.26	3 1.69 16.67 7.89	2 1.12 11.11 9.52	18 10.11
Faculty Secretary/ Administrative Assistant	2 1.12 10.00 3.17	5 2.81 25.00 13.51	0 0.00 0.00 0.00	11 6.18 55.00 28.95	2 1.12 10.00 9.52	20 11.24
Student Affairs Secretary/ Assistant	0 0.00 0.00 0.00	3 1.69 37.50 8.11	1 0.56 12.50 5.26	2 1.12 25.00 5.26	2 1.12 25.00 9.52	8 4.49

Table 3.3 (continued)
Frequency Distribution of PROFS Users by
Job Classification and Organizational Unit

	Organizational Unit					
Job Classification	Chancellor's Office	Economics Department	Library & Information Studies	School of Business Administration	School of Public Policy	Total
General Secretary/ Assistant	6 3.37 37.50 9.52	3 1.69 18.75 8.11	1 0.56 6.25 5.26	3 1.69 18.75 7.89	3 1.69 18.75 14.29	16 8.99
Administrative Faculty	1 0.56 33.33 1.59	0 0.00 0.00 0.00	0 0.00 0.00 0.00	2 1.12 66.67 5.26	0 0.00 0.00 0.00	3 1.69
Faculty and Teaching Support	0 0.00 0.00 0.00	17 9.55 41.46 45.95	8 4.49 19.51 42.11	6 3.37 14.63 15.79	10 5.62 24.39 47.62	41 23.03
Other	2 1.12 11.76 3.17	7 3.93 41.18 18.92	4 2.25 23.53 21.05	3 1.69 17.65 7.89	1 0.56 5.88 4.76	17 9.55
Total	63 35.39	37 20.79	19 10.67	38 21.35	21 11.80	178 100.00

Cells contain, in order: frequency, percent, row percent, column percent.

Source: USERS1D LISTING, 7/29/86

Part of the variation in job distribution reflects structural characteristics of the units. There are more 'executive' observations for the Chancellor's Office because there were more PROFS users in executive positions there. But it is clear that differences in use patterns within each unit could result from differences in job composition alone. Thus it is appropriate to control for job mix when studying use patterns.

Finally, Table 3.4 presents data on user characteristics. For this comparison we separate faculty from staff, since faculty observations complicate comparisons between the Chancellor's Office and other campus units. The results again indicate considerable inter-unit variability. Staff in the School of Business Administration and the Chancellor's Office tend to be older, and to have spent more time working in the University. Virtually everyone on the staff of the School of Library and Information Studies claims to be between ages 30 and 39!

Table 3.4
User Characteristics

Charac-teristic	Administrative Personnel by Organizational Unit						Faculty
Sex	Chancel-lor's Office	Department of Economics	School of Library & Info. St.	School of Business Admin.	School of Public Policy	Total	All Units
Female	45 32.85 44.55 71.43	14 10.22 13.86 70.00	9 6.57 8.91 81.82	24 17.52 23.76 75.00	9 6.57 8.91 81.82	101 73.72	6 14.63
Male	18 13.14 50.00 28.57	6 4.38 16.67 30.00	2 1.46 5.56 18.18	8 5.84 22.22 25.00	2 1.46 5.56 18.18	36 26.28	35 85.37
Total	63 45.99	20 14.60	11 8.03	32 23.36	11 8.03	137 100.00	41 100.00

Note: Data are divided between non-faculty and faculty participants. For non-faculty participants, cells contain, in order, frequency, percentage of all non-faculty participants, row percent, and column percent. Faculty frequency and percentages are for all units combined.

Table 3.4, continued
User Characteristics

Charac-teristic	Administrative Personnel by Organizational Unit						Faculty
Age	Chancel-lor's Office	Department of Economics	School of Library & Info. St.	School of Business Admin.	School of Public Policy	Total	All Units
20 to 29	4 3.03 40.00 6.67	3 2.27 30.00 15.00	0 0.00 0.00 0.00	2 1.52 20.00 6.25	1 0.76 10.00 10.00	10 7.58	2 4.88
30 to 39	27 20.45 42.86 45.00	14 10.61 22.22 70.00	7 5.30 11.11 70.00	9 6.82 14.29 28.13	6 4.55 9.52 60.00	63 47.73	12 29.27
40 to 49	19 14.39 55.88 31.67	3 2.27 8.82 15.00	2 1.52 5.88 20.00	10 7.58 29.41 31.25	0 0.00 0.00 0.00	34 25.76	15 36.58
50 to 59	6 4.55 33.33 10.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	9 6.82 50.00 28.13	3 2.27 16.67 30.00	18 13.64	7 17.07
60 plus	4 3.03 57.14 6.67	0 0.00 0.00 0.00	1 0.76 14.29 10.00	2 1.52 28.57 6.25	0 0.00 0.00 0.00	7 5.30	5 12.20
Not Known	3 . . .	0 . . .	1 . . .	0 . . .	1 . . .	. .	. .
Total	60 45.45	20 15.15	10 7.58	32 24.24	10 7.58	132 100.00	41 100.00

Table 3.4, continued
User Characteristics

Charac-teristic	Administrative Personnel by Organizational Unit						Faculty
Years at UCB	Chancel-lor's Office	Department of Economics	School of Library & Info. St.	School of Business Admin.	School of Public Policy	Total	All Units
0 - 4	9 6.87 23.08 15.00	11 8.40 28.21 55.00	2 1.53 5.13 20.00	9 6.87 23.08 28.13	8 6.11 20.51 88.89	39 29.77	12 29.27
5 to 9	11 8.40 34.38 18.33	7 5.34 21.88 35.00	4 3.05 12.50 40.00	9 6.87 28.13 28.13	1 0.76 3.13 11.11	32 24.43	10 24.38
10 to 14	17 12.98 73.91 28.33	0 0.00 0.00 0.00	3 2.29 13.04 30.00	3 2.29 13.04 9.38	0 0.00 0.00 0.00	23 17.56	5 12.20
15 to 19	16 12.21 66.67 26.67	1 0.76 4.17 5.00	1 0.76 4.17 10.00	6 4.58 25.00 18.75	0 0.00 0.00 0.00	24 18.32	5 12.20
20 to 24	2 1.53 28.57 3.33	1 0.76 14.29 5.00	0 0.00 0.00 0.00	4 3.05 57.14 12.50	0 0.00 0.00 0.00	7 5.34	6 14.63
25 to 29	5 3.82 83.33 8.33	0 0.00 0.00 0.00	0 0.00 0.00 0.00	1 0.76 16.67 3.13	0 0.00 0.00 0.00	6 4.58	1 2.44
30 plus	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00 0.00 0.00	0 0.00	2 4.88
Not Known	3 . . .	0 . . .	1 . . .	0 . . .	2 . . .	. .	. .
Total	60 45.80	20 15.27	10 7.63	32 24.43	9 6.87	131 100.00	41 100.00

Source: BIJOU Database USERS1D 7/29/86

The concentration of long-time UCB employees in the Chancellor's Office is not surprising. The University tends to fill upper level positions from the ranks of current employees. The greatest concentration of top-level administrative positions is located in the Chancellor's Office. As a result, employees in the Chancellor's Office have a high probability of prior experience elsewhere on campus, and this is what the data reveal. Again, it is important not to compare use patterns without adjustment for job and personal characteristics.

4.0 The Professional Office System

4.0 THE PROFESSIONAL OFFICE SYSTEM

For most users BIJOU meant two things: A new gadget for the desk (a workstation) and PROFS. Most of the analysis of project outcomes involves what people did with both. Understanding these responses requires understanding what PROFS is like in general, and as implemented at Berkeley.

PROFS is a hierarchical, menu-driven system. To perform most activities the user begins at the PROFS main menu screen and initiates an activity by pushing a function key. In response, the program displays successive screens of information, instructions, or data. Some PROFS activities such as document preparation require more than function key responses, but almost all command-related activities are performed by function key signals.[12]

Each installation of the PROFS system is potentially unique in that a great deal of customization is possible. The main menus of the system can contain choices of functions that execute non-PROFS systems, additional functions not provided by the released version of PROFS can be implemented, and the contents of the screen displays can be modified. The analysis of this report relies heavily on the specific function arrangement employed in the BIJOU version of the system. This chapter provides an overview of the system BIJOU installed.

The user's view of the generic PROFS system is presented in the manual <u>Using the Professional Office System</u> [20]. The BIJOU user's view is summarized by BIJOU's <u>Using PROFS at Berkeley</u> [21]. All of the menu screens employed in BIJOU PROFS are reproduced in Appendix C.

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[12] A command mode is available which bypasses the main menu; this was not used by unit participants in the BIJOU experiment.

4.1 Screens

Suppose you are a BIJOU participant. You log onto your account. What do you see? The first of three 'Main Menus'. These screens are reproduced as Figures 4.1.a and 4.1.b. The reproduction does not include contrasts; in application various items are highlighted, including today's date on the calendar and the time of day. The number in the upper right hand corner of each screen is the menu number. The menu number is very important, since much of the use progression data discussed later are presented based on menu number sequences. All three main menus have the PROFS number A00, but throughout the book we will refer to them as A001, A002, and A003.

The arrow in the lower left-hand corner of the screen identifies the command line, the home location of the cursor. CMS and other types of commands may be entered here. The PF list identifies the (Program) Function Keys to be used to initiate each activity. Function keys 10 and 11 'turn the page' on the Main Menu; thus from the first of the Main Menu screens, function key 10 moves the user to Main Menu Screen 2.

Figure 4.1a

PROFS Main Menu Page One

```
+-----------------------------------------------------------------------+
|  MDC-BIJ            P R O F S   M A I N   M E N U     CAO-SYSTEM   A00|
|  Press one of the following PF keys.                                  |
|  PF1  Calendar                                    Time:    1:45 PM    |
|  PF2  Review In-Basket                                                |
|  PF3  Search for Document                      1985   SEPTEMBER   1985 |
|  PF4  Manage Notelogs          *------*         S   M   T   W   T   F   S |
|  PF5  Prepare a Document       | PAGE |         1   2   3   4   5   6   7 |
|  PF6  Set a Reminder           | ONE  |         8   9  10  11  12  13  14 |
|  PF7  Send a Note              *------*        15  16  17  18  19  20  21 |
|  PF8  Send Immediate Message                   22  23  24  25  26  27  28 |
|                                                29  30                  |
| PF10  Menu Page Two                               Day of Year: 248    |
| PF11  Menu Page Three                                                 |
|                                              PF9 Help     PF12 End   |
| --------------------------------------------------------------------- |
|                                                                       |
|                                                                       |
|                                                                       |
|                                                                       |
|                                                                       |
|                                                                       |
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|                                                                       |
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|                                                                       |
|                                                                       |
|                                                                       |
|                                                                       |
|                                                                       |
|===>                                                                   |
+-----------------------------------------------------------------------+
```

Figure 4.1b

PROFS Main Menu Pages Two and Three

```
+--------------------------------------------------------------------------+
|  MDC-BIJ            P R O F S   M A I N   M E N U     CAO-SYSTEM    A00|
|  Press one of the following PF keys.                                     |
|  PF1  Manage Maillog                                  Time:   2:58 PM    |
|  PF2  Personal Directory                                                 |
|  PF3  File Documents                              1985   SEPTEMBER   1985 |
|  PF4  View Central Directory    *------*          S   M   T   W   T   F   S |
|  PF5  Prepare a Document        | PAGE |          1   2   3   4   5   6   7 |
|  PF6  Author Profiles           | TWO  |          8   9  10  11  12  13  14 |
|  PF7  Manage Distribution Lists *------*         15  16  17  18  19  20  21 |
|                                                  22  23  24  25  26  27  28 |
|                                                  29  30                   |
| PF10  Menu Page Three                               Day of Year: 248     |
| PF11  Menu Page One                                                      |
|                                                 PF9 Help    PF12 End    |
| ------------------------------------------------------------------------ |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|===>                                                                      |
+--------------------------------------------------------------------------+
```

```
+--------------------------------------------------------------------------+
|  MDC-BIJ            P R O F S   M A I N   M E N U     CAO-SYSTEM    A00|
|  Press one of the following PF keys.                                     |
|  PF1  .                                               Time:   3:02 PM    |
|  PF2  Update Names for Schedule Selection                                |
|  PF3  .                                           1985   SEPTEMBER   1985 |
|  PF4  Change Password           *------*          S   M   T   W   T   F   S |
|  PF5  .                         | PAGE |          1   2   3   4   5   6   7 |
|  PF6  .                         | THREE|          8   9  10  11  12  13  14 |
|  PF7  .                         *------*         15  16  17  18  19  20  21 |
|                                                  22  23  24  25  26  27  28 |
|                                                  29  30                   |
| PF10  Menu Page One                                 Day of Year: 248     |
| PF11  Menu Page Two                                                      |
|                                                 PF9 Help    PF12 End    |
| ------------------------------------------------------------------------ |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|===>                                                                      |
+--------------------------------------------------------------------------+
```

In general the PROFS hierarchy has the familiar 'Root and Tree' character. Selection of any of the function operations results in presentation of a new menu. An example is provided by PF1 on the first main menu. Pressing the 'calendar' option leads to screen B00, 'Process Schedules', which is reproduced as Figure 4.2. Here again the user is presented with options initiated by function key input. The user retreats to the root, the main menu, via PF12; help screens are available for B00 and almost all other menus via PF9. The Calendar activity tree may be followed further by reviewing Appendix C; much more detail on user movements among the options is presented in Chapter 8.

There are two exceptions to the Root and Tree structure evident in calendar function. For some activities no subsequent function key input is required ('Change Password' on Main Menu Page 3 is an example). And some branches cross over from one main menu function to another.[13]

4.2 Activities

Eliminating duplicate main menu entries[14] and excluding command line entries or transfers from main menu to main menu, there are 16 options available in the system. These options can be classified by the type of material being produced, such as notes or documents, or by the type of action being performed, such as searching for documents, creating documents, receiving documents, or viewing

---

[13] For example, if in review of mail the user receives a draft document mailed from another user for further changes, the recipient has the option of moving directly into the PROFS document editing facility from within the mail handling facility.

[14] Note that the user can 'Prepare a Document' from either Main Menu Screen 1 or 2.

Figure 4.2
PROFS Menu B00

```
+--------------------------------------------------------------------+
|                        PROCESS SCHEDULES                       B00|
|                                                                    |
| Schedule For:  Michael Cooper               Time:    2:37 PM      |
| Schedule Date:       /     /                                       |
|                                          1985   SEPTEMBER    1985 |
| Press one of the following PF keys.        S    M    T    W    T    F    S |
|                                            1    2    3    4    5    6    7 |
|  PF1  Look at or change the schedule       8    9   10   11   12   13   14 |
|  PF2  Choose another schedule             15   16   17   18   19   20   21 |
|  PF3  Choose a conference room            22   23   24   25   26   27   28 |
|  PF4  Change to the next day              29   30                          |
|  PF5  Change to the previous day                   Day of Year: 248 |
|  PF6  Look at the whole month                                      |
|  PF7  Schedule a meeting                                           |
|  PF8  Print a schedule                                             |
|                                                                    |
| PF10  Change to the next month                                     |
| PF11  Change to the previous month                                 |
|                                                                    |
|                                                                    |
| PF9 Help    PF12 Return                                            |
|                                                                    |
+--------------------------------------------------------------------+
```

documents. There are also support functions such as calendar and schedule maintenance.[15]

---

[15] Flexibility is provided by the PROFS system in naming these activities so that they more closely resemble the terms by which they are known in a particular organization. This flexibility leads to training problems and to nomenclature problems in discussing in a standard way a particular PROFS activity. Nevertheless, the names of activities referred to in this paper will be the ones used in the Berkeley customization of PROFS. Appendix B contains the equivalences between IBM PROFS activity and those used at Berkeley.

Mail is sent from one user to another with the 'send a note' function. The invocation of a function results in the display of the main menu screen for the function. Each menu is numbered, and in this case the menu number for the function is E04. Direct communication between online users is possible with the 'send immediate message' (E07) function. When a user wishes to receive mail, the 'review in-basket' (C00) activity is selected, and when the user wishes to find, change, print, or delete old mail messages the 'manage maillog' (D00) activity can be invoked.

Both electronic (softcopy) and paper (hardcopy) documents can be managed with PROFS. To file information about hardcopy and softcopy documents, the 'file documents' (A05) function is used, while the 'prepare a document' (F00) function invokes a text editor program so that the user can create a softcopy manuscript or letter. Users can also 'search for documents' (D01) in the PROFS database.

PROFS can be used to keep one's 'calendar' (B00) of daily appointments, and also to remind one of a task to be performed at a specific time of day - 'set a reminder' (X03).

To support the distribution and preparation of information, the system provides the facility for the user to maintain a 'personal directory' (N00) of the names, nicknames, computer addresses, and phone numbers of correspondents.[16] It also allows one to 'manage distribution lists' (T30) of individuals who will receive certain correspondence. Finally, there is a facility for creating 'author profiles' (T20) which are pre-defined formats used in generating correspondence.

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[16] Since this facility was a local enhancement to PROFS, the menu numbers in the released version are different.

In spite of the number of possible activities that can be performed, and the breadth and depth of the PROFS hierarchy, the system is relatively easy to master. As will be discussed later, several of the main processing subsections within the system are re-used to handle the processing of notes, mail, and documents. The result is a familiarity bred by exposure to one part of the system, which is easily transferable to another part.

4.3 Activity Measurement in the PROFS Hierarchy

The remainder of this book is concerned with how PROFS was used. Use is measured in several ways, each with different complexity. Chapter 5 considers use only in terms of number of users logged on to the system. Another way of measuring use is in terms of the amount of time the user is connected (logged on) to the system. Connect time is not a good measure of system use, however, since it is quite possible that BIJOU participants logged on to their accounts regularly but used functions infrequently. In Chapter 6 the notion of connect time is refined to focus on various definitions of active time, that is, time spent actually using the system.

In addition to total time spent in system use, it is important to understand the pattern of function utilization. Measuring function use is complicated by the problem of identifying when a function is actually invoked. When presented with menus of options such as appear in Figure 4.1, the typical BIJOU participant will try a function key. But trying things out in this way is a form of tourism and not function use. In Chapter 7 more refined measures of function use are introduced.

PART III: USING THE BIJOU SYSTEM

5.0 PROFS Use: An Overview

5.0 PROFS USE: AN OVERVIEW

In the remainder of this book an attempt is made to provide a picture of the quality and character of use of the BIJOU office support system by units participating in the project. Emphasis is on data collected from the PROFS Monitor. The first step is simply to count the number of system users and to try to identify trends in the number of active users in each department. This is the focus of the chapter.

5.1 Counting the Users

The number of users per day are plotted by unit in Figures 5.1-5.5 for Mondays from (with some exceptions) October, 1983 to June, 1985. A number of special factors affect the interpretation of these data. First, this is a count of <u>users</u> and not accounts. In cases in which users logged onto more than one account during the day, the total activity still counts for just one use. Second, the interval for which the data are plotted is defined by the period of regular availability of the Monitor. These data thus miss about one year of activity, and therefore the vital startup phase is not included. This reflects the time taken to design and implement the Monitor. The School of Business Administration data begin later than the data for other units because of the delay in installation of its own 4341 machine. Third, only Monday data are plotted because inclusion of all days adds clutter but not information. Tests of variation by day in the number of users logged onto the system revealed no statistically significant differences between the Monday counts and those for other days.[17] Finally, the gap in the plot in late 1984 results from a malfunction in the Monitor.

With this general interpretation, consider the unit results. Here emphasis will be placed on the overall trend and the difference between patterns of use in spring of 1984 and spring of 1985. In discussing the figures some data and statistical results for all workdays will be included.

Figure 5.1 covers the School of Business Administration. School of Business Administration monitoring began in March, 1984, with the installation of their own IBM 4341 machine. By and large, SBA use remained constant at around sixteen users per day. Neither the slight upward difference between user counts in 1984 and user counts in 1985 is statistically significant.[18] The first monitored Monday in 1985 fell within the between-semesters break when few faculty and staff were making use of the system, which explains the very low use recorded for this day in this and all other the graphs.

Figure 5.2 illustrates Chancellor's Office usage. Here both the upward trend through 1984 and the subsequent decline in use are statistically significant. Although less dramatic, a similar pattern is observed for the Department of

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[17] The one exception was a propensity for participants in the School of Public Policy to use the system more frequently on Tuesdays.

[18] Statements regarding statistical significance in this section reflect results of a regression of the logarithm of the user count on trend variables and dummy variables for days of the week. The functional form adopted permitted testing for differences in trend and levels of use before and after December, 1984. Tests were based on all work days, not Mondays alone. General references to 'significant' results imply that the corresponding hypothesis test (no time trend, no inter-year difference in use, etc.) could be rejected with at worst an error probability of .10.

Economics in Figure 5.3. Here again the upward trend in use through 1984 and the subsequent recession are both statistically significant.

Figure 5.1
Users by Date
Mondays, 1983-85
School of Business Administration

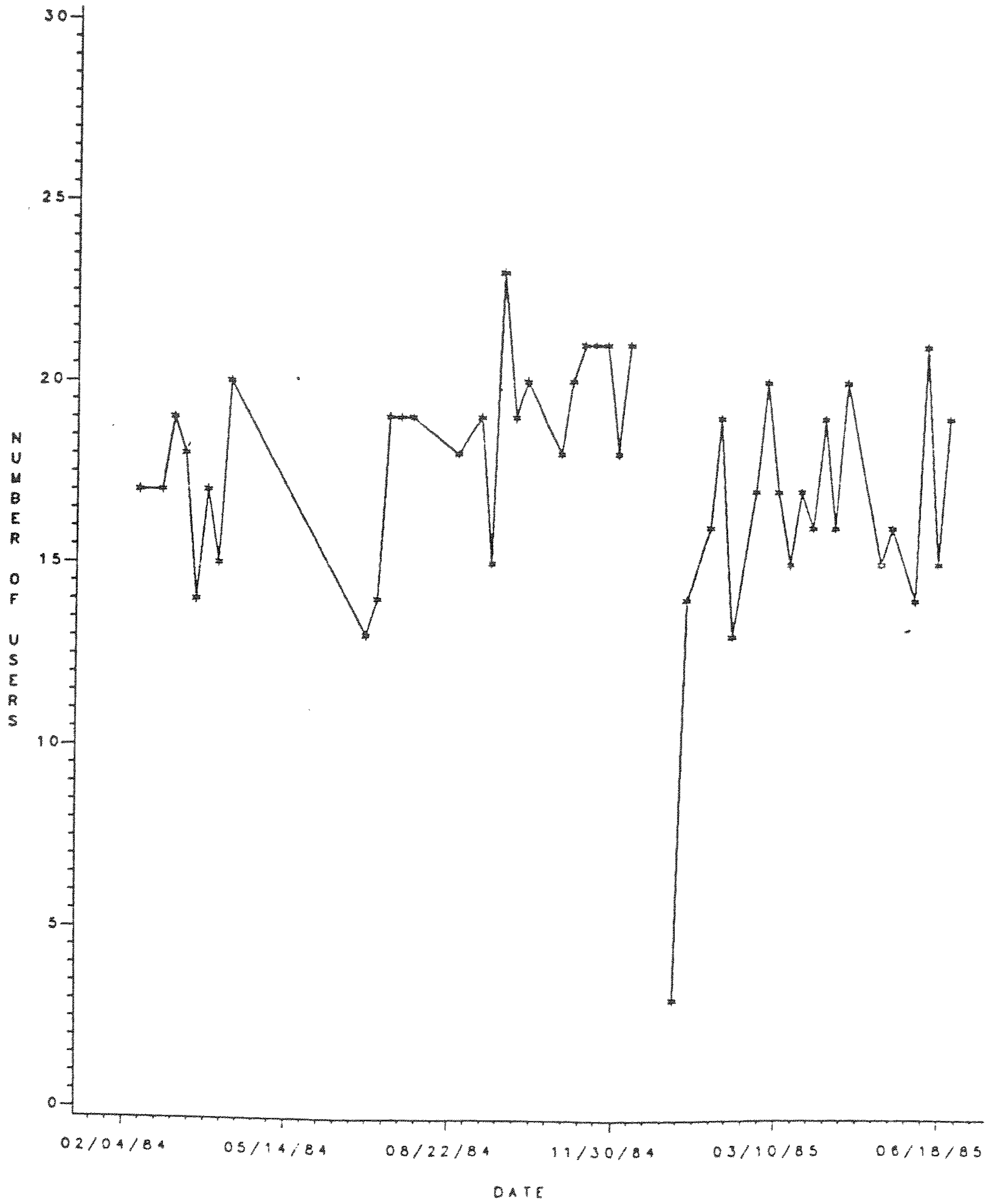
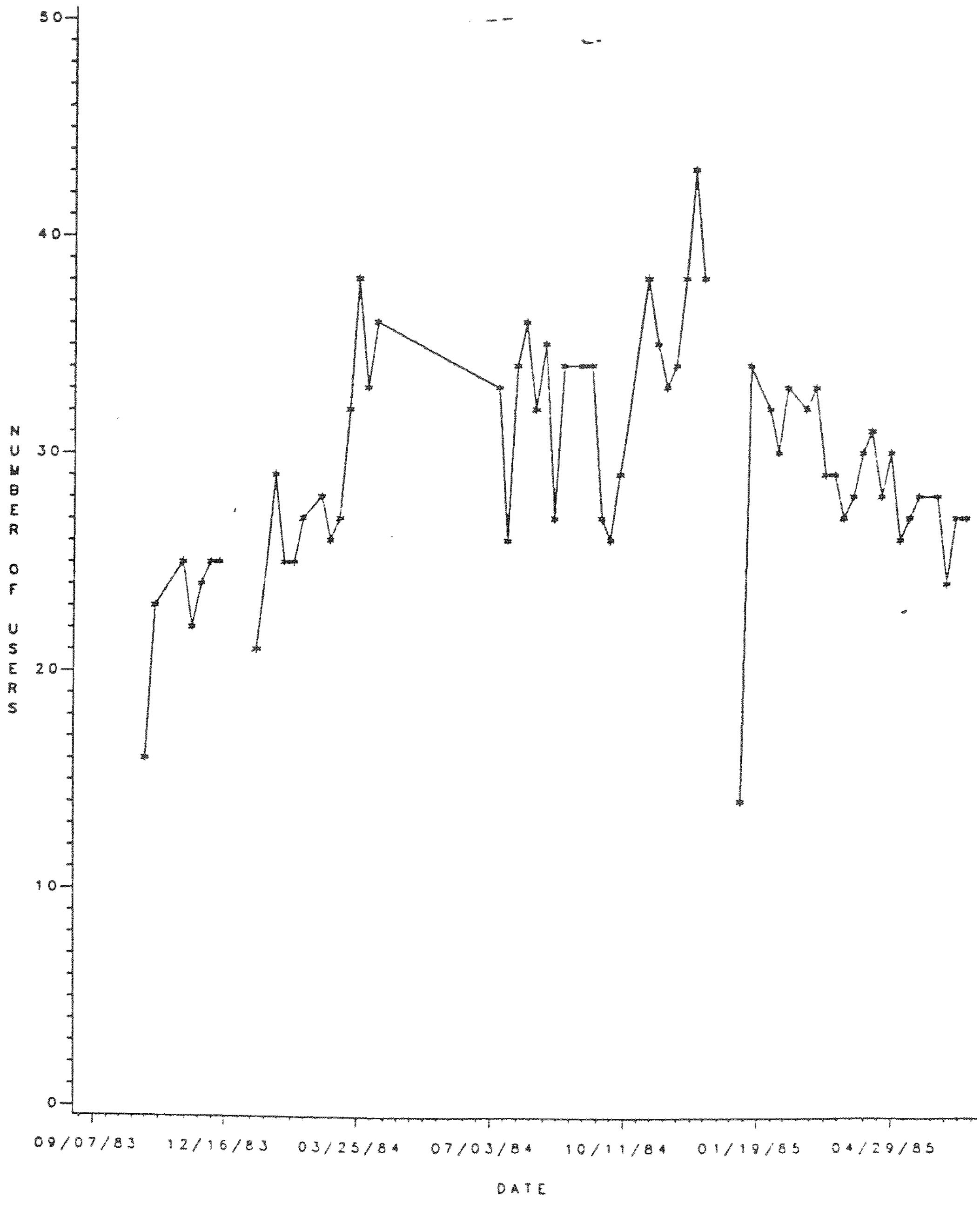
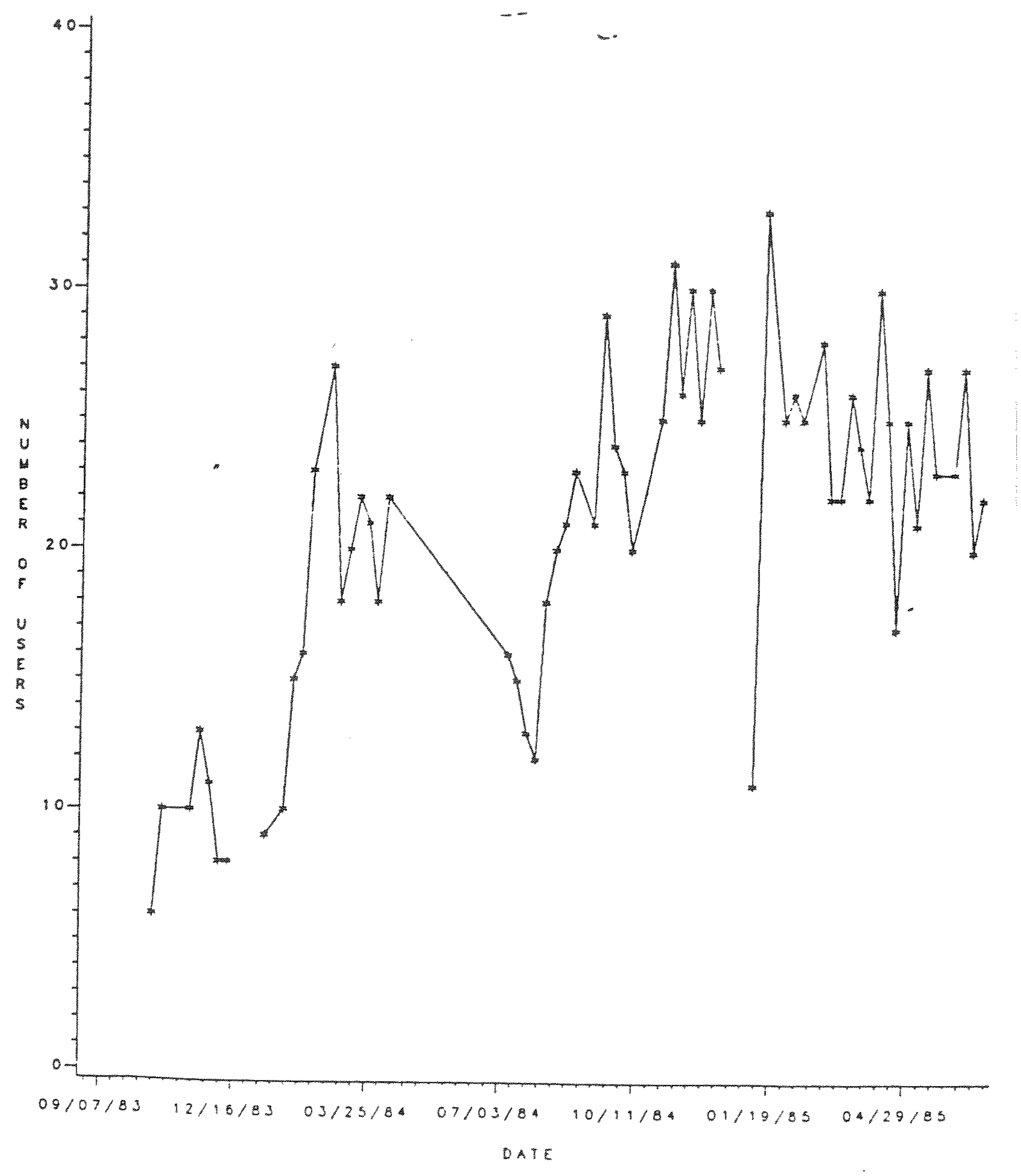

30
25
20
15
10
5
0
NUMBER OF USERS
02/04/84
05/14/84
08/22/84
11/30/84
03/10/85
06/18/85
DATE

Figure 5.2
Users by Date
Mondays, 1983-85
Chancellor's Office



50
40
30
20
10
0
NUMBER OF USERS
09/07/83
12/16/83
03/25/84
07/03/84
10/11/84
01/19/85
04/29/85
DATE

Figure 5.3
Users by Date
Mondays, 1983-85
Department of Economics


40
30
20
10
0
NUMBER OF USERS
09/07/83
12/16/83
03/25/84
07/03/84
10/11/84
01/19/85
04/29/85
DATE

The pattern of use for the School of Library and Information Studies and the Graduate School of Public Policy differ from that observed in the other units. As is clear in Figure 5.4, use in the School of Library and Information Studies continued to grow through 1985. While the number of users in the Graduate School of Public Policy was small and highly variable (see Figure 5.5), there is little evidence of significant decline as the project came to a close.

5.2 Matching Days

For both faculty and staff, work in the University is episodic: the year is segmented into registration time, finals time, grade recording time, budget time, graduation time, Blessed Summer, and so forth. Each of these episodes overlays special system requirements on more general work that continues with less month-to-month variation.

This seasonality makes comparison of use in one period with use in another difficult unless period-to-period comparisons are done based on the academic calendar. As a final check on differences between 1984 and 1985 in unit use patterns, data from spring 1985 were adjusted to coincide with the 1984 calendar. These data are plotted, along with the available monitoring results for 1984, in Figures 5.6-5.10 and overlayed on plots for all monitored work days for 1985. Wherever a 1984 day is marked in these plots, the corresponding point for 1985 is the match day. The 1985 data include other observations as well, since for 1985 the monitor was in operation every day.

Figure 5.4
Users by Date
Mondays, 1983-85
School of Library and Information Studies

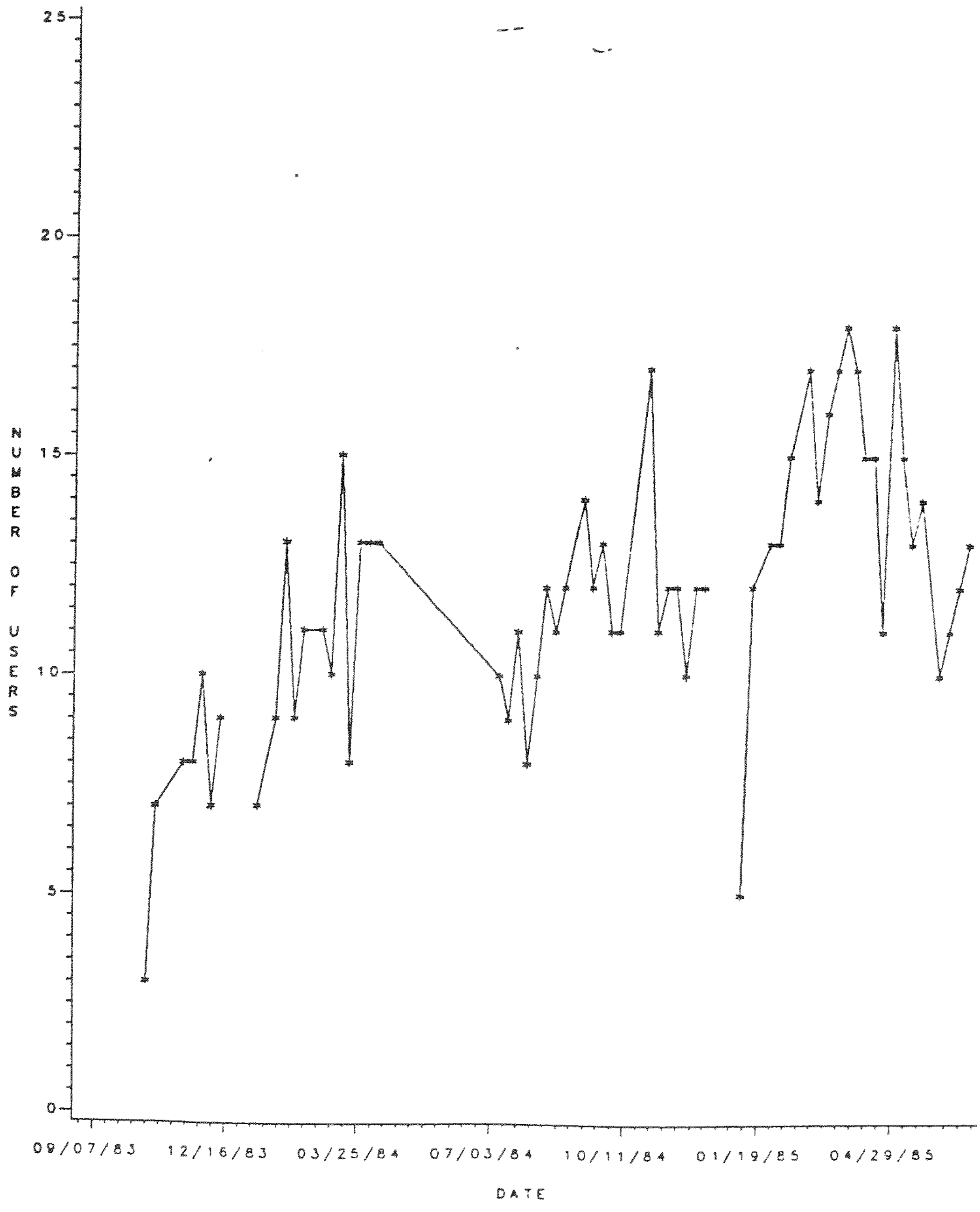
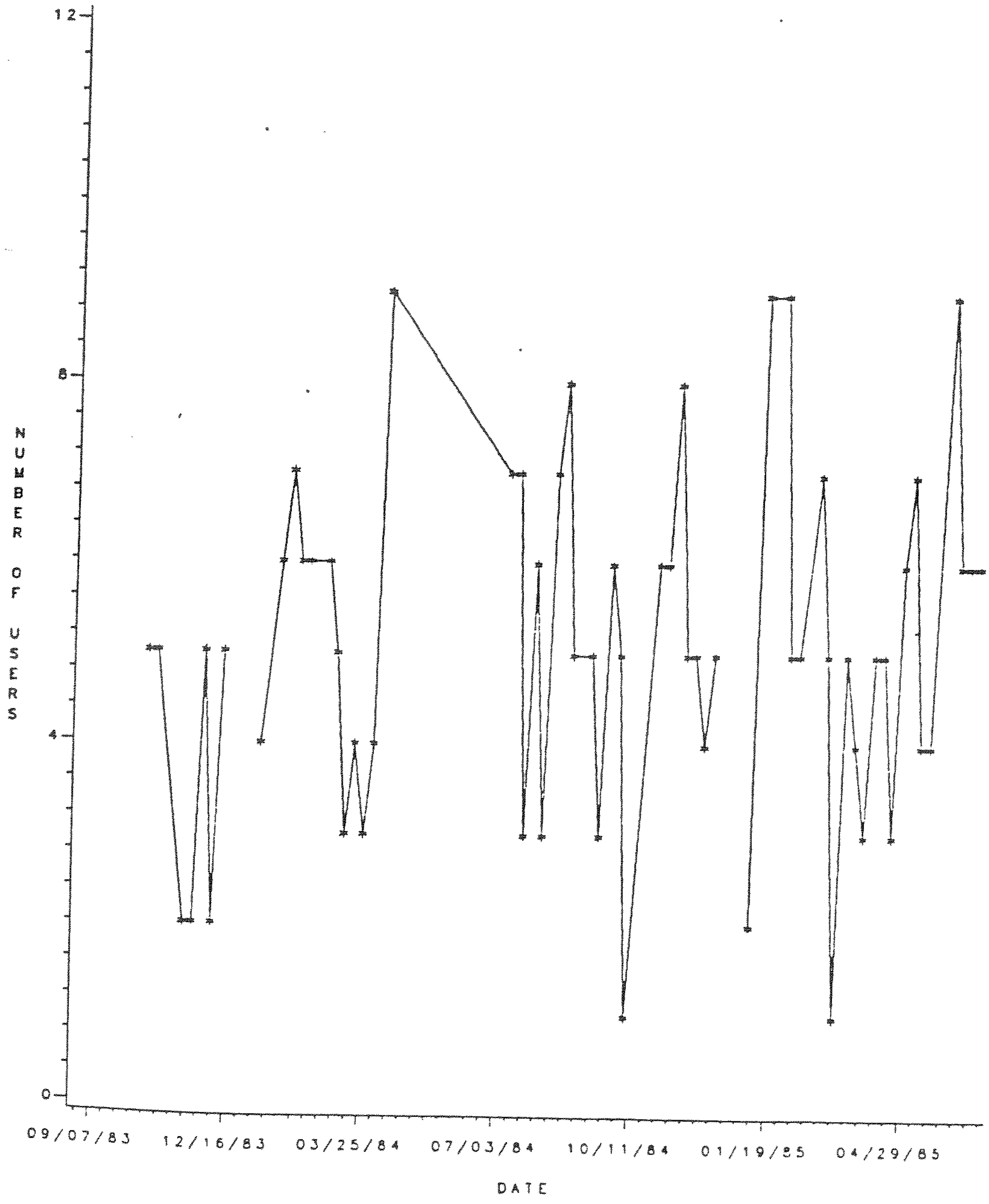

NUMBER OF USERS
0
5
10
15
20
25
09/07/83
12/16/83
03/25/84
07/03/84
10/11/84
01/19/85
04/29/85
DATE

Figure 5.5
Users by Date
Mondays, 1983-85
Graduate School of Public Policy


12
8
4
0
NUMBER OF USERS
09/07/83
12/16/83
03/25/84
07/03/84
10/11/84
01/19/85
04/29/85
DATE

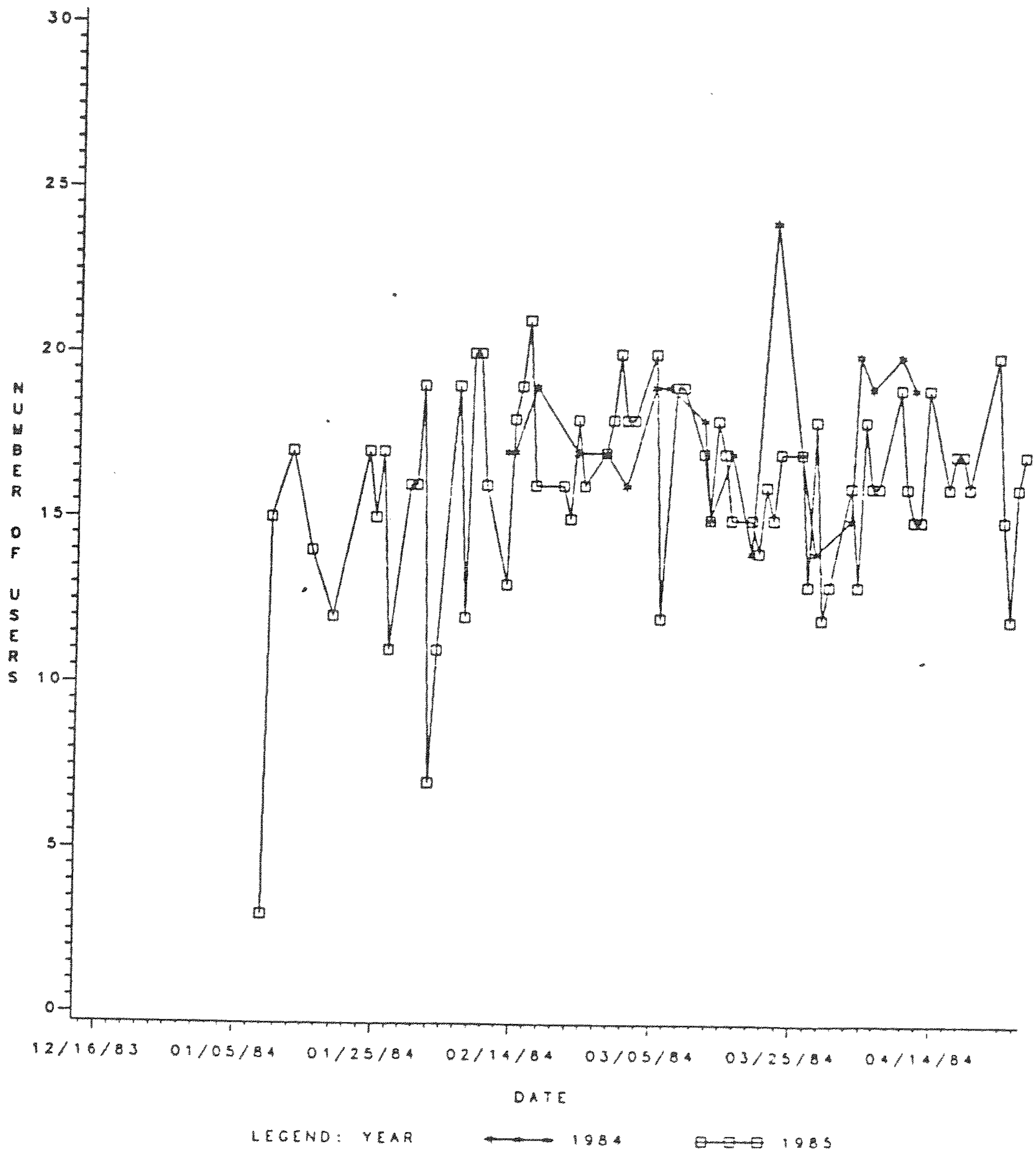
As is apparent from Figure 5.6, there is no statistically significant difference between use in 1984 and 1985 in the School of Business Administration. For the Chancellor's Office the difference between mean daily use in 1984 and 1985 is again not statistically significant, but as is apparent from Figure 5.7 the trends in use in 1985 (downward) was fundamentally different from the trend in use in 1984 (upward). Clearly, mean values do not tell the whole story.

Again, the pattern is different in the Department of Economics. For the matched days the average number of users was up from 16.3 in 1984 to 20.7 during the corresponding 34 days of 1985. This difference is statistically significant, as is the increase of 2.3 average users per day (from 9.5 to 11.8) in the data for the School of Library and Information Studies. The difference between years is again insignificant for the Graduate School of Public Policy.

5.3 Summary

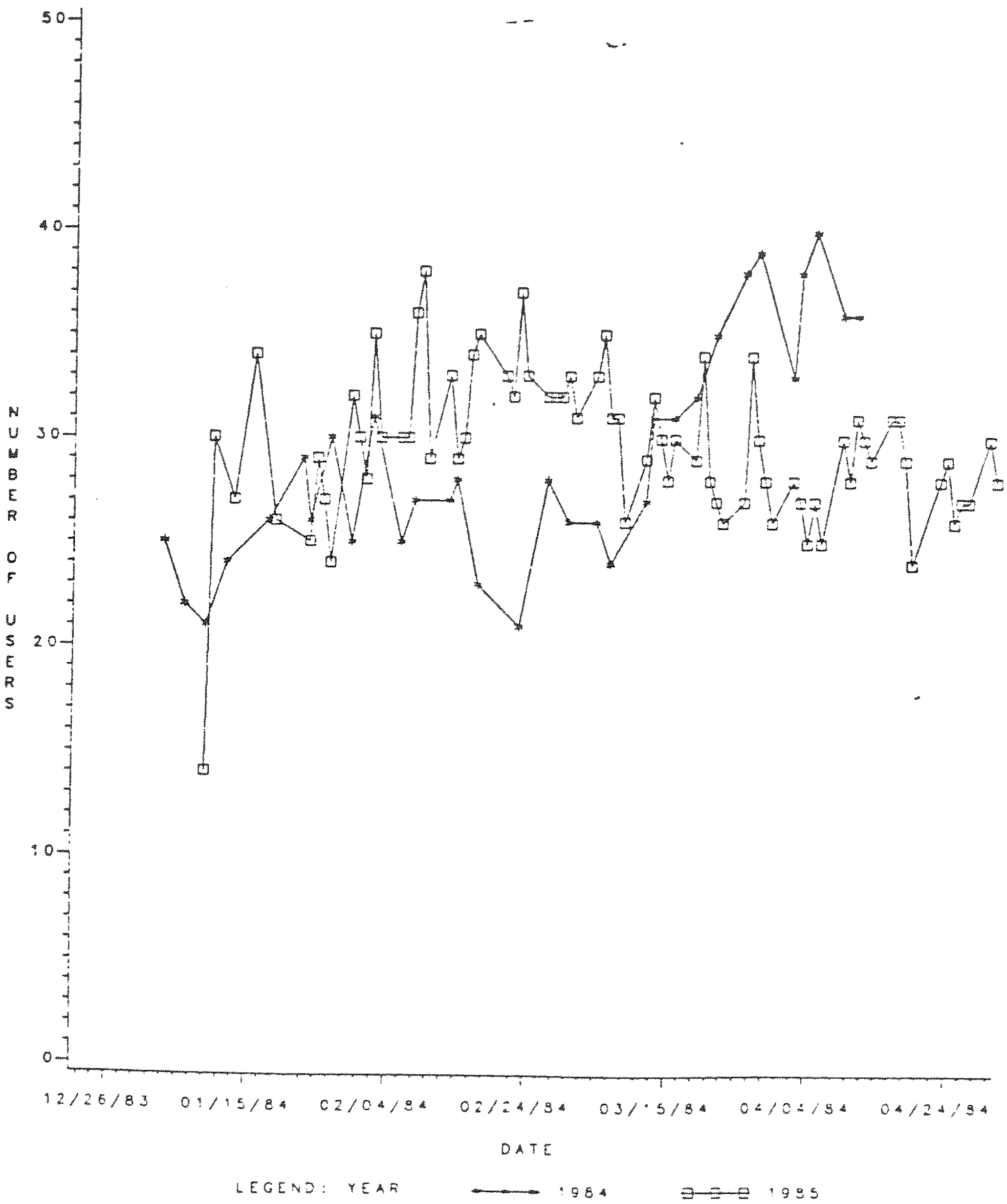
This chapter has presented first results from the Monitor. Three conclusions have emerged: Overall, the numbers of users in participating units did not change very much between 1984 and 1985. The significant exception is the Department of Economics and the School of Library and Information Studies, where use grew rapidly through 1984 and, as a result, averages for spring 1985 are significantly above averages for 1984.

Figure 5.6
Matched Use Data, 1984 and 1985
School of Business Administration



1985 DATA ARE FOR EQUIVALENT DAYS

Figure 5.7
Matched Use Data, 1984 and 1985
Chancellor's Office



1985 DATA ARE FOR EQUIVALENT DAYS

Figure 5.8
Matched Use Data, 1984 and 1985
Department of Economics

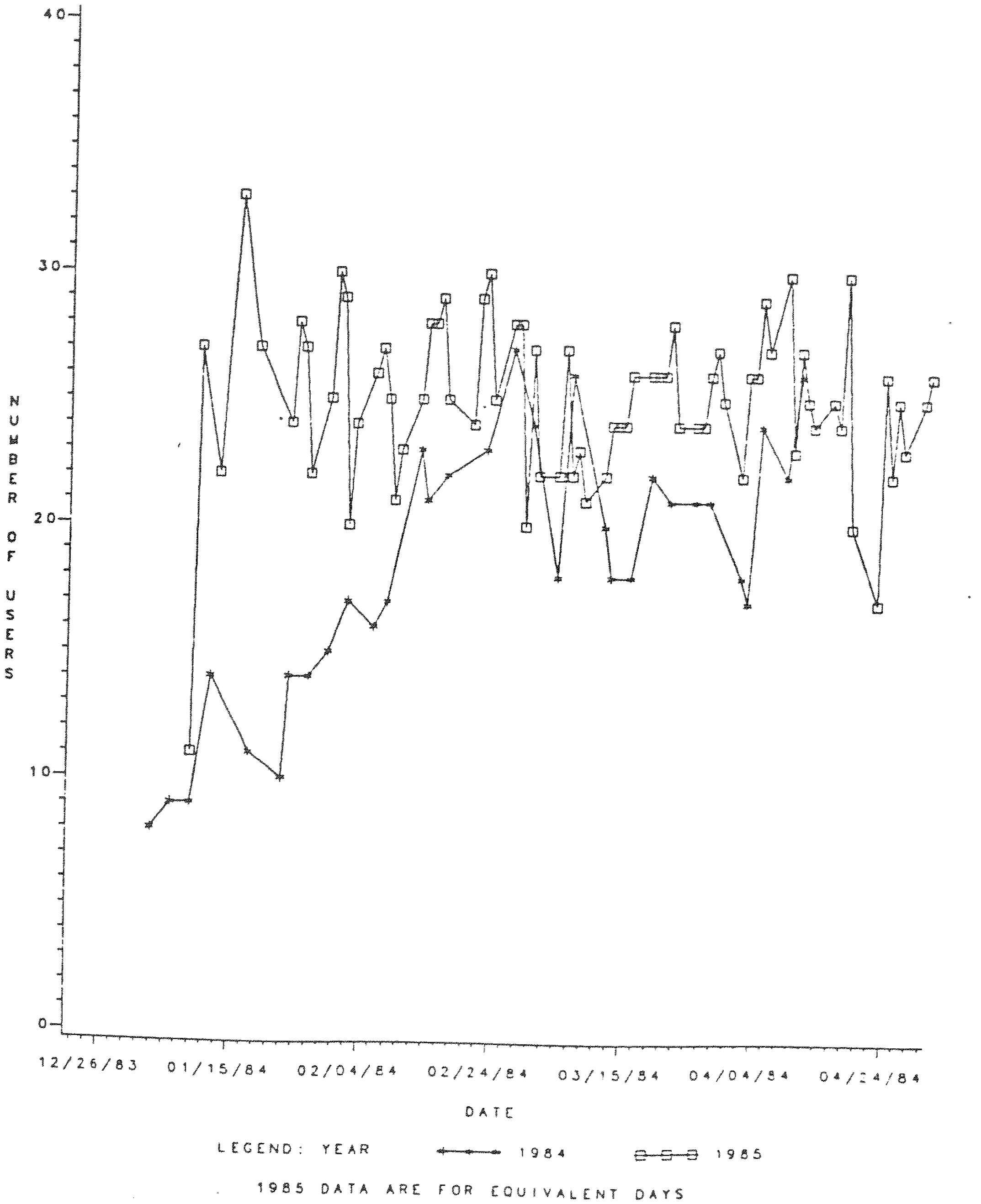
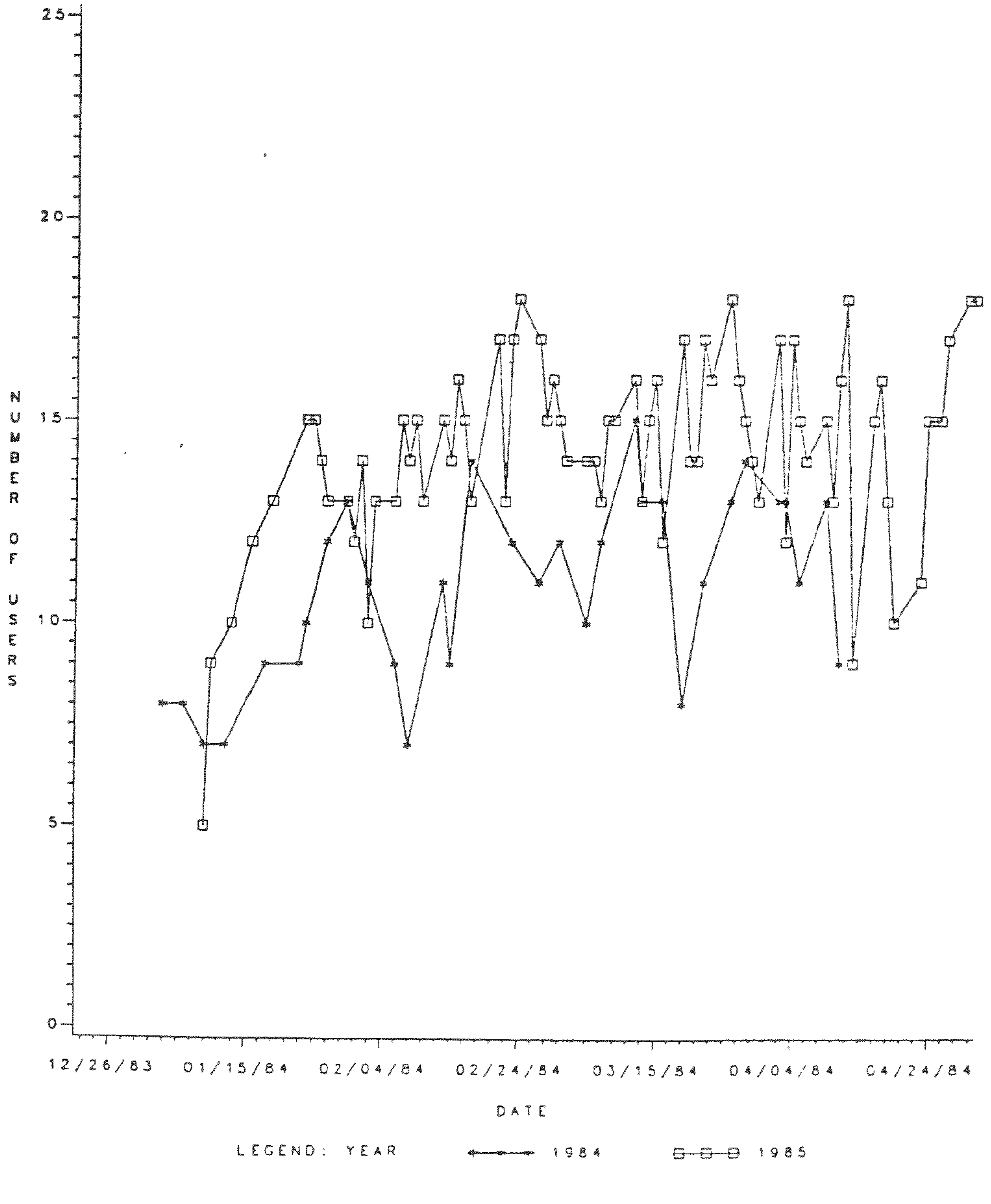

40
30
20
10
0
NUMBER OF USERS
12/26/83
01/15/84
02/04/84
02/24/84
03/15/84
04/04/84
04/24/84
DATE
LEGEND: YEAR
1984
1985
1985 DATA ARE FOR EQUIVALENT DAYS

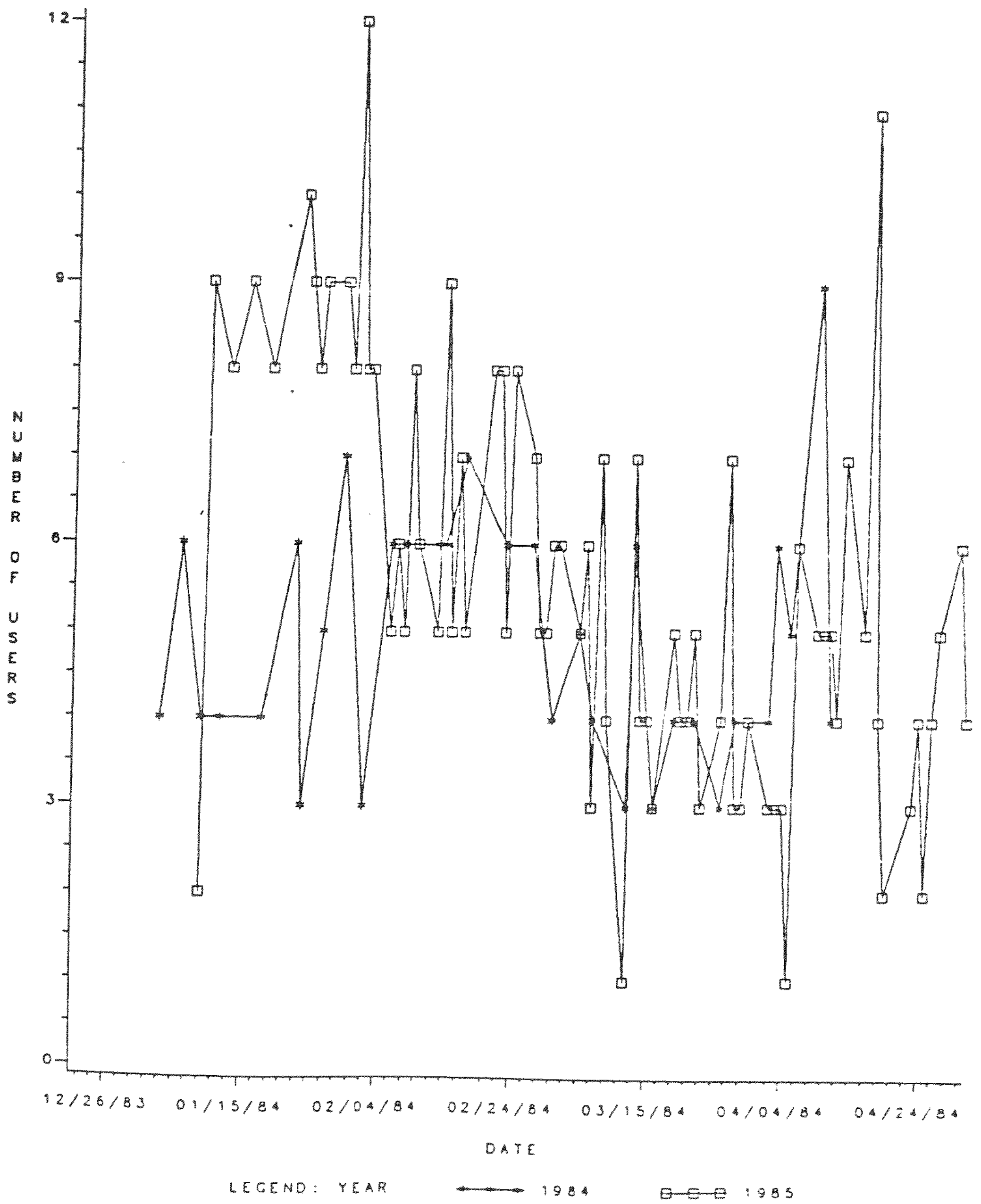
Figure 5.9

Matched Use Data, 1984 and 1985
School of Library and Information Studies



1985 DATA ARE FOR EQUIVALENT DAYS

Figure 5.10
Matched Use Data, 1984 and 1985
Graduate School of Public Policy



1985 DATA ARE FOR EQUIVALENT DAYS

Second, results for the Chancellor's Office, the School of Business Administration, and the Department of Economics all reveal some waning of use as the project neared the end of its third year. It is not clear from these aggregate statistics which users within these departments were dropping out. This is a matter for attention later in the book.

Third, use patterns for spring 1985 are not sufficiently different from spring 1984 use patterns to preclude focus on these months for more detailed analysis. This decision is important because, as pointed out earlier, it is for the first six months of 1985 that our data are most complete.

In the next chapter we move from study of aggregates of users to the behavior of individuals in the project.

6.0 Trying PROFS Out: Life, and Death, in Office Automation

6.0 TRYING PROFS OUT: LIFE, AND DEATH, IN OFFICE AUTOMATION

6.1 Introduction

The data in Chapter 5 showed aggregate PROFS usage in the BIJOU experiment. We turn now to analysis of PROFS use by individuals. Our objective is to study the pattern of system use by participants and to relate variations in these patterns to user characteristics.

System use has many dimensions. In this chapter we consider two: longevity, and intensity. Longevity refers to how long a participant remains an active user of the system once it has been introduced. Intensity concerns the amount of system use in any fixed time interval. A third dimension, variety, is considered in Chapter 7. Variety refers to the range of system functions employed. We begin by studying dropping out -- termination of system use by users who at one time or another during the experiment tried to use PROFS. We then consider the amount of system use by representative users.

Our approach to the study of user behavior in BIJOU is perhaps best understood by drawing an analogy to the study of the behavior of a child given a construction set. Such toys generally include many parts, and rarely, if ever, are all the parts used in any single play session. Also, while virtually all children will open the box, it is by no means certain that the construction set will become a regular part of each day's activities or, even if part of the system is incorporated into the play routine, how much time will be devoted to it and what parts will be used.

PROFS is like such a set. The system is multifunctional, and individual users can be expected to choose among functions on the basis of job requirements, tastes, and alternatives. For most functions, most users in the BIJOU experiment had alternatives, and as a result the related PROFS function could be adopted or dropped based on functionality, or accessibility, or both. Because of the haphazard pattern of equipment acquisition and training under BIJOU, in most units individuals could delay initial entry into the system and, once entry was achieved, could vary use and delay experimentation with particular functions for substantial amounts of time. While unimpressive as an example of office systems implementation, these facts suggest that the pattern of PROFS use within BIJOU may indicate something about individual preferences and job requirements, just as the pattern of voluntary use of a construction set would tell us something about what children like.

6.2 The BIJOU Dropouts: Analyzing the PROFS Quit Rate

In all, 233 identifiable BIJOU users appeared active at one time or another in the monitor data. During the last six months of the project only 183 users logged on. Even when allowances are made for normal job turnover, it is obvious that some users dropped out. Who were they? Why did they quit?

Study of the elapsed time between a first try with PROFS and termination of use has certain structural similarities to the study of failure times (see Kalbfleisch and Prentice [10]). Failure time analysis has traditionally been applied to problems such as the time to failure for a continuously-operated electronic component or time to expiration of laboratory animals injected with a known carcinogen. While superficially BIJOU is different, this project also features subjects, treatments, and a delayed response. In the next section a failure time model is developed for studying dropouts from office systems implementation. Because monitoring was initiated after the experiment was underway, the data developed in the BIJOU experiment are not completely appropriate for failure time analysis. But the results suggest that this approach holds promise for future applications.

6.2.1 The Model

We begin with a simplification. Define as BIJOU participants all persons who logged onto their own account at some point during the BIJOU experiment. We shall treat the general timing of first use of PROFS as being beyond the control of participants.[19] For most users the BIJOU experience began with the delivery and hook-up of a terminal; PROFS experience began at the point the user was given an account and shown how to log onto the system. As discussed earlier, for a variety of reasons not all users found the system to be worthwhile as support for their jobs. These users quit.

This event, quitting, is studied in the following way. Suppose participation longevity is measured by a continuous variable t and let $t = 0$ represent the instant at which the first logon occurs.[20] Let τ be a (nonnegative) random variable representing the duration of time between $t = 0$ and some user's last PROFS activity before quitting the system. Define as the BIJOU survivor func-

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[19] We treat the decision to participate as outside the control of the experiment. In some cases this decision itself would be an appropriate subject for investigation, but our data were inadequate for the task.

[20] For simplicity we carry out the failure time analysis exposition in continuous time. The application presented below is in discrete time. The analogous discrete time expressions for the formulae in the text are reported in Kalbfleisch and Prentice [10].

tion the probability that a participant drawn at random from the BIJOU group will continue PROFS use for at least some amount of time, t, that is

$$F(t) = P(\tau \geq t), \quad 0 < t < \infty.$$

Given the assumptions, $F(0) = 1$. It is a fact of life that, as good as PROFS may be, $F(\infty) = 0$.

The probability density function of τ is the negative of the derivative of $F(t)$ with respect to t:

$$f(t) = - \frac{dF(t)}{dt} .$$

The BIJOU quit rate at any time t is revealed by the hazard function:

$$\lambda(t) = \frac{f(t)}{F(t)} .$$

$\lambda(t)$ is interpreted as the proportion of users still active after the passage of time in amount t who quit at that instant. In application, time is measured in discrete units, say days, and the hazard function is interpreted as the ratio of the number of users who terminate during the t^{th} period of use to the number of users who last to the t^{th} period.

Given data on system entry and termination, it is possible to plot the survival and hazard functions for office system use. For purposes of analyzing how the PROFS system was used, attention is focussed on the short-run survival rate and the corresponding hazard function. In part, 'dropping out' (that is, no longer using the system) may be a manifestation of fundamental system shortcomings. But in an environment such as that created by BIJOU, it may also be the product of the lack of support. We are interested in the degree to which dropping out is a manifestation of personal and unit, as opposed to job, characteristics.

To investigate the consequences of variations in participant characteristics for longevity, we adopt a 'proportional hazards' model. The proportional hazard model is defined in the following way. Suppose any user may be described by a vector of $\underline{n}$ characteristics $\underline{X}$. Let $\lambda_o(t)$ be an arbitrary hazard function. Given λ_o, we specify the hazard for an individual with characteristics X as

$$\lambda(t;X) = [\lambda_o(t)]\exp(-X'\beta)$$

where β is an n x 1 vector of coefficients. As is apparent from the function, this model treats the independent variables that are included in the vector X as shifting the hazard for any given t.

Given this hazard, the proportion of users still using PROFS at point t after initiation of system use is given by the survivor function

$$F(t;X) = \exp[-\int_o^t \exp(-X\beta)\lambda_o(u)du]$$

$$= \exp[-\int_o^t \lambda_o(u)du]^{\exp(-X\beta)}$$

The survival function indicates that any change in X such that $\Delta X'\beta > 0$ will increase survival rates. Thus positive coefficients β_i will be associated with factors prolonging system use.

In practice, the application of failure time models is complicated by the common phenomenon of 'right-censoring' of sample data. Right-censoring occurs when failure is not observed for all sample subjects because, for example, the experiment is ended. Correction for bias introduced by right-censoring affects estimates of both parameters of the base line function λ_o and the coefficients β. The correction is straightforward as long as truncation is exogenous, that is independent of actual experimental outcomes (Kalbfleish and Prentice [10]). The procedure followed is to calculate the hazard for each t on the basis of those participants who were active at t for whom the $t+1^{th}$ observation was not censored (Kaplan and Meier [11]).

6.2.2 Application

The BIJOU project produced complete data on participation histories for 210 individuals for most of the life of the project. In applying failure time analysis to these data we encountered problems both in defining birth, that is, the beginning of participation, and death, that is, when the participant stopped using the PROFS system. The 'birth' problem occurred because, as discussed in Section 2.6, monitoring of PROFS use was not initiated until some twelve months after the beginning of the project. For these observations we were forced to impute starting date based on participant questionnaire response. The most serious consequence of this procedure is loss of data on an unknown number of early quitters, that is, persons who began and quit using PROFS prior to the advent of the monitoring process. The correlation between early quitting and loss from the sample is likely to produce a downward bias in our estimates of the hazard rates for early weeks of PROFS use. Later we use observations for the sample subset known to start after monitoring was initiated to gauge the magnitude of this bias.

The 'death' problem was one of definition. We assume that users quit the system when they ceased logging onto it. But when is cessation really definite? All data were right-censored as of May 18, 1985, but monitoring was continued until the end of June. Accounts were judged dead if they were not used from May 18 - June 30, 1985. This means that some accounts pronounced dead for the purposes of this analysis may have revived later in the year. We consider the likelihood of significant distortion from this assumption to be insignificant. Table 6.1 summarizes the data and the extent of monitor coverage. The equality between the number of participants active before monitoring was initiated and the number of dropouts is happenstance.

Table 6.1
Description of Population Used in Failure Time Analysis

Observation Group	Number	Percent
Basic Participant Population	223	--
Population with Complete Information	210	100
Participants Active before Monitoring Initiated	75	36
Participants Active after Monitoring Terminated (Right-Censored)	135	64
Dropouts	75	36
Source: BIJOU Database		

In adapting this model to the implementation of office systems, we hypothesize that the hazard rate for dropping out is a function of the participant's (1) job classification, (2) unit, (3) sex, (4) age, (5) number of years of employment at the University of California, Berkeley, and (6) time of initiation of BIJOU participation. In addition we include a dummy variable to capture any residual differences between dropout rates for those participants for whom start dates predated the monitor. The variable for time of initial PROFS use was included in the model on grounds that the likelihood that new users will drop out may very well depend on the point in the experiment at which they first tried the system. Clearly, by 1985 operations were more standardized, and help was more readily available, than was true in 1983.

6.2.3 Results: The Survival Function

We begin by directly plotting the survival function F(t) based on survival rates for the general sample at two-week intervals past first logon. The result, which is adjusted for right-censoring, is given in Figure 6.1.[21] The data imply that two years of BIJOU exposure would be associated with a cumulative withdrawal of about half of all persons. Roughly five percent of users drop out within four weeks of first logon.[22]

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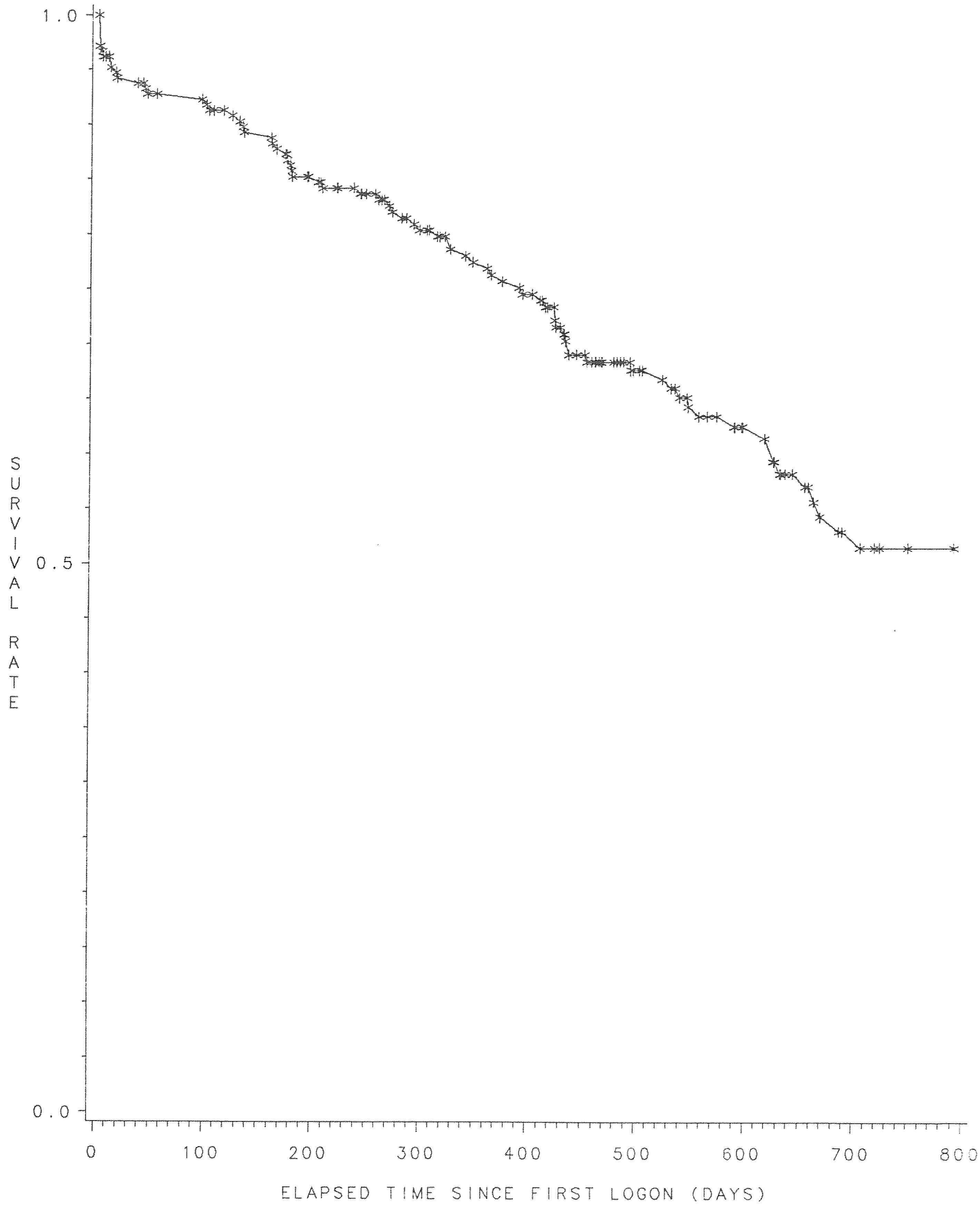
[21] Figure 6.1 is a plot of the product limit estimate of the survivor function first discussed by Kaplan and Meier [11].

[22] Recall that this estimate is biased downward by loss of information on individuals who started and stopped using PROFS before monitoring began. This number is consistent with the results for the subset of participants who began after the monitor was initiated.

Figure 6.1

Kaplan-Meier Survival Function Estimate



1.0
0.5
0.0
SURVIVAL RATE
0
100
200
300
400
500
600
700
800
ELAPSED TIME SINCE FIRST LOGON (DAYS)

Two features of Figure 6.1 stand out: First, there is no exceptional early fall-out. In general, people did not try the system and immediately quit. Second, a significant number of persons are expected to drop out. On average, in most academic units between ten and fifteen percent of staff can be expected to leave the unit each year for any number of reasons (transferring to a new unit, leaving the university, etc.). Thus the predicted fifty percent dropout rate (over two years) from system use significantly exceeds what one would expect as a byproduct of people leaving the units as a result of normal attrition.

6.2.4 Results: The Proportional Hazards Model

The simple hazard/survival estimates do not allow for systematic differences across participants in the likelihood of drop-out. To test for the possibility of such relationships, the parameters of a multivariate hazard function as described in Section 6.2.1 were estimated. We assume that the probability density function for times between initiation of PROFS activity and demise or last logon is distributed according to a Weibull function. Under this assumption the baseline hazard function has the form

$$\lambda_o(t) = \alpha\gamma t^{\gamma-1}$$

where α and γ are scale and shape parameters. Note that if γ=1 the hazard is invariant with respect to duration of time with the system. If $\gamma > 1$, the probability of dropping out increases with time; if $\gamma < 1$, the probability declines with time.

With this baseline hazard function, the proportional hazard function becomes

$$\lambda(t;X) = \alpha\gamma t^{\gamma-1}\ e^{-X'\beta}$$

$$= \gamma t^{\gamma-1}\ e^{-\mu X'\beta}$$

Note that $e^{-\mu} = \alpha$, the baseline hazard intercept.

The corresponding survival function is

$$F(t;X) = \exp[-\int_0^t \gamma u^{\gamma-1} du]^{\exp(-\mu X'\beta)}$$

Any variable in X for which the corresponding element of β is positive has a negative effect on the hazard rate at any time t and thus a positive effect on the rate of survival to any time t. Given this specification and sample data on the observed longevity distribution, maximum likelihood methods may be applied to estimate the coefficients β and the parameters α and γ.

The results of parameter estimates using the BIJOU data appear in Table 6.2. Variable definitions are given in Table 6.3. In this formulation the effects of occupation, unit, and sex are measured relative to the estimated hazard rate for a female general secretary in the Chancellor's Office who began participating in the project after monitoring was initiated. A person with these characteristics will be referred to as the baseline participant. One occupation category, 'administrative faculty' was excluded from the analysis because none of the 3 persons in this category quit using PROFS between the time they began and the end of monitoring. Under this circumstance the best estimate of the 'failure time accelerator' for this occupation class is infinity. Accordingly, we eliminated ADM_FAC from this part of the analysis, and this adjustment accounts for part of the reduction in sample size.

Table 6.2
Estimation Results Proportional Hazards Model
BIJOU Participants

Variable[1]	Coefficient Estimate	Standard Error	Probability of Error If (True) Hypothesis of Zero Value Rejected[2]
INTERCPT	9.923	2.151	0.000
EXECTIVE	-0.236	0.664	0.722
OFFICER	0.242	0.614	0.693
ADM_ANL	0.196	0.612	0.749
GEN_ANL	-0.512	0.565	0.365
FAC_SEC	0.681	0.727	0.349
STU_SEC	-0.741	0.710	0.297
FACULTY	-1.007	0.607	0.097
OTHERJOB	-0.517	0.618	0.402
ADM_SEC	0.395	0.585	0.499
ADM_FAC	(deleted)		
ECO	1.067	0.477	0.025
LIS	1.281	0.552	0.020
SBA	0.610	0.407	0.134
SPP	0.634	0.502	0.207
MALE	0.028	0.340	0.933
AGE	-0.057	0.098	0.556
AGE2	0.001	0.001	0.553
UCBTIME	-0.025	0.050	0.621
UCBTIME2	0.001	0.002	0.512
STARTLOG	-1.496	0.366	0.000
STAR1083	0.195	0.439	0.657
SCALE	0.979	0.107	---

Observations 207

Log likelihood for Weibull distribution -206.25

Source: Calculation by authors using BIJOU Database

Notes:
[1]For variable definitions, see Table 6.3.
[2]Based on Chi-Square test of restriction imposed by null hypothesis

Output: HAZARD4 LISTING 5/20/86 21:01:06

The coefficients are interpreted as follows. Consider the coefficient on the dummy variable for participants in the Economics Department, ECO. The estimated coefficient for this variable is 1.067. This means that at any time t

Table 6.3

Definitions of Variables Used in Multivariate Analysis

Variable	Definition
INTERCPT	Intercept: Always = 1.
	Job Type*
EXECUTIVE	Executive = 1 if participant is Executive, = 0 otherwise
OFFICER	Program Officer = 1 if participant is Program Officer, = 0 otherwise
ADM_ANL	Administrative Analyst = 1 if participant is Admin. Analyst, = 0 otherwise
GEN_ANL	General Analyst = 1 if participant is General Analyst, = 0 otherwise
FAC_SEC	Faculty Secretary/A.A. 0.349 = 1 if participant is Faculty Secretary, = 0 otherwise
STU_SEC	Student Affairs Secretary = 1 if participant is Student Secretary, = 0 otherwise
FACULTY	Faculty = 1 if participant is Faculty, = 0 otherwise
OTHERJOB	Other = 1 if participant is Other, = 0 otherwise
ADM_SEC	Administrative Secretary = 1 if participant is Admin. Secretary, = 0 otherwise
ADM_FAC	Administrative Faculty = 1 if participant is Admin. Faculty, = 0 otherwise
	Unit
ECO	Department of Economics = 1 if participant is in Economics, = 0 otherwise
LIS	School of Library and Information Studies = 1 if participant is in Lib. & Inf. St., = 0 otherwise
SBA	School of Business Administration = 1 if participant is in Business Admin., = 0 otherwise
SPP	Graduate School of Public Policy = 1 if participant is in Public Policy, = 0 otherwise
	Personal Characteristics
MALE	= 1 if participant is male, = 0 otherwise
AGE	= age in years
AGE2	= age squared
UCBTIME	= years as UCB employee
UCBTIME2	= UCBTIME squared
STARTLOG	= time in years between beginning of project and first use of PROFS
STAR1083	= 1 if participant began PROFS use after initiation of monitoring, = 0 otherwise
SCALE	Inverse of baseline hazard shape parameter
DWRITER	Displaywriter = 1 if participant used an IBM Displaywriter for access to PROFS, = 0 otherwise

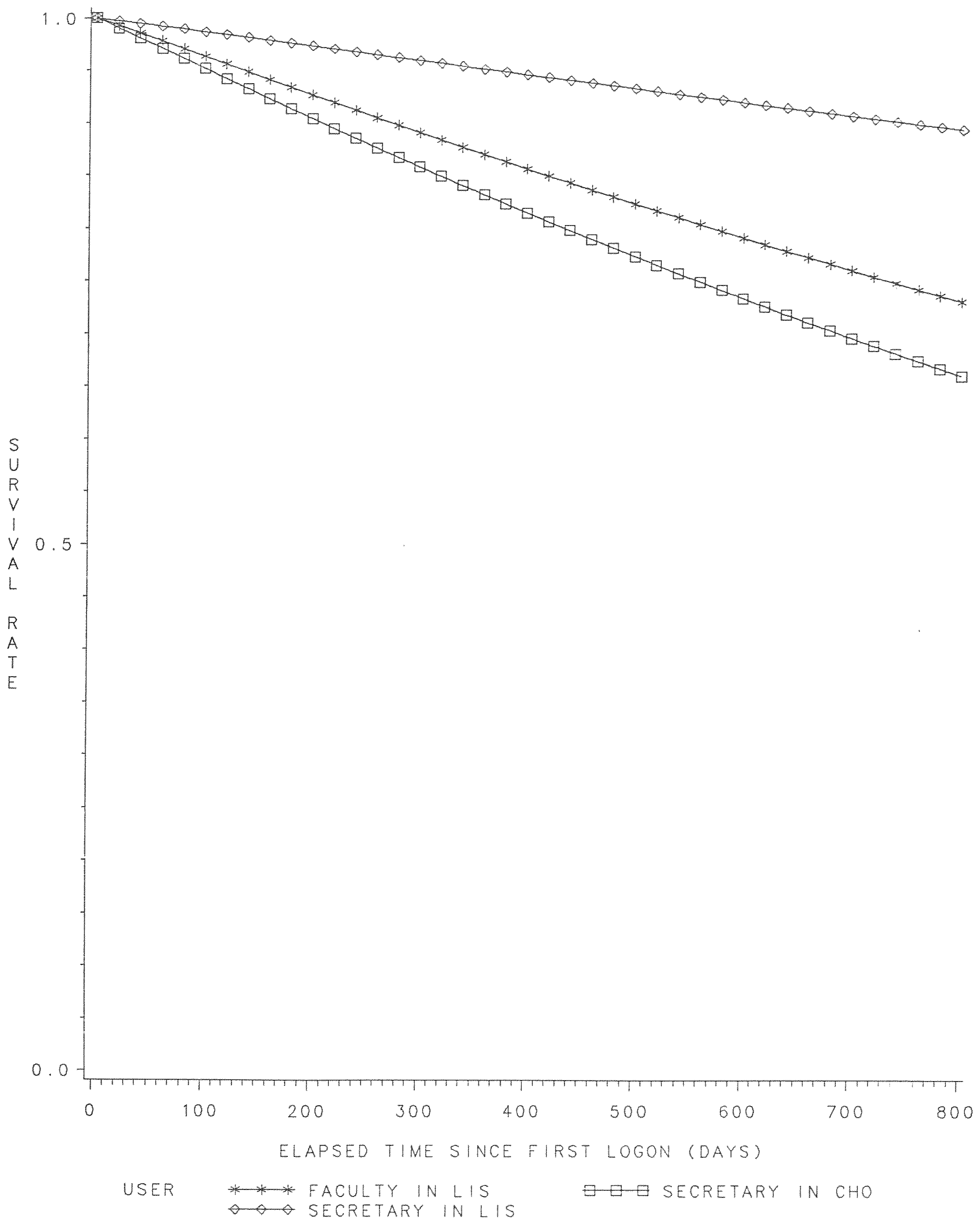
*See Table 3.2 for description of job classifications.

after first use the PROFS quit rate for general secretaries in economics who were still active users was $e^{-1.067}$ times the quit rate for Chancellor's Office general secretaries who were still active. Translated out of mathematics this means the economics quit rate was only one-third ($e^{-1.067} = .34$) as great. Note that each variable refers to characteristics of the participant at the time he or she began PROFS use.

In Figure 6.2 we have plotted the estimated BIJOU survival function for the baseline participant assuming the woman is 32, has worked at the University for five years, and begins using PROFS in May of 1983. The estimated coefficients imply that for this woman the probability of survival with PROFS for six months is .91; for eighteen months the probability is .75. Recall that we do not determine the reason for dropout, so part of this rate may be attributable to normal job turnover. For comparison, we have also plotted estimated PROFS use survival rates for a secretary and a member of the faculty of the School of Library and Information Studies.

Figure 6.2

Accelerated Failure Time Survival Function Estimates



1.0
0.5
0.0
SURVIVAL RATE
0
100
200
300
400
500
600
700
800
ELAPSED TIME SINCE FIRST LOGON (DAYS)
USER
FACULTY IN LIS
SECRETARY IN CHO
SECRETARY IN LIS

From the estimated parameters of the hazard function and the base hazard we learn the following:

1. The probability of leaving PROFS does not vary with time. This inference appears statistically reliable: the calculated value of the inverse of the scale parameter γ differs from 1 by less than one-fifth the standard deviation of the estimate.

2. Participant characteristics make a difference. A likelihood ratio test of the significance of the constraint imposed on the fit of the hazard function by elimination of $tX'\beta$ altogether leads to rejection of the hypothesis of no constraint at the .00001 level.

3. The likelihood of termination is not related to job for non-faculty personnel. While estimated coefficients for the various job categories vary substantially, they are estimated imprecisely, and as a result little statistical significance may be attached to the results. The only exception is for faculty. At any time the quit rate for faculty users is estimated to be $e^{-(1.007)} = 2.7$ times that for general secretaries.

4. The unit effects are very strong. The results indicate that, *ceteris paribus*, staff were much less likely to drop out of PROFS use once started if they were in Economics or Library and Information Studies than was true for the other units. The differences are numerically significant. Evaluation of the survival function using the parameter estimates in Table 6.2 indicates that the expected PROFS use survival rate for a secretary in the Chancellor's Office is .91 after 6 months of use -- 9% will have quit. For

Library and Information Studies the predicted survival rate is .98: only 2% will have quit.

5. PROFS longevity is not associated with person characteristics. Neither sex, age, or time on the campus is significantly related to the probability of dropout.

6. Late arrivals to the BIJOU System were more likely to drop out than were 'old hands'. The estimated coefficient for the variable STARTLOG is large, negative, and statistically significant. This result is contrary to our expectation. One consequence is that the aggregate survival rate plot in Figure 6.1 understates survival among core participants. As indicated by Figure 6.2, the estimated two-year survival rate for the reference Chancellor's Office secretary is 68%, and rate for all other units are higher still. But the estimated survival rate without control for characteristics (see Figure 6.1) is lower still. The undifferentiated survival estimates are apparently pulled downward by the greater propensity of late arrivers to BIJOU to quit.

7. No systematic difference was found between hazard rates for cases with imputed starting dates and cases for which starting dates are known with certainty. START1083 identifies those users whose PROFS beginning dates are known with certainty. If people who began PROFS use early in the project were systematically missed, we would expect those who began after monitoring was initiated to appear to have a higher propensity to terminate PROFS use. But the coefficient for START1083 is small and statistically insignificant.

Of these results the most surprising are the substantial differences between units and the evidence that late-arriving participants had higher quit rates. The differences among units will consistently reappear at each stage of our analysis and will be taken up again in the conclusion to this book.

The rise in the hazard rate as the project continued is difficult to interpret. Review of the data suggests that this trend may result from a selection phenomenon. The first PROFS accounts in Business Administration, the Chancellor's Office, and, to a lesser extent, the other units, were assigned to a core of users who were expected to have some use for the system and who received focussed support. As the project progressed, two types of new users were added. One set replaced old users as a natural result of turnover. But new accounts were also assigned to persons on the margin of the core PROFS work groups. These marginal users seemed to find continued system participation to be of much less advantage than was, on average, true of the core. The BIJOU system was not, in other words, very contagious. This too is a matter for further analysis.

6.3 Analysis of Active Time

Not quitting, or survival, is one dimension of PROFS usage. Another is the amount of time spent performing the various functions given survival. The previous section of this book looked at the former and this section discusses the latter. We begin with a discussion of a measure of time spent, what we shall call active time, and then review this aspect of system use during the project.

6.3.1 Defining Active Time

The amount of time that a user is actively working on a computer system is an elusive concept. Any problem-solving activity involves a combination of time when the user is thinking about how to solve a problem or perform a task, time when the user is actively keying information into the computer system, time when the system is performing computations and/or transmitting information to the user's terminal, and time when the user is connected to the system but is not using it.

The difficulty in determining what constitutes the time the user is actively using the system is that it is hard to differentiate total time from 'think time', and/or time when the user is connected but not using it and not 'thinking'. The problem is important because one is interested in knowing which tasks require the greatest amount of time to perform, and which tasks are time-consuming because of the way they must be executed, as opposed to time consuming because of their nature.

Theoretically, the way to answer such questions is to continually ask the user whether he or she is thinking about the computing problem at hand or about other issues. Practically, this is rather absurd. As an alternative to direct interrogation of the users, several alternative methods were developed to analyze active time.

The objective of the analysis was to determine the number of hours users spent performing PROFS tasks. Three versions of active time are employed. All of these are more refined than simple connect time, which is the total amount of time the user is logged onto the system. The focus of measurement is the time between the appearance of any PROFS menu or screen (see Chapter 4) and the next. A user responds to a main menu by depressing a function key or typing a command line instruction. The time measures are all based on accumulated time between appearance of a menu screen and the time the next keystroke that was monitored took place. The first measure, ATIME1 (active time 1), is the sum of the time between screens and therefore equals the total time that the user spent within PROFS activities, including time with Main Menus displayed. If a user began the calendaring function, established a few appointments, and left his or her screen at the calendar menu (B00) for fifteen minutes while answering the phone or talking to a colleague, the entire time interval until emergence from the calendar function would be considered related to calendaring and included in ATIME1.

The second and third measures adjust ATIME1 for idle time based upon reasonable cutoff values for what constitutes an abandonment of PROFS activity in favor of some other activity. In principle, what was attempted was to truncate time between the appearance of a screen and a function key response based upon reasonable cutoff values for what constitutes an abandonment of PROFS activity in favor of some other activity. In practice, making this adjustment was complicated by the fact that not all screen/function key responses were recorded by the monitor. Perhaps the most important example of this occurred with document editing functions, but it was also true for certain activities related to notelog adjustment, working with mail distribution lists, and other functions.

Given this problem the following convention was employed. For the second measure, ATIME2, if the function undertaken was completely monitored and no function key activity took place within fifteen minutes, the inactive time after fifteen minutes was considered non-PROFS related. For ATIME3 the cutoff value was set at five minutes - inactive time in excess of five minutes was assumed non-PROFS.

A permutation of these rules was necessary when counting time accumulated within activities that are incompletely monitored. The amount of time a user spent in these functions between one monitored screen and the next could be substantially different than for normal PROFS activities. This means that without adjustment 45 minutes of text editing would be truncated to five minutes for ATIME3. We adjusted for this by truncating time for incompletely monitored functions at 60 minutes for ATIME2 and 30 minutes for ATIME3.[23] The definitions are summarized in Table 6.4.

We study active time measured in this way with two sets of data. The first data set covers all active users for 89 work days in spring of 1985. These data are used to evaluate the alternative time measures. They are also used in a multivariate analysis to determine the variation among participants in the use of the PROFS system. The second data set covers the 20 matched days of activity for spring of 1984 and spring of 1985 discussed in Chapter 5. These data allow us to gauge changes in the volume of use between years. In all of this analysis we focus on users; where individuals used more than one account, total use was aggregated.

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[23] No quantitative information exists by which to determine these cutoff values. They were established subjectively using professional judgement.

Table 6.4
Active Time Definitions
Time ≡ Elapsed Real Time Between Appearance of One Monitored Screen and Next (or Logoff)

Active Time Measure		Time Counted, Each Two-Screen Sequence	
		For Completely Monitored Screen Sequences	For Incompletely Monitored Screen Sequences (e.g. Editing Activities)
Symbol	Abbreviation		
ATIME1	----	All Time Counted	All Time Counted
ATIME2	15(60)	= Min [Time, 15 minutes]	= min [Time, 60 minutes]
ATIME3	5(30)	= Min [Time, 5 minutes]	= Min [Time, 30 minutes]

Note: Min [x,y] = x if $x < y$
= y if $y \leq x$

6.3.2 System Use in Spring, 1985

Table 6.5 gives the average system use by active participants during spring, 1985 by unit and by day using three definitions of active time. Active participants are those who had not quit (using the definition introduced earlier) by January 8, 1985. We calculate average use for all days and for only those days in which participants logged on at least once.

The data indicate that the method used for measuring active time makes a difference. The average active time for all participants was 1.8 hours per day with no truncation, and only .4 hours under the 5(30) truncation restriction used for ATIME3 (see Table 6.4). On average users logged on only about every other day, so times calculated for days with at least one logon are slightly more than twice as great as averages for all days.

There is unit-to-unit variation in the intensity of use. This can be roughly gauged by comparing ATIME1 to ATIME2. The higher the ratio, the lower the frequency with which participants in the unit leave the system idle at some screen. For the Economics Department, the ratio was 2 to 1; for the School of Business Administration the ratio is 4 to 1. Casual empiricism, i.e., going and looking at a secretary's terminal, indicates that this is due to differences among units in whether or not inactive stations were left idle with the calendar, as opposed to the main PROFS menu, showing. The Graduate School of Public Policy shows the lowest active time; as will be discussed in Chapter 7, GSPP use was dominated by documents editing done outside of PROFS. This doesn't count as 'active time'.

The results in Table 6.5 show large differences among units in active time, regardless of measure. To investigate the extent to which these differences are related to differences among units in participant job mix and other characteristics, we conducted a multivariate analysis of system use.

Our approach was to regress the logarithm of total hours of active system use, as gauged by each of the three active use measures, on a set of variables defining the characteristics and unit of the participant. The variables employed in this model are identical to those introduced for the proportional hazard model in the previous section except that here we use the logarithms of continuous variables.

Table 6.5
Average System Use, Active BIJOU Participants, Spring 1985
(Hours per Day)

Unit	No. of Users	Average over all days			Average over days with one or more logons		
		ATIME1	ATIME2	ATIME3	ATIME1	ATIME2	ATIME3
Chancellor's Office	63	2.21	0.75	0.46	5.41	1.84	1.12
Department of Economics	37	1.87	0.91	0.58	3.95	1.93	1.23
School of Lib. & Info. St.	19	2.31	0.68	0.42	3.30	0.97	0.59
School of Business Admin.	38	1.63	0.43	0.22	4.46	1.17	0.61
School of Public Policy	21	0.56	0.24	0.15	2.01	0.86	0.55
Total	178	1.83	0.65	0.39	4.27	1.51	0.92

Note: ATIME1 = All time in PROFS functions
ATIME2 = Time in PROFS functions with 15(60) minute truncation
ATIME3 = Time in PROFS functions with 5(30) minute truncation

See text, Section 6.3.1, for an explanation of truncation methodology.

Source: Calculations by authors from BIJOU use data.

Outputs: AGTIME3 12/11/85 10:01:23, AGTIME5 12/11/85 10:01:22

The first thing to note from the results in Table 6.6 is that in general the regression model does not capture much of the variance in PROFS use in our sample. The goodness-of-fit statistic, R^2, is low, and most of the coefficient values are estimated very imprecisely. To focus attention on coefficients estimated with some reliability, we have included in the results the estimated probability of calculating the indicated coefficient value from sample results when in reality, with repeated sampling, the corresponding coefficient would be determined to be zero. In general we confine our discussion to variables for which the null hypothesis of no effect can be rejected with less than a 10% chance of error.

Table 6.6
Regression Results, Active Time
Dependent Variable is User's Total Active Time, Spring 1985

Variable (1)	Dependent Variable: LN_ATIM1			Dependent Variable: LN_ATIM2			Dependent Variable: LN_ATIM3		
	Parameter Estimate	Standard Error	Prob > |T| Given H0 (2)	Parameter Estimate	Standard Error	Prob > |T| Given H0	Parameter Estimate	Standard Error	Prob > |T| Given H0
INTERCEP	11.934	4.695	0.012	10.401	4.129	0.013	9.885	3.897	0.012
EXECTIVE	-2.917	1.616	0.073	-2.002	1.421	0.161	-1.744	1.341	0.196
OFFICER	-1.147	1.337	0.393	-0.982	1.175	0.405	-0.934	1.109	0.401
ADM_ANL	-2.815	1.377	0.043	-1.916	1.211	0.116	-1.622	1.143	0.158
GEN_ANL	-2.456	1.347	0.071	-1.517	1.185	0.203	-1.318	1.118	0.241
FAC_SEC	-1.465	1.284	0.256	-0.814	1.129	0.472	-0.632	1.066	0.554
STU_SEC	-1.778	1.489	0.235	-1.464	1.309	0.265	-1.312	1.236	0.290
FACULTY	-1.997	1.391	0.153	-1.455	1.223	0.237	-1.239	1.154	0.285
OTHERJOB	-3.755	1.495	0.013	-2.958	1.315	0.026	-2.726	1.241	0.030
ADM_SEC	-0.622	1.228	0.613	-0.353	1.079	0.744	-0.342	1.019	0.738
ADM_FAC	1.938	2.226	0.386	1.806	1.957	0.358	1.686	1.847	0.363
ECO	0.801	0.915	0.383	1.072	0.805	0.185	1.040	0.760	0.174
LIS	2.186	0.971	0.026	2.028	0.854	0.019	1.886	0.806	0.021
SBA	0.745	0.850	0.382	0.602	0.748	0.422	0.489	0.706	0.489
SPP	-1.210	1.049	0.251	-0.841	0.923	0.364	-0.766	0.871	0.381
MALE	-1.273	0.824	0.125	-1.165	0.724	0.110	-1.123	0.684	0.103
LN_AGE	-1.701	1.277	0.185	-1.652	1.123	0.144	-1.652	1.060	0.122
LN_UTIME	-0.512	0.287	0.076	-0.513	0.252	0.044	-0.512	0.238	0.033
LN_OSAGE	0.819	0.409	0.047	0.585	0.360	0.106	0.485	0.340	0.156
R-square	0.3101			0.2984			0.2943		

Notes: (1) For definitions of all variables, see Table 6.2
(2) Probability of error given rejection of null hypothesis that coefficient = 0.

Outputs: TIME5 1/24/86 13:24:01

While many of the coefficients are imprecisely estimated, the fact that every job classification with the exception of administrative faculty has a negative coefficient in each equation indicates that, on average, the baseline general secretary uses PROFS much more, for all measures of active time, than do most other participants.

Among the units we find that for all measures of active time, persons in the School of Library and Information Studies do more with PROFS than do similar people in the Chancellor's office. Two personal characteristics seem to make a difference. All other things equal, 'old timers' at the University spent less time using PROFS than did other users. Although the effect appears less reliably estimated, the regression results for at least ATIME1 indicate that active time grows with time since the user's first logon. This precision of estimation of this 'system age' effect declines as the definition of active time is made more restrictive; PROFS old-timers may simply be more willing than others to leave the system idle.

The most surprising thing about these results is that not much was gained by our effort to increase precision of measurement of active time. Indeed, the equation for ATIME1 predicts with slightly less residual variance than the equations for ATIME2 and ATIME3. There are no cases of effects for which inferences drawn from one ATIME measure are significantly contradicted by inferences drawn using another. We believe this problem is related to incomplete monitoring of screens and the ad hoc truncation rules that were applied to skirt this problem. We tentatively conclude that if there are problems for which precision in measurement of active time is important, a more refined technique must be developed to find them.

6.3.3 Comparative System Use

As a last step in evaluation of general system use we consider changes in use between spring 1984 and spring 1985. This comparison is based upon average participant use of the system on days with one or more logons. The counts are for twenty days each spring that were matched to assure comparable positions in the academic calendar. The twenty days in spring, 1985 used here are a subset of the 89 use days employed for constructing Table 7.3. The results appear in Table 6.7.

Three outcomes of this experiment are apparent. First, by and large inter-unit differences in use patterns evident in 1984 persisted in 1985. GSPP personnel used the system less in 1984, and that was still true in 1985. Second, ATIME1 went up by much more between years than did either of the two more restrictive measures for all units. We interpret this result to mean that users were learning they didn't have to logoff when engaged in non-PROFS activities. Third, among active users on days in which they logged on at all, staff in the Chancellor's Office show the greatest increase in system use between years; it is not clear whether this result is accounted for by a change in behavior among users active at both times or a change in the mix of users within the Chancellor's Office. We do know from the regression results that the high averages for use in the Chancellor's Office that appear in Table 6.7 are misleading, for when we control for other factors, as was done with the regressions, use of PROFS by Chancellor's Office participants differs significantly different only from use by participants in the School of Library and Information Studies.

Table 6.7
Average Hours Per Day of PROFS Usage
For Days With One or More Logons

Matched Working Days Spring 1984 and Spring 1985

Unit	Average Use (Hours per Day)					
	ATIME1		ATIME2		ATIME3	
	1984	1985	1984	1985	1984	1985
Chancellor's Office	4.58	5.43	1.59	1.86	0.96	1.14
Department of Economics	2.86	3.76	1.76	1.79	1.27	1.13
School of Lib. & Info. St.	2.91	3.19	1.08	1.00	0.66	0.60
School of Business Admin.	4.58	4.96	1.46	1.27	0.83	0.64
School of Public Policy	1.39	2.07	0.70	0.76	0.53	0.49
All	3.78	4.35	1.46	1.51	0.92	0.91

Note: ATIME1 = All time in PROFS functions
ATIME2 = Time in PROFS functions with 15(60) minute truncation
ATIME3 = Time in PROFS functions with 5(30) minute truncation

See text, Section 6.3.1, for an explanation of truncation methodology.

Source: Calculations by authors from BIJOU use data.

Outputs: AGTIME5M 12/11/85 10:01:21

6.4 What Did We Learn?

This chapter constitutes our first foray into a microanalytic study of PROFS use in the BIJOU project. Despite deficiencies in monitor coverage and problems with some of our measuring instruments, a great deal has been learned:

1. Breadth of Participation Makes a Difference. By and large our results are consistent with the proposition that the larger the proportion of unit personnel with system access, the greater the likelihood that participation, once initiated, will endure.

2. Unit Composition Makes a Difference. There are significant differences in longevity and amount of PROFS use across job titles. Differences in job mix may produce misleading inferences from simple comparisons of aggregate use frequency statistics.

3. Gains from Improvement in Measurement of Active Time Are Elusive. In future applications the procedures to gauge volume of activity must be refined over the largely unsuccessful measures used here.

This work has only considered whether or not people are using PROFS and, counting one way or another, how much time they are devoting to it. Most important questions concern what the system is being used to do. This issue is taken up next.

7.0 Choosing Functions

7.0 CHOOSING FUNCTIONS

BIJOU provided participants many tools for productivity enhancement. In this chapter we study use of these tools. Our approach is to first review the alternatives provided and the frequency of their use near the end of the project. We next examine the timing of first use of PROFS functions. From this we go on to study variation among users in the frequency of function use and the allocation of time among the alternatives.

7.1 The Function Alternatives

The basic PROFS functions were discussed in Chapter 4 and three approaches to measuring function use were presented. The first, 'main menu entry' involves the number of times an activity is selected from one of the three main menus. This count is derived from the number of times particular main menu function key responses are observed. The second measure of function use is based on the appearance of the screen or submenu that follows main menu entry. It is once this submenu is presented that the actual work associated with function use begins.

In some cases the process is cyclical. That is, once the user begins processing incoming messages the 'review in-basket' menu (C00)[24] will reappear each time a new message is processed. 'Main Menu uses' counts the number of times an activity is selected from the main menus. 'Total uses' are the total number of times the associated submenu appears regardless of point of origin.

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[24] See Appendix C for reproductions of BIJOU/PROFS screens.

For main menu entry and total use counts, functions were defined only on the basis of appearance of individual screens. We also counted function use under a more restricted definition intended to filter out non-productive function entry -- for example when users moved into the 'prepare a document' function but never performed an action on a document. Restricted definition counts were made for eleven major functions: (1) opening mail, (2) document search, (3) using calendar, (4) processing a mail log, (5) sending a note, (6) looking at a note log, (7) preparing a document, (8) filing a document, (9) setting an automatic reminder, (10) reviewing one's personal directory, and (11) sending a message. Counts using the restricted definition are a subset of total uses.

Counts of activities under each of the three measures are presented in Table 7.1. These data are for all days in spring, 1985. The data show that once having selected a certain function, users tend to perform it a number of times. For example, there are almost 3.5 calendaring actions for every one main menu invocation of this function. While the search action is selected only about five percent of the time from the main menu, about sixteen percent of all actions were searches.

Some additional explanation of these data will be helpful. PROFS is structured to allow more than one main menu of selectable actions. As already discussed, the BIJOU PROFS system used three main menus, all with selectable activities. A consequence of this was that one of the most frequently occurring main menu actions was simply transferring between main menus. This action, marked 'transfer between main menus' in the table, constituted about twelve percent of all main menu actions.

Table 7.1

Frequency Distribution of PROFS Function Use

Function Name	Main Menu Uses	Percent Distri-bution	Total Uses	Restricted Definition Uses	Percent Distri-bution
PROFS or CMS Command at Command Line	35550		35550		
Review In-Basket	19024	19.099	52061	15809	21.444
Transfer between Main Menus	12117	12.165	12117		
Search for Document	4907	4.926	18746	11596	15.729
Send a Note	4507	4.525	9635	3810	5.168
Calendar	4015	4.031	13947	7629	10.348
Manage Mail Log	3526	3.540	9713	5087	6.900
Other	3518	3.532	3518		
Prepare Document	3284	3.297	3978	9658	13.100
Exit PROFS	3211	3.224	3211		
Manage Note Logs	1657	1.664	4247		
File Documents	1460	1.466	2977	11367	15.418
Personal Directory	668	0.671	1558	367	0.498
View Central Directory	656	0.659	656		
Set a Reminder	607	0.609	1618	852	1.156
Send Immediate Message	437	0.439	502	360	0.488
Manage Distrib. Lists	138	0.139	138		
Author Profiles	100	0.100	100		
Help	89	0.089	89		
Update Names	68	0.068	68		
Change Password	68	0.068	68		
Total	99607	100.000	118982	73723	100.000

Source: Tabulations by authors from BIJOU monitor data.

PROFS operates under the CMS Operating System and one of the facilities of PROFS is to execute CMS commands such as FILELIST (list the names of files on one's account) or XEDIT (invoke the CMS editor to process a file). The most frequently occurring activity by users was to execute a CMS command. One explanation for this may be the nature of the BIJOU project. Participants were given terminals and a CMS account with PROFS access, for which they were not billed. Users may have found out that they could save money by simply doing their normal CMS computing for free on their PROFS account rather than at cost on their regular account, and the high 'PROFS or CMS Command' usage may reflect that. A second explanation for the high execution of CMS commands within PROFS is that users may have found that the PROFS environment was good for some office automation activities and not as good for others. For example, they may have chosen to do their editing and document formatting outside PROFS in order to have what they considered more flexibility in document handling.

The main conclusion to be drawn from Table 7.1 is that although a wide variety of functions were available under PROFS at Berkeley, users selected only a very few for heavy use.

7.1.1 Activity Distribution under Restricted Definition

Tables 7.2 and 7.3 present a breakdown of PROFS activity usage by unit and job classification using the restricted definition of activity. Table 7.2 shows major differences between the way PROFS was used in the administrative unit (the Chancellor's Office) and the academic departments. Further, it indicates that between academic departments usage patterns vary considerably.

The Chancellor's Office uses PROFS mainly for searching for, and filing, documents. This constitutes nearly 56 percent of all their activity. Most of the searching and filing was conducted by the CCRC subunit. In contrast, the academic departments have almost no use of those two functions. Document preparation is heavily used in the Economics Department and the School of Public Policy. The School of Library and Information Studies mainly uses the system for mail-related activities (reviewing in-basket, looking at notelog). The

School of Business Administration's main use of the system is for its calendaring function.

Table 7.2
Frequency Distributions of PROFS Actions
Performed by Organizational Unit, Spring 1985

	Chancel-lor's Office	Department of Economics	School of Library & Info. St.	School of Business Admin.	School of Public Policy	Total
Review In-Basket	3979 5.40 10.14	4437 6.02 34.09	5102 6.92 49.78	1600 2.17 20.67	691 0.94 19.90	15809 21.44
Search for Document	10581 14.35 26.96	293 0.40 2.25	136 0.18 1.33	106 0.14 1.37	480 0.65 13.82	11596 15.73
Calendar	2228 3.02 5.68	145 0.20 1.11	608 0.82 5.93	4217 5.72 54.48	431 0.58 12.41	7629 10.35
Manage Mail Log	4368 5.92 11.13	355 0.48 2.73	101 0.14 0.99	164 0.22 2.12	99 0.13 2.85	5087 6.90
Send a Note	757 1.03 1.93	1326 1.80 10.19	1133 1.54 11.05	322 0.44 4.16	272 0.37 7.83	3810 5.17
Manage Note Logs	3110 4.22 7.92	1311 1.78 10.07	1802 2.44 17.58	506 0.69 6.54	459 0.62 13.22	7188 9.75
Prepare a Document	2392 3.24 6.09	4968 6.74 38.17	894 1.21 8.72	478 0.65 6.18	926 1.26 26.67	9658 13.10
File Documents	11224 15.22 28.60	9 0.01 0.07	73 0.10 0.71	26 0.04 0.34	35 0.05 1.01	11367 15.42
Set a Reminder	227 0.31 0.58	31 0.04 0.24	319 0.43 3.11	270 0.37 3.49	5 0.01 0.14	852 1.16
Personal Directory	219 0.30 0.56	38 0.05 0.29	42 0.06 0.41	9 0.01 0.12	59 0.08 1.70	367 0.50
Send Immediate Message	161 0.22 0.41	102 0.14 0.78	40 0.05 0.39	42 0.06 0.54	15 0.02 0.43	360 0.49
Total	39246 53.23	13015 17.65	10250 13.90	7740 10.50	3472 4.71	73723 100.00

Table 7.3
Frequency Distributions of PROFS Actions Performed by Job Classification, Spring 1985

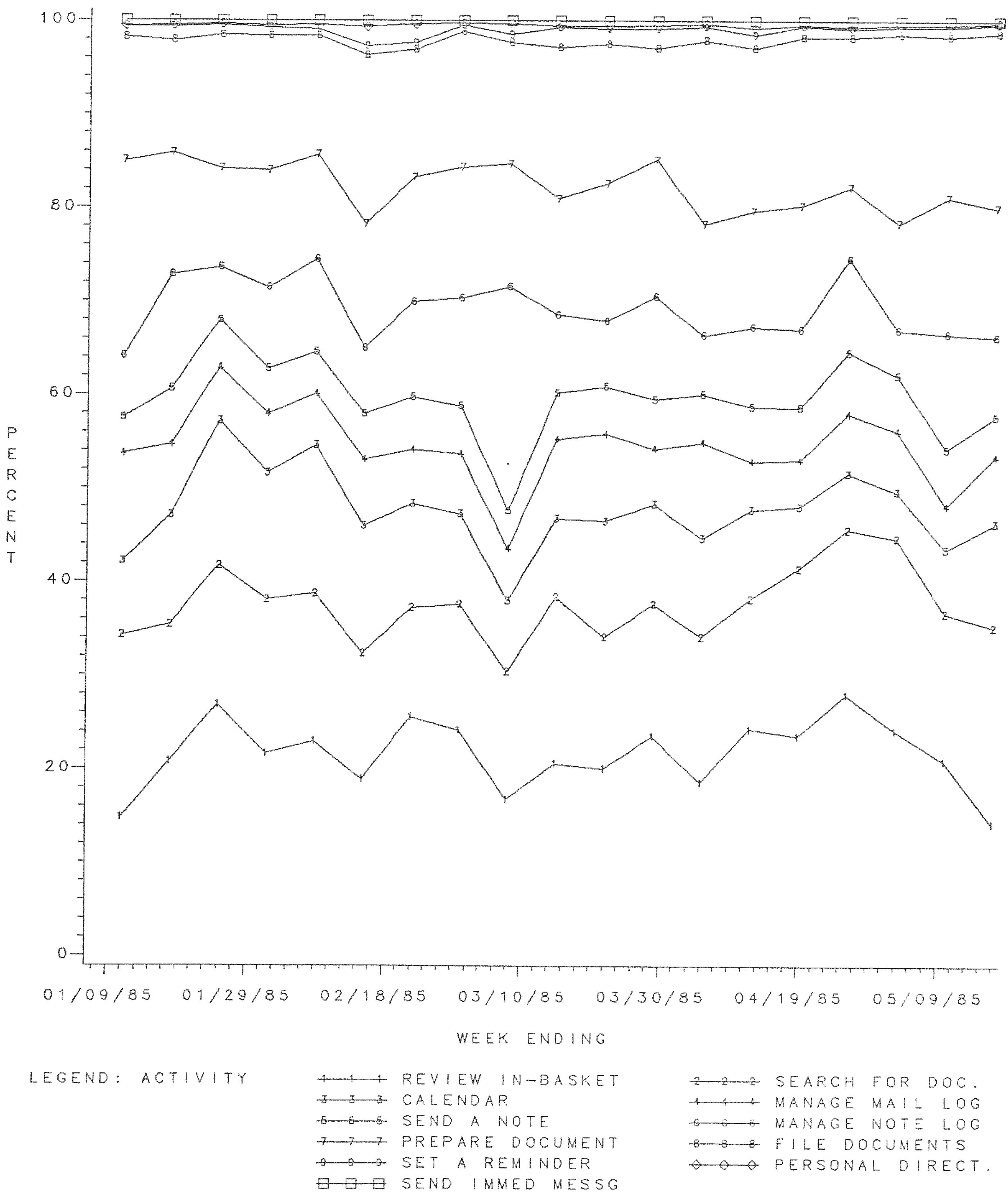
	Executive	Program Officer	Admin. Analyst	General Analyst	Faculty Sec.	Student Sec.	General Sec.	Faculty	Other	Admin. Sec.	Admin. Faculty	Total
Review In-Basket	304 0.41 21.62	1162 1.58 32.83	972 1.32 12.19	2017 2.74 10.37	2891 3.92 32.42	954 1.29 38.07	1016 1.38 11.23	3381 4.59 41.56	840 1.14 30.27	2065 2.80 22.09	207 0.28 32.91	15809 21.44
Search for Document	19 0.03 1.35	40 0.05 1.13	1775 2.41 22.26	6818 9.25 35.06	316 0.43 3.54	72 0.10 2.87	1700 2.31 18.79	375 0.51 4.61	42 0.06 1.51	422 0.57 4.51	17 0.02 2.70	11596 15.73
Calendar	353 0.48 25.11	1010 1.37 28.54	16 0.02 0.20	1178 1.60 6.06	458 0.62 5.14	63 0.09 2.51	210 0.28 2.32	141 0.19 1.73	572 0.78 20.61	3400 4.61 36.38	228 0.31 36.25	7629 10.35
Manage Mail Log	29 0.04 2.06	107 0.15 3.02	1921 2.61 24.09	454 0.62 2.33	296 0.40 3.32	71 0.10 2.83	1642 2.23 18.15	116 0.16 1.43	96 0.13 3.46	353 0.48 3.78	2 0.00 0.32	5087 6.90
Send a Note	111 0.15 7.89	132 0.18 3.73	154 0.21 1.93	373 0.51 1.92	986 1.34 11.06	150 0.20 5.99	249 0.34 2.75	968 1.31 11.90	189 0.26 6.81	461 0.63 4.93	37 0.05 5.88	3810 5.17
Manage Note Logs	256 0.35 18.21	363 0.49 10.26	414 0.56 5.19	303 0.41 1.56	1345 1.82 15.09	339 0.46 13.53	992 1.35 10.96	1195 1.62 14.69	338 0.46 12.18	1587 2.15 16.98	56 0.08 8.90	7188 9.75
Prepare a Document	319 0.43 22.69	621 0.84 17.55	1144 1.55 14.34	348 0.47 1.79	2213 3.00 24.82	848 1.15 33.84	1402 1.90 15.50	1743 2.36 21.43	429 0.58 15.46	535 0.73 5.72	56 0.08 8.90	9658 13.10
File Documents	10 0.01 0.71	2 0.00 0.06	1541 2.09 19.32	7884 10.69 40.54	7 0.01 0.08	1 0.00 0.04	1569 2.13 17.34	27 0.04 0.33	74 0.10 2.67	247 0.34 2.64	5 0.01 0.79	11367 15.42
Set a Reminder	0 0.00 0.00	85 0.12 2.40	0 0.00 0.00	40 0.05 0.21	237 0.32 2.66	4 0.01 0.16	27 0.04 0.30	80 0.11 0.98	161 0.22 5.80	218 0.30 2.33	0 0.00 0.00	852 1.16
Personal Directory	3 0.00 0.21	10 0.01 0.28	8 0.01 0.10	4 0.01 0.02	56 0.08 0.63	1 0.00 0.04	217 0.29 2.40	47 0.06 0.58	13 0.02 0.47	8 0.01 0.09	0 0.00 0.00	367 0.50
Send Immediate Message	2 0.00 0.14	7 0.01 0.20	30 0.04 0.38	29 0.04 0.15	111 0.15 1.24	3 0.00 0.12	23 0.03 0.25	62 0.08 0.76	21 0.03 0.76	51 0.07 0.55	21 0.03 3.34	360 0.49
Total	1406 1.91	3539 4.80	7975 10.82	19448 26.38	8916 12.09	2506 3.40	9047 12.27	8135 11.03	2775 3.76	9347 12.68	629 0.85	73723 100.00

NOTE: Cells contain, in order: frequency, percent, column percent.
Source: ACTIONS3 LISTING

As would be expected, users in different job categories have different patterns of use of the system. Table 7.3 indicates that while the number of executives in the sample is small, their use is mainly for calendaring, document preparation and reviewing their in-basket. Faculty, faculty secretaries, and student secretaries use the system for its electronic mail facility and to prepare documents. Administrative analysts use the 'manage mail log' function most heavily. This function allows the user to find, change, forward, print, and delete past mail received or sent.

The varying pattern of activity for users of PROFS can be seen in Figure 7.1. The figure shows the percent distribution of use of various functions over a five month period in Spring 1985, a period when the system had been up and in operation for nearly eighteen months. The time series data show remarkable stability: users appear to have selected certain functions to use and to continue to use them in the same proportion over time. There are some perturbations, such as in early March 1985 and early May 1985. As Table 7.1 showed and Figure 7.1 reinforces, the dominant activity over time is reviewing one's in-basket. Functions such as using the automatic reminder feature, consulting one's own personal directory, and sending an immediate message are lightly used.

Figure 7.1
Cumulative Percent Distribution of Actions by Week for All Users, Spring 1985



100
80
60
40
20
0
PERCENT
01/09/85
01/29/85
02/18/85
03/10/85
03/30/85
04/19/85
05/09/85
WEEK ENDING
LEGEND: ACTIVITY
1 1 1 REVIEW IN-BASKET
2 2 2 SEARCH FOR DOC.
3 3 3 CALENDAR
4 4 4 MANAGE MAIL LOG
5 5 5 SEND A NOTE
6 6 6 MANAGE NOTE LOG
7 7 7 PREPARE DOCUMENT
8 8 8 FILE DOCUMENTS
9 9 9 SET A REMINDER
PERSONAL DIRECT.
SEND IMMED MESSG

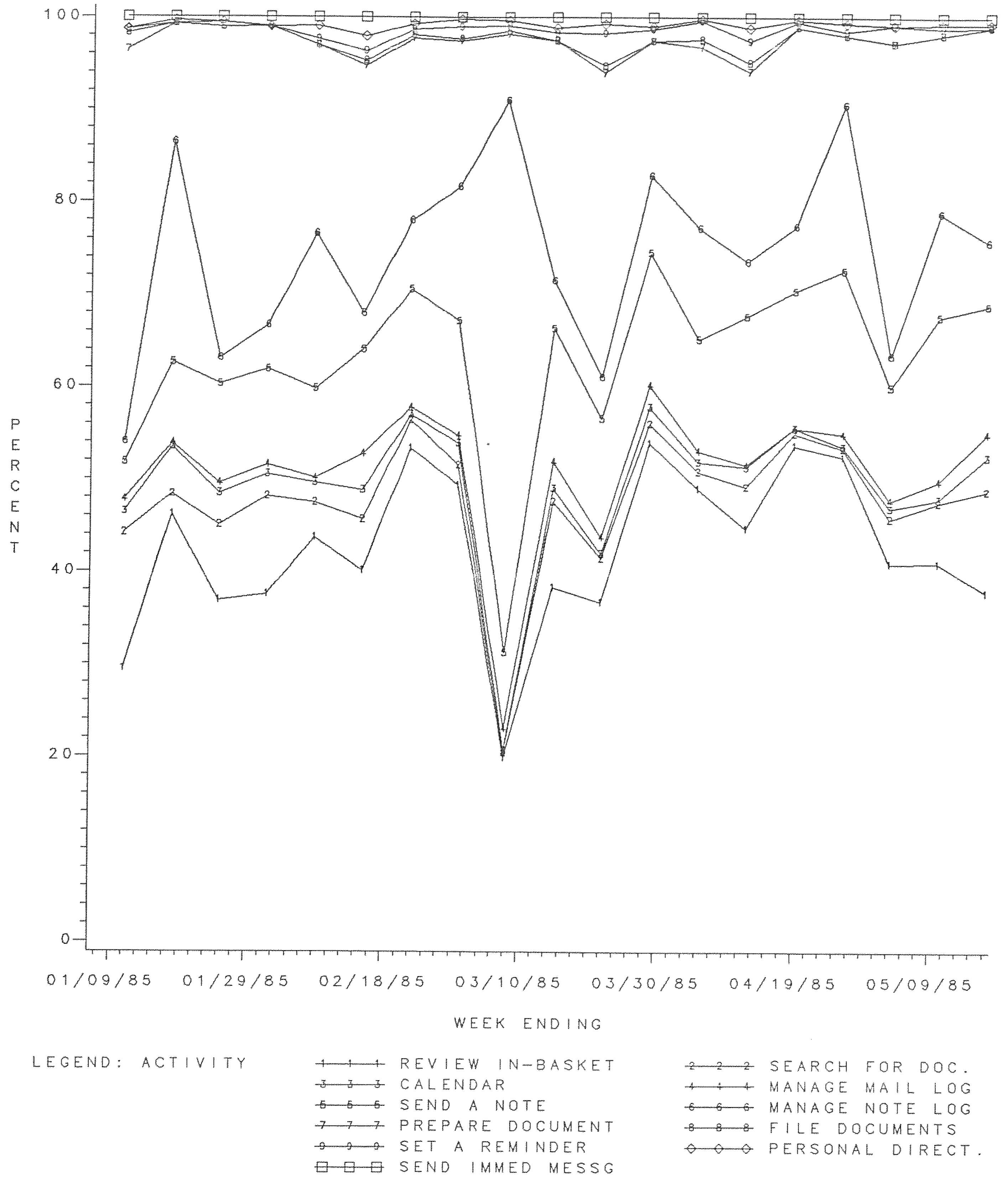
In contrast to Figure 7.1, Figures 7.2 and 7.3 present plots for two selected job classifications, general secretaries and faculty, for the same period. The distributions of activity use are radically different from one another and from the overall pattern (Figure 7.1) as well. General secretaries spend little time sending notes or calendaring. There is considerable variation in the proportion of their time spent searching for documents, managing their mail and note logs, and preparing and filing documents.

Faculty workload on PROFS (Figure 7.3) is dominated by reviewing their in-baskets, followed by preparing documents, and sending notes. The document search, calendar, and manage mail log functions are infrequently used.

Some other categories of users have even more radical longitudinal patterns: student secretary activity is dominated by preparing documents and reviewing in-baskets. When they are not doing one, they seem to be doing the other.

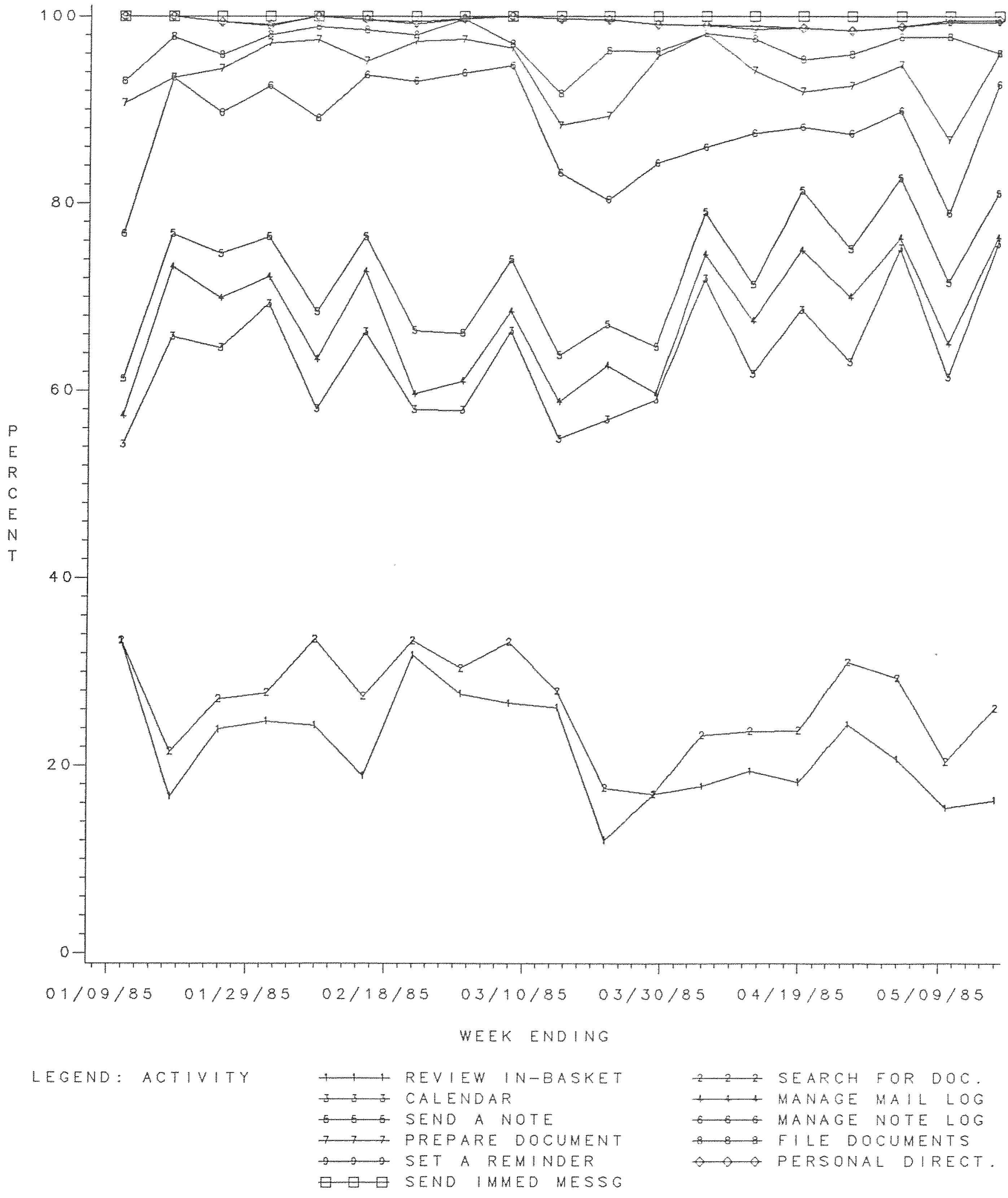
General analysts are a model of PROFS stability. The proportion of time they spend filing and searching for documents, as well as reviewing in-baskets is almost constant throughout the five months. Nearly all other functions were unused.

Figure 7.2
Cumulative Percent Distribution of Actions by Week for General Secretaries
Spring 1985



100
80
60
40
20
0
PERCENT
01/09/85
01/29/85
02/18/85
03/10/85
03/30/85
04/19/85
05/09/85
WEEK ENDING
LEGEND: ACTIVITY
REVIEW IN-BASKET
SEARCH FOR DOC.
CALENDAR
MANAGE MAIL LOG
SEND A NOTE
MANAGE NOTE LOG
PREPARE DOCUMENT
FILE DOCUMENTS
SET A REMINDER
PERSONAL DIRECT.
SEND IMMED MESSG

Figure 7.3
Cumulative Percent Distribution of Actions by Week for Faculty
Spring 1985


100
80
60
40
20
0
PERCENT
01/09/85
01/29/85
02/18/85
03/10/85
03/30/85
04/19/85
05/09/85
WEEK ENDING
LEGEND: ACTIVITY
REVIEW IN-BASKET
SEARCH FOR DOC.
CALENDAR
MANAGE MAIL LOG
SEND A NOTE
MANAGE NOTE LOG
PREPARE DOCUMENT
FILE DOCUMENTS
SET A REMINDER
PERSONAL DIRECT.
SEND IMMED MESSG

7.1.2 The Matched Sample

In order to gain a picture of how PROFS usage changed over time, a matched sample of time periods was developed to allow 1984 and 1985 usage of the system to be compared. The periods chosen were February 13, 1984 to April 11, 1984 and February 11, 1985 to April 10, 1985.

Table 7.4 summarizes use of the eleven functions with restricted definitions (see Table 7.1) for the two sample periods. In terms of volume of activity, close to 56 percent of the actions took place in 1984. Thus there was about a 20 percent decline in volume of activity from one sample to another.

Several of the activities remained relatively constant as a proportion of all activity performed. Viewing one's in-basket constituted 21-22 percent of the actions in both periods, while managing one's mail log, sending a note, and using the calendar function were all proportionally very stable across time periods. There were significant increases in the amount of document searching and filing from 1984 to 1985 and a 25% decline in the use of the document preparation function.

Table 7.4

Frequency Distribution of Activity by Year for Matched Sample 1984, 1985

Activity	Year 1984	Year 1985	Total
Review In-Basket	6144 14.15 25.52	4145 9.55 21.44	10289 23.70
Search for Document	2422 5.58 10.06	2874 6.62 14.87	5296 12.20
Calendar	1846 4.25 7.67	2048 4.72 10.59	3894 8.97
Manage Mail Log	1683 3.88 6.99	1415 3.26 7.32	3098 7.14
Send a Note	1382 3.18 5.74	987 2.27 5.11	2369 5.46
Manage Note Logs	3788 8.73 15.73	1826 4.21 9.45	5614 12.93
Prepare a Document	3941 9.08 16.37	2567 5.91 13.28	6508 14.99
File Documents	2545 5.86 10.57	2932 6.75 15.17	5477 12.62
Set a Reminder	192 0.44 0.80	260 0.60 1.34	452 1.04
Personal Directory	0 0.00 0.00	177 0.41 0.92	177 0.41
Send Immediate Message	134 0.31 0.56	100 0.23 0.52	234 0.54
Total	24077 55.47	19331 44.53	43408 100.00

NOTE: Cells contain, in order: frequency, percent, column percent
Source: ACTIONS4 LISTING, p. 4.

Changes in the extent of document searching and filing are almost completely explained by the usage of the system in the Chancellor's Office. A major part of PROFS activity in that unit involves these activities. Each academic unit declined in the use of the document preparation function, and there is no pattern with respect to the use of the 'review in-basket' function. Economics and Public Policy significantly increased their use of this activity, Library and Information Studies held almost steady, and Business Administration use declined.

Major usage differences were also observed between the sample periods for various job classifications. The overall usage of the system by executives declined sharply from 1984 to 1985, with the 88 percent of their use of the system occurring in 1984 and only 12 percent in 1985. Faculty and all secretaries, except administrative secretaries, increased their use of the 'review in-basket' function while all analysts and all administrative job titles reduced their use of it. Executives, faculty, faculty secretaries, and student secretaries all made greater use of the note-sending facility in 1985 than 1984.

7.2 Time to Function Use

Analysis to this point has not reflected the dynamic character of function use. Users do not begin to use all functions at once. The pattern of skill acquisition is important both as an indicator of possible timing of training and to identify patterns that inhibit growth of general skills.

A first step in analysis of the pattern of learning for PROFS is to consider the use of particular PROFS functions. For this purpose we employ the survivor analysis methods introduced in Chapter 6. However, here we consider not the demise of an activity but the advent of it. Hence instead of survivor functions we calculate what might be called advent functions.

Analysis of the advent of first use of a function was complicated by data problems. In particular, while the data from the early stages of the experiment were generally adequate to support estimation of the very first time a user logged onto the system, in many cases we lacked the information required to spot reliably the first time a user performed a particular PROFS functions. Given questions about data reliability we undertook no multivariate analysis and concentrated instead on illustrative calculations of simple aggregate advent functions for the eleven restricted definition activities. We calculate the proportion of users expected to have tried (in the restricted sense) each function by time $\underline{t}$ following first logon at time t=0. These estimates are unconditional in the sense that they are not adjusted for the 'competing hazard' of dropping out: some users $\underline{i}$ may not have tried function $\underline{m}$ by time t because they quit using the system altogether.

These advent ('survival' until trying the function) estimates are based on the behavior of all users. The evidence presented in Chapter 6 suggests that many users who began after the project was underway were peripheral to core participants and relatively uninvolved in the project. As a result, their use patterns may not be representative of what would be expected in a unit that seriously tried to use PROFS. This should be kept in mind when studying the outcomes.

Table 7.5 presents two points on the estimated advent functions for each of the 11 activities and for dropping out. The first is at six months after first logon, the second is at the first anniversary of initial logon. We present as an additional indicator the ratio of the advent rate at six months to the advent rate at twelve. This advent ratio allows us to discriminate between those activities picked up quickly by users (high ratio) to those picked up later (low ratio).

Table 7.5
Advent Rates, PROFS Activities
(Sample Size = 210 Participants)

PROFS Function	(a) Advent Rate 6 months After first logon	(b) Advent Rate 12 months After first logon	Ratio (a)/(b)
Review In-Basket	.877 (.025)	.944 (.020)	.93
Calendar	.353 (.034)	.397 (.037)	.89
Send a Note	.706 (.034)	.798 (.032)	.88
Manage Note Logs	.568 (.036)	.711 (.037)	.80
Set a Reminder	.250 (.032)	.324 (.036)	.77
Prepare a Document	.472 (.037)	.630 (.038)	.75
Manage Mail Log	.531 (.037)	.718 (.037)	.74
Search for Document	.458 (.037)	.662 (.039)	.69
Send Immediate Message	.340 (.035)	.495 (.040)	.69
File Documents	.180 (.028)	.280 (.035)	.64
End Logons (Quit Use)	.145 (.025)	.231 (.030)	.63
Personal Directory	.093 (.022)	.208 (.032)	.45

NOTE: Numbers in parentheses are standard errors of estimates. Estimates calculated on basis of fragmentary data; standard errors exaggerate precision of data. Estimation based on 'Life Table' techniques; see Kalbfleisch and Prentice [10].

Source: HAZARD1 LISTING 4/03/86; 21:17:10.

The results indicate that mail functions are used early (the advent ratio for open mail is .93) and functions like search for document and personal directory are learned late (the advent ratio for file a document is .64). Some functions are not investigated for a long time, if ever: only one in five users is expected to perform a personal directory task after twelve months.

7.3 Who Uses What

Given the advent of first use, who uses which functions in a typical work day? In Table 7.6 conditional function use rates are calculated for the 89 work days monitored in spring 1985 during which there were 19,605 user-days of activity. The sample is limited to participants beginning PROFS use prior to January 8, 1985 (the first day of the spring data subset) who were active for at least one of the days in the interval.

Table 7.6

PROFS Actions Counts, Spring 1985

Activity	Observations	Days Without	Days With	Nonuser Days	Use Rate (Conditional)	Use Rate (Unconditional)
Review In-Basket	18,773	15,346	3,427	832	0.18	0.17
Search for Document	12,971	12,101	870	6,634	0.07	0.04
Calendar	7,798	7,089	709	11,807	0.09	0.04
Manage Mail Log	14,325	13,527	798	5,280	0.06	0.04
Send a Note	16,013	14,247	1,766	3,592	0.11	0.09
Manage Note Logs	14,562	13,834	728	5,043	0.05	0.04
Prepare a Document	13,082	12,002	1,080	6,523	0.08	0.06
File Documents	5,919	5,477	442	13,686	0.07	0.02
Set a Reminder	7,123	6,819	304	12,482	0.04	0.02
Personal Directory	5,318	5,237	81	14,287	0.02	0.00
Send Immediate Message	9,889	9,676	213	9,716	0.00	0.01

Source: Calculations by authors from PROFS monitor data for 19,605 user-days.

File: LOGIT1 LISTING, 01/24/86; 13:24:02

For each activity two use rates are reported. One is the conditional use rate, that is the share of all user days in which the activity appears for those users ever using the activity in the spring. The second is the unconditional use rate, the share of all user days in which the activity appears in any of the 19,605 user-days. Table 7.6 shows, for example, that there were 18,773 days of use observations for participants who opened mail at least once. We have 832 days of use observations for users who never opened mail during the 89 day period. The unconditional use rate is 832 use-days divided by 19,605 total use days (18,773 plus 832 use days accumulated by the unfortunates who never garnered a message). The conditional use rate is 3,427 use days observed with a mail opening divided by 18,773 (19,605 - 832).

We analyze the incidence of use revealed in Table 7.6 as a random process in which the logarithm of the ratio of the odds of use of function i by user j on some use day is a linear function of a vector of characteristics X_j. That is, if P_{ijt} is the probability that user j will undertake activity i in period t then,

$$\ln [(P_{ijt})(1-P_{ijt})^{-1}] = X_{jt}'\beta_i,$$

where β_i is (again) a vector of coefficients. The probability P_{ijt} is then

$$P_{ijt} = [1 + \exp(-X_{jt}'\beta_i)]^{-1}$$

Given a sample of use-days for which the incidence of activity i and user characteristics X_{jt} are recorded, the parameters of the expression above may be estimated using maximum likelihood techniques. The results appear in Table 7.7.

Table 7.7

Logit Estimation Results, Probability of Function Use
BIJOU Project, Spring 1985

Variable	Mean	Review In-Basket		Search for Document		Calendar		Manage Mail Log	
		Coefficient	Probability	Coefficient	Probability	Coefficient	Probability	Coefficient	Probability
INTERCPT	1.00	-5.983	0.000	6.104	0.000	-20.447	0.000	4.092	0.000
OS_AGE	1.36	-0.248	0.122	-2.944	0.000	1.859	0.001	-1.734	0.000
OS_AGE2	2.17	0.249	0.000	1.046	0.000	-0.601	0.000	0.629	0.000
EXECTIVE	0.06	-1.103	0.000	-1.302	0.013	-0.585	0.101	-2.228	0.000
OFFICER	0.08	-0.041	0.738	-1.360	0.000	-1.056	0.000	-0.517	0.014
ADM_ANL	0.08	0.156	0.212	-0.299	0.178	-2.398	0.001	0.278	0.185
GEN_ANL	0.07	0.273	0.022	0.356	0.050	-0.101	0.746	-0.153	0.429
FAC_SEC	0.12	0.804	0.000	-1.763	0.000	-0.982	0.001	0.221	0.238
STU_SEC	0.06	0.212	0.085	-0.408	0.114	-1.387	0.000	-0.412	0.103
FACULTY	0.02	1.136	0.000	0.653	0.542	-1.041	0.006	-2.929	0.005
OTHERJOB	0.07	-0.976	0.000	-1.934	0.000	-0.325	0.416	-0.359	0.214
ADM_SEC	0.13	0.043	0.677	-1.263	0.000	2.592	0.000	-0.514	0.006
ADM_FAC	0.23	-0.043	0.731	-0.055	0.824	-1.708	0.000	-1.073	0.000
ECO	0.22	0.838	0.000	-1.788	0.000	0.508	0.043	-1.164	0.000
LIS	0.13	1.921	0.000	-1.579	0.000	0.052	0.830	-1.522	0.000
SBA	0.22	-0.590	0.000	-1.879	0.000	1.566	0.000	-0.984	0.000
SPP	0.09	-0.397	0.000	-0.233	0.150	0.685	0.007	-1.172	0.000
MALE	0.42	-0.447	0.000	-0.680	0.000	0.354	0.121	-0.155	0.257
AGE	41.82	0.224	0.000	-0.141	0.005	0.799	0.000	-0.167	0.000
AGE2	1851.71	-0.002	0.000	0.001	0.124	-0.009	0.000	0.002	0.000
UCBTIME	10.38	0.015	0.206	-0.222	0.000	0.076	0.020	-0.076	0.000
UCBTIME2	170.71	-0.002	0.000	0.005	0.000	-0.005	0.000	0.001	0.099
DWRITER	0.22	0.064	0.384	-0.472	0.001	-2.939	0.000	-1.282	0.000
CONCPRS		0.753		0.827		0.828		0.764	
RNKCORR		0.521		0.679		0.674		0.564	
Number of Observations		12,242		8,535		5,194		9,440	

Note: 'Probability' column gives probability of estimation of corresponding coefficient with same or greater absolute size given observation count when the true coefficient value is zero. CONCPRS and RNKCORR are defined in the text. The dependent variables are defined as follows:

Review In-Basket	User looks at note or document in in-basket
Search for Document	User performs search for document
Calendar	User looks at calendar
Manage Mail Log	User performs some operation with maillog

See Table 6.3 for definitions of the independent variables.

Source: Calculations by authors from PROFS monitor data.
File: LOGIT1 LISTING

Table 7.7, continued

Logit Estimation Results, Probability of Function Use
BIJOU Project, Spring 1985

Variable	Mean	Function							
		Manage Note Logs		Prepare a Document		Send Immediate Message		Send a Note	
		Coefficient	Probability	Coefficient	Probability	Coefficient	Probability	Coefficient	Probability
INTERCPT	1.00	-10.133	0.000	-3.946	0.000	-3.900	0.086	-9.273	0.000
OS_AGE	1.36	-2.066	0.000	0.648	0.021	-1.899	0.002	-1.158	0.000
OS_AGE2	2.17	0.657	0.000	-0.146	0.091	0.640	0.000	0.547	0.000
EXECTIVE	0.06	-0.857	0.022	1.174	0.000	-1.977	0.098	-0.438	0.089
OFFICER	0.08	-0.131	0.501	0.460	0.010	-0.596	0.352	-0.090	0.602
ADM_ANL	0.08	0.301	0.171	1.304	0.000	-0.944	0.173	0.004	0.981
GEN_ANL	0.07	-0.297	0.169	0.562	0.006	-0.313	0.455	0.624	0.000
FAC_SEC	0.12	0.996	0.000	0.882	0.000	1.486	0.000	2.028	0.000
STU_SEC	0.06	-0.437	0.100	0.380	0.051	-0.761	0.275	0.102	0.000
FACULTY	0.02	-0.418	0.301	-1.467	0.018	1.489	0.023	1.422	0.000
OTHERJOB	0.07	-0.332	0.282	-1.107	0.000	0.933	0.103	0.292	0.106
ADM_SEC	0.13	0.787	0.000	-0.119	0.528	0.594	0.104	1.132	0.000
ADM_FAC	0.23	-0.012	0.960	-0.576	0.003	1.137	0.031	0.838	0.000
ECO	0.22	0.105	0.429	0.359	0.004	-0.532	0.087	0.825	0.000
LIS	0.13	0.141	0.335	-0.155	0.250	-0.760	0.034	1.361	0.000
SBA	0.22	-0.981	0.000	-0.902	0.000	-1.440	0.000	-1.009	0.000
SPP	0.09	-0.314	0.104	-0.501	0.001	-1.587	0.000	-0.336	0.015
MALE	0.42	-0.889	0.000	0.570	0.000	-0.590	0.136	-0.683	0.000
AGE	41.82	0.396	0.000	0.114	0.001	-0.007	0.952	0.308	0.000
AGE2	1851.71	-0.004	0.000	-0.001	0.000	0.001	0.646	-0.003	0.000
UCBTIME	10.38	0.109	0.000	-0.195	0.000	0.408	0.000	0.102	0.000
UCBTIME2	170.71	-0.006	0.000	0.005	0.000	-0.024	0.000	-0.005	0.000
DWRITER	0.22	-0.500	0.000	-0.772	0.000	-0.178	0.510	-0.512	0.000
CONCPRS		0.704		0.734		0.733		0.754	
RNKCORR		0.451		0.495		0.542		0.527	
Number of Observations		9,727		8,803		6,602		10,499	

The dependent variables are defined as follows:

Manage Note Logs	User reviews a note log
Prepare a Document	User enters editing facility and executes some task related to document processing
Send Immediate Message	User sends "immediate" message
Send a Note	User sends a note

We consider first the 'goodness of fit' of the functions in Table 7.7, then review the results on the basis of the independent variables. This overview concentrates on signs and statistical significance; we later present information on the numerical implications of the results.

Since the logit equations presented above produce probability estimates, but what is observed are discrete events, it is impossible for the equation to 'fit' perfectly in the sense that every use of the system will be associated with an estimated probability of 1 and every user day in which the associated function is not used will have an estimated probability of precisely 0. We have included two measures that provide a sense of how well the equation does. One is the 'fraction of concordant pairs of predicted probabilities and responses', CONCPRS. CONCPRS is calculated by first ranking all observations by the estimated probability of use of the indicated function. Then the probability is compared with the outcome. All cases in which the function was used and the estimated probability exceeded .5, or in which the function was not used and the estimated probability was less than .5, are designated 'concordant'. The CONCPRS value of .753 for the 'Review In-Basket' function means that 75 percent of all cases were correctly predicted on this criterion. Among the functions for which logits were estimated, the best prediction was achieved for calendar use, the worst for 'Manage Note Logs'.

The alternative measure of goodness of fit is RNKCORR, the rank correlation between estimated probability of function choice and actual outcome. All of these correlations are statistically significant.

Turning to the independent variables themselves, the large number of observations allows considerable precision in estimation. Here as in the earlier multivariate analysis we have chosen to report, instead of standard errors for the estimated coefficients, the estimated probability of observing the association between the outcome and the independent variable that appears in the sample. This estimated probability is conditional in that, with repeated sampling, the observed correlation will disappear; that is, under the null hypothesis the true value of b_i is zero. Throughout this book we have chosen to focus on the relationships for which these probabilities are less than .10. Again, this choice is arbitrary and may be unduly restrictive given the exploratory character of our exercise.

For all the models reported in Table 7.7, we entered 'Office System Age' (OS_AGE) with a quadratic term to allow for nonlinearity of change in use with the passage of time. For all eight functions the OS_AGE effects are jointly significant. The remaining functions fall into three categories. For everything but calendar and document preparation, use initially declines with time. However, the positive coefficients on the square of OS_AGE indicate that this decline slows and, in some cases, reverses direction of change within the domain of OS_AGE included in the data. For the 'Review In-Basket' function, this reversal occurs after almost exactly one year of experience with the system. For the 'Manage Note Logs' function, the estimated reversal point is at 3 years, almost outside the domain of the data we study. Since the quadratic specification must be only an approximation to the 'true' functional relationship between OS_AGE and note log management, the results are probably telling us only that the incidence of this activity declines at a decreasing rate with time on the system. The third pattern is represented by 'Prepare a Document'; here activity increases with office system experience, but the rate of increase declines with time.

Recall that the use of a PROFS function is measured relative to what is expected from a general secretary in the Chancellor's Office. Members of most of the occupational categories perform the 'Review In-Basket' function more frequently than members of this reference group. The only job classifications in which members do significantly less mail handling are executives and people in the 'other' group. Likewise, members of all other classifications save one either look for documents with less or about the same frequency as the reference group; most appear to open it less frequently. The exception is, again, the general analyst. Interestingly, administrative secretaries appear much more likely to use the calendar function than is true for the general secretary in the Chancellor's Office, and the administrative analysts in the sample appear to have used the calendar function extremely infrequently. Other results are generally consistent with our expectations except that, aside from faculty, administrative secretaries, and research assistants, everyone seems to be more likely to prepare documents using PROFS than a general secretary is.

The differences in use patterns between the participating units are again significant and varied. For activities related to accessing the PROFS database (Search for a Document; Manage Mail Log), function use by users in other units is consistently less than for the Chancellor's Office. For other functions, use in the Economics Department and in the School of Library and Information Studies tends to be greater, although in some cases (e.g., Manage Note Logs) the differences are not statistically significant. The compact quarters that house the staff of the School of Library and Information Studies apparently foster communication of all sorts, including the transmission of lots of PROFS notes.

Differences in function use by sex do appear. All other things being equal, men are less likely to undertake any operation involving note or message sending than are women; they are less likely to conduct database-related activities; and they are more likely to use the document preparation functions.

Other things being equal, older participants were more likely than young ones to send and receive mail, use the notelog, use the calendar, and prepare documents. They were less likely to undertake activities involving the PROFS database. Age being constant, old-timers at Berkeley were less likely to use all functions in the system except those associated with note and message sending and receiving functions.

About one-fifth of the potential use days for the spring were accumulated for operators using the IBM Displaywriter as a terminal. The last row in Table 7.7 shows that Displaywriter operators were less likely than others to do all PROFS activities except open mail. Clearly Displaywriter functions were substituted for PROFS. And it appears that use of the Displaywriter made it less likely the user would employ other PROFS functions, such as calendaring, even when they were not available on the workstation.

Coefficients and statistical tests may interest some people, but, to paraphrase Legs Diamond, the real question is, 'What does it mean for the odds?' Sample probabilities of function use calculated from the data in Table 7.7 are presented in Table 7.8. Calculations begin by assuming the baseline General Secretary in the Chancellor's Office who is 35 years old, has one year of office systems experience, and has worked for the University for 10 years. Consider the effect on the likelihood of opening mail if these characteristics are changed. The baseline probability is just .21. While experience at the University may have a statistically significant effect on the likelihood of opening mail, the consequences are not numerically very large: 50 percent less experience raises the likelihood of receiving mail by about .01. Mail use in the Graduate School of Public Policy is less frequent by a third, but, as we have already seen, secretaries in the School of Library and Information Studies are more than three times more likely to receive mail. Even a faculty member in the School of Library and Information Studies receives mail more frequently than is true for the general secretary in the Chancellor's Office.

Table 7.8
Probability of Activity Occurrence
BIJOU Project, Spring 1985

	Review In-Basket	Search for Document	Calendar	Manage Mail Log	Send a Note	Manage Note Logs	Prepare Document	Send Immediate Message
General Secretary, Chancellor's Office	0.210	0.208	0.118	0.192	0.077	0.103	0.069	0.052
General Secretary, Chancellor's Office, 5 years at UC Berkeley	0.221	0.357	0.116	0.243	0.069	0.093	0.117	0.040
General Secretary, School of Public Policy	0.152	0.172	0.209	0.069	0.057	0.078	0.043	0.011
General Secretary, School of Library & Info. Studies	0.645	0.051	0.123	0.049	0.246	0.117	0.060	0.025
Faculty Secretary, School of Library & Info. Studies	0.802	0.009	0.050	0.061	0.713	0.264	0.134	0.101
Faculty Member, School of Library & Info. Studies	0.850	0.094	0.047	0.003	0.575	0.080	0.015	0.101

Source: Calculations from logit estimation results.

File: LOGIT3B LISTING 8/06/86, 19:22:16.

While secretaries in the School of Library and Information Studies are much more likely to send and receive notes than is true for secretaries in the Chancellor's Office, calendar use appears much greater among secretaries in the School of Public Policy. Nonetheless, most of these numbers are small; a probability of calendar use of .138 means on average a general secretary in the Graduate School of Public Policy looks at her (by assumption) calendar only every 7 working days. What is more likely, of course, is that within each category the average masks wide dispersion: some use it frequently, some use it not at all. Similarly low use rates are apparent for the document preparation function.

Hence while our multivariate analysis detects interesting variations among users in the degree of BIJOU participation, our conclusion remains the same as was drawn from the first of our tables: 'Only a few functions, such as reviewing one's in-basket, were used heavily, and the rest were used only occasionally.'

7.4 The Distribution of Active Time

7.4.1 Spring, 1985

Table 7.9 presents the results of the active time analysis. When all the time the user is connected to PROFS is considered active, the table shows that users spend most of their time (62 percent) looking at one of the PROFS main menus (A00). Of the remaining activities, the ones that consume the most time are reviewing the in-basket, calendaring, and editing. When the ATIME2 duration cutoff is applied to the activities (see Table 6.4), the number of hours users spend looking at the main menu drops from 18,088 to 4,116 hours for the Spring

1985 sample. When the most restrictive cutoff is applied (ATIME3), the main menu viewing time drops even further, to 1,777 hours.

Table 7.9

Number of Hours Performing PROFS Functions, Spring 1985

Function/Activity	All Time Is Active ATIME1		15(60) Minute Cutoff ATIME2		5(30) Minute Cutoff ATIME3	
	Hours	Percent	Hours	Percent	Hours	Percent
View Main Menus	18088	62.28	4116	40.05	1777	28.57
Review In-Basket	2090	7.20	966	9.40	686	11.03
Calendar	2072	7.13	651	6.34	349	5.62
XEDIT/FILELIST	1697	5.84	1299	12.64	971	15.62
Prepare a Document	1138	3.92	770	7.49	605	9.72
Search for Document	1035	3.56	672	6.54	467	7.53
Other Commands	948	3.27	478	4.65	336	5.40
Manage Mail Log	628	2.16	375	3.65	276	4.43
File Documents	533	1.84	343	3.33	264	4.25
Send a Note	363	1.25	285	2.78	215	3.46
Other Locations	309	1.06	220	2.14	186	2.99
Manage Note Logs	120	0.41	85	0.83	71	1.14
Set a Reminder	16	0.05	13	0.13	10	0.17
Send Immediate Message	6	0.02	5	0.05	5	0.08
Total	29044	100.00	10278	100.00	6220	100.00

Note: See Table 6.4 for definitions of active times ATIME1, ATIME2, and ATIME3.

Source: AGTIME2 LISTING

Editing documents is the major consumer of user time when either of the two restrictive criteria is applied to the active time sequences. However, it appears that the 5(30) minute cutoff may be too restrictive in that the total number of hours editing increases as the threshold becomes greater. It is not possible to say with any certainty what the cutoff should be, but using one criterion, the 15(60) value is better.

Different units have very different patterns of active time usage, just as they had different frequencies of use of the activities. Using the 15(60) criterion for analysis, and excluding main menu time, the School of Business Administration spent more than half (52 percent) of their time at the calendar function, Economics spent 40 percent of its time editing, Library and Information Studies spent 35 percent reviewing their in-basket, and the Chancellor's Office spent a quarter of their time searching for documents.

Figures 7.4 and 7.5 summarize the active time for the Spring 1985 for the case where all login time is considered active. Figure 7.4 plots the percent distribution of active time for all accounts and Figure 7.5 shows the same distribution for the School of Public Policy. The usage pattern for all users remained relatively stable during Spring 1985 for all accounts, but there were major shifts in usage for Public Policy. At the beginning of the year (and of the semester), document preparation time was relatively large and by the end of the semester it had declined appreciably. Calendaring activity increased substantially as the semester progressed and main menu time decreased proportionally.

Figure 7.4
Cumulative Percent Distribution of Account Time by Week for All Accounts, Spring 1985

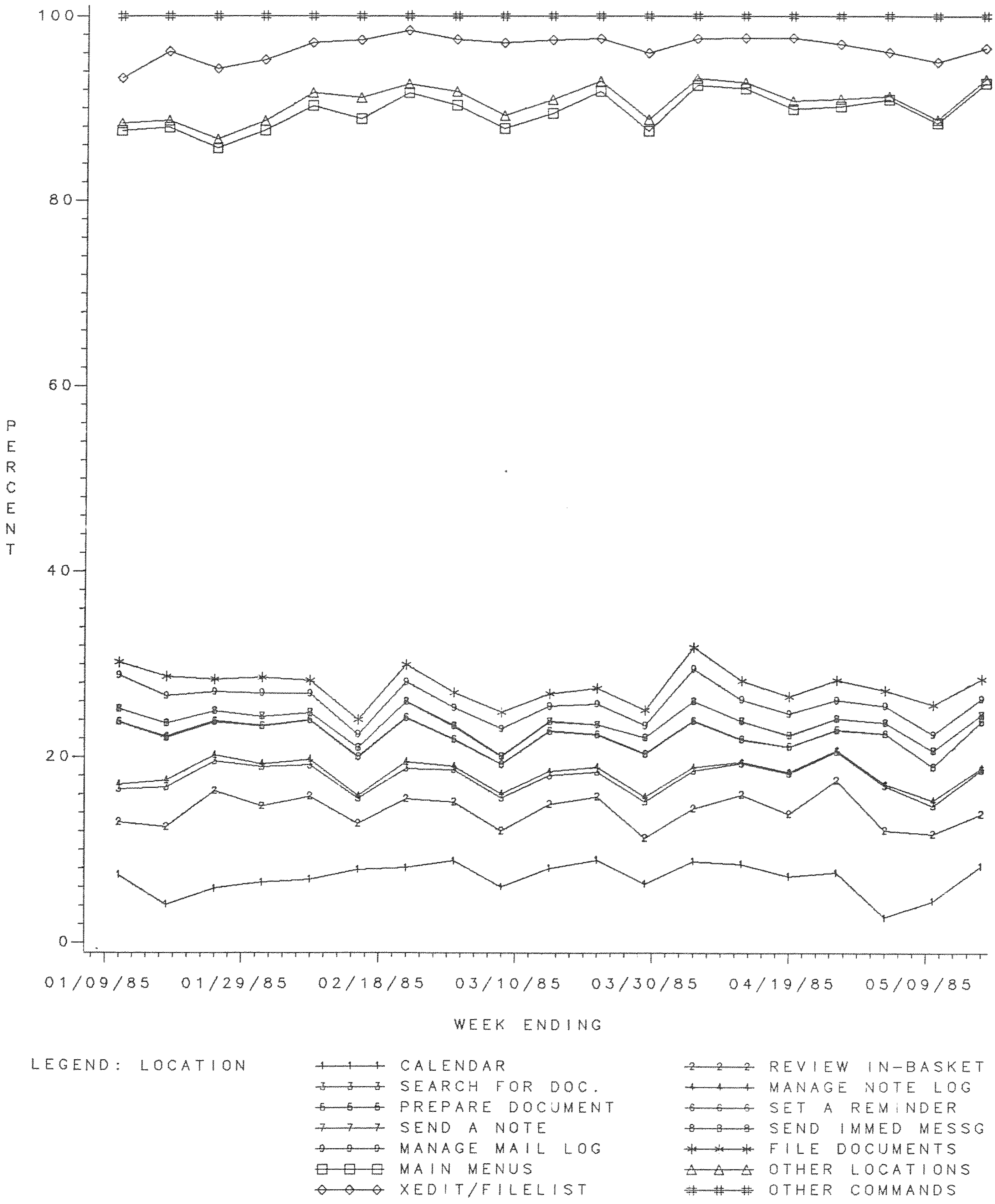
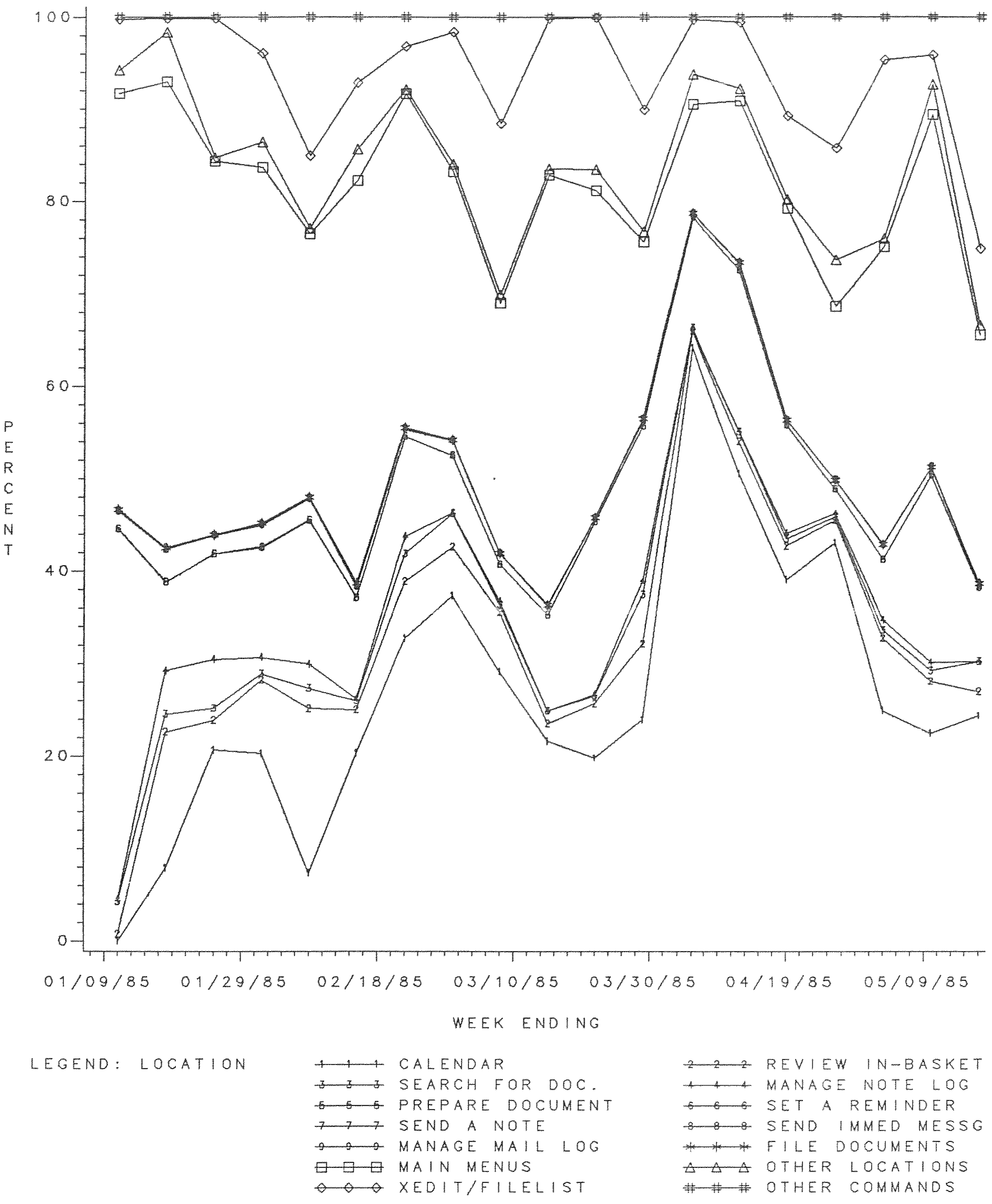

100
80
60
40
20
0
PERCENT
01/09/85
01/29/85
02/18/85
03/10/85
03/30/85
04/19/85
05/09/85
WEEK ENDING
LEGEND: LOCATION
CALENDAR
REVIEW IN-BASKET
SEARCH FOR DOC.
MANAGE NOTE LOG
PREPARE DOCUMENT
SET A REMINDER
SEND A NOTE
SEND IMMED MESSG
MANAGE MAIL LOG
FILE DOCUMENTS
MAIN MENUS
OTHER LOCATIONS
XEDIT/FILELIST
OTHER COMMANDS

Figure 7.5
Cumulative Percent Distribution of Account Time by Week
School of Public Policy, Spring 1985



100
80
60
40
20
0
PERCENT
01/09/85
01/29/85
02/18/85
03/10/85
03/30/85
04/19/85
05/09/85
WEEK ENDING
LEGEND: LOCATION
CALENDAR
REVIEW IN-BASKET
SEARCH FOR DOC.
MANAGE NOTE LOG
PREPARE DOCUMENT
SET A REMINDER
SEND A NOTE
SEND IMMED MESSG
MANAGE MAIL LOG
FILE DOCUMENTS
MAIN MENUS
OTHER LOCATIONS
XEDIT/FILELIST
OTHER COMMANDS

7.4.2 Active Time using Matched Sample

The matched sample from February-April 1984 and 1985 was also used to analyze how the amount of time performing PROFS functions had changed between the years. The results are given in Table 7.10. The total number of hours of use of the system when all time is considered active increased by about 1000 hours between the two periods, but when the ATIME2 and ATIME3 cutoff criteria were applied to the time sequences there was almost no change in the number of hours of actual use between the sample periods. But Table 7.4 showed that the number of activities performed also declined between the 1984 and 1985 sample. Thus it appears that either user productivity declined between the two periods,[25] or that the cutoff criteria still exceed the time actually required for each function in normal use.

[25] To completely verify this statement one would have to validate that the task mix remained relatively constant between the two periods as well.

Table 7.10

Number of Hours Performing PROFS Functions: 1984 and 1985 Matched Sample

Function/Activity	All Time Is Active ATIME1		15(60) Minute Cutoff ATIME2		5(30) Minute Cutoff ATIME3	
	1984	1985	1984	1985	1984	1985
View Main Menus	3829 62.91	4511 63.68	983 41.79	1002 40.65	444 29.93	428 28.96
Review In-Basket	401 6.59	454 6.41	246 10.45	226 9.17	182 12.25	163 11.05
Calendar	617 10.14	575 8.12	199 8.45	182 7.39	115 7.76	94 6.34
XEDIT/FILELIST	223 3.67	363 5.12	192 8.17	284 11.52	156 10.51	213 14.43
Prepare a Document	260 4.27	248 3.51	196 8.34	171 6.93	163 10.97	134 9.09
Search for Document	147 2.42	246 3.47	105 4.47	162 6.58	79 5.33	112 7.56
Other Commands	47 0.76	182 2.56	42 1.78	95 3.86	38 2.53	70 4.70
Manage Mail Log	95 1.57	166 2.35	54 2.29	105 4.27	42 2.85	77 5.23
File Documents	121 1.99	132 1.86	72 3.05	78 3.17	53 3.59	59 4.01
Send a Note	100 1.64	93 1.32	78 3.33	73 2.97	61 4.09	55 3.70
Other Locations	168 2.76	85 1.20	115 4.89	61 2.49	91 6.14	51 3.45

NOTE: Entry is, in order, number of hours and column percent. See Table 6.4 for definitions of active times ATIME1, ATIME2, and ATIME3.
Source: AGTIME2M LISTING

Table 7.10, continued

Number of Hours Performing PROFS Functions: 1984 and 1985 Matched Sample

Function/Activity	All Time Is Active ATIME1		15(60) Minute Cutoff ATIME2		5(30) Minute Cutoff ATIME3	
	1984	1985	1984	1985	1984	1985
Manage Note Logs	72 1.19	23 0.33	66 2.79	20 0.80	56 3.78	18 1.22
Set a Reminder	5 0.09	4 0.05	5 0.20	3 0.14	4 0.26	3 0.18
Send Immediate Message	0 0.00	1 0.02	0 0.00	1 0.05	0 0.00	1 0.08
Total	6087	7084	2353	2465	1485	1478

The most interesting aspect of the active time distributions of Table 7.10 is their stability. No matter which of the three cut-off criteria is applied to the time values, the percent distribution of time spent performing tasks between the two samples and within each cutoff never varies by more than about five percent. There are, of course, major differences in the overall distributions of time between cutoff values. When all time is considered active, the largest amount of time is consumed by calendaring, reviewing in-basket, xediting, and document preparation, in that order. Both of the two cutoff criteria simply result in a reordering of those four activities so that the largest amount of time is spent in using the CMS XEDIT editor or FILELIST functions, reviewing in-basket, calendaring, and document preparation within PROFS.

7.5 What Did We Learn?

This chapter has presented a number of approaches to the study of the use of PROFS functions. It is useful to summarize what has been learned.

1. PROFS usage was very low. No formal standard of comparison was available to use in preparing this analysis. However, both the simple counts of PROFS 'actions' and the more sophisticated logit analysis led to the same conclusion: the typical BIJOU participant did not use system functions much at all. On average the typical secretary in the Chancellor's office used his/her calendar only once very ten days. The only function used with regularity by participants in active units was document preparation. This is not to say that there were not users who were very active and who employed a wide range of PROFS support. The point is that these people were exceptional.

2. Use of PROFS functions declined from 1984 to 1985. While logon time among all users went up, the number of PROFS functions employed went down. Part of this may be attributable to substitution of CMS utilities for PROFS equivalents. Certain functions appear to be heavily used, but inspection of the data indicates that use is very concentrated. The best example of this is the concentration of use of the document filing/retrieval facility in the Chancellor's Communication and Resources Center.

3. Use of restricted definitions of function use is feasible. The results of this chapter demonstrate the significant difference between incidence of genuine use of a function and the incidence of selecting a function without using it. For study of learning sequences, it is use that counts. For this

work the utility of definition refinement was limited because of incomplete monitoring results and thinness of function use. However, we believe these measures could be productively applied in other applications.

4. Survival techniques may be applied to learning sequences. As with application of restricted definitions of function use, incomplete data hampered our use of survival techniques in the study of function learning. However, the results are intuitively plausible. Study of the sequence in which functions are adopted by different types of workers in a variety of environments could provide information useful in planning training programs.

5. Interunit variation in PROFS use is very significant. This, of course, was the conclusion of the last chapter as well.

PART IV: ANALYZING THE BIJOU SYSTEM

8.0 Analyzing Work Sessions

8.0 ANALYZING WORK SESSIONS

In Chapters 6 and 7 the amount of time devoted to PROFS and the functions users employed were investigated. In this chapter the actual method of function use and sequence of activities are studied.

The sequences with which PROFS activities are performed provides useful supplementary information to complete the picture of how the system is used. Data on the patterns of use are important because they reveal the steps the user took to accomplish an objective. Knowing what these steps are allows a more careful investigation of whether the structure of the system assists or inhibits the user, whether there are features that appear to be missing from the system's repertoire, and whether some functions could benefit from repackaging so as to facilitate use.

In this chapter use-sequences are studies in three ways. First we consider branches of the PROFS function 'tree' and analyze responses to the main menus, note sending, note receiving, document preparation, calendar, and help screens. In Section 8.2 multi-screen use sequences are investigated. In Section 8.3 the speed of user responses to menu alternatives is considered. Section 8.4 summarizes the results.

8.1 The Main Menus and Function Use

8.1.1 Menu A00

When a BIJOU PROFS session begins, the user enters the 'A00 node'. This node is composed of the three menus A001, A002, and A003, that are reproduced (in compressed form) in Figure 8.1.[26] There is no logical reason for the user to have to scan three screens to make a choice of the task to be performed, but the physical size of the screen prevents all choices being displayed on one screen given the PROFS display format. Table 8.1 displays the frequencies and probabilities of function use by main menu screen for a sample of 15,437 PROFS sessions recorded in Spring, 1985. A session begins when the first PROFS screen is displayed after logon, and ends when the user exits PROFS; in general for BIJOU users this occurred on logoff.

[26] A complete set of BIJOU PROFS screens is reproduced in Appendix C.

Figure 8.1
BIJOU PROFS Main Menus (compressed)

A001

```
  MDC-BIJ             P R O F S    M A I N    M E N U      CAO-SYSTEM   A00
 Press one of the following PF keys.
 PF1   Calendar                                         Time:    1:45 PM
 PF2   Review In-Basket
 PF3   Search for Document                          1985   SEPTEMBER   1985
 PF4   Manage Note Logs            *-------*        S    M    T    W    T    F    S
 PF5   Prepare a Document          | PAGE |         1    2    3    4    5    6    7
 PF6   Set a Reminder              | ONE  |         8    9   10   11   12   13   14
 PF7   Send a Note                 *-------*       15   16   17   18   19   20   21
 PF8   Send Immediate Message                      22   23   24   25   26   27   28
                                                   29   30
PF10   Menu Page Two                                       Day of Year: 248
PF11   Menu Page Three
===>   (command line)                              PF9 Help     PF12 End
---------------------------------------------------------------------------
```

A002

```
  MDC-BIJ             P R O F S    M A I N    M E N U      CAO-SYSTEM   A00
 Press one of the following PF keys.
 PF1   Manage Mail Log                                  Time:    2:58 PM
 PF2   Personal Directory
 PF3   File Documents                               1985   SEPTEMBER   1985
 PF4   View Central Directory       *-------*       S    M    T    W    T    F    S
 PF5   Prepare a Document           | PAGE |        1    2    3    4    5    6    7
 PF6   Author Profiles              | TWO  |        8    9   10   11   12   13   14
 PF7   Manage Distribution Lists    *-------*      15   16   17   18   19   20   21
                                                   22   23   24   25   26   27   28
                                                   29   30
PF10   Menu Page Three                                     Day of Year: 248
PF11   Menu Page One
===>   (command line)                              PF9 Help     PF12 End
---------------------------------------------------------------------------
```

A003

```
  MDC-BIJ             P R O F S    M A I N    M E N U      CAO-SYSTEM   A00
 Press one of the following PF keys.
 PF1   .                                                Time:    3:02 PM
 PF2   Update Names for Schedule Selection
 PF3   .                                            1985   SEPTEMBER   1985
 PF4   Change Password             *-------*        S    M    T    W    T    F    S
 PF5   .                           | PAGE |         1    2    3    4    5    6    7
 PF6   .                           | THREE|         8    9   10   11   12   13   14
 PF7   .                           *-------*       15   16   17   18   19   20   21
                                                   22   23   24   25   26   27   28
                                                   29   30
PF10   Menu Page One                                       Day of Year: 248
PF11   Menu Page Two
===>   (command line)                              PF9 Help     PF12 End
---------------------------------------------------------------------------
```

Table 8.1

Main Menus Screen Function Key Use
Spring 1985

Main Menu Screen		Responses Number	Percent
Menu A001 (81,696 Appearances)			
PF1	Calendar	4,015	4.9
PF2	Review In-Basket	19,024	23.3
PF3	Search for Document	4,907	6.0
PF4	Manage Note Logs	1,657	2.0
PF5	Prepare a Document	2,982	3.7
PF6	Set a Reminder	607	0.7
PF7	Send a Note	4,507	5.5
PF8	Send Immediate Message	437	0.5
PF9	Help	66	0.1
PF10	Menu Page Two	5,143	6.3
PF11	Menu Page Three	729	0.9
PF12	End	2,687	3.3
Enter		32,285	39.6
Other		2,650	3.2
	Total	81,696	100.0
Menu A002 (13,776 Appearances)			
PF1	Manage Mail Log	3,526	25.6
PF2	Personal Directory	668	4.8
PF3	File Documents	1,460	10.6
PF4	View Central Directory	656	4.8
PF5	Prepare a Document	302	2.2
PF6	Author Profiles	100	0.7
PF7	Manage Distribution Lists	138	1.0
PF9	Help	13	0.1
PF10	Menu Page Three	1,460	10.6
PF11	Menu Page One	2,855	20.7
PF12	End	391	2.8
Enter		2,006	14.6
Other		201	1.5
	Total	13,776	100.0

Source: MENUKEY2 LISTING; 12/03/85

The analysis in the preceding chapter (Table 7.1) indicated that about twelve percent of all user actions involved transfers among the three parts of Screen

Table 8.1, continued

Main Menus Screen Function Key Use
Spring 1985

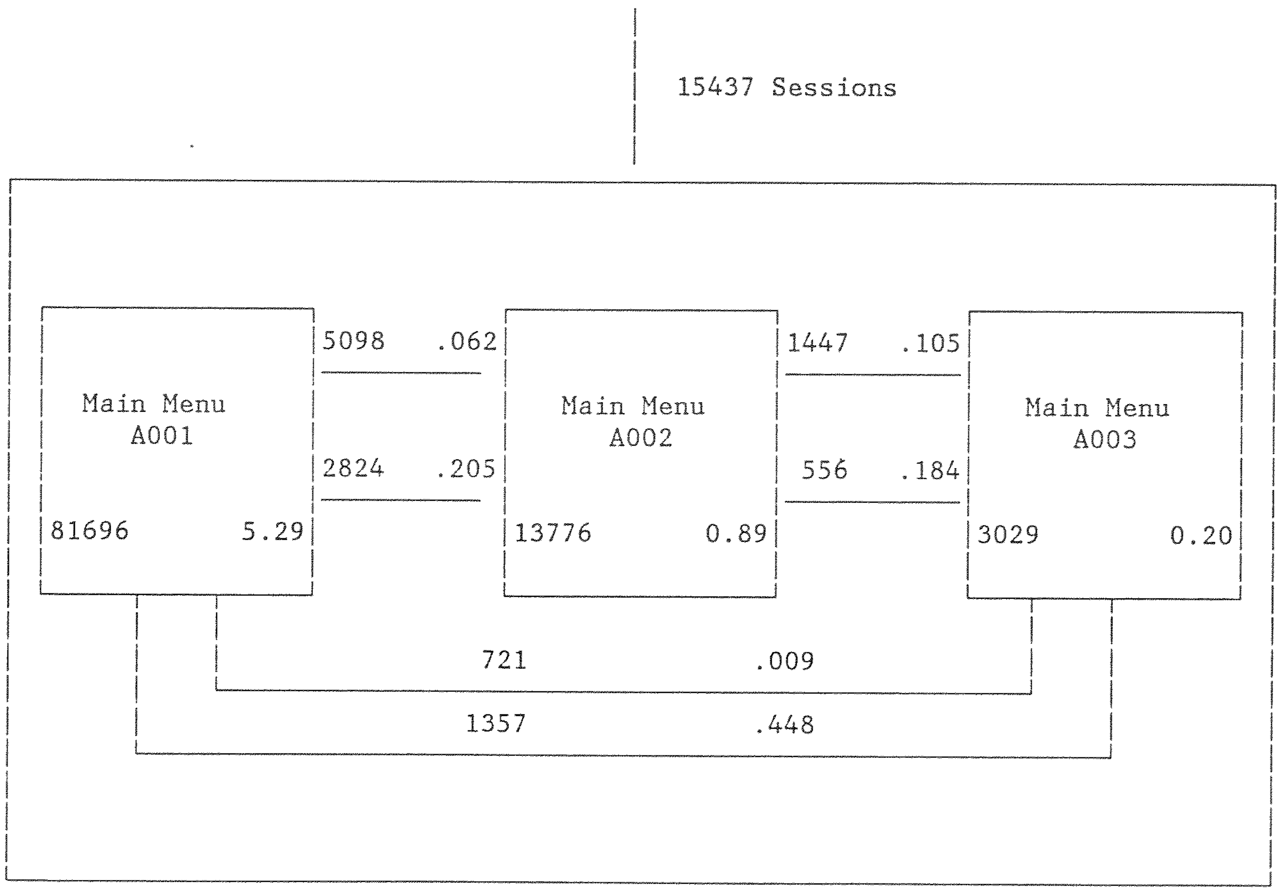
Main Menu Screen		Responses Number	Percent
Menu A003 (3,029 Appearances)			
PF1	.	401	13.2
PF2	Update Names for Schedule Selection	68	2.2
PF3	.	188	6.2
PF4	Change Password	68	2.2
PF5	.	3	0.1
PF6	.	4	0.1
PF7	.	8	0.3
PF9		10	0.3
PF10	Menu Page One	1,362	45.0
PF11	Menu Page Two	568	18.8
PF12	End	133	4.4
Enter		153	5.1
Other		63	2.1
	Total	3,029	100.0

A00. Figure 8.2 illustrates these transitions based on data from Table 8.1. For the 15,437 sessions analyzed, menu A001 was displayed 81,696 times. Thus the user returned to the menu an average of 4.4 times per session (not counting the original display). About six percent of all the actions users took while at menu A001 were to move to menu A002, and less than one percent of the actions were to move to menu A003. Every 2.6 sessions users moved from the first to the second, or first to the third menu. Proportionately, the second and third main menus were used lightly. It is likely that few of the transfers to A003 were for actions to be performed there, since as Figure 8.1 shows the only options included on Menu 3 involved changing password or changing the list of persons with access to the user's calendar. In the BIJOU implementation of PROFS, the menu transfer function key set (PF10-PF11) were organized as a round robin so that pushing any one key would bring the user through each of the menus.

Thus the user wishing to move to menu A001 from menu A002 who accidentally pushes PF12 need only do it one more time to reach the intended destination.

Figure 8.2

PROFS Main Menus Transitions
Spring 1985 Sample



Note: Entries in boxes are (counterclockwise from the top): (1) screen number; (2) number of screen appearances, all sessions; (3) number of screen appearances per session. Flows show number of observed transitions and fraction of actions from origination screen accounted for by indicated transition.

Suitable reorganization could reduce the frequency of some of these transitions. For example, 'Set a Reminder' (PF6) on menu A001 was used 607 times, less frequently than four of the alternatives on menu A002. This suggests that transferring the 'reminder' function to some other location, perhaps as an option within the general calendar function, and reassigning PF6 to one of the other functions might improve system efficiency. Also, the results for menu A003 seem to suggest that users at this menu generally thought they were somewhere else. Note that, of the 750 responses to this screen that did not involve moving to the next page or leaving PROFS commands (PF10-12), over 80 percent were in error, that is they involved unassigned function keys. This suggests that extra, empty screens simply cause users trouble; it might be better to integrate rarely used housekeeping functions under a general 'housekeeping' entry on menu A002 in place of, perhaps, the redundant 'Prepare a Document' option that appears there.

Considering all main menu activities as one unit, as is done in Figure 8.3, the average number of times per session that a main menu was displayed was 6.38. The proportion of times particular main menu activities were performed is given in Figure 8.2 as well. As with the other forms of analysis, this one also shows that the 'Open the Mail' function dominates (43.7 percent) the user's choice, with note-sending (E04) a distant second (10.7 percent). But in this case we carry the analysis further by following users down the PROFS tree.

What happens when users select one of these branches? We consider four: Sending a Note, Receiving a Note, Preparing a Document, and Processing a Schedule. After reviewing these options, we evaluate use of the PROFS help function.

Figure 8.3
PROFS Activity Branching, Spring 1985 Sample

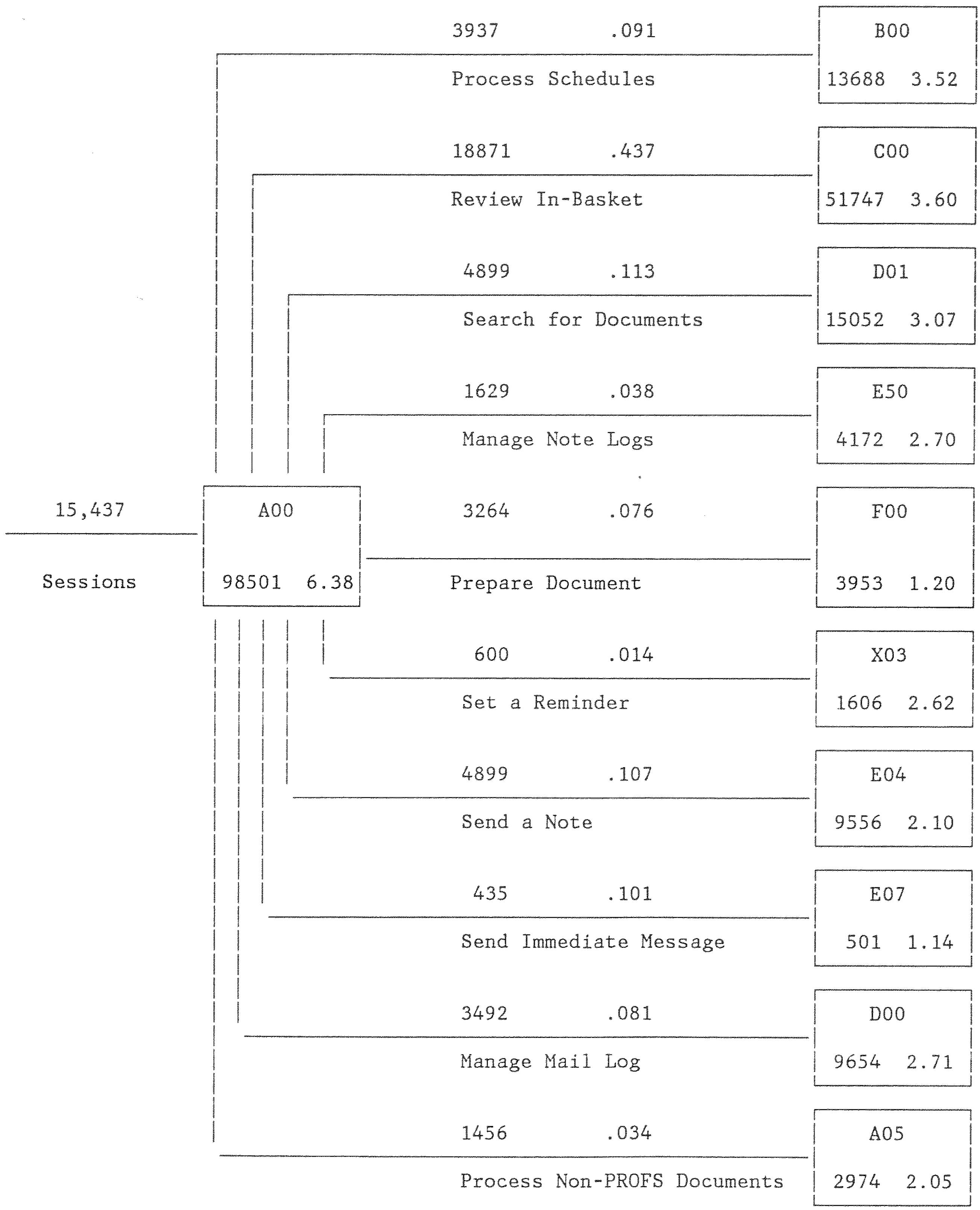


Figure 8.3, continued
PROFS Activity Branching, Spring 1985 Sample

Note: Entries in boxes are (counterclockwise from the top): (1) screen number; (2) number of screen appearances, all sessions; (3) number of screen appearances per session. Flows show number of observed transitions and fraction of actions from origination screen accounted for by indicated transition.

8.1.2 Sending Notes

If the user begins at menu A00 and selects the 'Send a Note' action, menu E04 (reproduced in Figure 8.4) is displayed. Table 8.2 summarizes the actions that an average user took when presented with the menu in this context.[27] These data are based on 4,561 recorded entries to the 'Send a Note' function during spring 1985. The difference between this number and the 4,899 transfers from A00 to E04 is accounted for by two possibilities: users disconnected from the PROFS system after leaving the A00 screen and before reading the E04 screen, or the monitor failed to record the transaction.

Figure 8.4

The Note Composition Screen (Compressed)

```
                                 SEND A NOTE                                E04
 Send to:
 From   : Michael Cooper        2-1692      ID: MDC-BIJ
 Subject:




 PF1 Top  PF2 Bottom  PF3 Erase Line  PF4 Add Line  PF5 Nulls Off  PF6 Format
 PF7 Send  PF9 Help  PF10 Next Screen  PF11 Previous Screen  PF12 Cancel
```

Interpretation of the results in Table 8.2 is facilitated by reviewing how users send notes under BIJOU PROFS. When Menu E04 is presented, the cursor appears on the 'Send to' line (see Figure 8.4). The user types in the nickname

---

[27] A number of menus in PROFS are essentially the same but are used for handling different types of materials. For example, menus C00, D04, D06, D20, and E08 (reproduced in Appendix C) all allow the user to select a particular note or document from a list. Thus, the context within which the action takes place is relevant to the analysis.

or account of the person to whom the note is addressed and then moves the cursor to the 'Subject:' line. The contents of the 'From:' line, the user's name, phone number, and logon id, are pre-set. Movement from line to line is accomplished by use of the 'Tab' key or the cursor control keys. Once the user begins entering the text of the note, lines may be entered continuously; 'word wrap' is automatic. Users may also choose to terminate lines themselves by moving to a new line with the Tab key. Paragraphs are established by skipping a line using the Tab key. Note that none of these text entry steps are recorded in Table 8.2. Once text entry is completed the note may be 'formatted' with key PF6. This action, which is counted in Table 8.2, reorganizes lines and establishes a right margin, but is not necessary for note transmission. Users formatted their notes before sending them in about 45 percent of the cases in which transmission occurred.

Table 8.2

User Actions While Sending Notes
Spring 1985 Sample
Menu E04
Path A00 - E04

Action	Next Menu	Frequency	Probability of Taking Action	Average No. of Actions per Entry into Menu
PF1 - Top	E04	49	0.005	0.01
PF2 - Bottom	E04	67	0.007	0.01
PF3 - Erase Line	E04	277	0.029	0.06
PF4 - Add Line	E04	559	0.058	0.12
PF5 - Nulls Off	E04	22	0.002	0.00
PF6 - Format	E04	1771	0.185	0.39
PF7 - Send	A00	3920	0.410	0.86
PF8 - (Invalid)	E04	19	0.002	0.00
PF9 - Help	HELP	35	0.004	0.01
PF10 - Next Screen	E04	756	0.079	0.17
PF11 - Previous Screen	E04	380	0.040	0.08
PF12 - Cancel	A00	634	0.066	0.14
ENTER (Invalid)	E04	910	0.095	0.20
OTHER (Invalid)	E04	157	0.016	0.03
Total Actions		9556	1.000	2.10
Total Entries into Menu		4561		

For users of other systems, the note composition facility had a number of anomalies. One involved use of the 'Tab' key for skipping lines or moving the cursor from the end of one line to the beginning of the next. A more natural response for at least the novice user was to attempt to do this with the 'Enter' or 'Carriage Return' key. However, for this screen the 'Enter' key had no function whatsoever. Yet note that almost ten percent of user actions involved hitting this key. This appears to be a significant design flaw.

Editing facilities provided with the note sending function in BIJOU PROFS were very limited. It was only possible to delete whole lines of text. Since no line-splitting option was included, deletion of a fraction of a line either meant deletion of a large number of characters or retyping the portion to be saved. Insertion of significant amounts of text within existing lines required addition of lines, since line-wrapping did not occur for text insertion. While not all editing activities were captured by the monitor, the significant incidence of line erasing and adding implies that users do some editing when preparing notes. As with other text preparation aspects of the system, there could be some benefit in enhancing the editing capability within the function. This would offer the user customary flexibility in text manipulation.

When a user's note fills the screen the cursor jumps back to line one and new text is written over existing text unless PF10, 'Next Screen', is depressed. These data indicate that use of the PF10 key was necessary in 8 percent of the cases. The implication seems to be that automatic note scrolling would be useful.

8.1.3 Receiving Notes

Approximately 19 percent of all main menu actions directed the user to the 'review in-basket' screen (C00). Screen C00 displays the header lines of messages or other documents that are in the user's electronic in-basket. A sample in-basket is reproduced as Figure 8.5. By means of a function key, the user selects a note or other document out of the list for further action. It is possible that there are more items in the in-basket than can be displayed on one screen, in which case the user can page forward (PF10) or backward (PF11) through them.

Figure 8.5

A Sample BIJOU-PROFS In-Basket

```
                              OPEN THE MAIL                             C00

 Press the PF key for the document you want.
      ----FROM----        -----TO-----         TYPE  DUE DATE  DOCUMENT NO.
 PF1  JAS-OCA --UCBCAO   MLW-BIJ --UCBCAO      Reply           08/28/85 12:42
         Subject: Quarterly reports
 PF2  MDC-BIJ --UCBCMSB  MLW-BIJ --UCBCMSB     Note            08/23/85 17:00
         Subject: Logit Analysis
 PF3  OCAATS  --UCBCMSB  MLW-BIJ --UCBCMSB     Forward         08/23/85 17:00
         Subject: The psc proc option
 PF4  KJI-BIJ --UCBCAO   MLW-BIJ --UCBCAO      Reply           08/21/85 16:39
         Subject: Monitor Data Book
 PF5  Paul E. Lugo       Michael Wiseman       Note            08/21/85 09:03
         Subject: Monitor Data Book
 PF6  Danziger           MLW-BIJ --UCBCAO      Other           86128HDC0001
         Subject: "Antipoverty Policy:  Effects on
 PF7  Wiseman, Michael   Ottaway, Alan         Final           85234CA00001
         Subject: SAS Interactive Editing for Data
 PF8  Mike               Karl Iorio            Draft           85222CA00004
         Subject: Search Results

                                                           Screen    1 of    1
To look at all of these documents, type ALL here and press ENTER===>
PF9 Help    PF10 Next Screen    PF11 Previous Screen    PF12 Return
```

Nearly one-quarter of all function key responses to menu C00 were paging commands indicating long in-baskets. Long in-baskets could mean that users have not mastered the concept of filing documents, that they do not want to make a decision about what to do with a message so they leave it in their in-basket, that the presence of the message in the in-basket serves as a tickler and is more effective than filing (and possibly forgetting) it, or that this is simply a management style of dealing with correspondence.

Once an in-basket item is selected, what happens next depends upon the type of document involved. Notice that the sample in-basket reproduced in Figure 8.5 includes several different types of items. The first five list entries are notes. Note numbers 1 and 4 are replies to some other communication; note 3 has been forwarded from its original destination; notes 2 and 5 are the only examples of direct transmissions. Item 6 is notice of a document filed in hardcopy; addition of this entry into the user's Maillog will allow relocation of the item through the PROFS document search facility. Item 7 is a final version of a document that has been stored in the Department's PROFS data base; this notice gives the user access to it. The last in-basket item is a document in draft; this means that the user of this account could, should he desire, retrieve and alter it.

Here we concentrate on disposition of standard notes. Suppose the user selects note 1. When this occurs screen E01 appears, displaying the text of the note and options as to its disposition. Figure 8.6 shows screen E01 for the first item in the sample in-basket. As with most PROFS screens, the bottom line on it provides a list of options. It is possible to make more than twelve choices at a single PROFS menu, and thus more than twelve PF keys are needed. To solve this problem, certain menus have as one PF-key choice a key labeled 'alternate PFs', which when pressed reveal a new set of key choices. In this situation, the menu number does not change. The notation adopted in this paper is that a menu number suffixed with a B refers to the base menu, and a menu number suffixed with an A refers to the alternate menu. For example, E01B refers to the E01 menu with the base set of PF keys displayed, and E01A references the menu with the alternate set displayed.

Figure 8.6

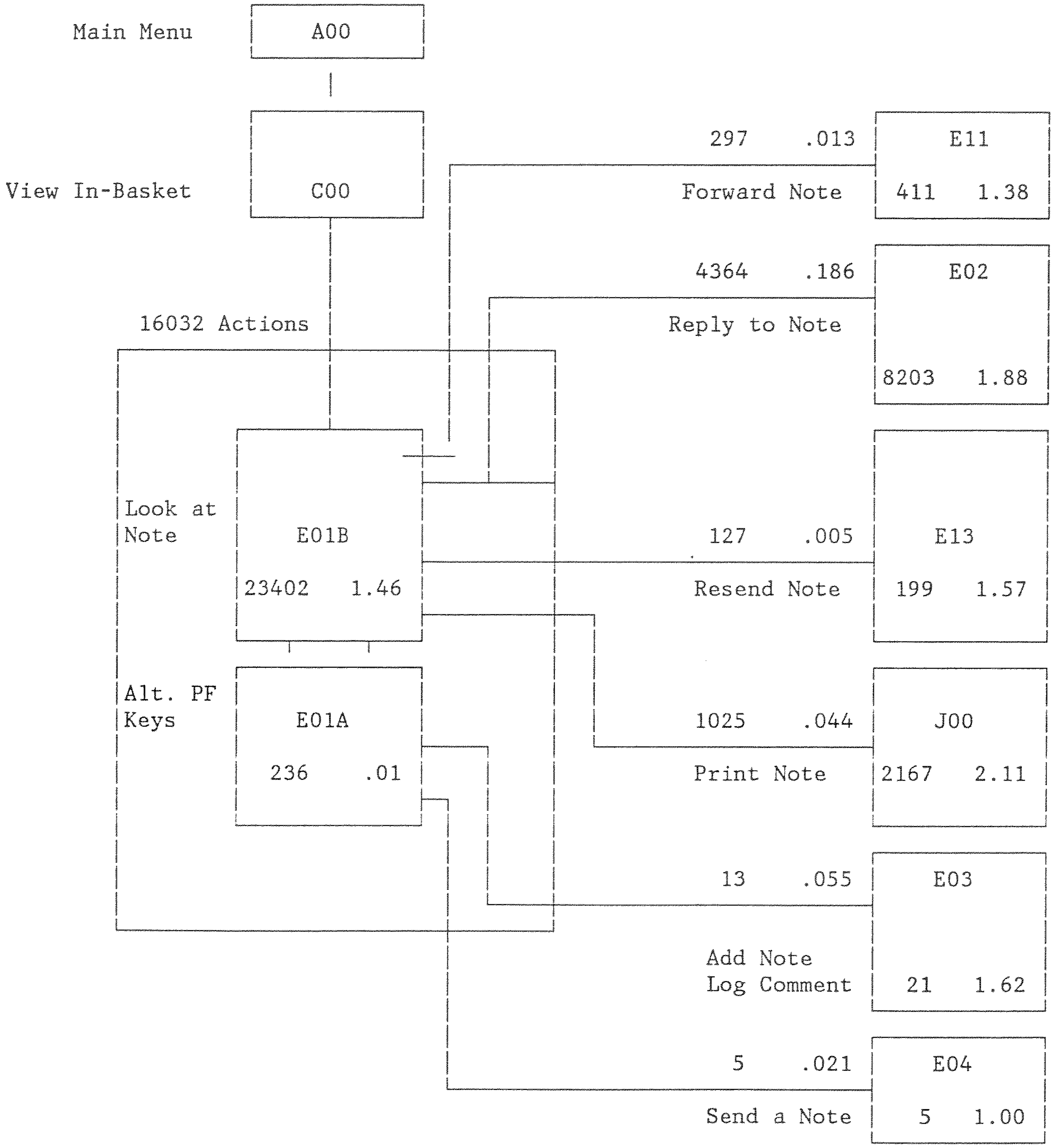
The User Receives a Note

```
                              LOOK AT THE NOTE                            E01
From: JAS-OCA --UCBCAO                         Date and time  08/28/85 12:42:16
To: MLW-BIJ --UCBCAO

*** Reply to note of 08/28/85 11:23
From    : Jerome A. Smith       2-5965       ID: jas-oca
Subject: Quarterly reports
Great.  I'll look forward to receiving a draft of the report on Monday.
Jerry
                             E N D   O F   N O T E









PF1 Alternate PFs  PF2 File NOTE      PF3 Keep  PF4 Erase  PF5 Forward Note
PF6 Reply PF7 Resend PF8 Print PF9 Help PF10 Next PF11 Previous PF12 Return
```

Figure 8.7 diagrams the PROFS hierarchy for the note-viewing function and Table 8.3 provides supporting information about function-key use at menu E01B. A total of 16,032 actions were recorded entering node E01 and very few of the subsequent actions resulted in proceeding further down the hierarchy. If the user selected some follow-on action after viewing the note, it was usually to reply to it (18.6 percent) or print it (4.4 percent). Half of all actions were to erase the note; notes were filed in 14 percent of menu entries.

Filing or erasing a note returns the user to menu C00. The fact that 20 percent of note viewings were completed instead with a <u>return</u> response is consistent with our earlier observation that users tended to retain notes in their in-baskets for future reference.

Figure 8.7
The Note-Viewing Hierarchy, Spring 1985 Sample



Note: Entries in boxes are (counterclockwise from the top): (1) screen number; (2) number of screen appearances, all sessions; (3) number of screen appearances per session. Flows show number of observed transitions and fraction of actions from origination screen accounted for by indicated transition in 16032 note viewings.

Table 8.3

User Actions While Looking at Notes
Spring 1985 Sample
Menu E01B (Base Menu)
Path A00 - C00 - E01

Action	Next Menu	Fre-quency	Probability of Taking Action	Average No. of Actions per Entry into Menu
PF1 - Alternate PF's	E01A	121	0.005	0.01
PF2 - File	C00	2318	0.099	0.14
PF3 - Keep	C00	535	0.023	0.03
PF4 - Erase	C00	8168	0.349	0.51
PF5 - Forward Note	E11	297	0.013	0.02
PF6 - Reply	E02	4364	0.186	0.27
PF7 - Resend	E13	127	0.005	0.01
PF8 - Print	J00	1025	0.044	0.06
PF9 - Help	HELP	21	0.001	0.00
PF10 - Next	E01	1039	0.044	0.06
PF11 - Previous	E01	246	0.011	0.02
PF12 - Return	C00	4872	0.208	0.30
ENTER (Invalid)	E01	100	0.004	0.01
OTHER (Invalid)	E01	169	0.007	0.01
Total Actions		23402	1.000	1.46
Total Entries into Menu		16032		

8.1.4 Document Preparation

The PROFS document preparation system is accessed from either menu A001 or A002 by use of PF5. (See Table 8.1.) The next menu, F00, offers another opportunity to illustrate the utility of the PROFS monitor.

Table 8.4 combines a reproduction of Menu F00 with a table of responses by users (taken from the spring 1985 sample). Menu F00 offers five options. The first two involve creation of new documents. If PF1 is depressed, the next screen initiates preparation of a memorandum using a basic format (see menu F51 in Appendix C for an example). The second alternative summons other formats. Users can either enter a format name here directly, or leave the name field blank and pass directly to a list of formats, with selection of each governed by function keys (see F04 in Appendix C for an example of one unit's alternatives). This list differed somewhat by unit. The third alternative is to continue work on a document in draft form.

Within PROFS, documents in draft are maintained either on a user's personal storage or in the PROFS database. When creation of a document is initiated, PROFS first assigns the document a temporary sequence number for the user's storage. The first document is simply document 1, and so forth. In the course of editing, the user may choose to cease work. When this occurs an editing options screen is presented, number F01 (Figure 8.8). Note the document number ('1' in the example) appears in the upper left-hand corner. If from this screen the user choses to file the document in personal storage (PF6), the document is stored as, say, '1 SCRIPT' in the user's storage and the user is returned to the main menu. To continue work on the document, the user returns from the main menu to menu F00 (Table 8.4), puts a '1' in the document number field for 'Change a Draft Document', and pushes PF3.

Alternatively, the user may at menu F01 choose option 7, 'File the document for further changes by you and the reviewers.' In this case the document goes into the PROFS database, and the author is given opportunity to mail authorization for access to other users. Once this occurs, either these reviewers or the original author may retrieve the document for further changes through the document search or retrieval options available elsewhere in the system.[28] Once a draft document is recovered in this way, the retriever is presented again with an editing options screen. Should editing be interrupted before the document

---

[28] See, for example, the screen sequence A001/PF3;D01/ENTER;D03/PF1;D04/PF4;D11/PF10;D09/PF3.

Table 8.4

User Response to Prepare Documents
Spring 1985 Sample
Menu F00 (Base Menu)
Path A00 - F00

The Menu (Compressed)

```
PREPARE DOCUMENTS                                            F00

Press one of the following PF keys.

PF1  Prepare a document using the Standard document style.
PF2  Prepare a document using another document style.  Type the name of
     the style you want below and press the PF key.  Or, to look at
     the list of available document styles, just press the PF key.

               --------

PF3  Change a draft document.  Type the document number below first.
     Then press the PF key.

               -------- ----

PF9 Help    PF12 Return
```

Action	Frequency	Probability of Action: All Responses	Probability of Action: Valid Responses Only
PF1 - Prepare Standard Document	244	6.13	6.63
PF2 - Prepare Other Document	2,078	52.24	56.42
PF3 - Change Draft Document	1,033	25.97	28.05
PF4-8 - Invalid	42	1.06	
PF9 - Help	21	.53	0.57
PF10-11 - Invalid	4	.10	
PF12 - Return	307	7.72	8.34
ENTER - Invalid	236	5.93	
OTHER - Invalid	13	3.27	
Total of All Actions	3,978	100.00	
Total of Valid Responses Only	3,683	84.34	100.0
Total Entries into Menu F00	3,284		

Source: MENUKEY2 LISTING 12/03/85 9:30:16

user is prepared to re-enter the document in the database, it can be stored in his or her personal storage. In this case, however, a special number derived

Figure 8.8

Document Editing Options Screen

```
                         PROCESS THE DOCUMENT                          F01

 Document No.:  1
 Type:          Draft
 ----------------------------------------------------------------------

 Press one of the following PF keys.

 PF1  Look at the document
 PF2  Change the document
 PF3  Assign a new document number
 PF4  Proofread the document
 PF5  File and send the document as a Final document
 PF6  File the document in your personal storage for further changes
 PF7  File the document for further changes by you and the reviewers
 PF8  Print the document



 To erase the document from your personal storage, type DELETE below and
 press ENTER.









PF9 Help
===>
```

from the database filing system is assigned. These numbers are 8 digits long. Thus for operations on a pre-existing draft, the user must remember a number -- a short one for a document that has never been in the database, a long one for a document 'retrieved for update'.

Now, consider again the results in Table 8.4. Going down the incidence of actions both PF1 and PF2 are used for initiating documents. Since the ratio of use of PF2 to PF1 is 8.5:1, it is clear that for most units the 'standard' document wasn't standard at all. In the vast majority of cases users either entered a format name or went on to the options list. It is not possible to identify with certainty which procedure was followed from these data. Our impression is that format names rarely were entered here, since all formats were presented as function key alternatives on the screen evoked by pushing PF2. This was a two keystroke alternative, while typing in a format name usually required more effort.

There is a remarkably high incidence of invalid response to this screen. By far the most common invalid response is to push the 'Enter' or 'Carriage Return' key. This action constituted 6 percent of all responses to this screen. What may be happening is that once the user fills in a document number or format name, he or she reflexively 'Enters' the data rather than pushing a function key. If our assumption that format names were rarely entered on this screen is true, most of the 'Enter' responses occurred after a draft document number was entered in the second field. This feature of the system is awkward, since if the user forgets a document number there is no opportunity to examine from this screen the list of draft documents maintained by the user. If the user forgets the document number, the only alternative is to move back to the main menu (PF12), execute a CMS 'FILELIST' command, and try to identify it. A better procedure would involve automatic presentation of documents in the user's personal storage files when PF3 is depressed and the document number field is left blank.

In summary, the monitor indicates that attention should be devoted to unit-specific counts of use of document formats in order to assign to the 'standard' document option the most commonly used format and to develop a system for listing draft documents maintained in user's personal storage in connection with document revision activities.

8.1.5 Calendar

The PROFS Calendar function was used frequently during the project, but for the most part use was confined to the simplest calendaring activities. Pushing function key PF1 from the main menu (see Figure 8.1) brings the BIJOU PROFS user to screen B00, 'Process Schedules', reproduced here as Figure 8.9.

Figure 8.9

The Main Schedule Screen

```
                          PROCESS SCHEDULES                                  B00

 Schedule For:  Michael Cooper                          Time:    2:37 PM
 Schedule Date:    09 / 05 / 85
                                                   1985   SEPTEMBER    1985
 Press one of the following PF keys.                S   M   T   W   T   F   S
                                                    1   2   3   4   5   6   7
  PF1  Look at or change the schedule               8   9  10  11  12  13  14
  PF2  Choose another schedule                     15  16  17  18  19  20  21
  PF3  Choose a conference room                    22  23  24  25  26  27  28
  PF4  Change to the next day                      29  30
  PF5  Change to the previous day                          Day of Year: 248
  PF6  Look at the whole month
  PF7  Schedule a meeting
  PF8  Print a schedule

 PF10  Change to the next month
 PF11  Change to the previous month




 PF9 Help    PF12 Return
```

Thirty-seven percent of all actions from screen B00 were to select the 'Look at or Change the Schedule' function, that is move to screen B02. There was very little use made of the ability to schedule a conference room (about ten percent of all actions), but some use of the B00 function keys (PF03 and PF04) to select the next or previous day for viewing the calendar (about sixteen percent of all actions). Other options were lightly used.

Once at the B02 screen (see Figure 8.10), users typed scheduling information and then used the 'Enter' key 34 percent of the time to confirm that the scheduling transaction was accepted by the system. Thirty-eight percent of the responses to this menu were to view the next day's (30 percent) or the previous day's (8 percent) schedule. As was the case from the B00 menu, users made infrequent use (one percent) of the ability to operate on an entire month's schedule.

The PROFS structure for the scheduling activities does not fit into the same type of hierarchy as most other functions. In Figure 8.11 menu change operations are charted for the calendar operations. Flows to and from each box show absolute numbers of times the indicated transition was observed and the proportion of actions from the source screen attributable to each transition. Thus of 13,688 actions at screen B00 5,027 or 36.7 percent involved moving to screen B02.

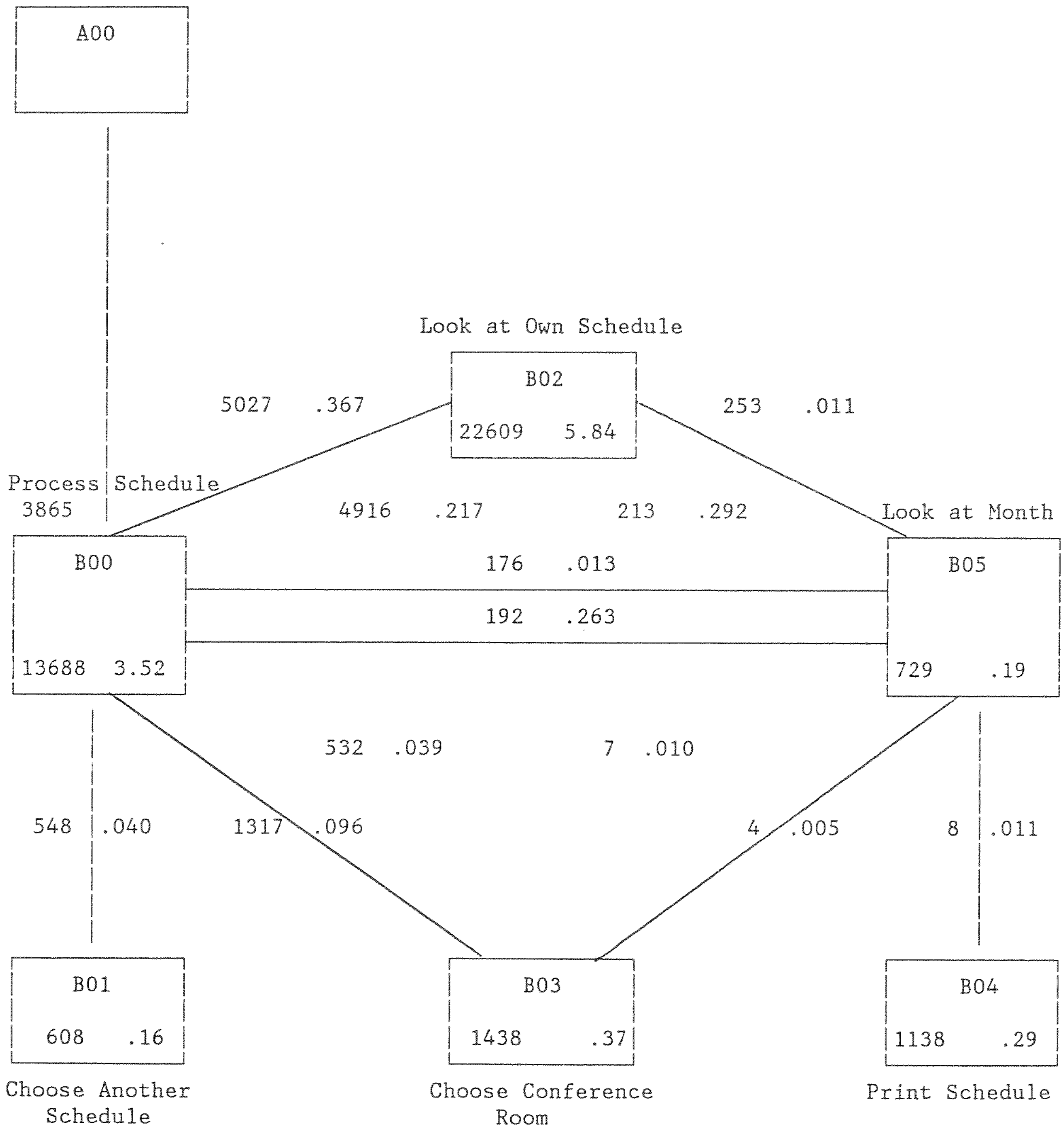
Figure 8.10

The User Schedule

```
                        LOOK AT OR CHANGE THE SCHEDULE                     B02
Schedule for: Michael Cooper                         Date:  9 / 05 / 85 , Thursday

BEGIN   END     DESCRIPTION
 9:00AM 10:00AM Give lecture on relational database models
 4:00PM  5:30PM Faculty meeting
NOTES:          Check on computing equipment order








PF1 Move PF2 Copy PF3 Quit PF4 Next PF5 Prev. PF6 Month PF9 Help PF12 Return
```

Figure 8.11

The Calendar Function



Note: Entries in boxes are (counterclockwise from the top): (1) screen number; (2) number of screen appearances, all sessions; (3) number of screen appearances per session. Flows show number of observed transitions and fraction of actions from origination screen accounted for by indicated transition.

The data for calendar use provide an example of another opportunity for improving the efficiency of BIJOU PROFS design. As discussed above, over half of all actions from menu B00 involved either moving to B02 to look at the user's calendar for the current day or paging backward or forward in the calendar to adjacent dates. Most of the remaining actions were accounted for by leaving the calendar function altogether, that is pushing PF12. As Figure 8.11 illustrates, it is possible to page backwards or forwards by day from that screen, as well as from B00. This implies that for most instances of calendar use, keystrokes could be saved by moving directly from A00 to B02, and offering B00 as a 'General Calendar' option from the main menus. If space were missing for this on the main menu, it could be added as an option to B02. Such an adjustment could have saved over 3,000 keystrokes during the sessions covered by these data.

8.1.6 The PROFS HELP Facility

PROFS provides an extensive assistance facility. After the display of almost any menu in the system, the user can press the PF09 function key and receive context-sensitive information to assist with the solution to a problem. As Table 8.5 shows (for the Spring 1985 sample) this facility was lightly used, with only 433 help requests made relative to more than 100,000 actions performed, an average of one every 28 sessions.[29]

---

[29] Our estimate of help requests is subject to some error due to an option provided users with more than one account. In the Berkeley system users could log onto more than one account and move among accounts by pushing a user defined toggle key. Most users chose PF9 for this purpose. Use of this facility was rare, but it probably accounts for most use of PF9 from the main menus (where no 'Help' option is offered). The data are adjusted by an estimate of the number of PF9 uses attributed to this source. We suspect that the adjustment is conservative, that is that help usage is even smaller than Table 8.5 implies.

Table 8.5

Use of HELP Facility (PF09) in PROFS, Spring 1985 Sample

Menu At Which Help Was Requested	Menu Number	Frequency	Percent Distribution
Search for Document	D01	44	10.2
Send a Note	E04	35	8.1
Review In-Basket	C00	34	7.9
Look at the Document	I00	27	6.2
Look at Note	E01	27	6.2
Look at or change the schedule	B02	23	5.3
Print the Document	J00	22	5.1
Process the Document	F01	22	5.1
Prepare Document	F00	21	4.8
All Others		178	4.1
Total		433	100.0
Source: MENUKEY3 LISTING			

There are a number of possible explanations for this, the foremost being that PROFS is generally well designed. The menus are relatively clear and it is usually intuitive what the system expects the user to enter in order to complete a transaction. There is some bias by conducting the analysis of the assistance facility so late in the project, since users are likely to have solved many of their problems with the system by this time. Nevertheless, the population of users participating in the experiment was steadly augmented throughout the project and there is no reason to believe that the new users were any different in their learning skills than older ones. Even if the usage of the help facility is off by a factor of ten, it is still insignificant in comparison to the total transaction volume.

On the negative side, one could argue that having used the help screens, users did not find them helpful and stopped pressing PF9. The help screens tend to have formal syntax descriptions of commands or operations and may not be useful to a large number of participants. We have no information about the frequency with which participants used printed manuals or consulted colleagues when they needed help, but we presume that this was the most frequently used method of gaining assistance.

Menu D01 was the location where help was most frequently requested. It is one of the most complex menus in the system. It asks the user to fill in the terms the system is to use to search the PROFS database for documents. The layout of the menu seems a candidate for redesign, although by its nature considerable information needs to be squeezed into a limited-sized window.

Screen E04 was also a location where many request for assistance were made. The menu is relatively straightforward. The user fills in the name(s) of the person(s) to receive a note, the subject, and the text of the note to be sent. There are several possible sources of confusion, however. One is addressing notes. At Berkeley the format of the address for sending notes to users who are not on the PROFS computer system is not intuitive, and the help facility can be used to remind the user of the correct addressing format. A second possibility is that until the user is familiar with the restricted set of editing commands provided by PROFS in this context (see Section 8.1.2) results may be unpredictable. Users may have been using the help facility for this purpose. Finally, sending a note is one of the most highly used functions in the system, and as a result the relatively high incidence of help use may simply reflect greater opportunity both for users to need assistance at this point or to push PF9 by mistake.

8.2 Key Sequences

To this point we have concentrated on studying the probabilities and frequencies of making one-step moves through parts of the PROFS function tree. The monitor also allows study of sequences of moves. Table 8.6 presents the most frequently occurring patterns of use of the sytem for four-step menu and function key sequences which begin with the main menus. The table includes for each sequence elapsed time in seconds between presentation of the main menu and the last function key response and a brief interpretation of the activity that generated the observation.

The first thing to note is that, even when restricted to sequences beginning at A00, the range of opportunities in PROFS (including key sequences that involve mistakes) is very large: the data reveal 1,781 of them. The 15 most frequently observed sequences account for just one-quarter of the total number of uses of these 1,781 alternatives during Spring, 1985. As might be expected, this distribution has a long tail: the first 100 most frequently observed sequences account for less than 49 percent of the total number counted. Sequence number 100 (A001-PF3/D01-ENT/D03-PF1/D04-PF2) occurred only 128 times.

Understanding user patterns of behavior here is difficult, and in some instances a certain amount of guesswork is required. The most frequently observed menu sequence, four repeats of pressing the ENTER key at the main menu, is somewhat enigmatic until one recalls that the main menu includes a command line. If the user were to work on a SCRIPT document from the main menu, four XEDIT commands from the main menu would produce this sequence.[30] Recall from Chapter

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[30] Steps subsequent to each XEDIT entry would not be recorded until the user, perhaps by filing the document, returned to the main menu.

Table 8.6
Frequency Distribution of Menu-Key Sequences Beginning from Main Menu
Spring 1985 Sample

Sequences (Menu-Response)	Frequency	Average Time (Seconds)	Percent Distribution
1 A001-ENT /A001-ENT /A001-ENT /A001-ENT	8486	2047.3	0.0875
2 A001-PF02/C00 -PF01/E01 -PF06/E12 -PF07	1758	185.1	0.0181
3 A001-PF03/D01 -ENT /D03 -PF01/D04 -PF12	1546	360.3	0.0159
4 A002-PF03/A05 -PF01/D15 -PF02/H05 -PF02	1338	143.0	0.0138
5 A001-PF02/C00 -PF01/E01 -PF04/C00 -PF12	1282	371.5	0.0132
6 A001-PF02/A001-PF02/A001-PF02/A001-PF02	1274	3081.8	0.0131
7 A002-PF01/D00 -PF04/D17 -Ent /D18 -ENT	1198	24.6	0.0124
8 A001-PF02/C00 -PF01/E01 -PF12/C00 -PF12	1182	429.7	0.0122
9 A001-PF10/A002-PF01/D00 -PF04/D17 -ENT	1091	10.3	0.0112
10 A001-PF10/A002-PF03/A05 -PF01/D15 -PF02	1026	120.7	0.0106
11 A001-PF02/C00 -PF12/A001-PF02/C00 -PF12	1017	2475.3	0.0105
12 A001-PF02/C00 -PF01/C05 -PF07/D18 -ENT	859	62.5	0.0089
13 A001-PF03/D01 -ENT /D03 -PF01/D04 -PF01	787	27.7	0.0081
14 A001-PF03/D01 -ENT /D03 -PF01/D04 -PF10	712	68.6	0.0073
15 A001-PF01/B00 -PF01/B02 -PF12/B00 -PF12	688	805.4	0.0071
All others	72735		0.7501
Total	96979		1.0000
Total Sequences = 1781			

Explanation of sequences (See Appendix C for copies of the menus):

1. All elements are entry of commands from main menu command lines. Probably reflects use of CMS commands.
2. User reads and replies to first note in the in-basket.
3. Document search without retrieval.
4. CCRC user files a paper (Hardcopy) document.
5. User reads and discards the first note in the in-basket.
6. User repeatedly checks in-basket; there is nothing there.
7. CCRC user modifies maillog entry for a filed hardcopy document.
8. User reads first note in in-basket; leaves it there.
9. CCRC user goes from menu 1 to menu 2 to initiate sequence (7) above.
10. CCRC user goes from menu 1 to menu 2 to initiate sequence (4) above.
11. Continuous check of in-basket; there is nothing new there.
12. CCRC user receives notice of hardcopy filing information.
13. User searches for document and looks at first item in list.
14. User searches for document, then turns to second page of results.
15. User moves from main menu to today's calendar and then returns without altering it or performing other operations.

Source: KEYSEQ3 LISTING

7 that CMS commands of various types were extremely common, especially in the Graduate School of Public Policy. The average amount of time accumulated in the sequence, over 30 minutes, is consistent with the speculation that it arises when non-PROFS functions are used.

The second most frequently occurring pattern of menu-key sequences was initiated from the Main Menu by PF2, which took the user to his or her in-basket (C00). The next step was to look at the first item in the in-basket by pushing PF01. The result was that the note was displayed using screen E01. Then the user replied to the note (PF6; see Figure 8.4). After text entry on the Reply to Note screen (E12), the note was transmitted (PF7). In these cases the user does not bother to format the reply, and the whole activity takes on average about three minutes. Answers tend to be brief, even if ten percent of notes take (as suggested by the note entry data presented earlier) more than one page. Other actions with notes appear in sequences 5 and 8 on Table 8.6. In sequence 5 the first note is (presumably) read and discarded. In sequence 8 the first note is opened and then retained in the in-basket. This is the sequence that results from one of the mail management management procedure discussed earlier. Finally, a note of pathos is exhibited in note sequences 6 and 11. In sequence 6 the user checks the in-basket and does not even get menu C00. There is <u>nothing</u> there, so the system simply prints, without compassion, 'Your In-Basket is Empty'. This is not just one frustrated check but four, and on average the sequence takes almost an hour of elapsed time, presumably including time when non-PROFS activities were performed. Users doing this obviously were using the system for nothing other than mail, and the mail wasn't coming. Sequence 11 is the same thing, but in this case the user is presented with screen C00. There is something in the in-basket, but since it is not examined, we may assume that it is not new.

These sequences justify (after the fact) a useful BIJOU PROFS modification. Near the end of the period for which these data were collected, the mail facility was modified to display a notice, 'MAIL WAITING' on the lower right-hand side of the main menus when mail arrived at the account. The message turned off only after the new mail had been observed by the user in screen C00 (opening was not necessary). This innovation presumably eliminated the effort, if not the tragedy, of sequences 6 and 11.

The third most frequently occurring pattern involved searching for a document. Here again familiarity with the experiment assists in interpreting the results. This pattern of commands culminates with display of screen D04 (Figure 8.12), the 'List of the Documents Found'. But rather than an inspection of one or more items in the list, sequence 3 ends with a simple exit from this menu. Why should this be the most common search sequence? Does this imply most searches are unsuccessful? The answer is probably no, for two reasons. One is that if searches tend to turn up more than one document, then there is no reason to believe the results of a successful search will regularly culminate with any one function key response. That is, for a successful search in which the found document is inspected, the last keystroke will be the function key that corresponds to the selected document on the list of documents found. If only one document is found, that will be PF1, and indeed the successful search with this result is sequence number 13 in Table 8.6. But if the selected document is not the first, then a different key sequence is recorded and the results fall someplace further down in the sequence listings. Sequence 14, for example, is a document search which produced at least two pages of listings, since the fourth key entry scrolls the document search results screen.

Figure 8.12

```
                        List of the Documents Found

                          LIST OF THE DOCUMENTS FOUND                        D04

 Press the PF key for the document you want.
      ----FROM----      -----TO-----        ACTION    IDENT TYPE  DOCUMENT NO.
 PF1  Wiseman, Michael                                      Final 85239CA00002
         Subject: Economics 1, Lecture 1

         Comments:
 PF2  Wiseman, Michael Fleeter, Howard                      Final 85239CA00001
         Subject:  Econ 1 T.A.  Meeting

         Comments:
 PF3  Wiseman, Michael                                      Draft 85238CA00002
         Subject: Economics 1, Lecture 1

         Comments:
 PF4  Wiseman, Michael                                      Draft 85238VMB0001
         Subject: Economics 1 Lectures

         Comments:
 PF5  Snow, F.         File                                 Draft 85228VMB0015
         Subject:  Plan for final report
                                                           Screen    1 of    6
         Comments:




To look at all of these documents, type ALL here and press ENTER===>
PF9 Help    PF10 Next Screen    PF11 Previous Screen    PF12 Return
```

The second reason for the prevalence of document search without inspection involves the principal user of the PROFS search function, the Chancellor's Communications and Record Center, CCRC. CCRC document search and retrieval procedures are discussed in considerable detail in [12]. The important aspect of the operation for reference here is that most documents filed by CCRC are in hardcopy, and the PROFS maillog/ search procedures are used to find documents related to particular topics. All of the information required to recover a document appears on screen D04. Thus for most CCRC searches, the retrieval process can stop there.

CCRC operations are also apparent in at least four other items in Table 8.6. Sequences 4 and 7 are examples of CCRC sequences which begin from page 2 of the main menu. Sequence 4 provides an example of document filing. The first step, PF3 from A002, is 'File Documents'. The next screen in the sequence, A05, is 'File Documents from Other Sources', and PF1 is 'Add mail log information for a document printed on paper'. This leads to D15, 'Add Mail Log Information for a Printed Document', in which various data, including a subject search field, are entered. PF2 from this screen adds the item to the user's 'Maillog' and transfers the user to a screen which permits transmission of the filing information to the central CCRC account. In sequence 7 a CCRC analyst (1) Goes from the second main menu to 'Process Mail Log' (D00), (2) Pushes function key 4 to 'Change the Mail Log Information', (3) Enters a document number from menu D17, and (4) is presented with the filing information originally created using sequence four. This is then (apparently) edited; ENTER changes the mail log information for the item. In sequence 9 a CCRC user goes from the first to the second page of the main menu initiates and then sequence 7, above. In sequence 10 a CCRC user goes from the first to the second main menu to initiate sequence 4.

The fact that at least 5 of the 15 most frequently observed sequences arise in a single small office suggests that office operations there are exceptionally routinized. This provides an opportunity for further rationalization of PROFS functions. At minimum it appears that Maillog operations should be placed on the same page with the In-basket. Sequence 4 could be made more efficient by collapsing steps 1 and 2 to a single keystroke.

The key sequence data confirm the arguments made earlier about inefficient organization of menu F00, Prepare Documents. Recall that option one on this menu introduced a standard document format and option two provided for a choice among alternatives. Sequences beginning (A00-PF5/F00-PF2) occur nearly two times more frequently than sequences beginning (A00-PF5/F00-PF1).

The data from the key sequence analysis also support the argument made earlier about the Calendar function. Sequence 15 is the first calendar operation that appears in the list. It is a straight move from the main menu to the calendar and back. It should be possible to glance at the calendar with a single keystroke and then to return with a single keystroke; in this case during the sample period 1,376 keystrokes would have been saved by providing this option.

8.3 User Response Times

The complexity of certain PROFS tasks can be inferred by analyzing the length of time it takes for a user to respond to a menu once it has been displayed. Table 8.7 summarizes user response time to selected PROFS menus for the Spring 1985 sample.

Table 8.7

Percent Distribution of Time in Seconds between Menu Display and User Response for Selected Menus
Spring 1985

Menu Number	Activity	Percent Distribution								Total Observed Responses
		0 TO 1 Seconds	2 TO 3 Seconds	4 TO 6 Seconds	7 TO 12 Seconds	13 TO 18 Seconds	19 TO 30 Seconds	31 TO 60 Seconds	61 PLUS Seconds	
B00	Calendar	38.98	22.15	14.52	10.79	3.81	2.57	1.49	5.69	13947
F00	Prepare a Document	6.23	22.47	29.66	21.12	8.70	6.18	3.57	2.06	3978
A05	File Documents	77.36	10.85	3.66	2.75	0.87	0.87	0.64	2.99	2977
C00	Review In-Basket	14.75	43.55	19.29	10.31	3.39	2.46	1.87	4.39	52061
D00	Manage Mail Log	49.79	27.60	9.51	5.26	1.70	1.49	1.27	3.38	9713
E50	Manage Note Logs	20.30	27.13	20.60	15.45	6.15	4.94	2.38	3.06	4247
D01	Search for Document	7.04	9.69	13.56	34.40	15.88	9.28	4.77	5.39	18746
E04	Send a Note	8.60	7.39	6.36	7.27	4.67	7.87	15.12	42.72	9635

Source: MENUKEY2 LISTING A1 12/03/85

The response time distributions vary by the complexity or content of the tasks. For example, the process of sending a note to another user requires the text to be entered, possibly edited, formated, and sent. The user response time distribution is definitely skewed toward responses over a minute long (almost 43 percent of all actions). The large number of notes sent within a minute indicate the usefulness of quick responses to queries with minimal expenditure of the user's time.

Certain tasks that are performed relatively frequently are done with considerable dispatch. The process of managing one's mail log involves finding materials that have been previously filed. Users are quite purposeful in performing that function.

One of the major functions of the Chancellor's Communications and Record-Keeping Center is to record all correspondence coming into the Chancellor's Office. The PROFS facility to index hardcopy documents is used extensively by CCRC, as is the search function. Table 8.7 shows that there is a very rapid response to the 'file document' menu indicative of an efficient production environment.

The processing of one's in-basket is a frequently occurring task and while a large proportion of transactions are performed rapidly, almost a quarter of all user responses take more than six seconds to complete. Users probably scan the list and contemplate which message to view before selecting one.

Judging from the user response time data the most complex task to perform is searching the data base. The 'search menu' (D01) is one of the most difficult to complete and/or understand. About 35 percent of the users took from seven to twelve seconds to fill in this menu. This response is relatively low given the number of fields to be completed, and the response time value may be biased downward by the speed with which searching is performed by CCRC. Non-CCRC users probably take considerably longer to do searching.

8.4 Summary

With relatively little training, Berkeley users seem to have become remarkably proficient using the PROFS system. The menu-driven design of the system helps novice and expert alike by putting a low intellectual load on an individual who wishes to be productive immediately.

The detailed analysis of usage patterns did indicate some areas where the system could be improved. For example, in the Berkeley implementation of PROFS users had to move frequently between the three main menus to find the activity they wished to select. Better initial implementation of the system would have minimized unnecessary keystrokes.

The interpretation of the 'Tab' versus 'Enter' key by PROFS (and probably CMS) is troublesome for Berkeley users. In a number of cases, it is believed, users press the Enter key when they should have used the Tab key. Since the Berkeley computing milieu is mixed between IBM-CMS and DEC-UNIX systems, users transferring between the systems are likely to be confused by the PROFS use of the Tab key. In addition, its interpretation, even without a UNIX background, is not really understandable.

In some parts of the PROFS system a high degree of flexibility is built into the system to allow complex editing tasks to be performed. This is not universally true. It is understandable that the designers felt that preparation of notes or mail do not require a full editor, but some users may need it and others may be baffled by the lack of parallelism in the tools available to prepare one kind of written communique versus another.

At a more general level, one can see in PROFS extremely complex methods for controlling documents and versions of documents, for providing access to documents and for routing and changing documents. In one sense the complex control procedures attached to documents are useful, but on the other hand they may not be needed for all users. The distinction between mail, notes, and documents has logic, but on the face of it a user may not care about the distinction and it may just confuse him or her.

The PROFS screen is well designed in that there is consistency in the placement of fields. The user always knows that a list of commands will be at the bottom, that the name and number of the screen will be at the top and user text will be typed somewhere in the middle. Certain function keys always have the same meaning throughout all activities.

Movement of user text within the window provided for it is usually controlled by the PF10 and PF11 keys. A relatively small window sometimes makes very little text visable (e.g. in replying to a note) and it might be useful to allow text to scroll rather than page within the window.

PART V: CONCLUSIONS

9.0 The Outcomes

9.0 THE OUTCOMES

The simplest way to summarize the BIJOU project is to say that 'The operation was a success but the patient died'. In the course of the joint study the PROFS integrated office system was installed on the University of California, Berkeley campus, more than 300 users accessed the system, and a considerable amount of information was gathered on the characteristics of office system users and use. Significant methodological tools were also developed to analyze user behavior. The major criterion of a successful implementation of any software system is sustained voluntary use of the system after the experimental period was over. This objective was not met for a variety of reasons.

9.1 Conclusions for BIJOU: Can the University be Automated?

There are two extremes to strategies for implementing computing systems. At one end of the spectrum, a prospective user can simply make an executive decision that a hardware and software package be acquired, perform the necessary contractual arrangements, and have the system delivered and physically installed. At the other extreme requirements documents can be developed, users consulted about their needs, systems benchmarked and evaluated, and final selections made. The later approach implies a carefully developed plan for installing the system as well as an organized training program.

One of the purposes of the Berkeley-IBM Joint study of office automation was to test whether a large and complex research university could successfully adopt an integrated office automation system. The nature of the joint study arrangement did not lend itself to careful and rational planning. A finite amount of time was agreed upon for the project; the hardware, software, and communication facilities were installed; and the project begun. This description understates the technical effort required to install the PROFS system. It clarifies that user requirements were subservient to the opportunity the university had to make a quantum leap in its sophistication in office automation and office productivity.

The effort of a sudden infusion of a limited amount of funds for the project was that the system could not be integrated. The project could not provide access to PROFS for all staff in all units in the University. Instead, a small subset were selected to participate. Since the University's decision-making is decentralized and its communications patterns extremely complex, the individuals participating in the project could not use PROFS to communicate with all the people in the University with whom they needed to conduct business. The consequence of partial implementation was that the user now had two or more ways of communicating.

The PROFS system provided Berkeley users with a number of functions such as electronic mail, document preparation, document management, and calendar management. Before its installation, a complex variety of computer systems and software were already available to Campus users. These included access via a network to DEC VAX systems running UNIX, IBM machines running CMS, Data General equipment running AOS, and Tandem machines running NONSTOP. In addition, many office staff had IBM Displaywriter or other stand-alone word processors, and many faculty and staff had IBM, Apple, Hewlett-Packard, etc. personal computers available.

The dearth of editors, word processors, spreadsheets, and database management systems gave every user considerable flexibility in adopting his or her favorite. With the arrival of PROFS, participants had another choice, and as the experimental results indicate, they chose to use PROFS for some tasks and not to use it for others. This is entirely reasonable since the users had no reason to believe the experiment would continue and they were not willing to use a PROFS function if they perceived that the manual or automated way they were doing it now was better than that provided by PROFS.

The decentralized management structure of the University had other consequences beside the inability of the experiment to provide network access to all parties. The nature of the Berkeley campus is such that no one person in an academic department seems to be able to impose his or her managerial will on faculty. The faculty views itself as autonomous and above direction. A faculty member's willingness to continue participating in the experiment was entirely a function of that person's perceived benefits from the project and not a result of managerial direction.

Other participants in the experiment had considerable flexibility to participate but less choice in the matter than faculty. The lack of strong executive and managerial commitment to the the project coupled with other viable choices for some office automation tasks resulted in a less-than-enthusiastic acceptance of the system.

The project was also plagued by delays in installing equipment and communications facilities. Some participating units did not have terminals or lines installed until the project had been under way for some time. Some of the IBM 4341 machines and peripheral devices were also delayed in installation. The effect was an uneven starting time.

Office functions are labor-intensive activities and a university such as Berkeley has a high proportion of staff and faculty spending a great deal of their time on these activities. The functions that PROFS provides are integral to the operation of any business, and as such are applicable to the Berkeley environment. The question is whether an institution like Berkeley can successfully adopt an office automation system like PROFS.

The BIJOU experiment showed that it was possible to install and operate PROFS in an environment where there were a wide variety of users with radically different skill levels. The experiment showed that some users were quite devoted to the system and used it heavily. The general conclusion was that certain internal and external factors prevented the project from being successful. Among them was a lack of strong managerial commitment to the project, a lack of effective planning for the installation of equipment, and inadequate coverage of the campus by the network of PROFS users.

Significant productivity gains can be made by having a system like PROFS available to the University. The University can be the successful user of an office automation system. But better planning is needed to insure its success.

9.2 Conclusions for PROFS: What's to be Learned about Users and Usage Patterns?

One of the major accomplishments of the project was to gain considerable insight into how the PROFS system was used. The analysis concentrated on how the number of users changed over the experimental period, the rates at which users stopped participating in the project, the amount of time users spent performing PROFS functions, the sequence with which users adopted PROFS functions, and the patters users followed in performing individual PROFS functions.

During the three years of the experiment, close to 300 users participated in the project from five different schools, departments, and administrative units on the Berkeley Campus. The individuals came from 11 different job classifications including executive, analyst, secretary, and faculty member. About 60 percent of the participants were female, close to 43 percent fell into the 30-39 year age bracket, and 30 percent had worked for the University for less than five years.

A number of different methodological approaches suggest there are significant variations in the type and amount of usage of the PROFS system by different units and by participant characteristics. The overall pattern showed that two departments increased their number of PROFS users over the three years, while the number of users from the other units remained relatively stable.

Our investigation into the rates at which users stopped using the PROFS system showed that without managerial intervention, 50 percent of the participants dropped out after two years. Some of the terminations may be due to normal attrition, which we estimate at 10-15 percent of the work force each year. Participants could have moved from a unit that was participating in the experiment to one that was not.

Even though there was attrition, the number of participants in the experiment was constantly augmented over its life. When we investigated the factors underlying stopping using PROFS, we found that the probability of stopping using PROFS did not vary with the length of time the user had been participating in the experiment. Further analysis revealed that both personal characteristic, unit affiliation, and job classification influence the drop-out rate. Faculty members have a significantly higher termination rate than do general secretaries, and participants from the Department of Economics and School of Library and Information Studies were more likely to continue participating than members of other units. We also found that the length of time a person continues to use PROFS was not related to sex, age, or the number of years the person had worked on the Berkeley Campus.

The number of users of the system is only one dimension of the analysis. Intensity and variety are others. The number of hours that users were connected to the PROFS system increased with the number of days since their first use of the system. We found there were differences in the amount of usage between different units and that the longer the participant had been working on the Berkeley campus the less they were likely to use the PROFS system.

We attempted to separate the amount of time users were logged onto the system from the amount of time they were actively performing a computing task. This was accomplished by applying restrictions to measures of total connect time to arrive at active time. The definitions are discussed in Chapter 6. Our definitions are rough approximations, and as will be discussed in Section 9.3, can be improved upon. Nevertheless, they showed that even if adjustments are not made to measures of connect time, relatively good measures of the proportion of time spent performing various tasks can be made. We found that the proportions of time were stable even though the definitions changed.

The PROFS system lets one send and receive electronic mail, maintain a calendar, prepare documents, and maintain mail and document files, to name but the most used. When we examined the extent to which these functions were used, we found a few dominated the list. Close to 20 percent of all actions were for the user to look at his or her electronic in-basket for mail. About 30 percent of the actions were to search and file documents and this was performed mostly in one unit. Document preparation constituted about 13 percent of all activities and one in ten actions were to maintain a calendar. All the other PROFS functions were used lightly.

There were significant variations in the extent of usage of these functions between units and between job classes. The Department of Economics and the School of Public Policy used the document preparation function heavily, the School of Library and Information Studies was the heaviest user of electronic mail, the School of Business used the calendar function to the exclusion of most others, and the Chancellors Office was the major user of the PROFS searching function.

Executives used the system for calendaring, document preparation, and reviewing their in-basket. Faculty, faculty secretaries, and student secretaries used the system for electronic mail and document preparation.

In addition to exploring which PROFS functions were used most heavily, we were interested to find out the sequence in which system functions were learned and incorporated into the user's command repertoire. Our advent analysis showed that mail-related functions are used first and much later a typical user will begin to perform document preparation activities. All other functions fall between these extremes.

In summary, organizational unit and job classification are the paramount determinants of intensity and variety of use that an individual makes of an integrated office system. Age, sex, and length of time the individual has worked at the institution has less to do with use than unit and job classification.

9.3 Directions for Research

A number of significant methodological approaches were taken in the analysis of PROFS usage. These approaches represent first attempts at a range of modeling techniques to quantify user behavior patterns with an office automation system.

By far the most important tool that was developed in the project was the monitoring system. This program gathered information on the function keys and text entered by each user and date- and time-stamped each transaction. From the monitor data it was possible to perform most of the modeling and analysis.

The monitor and the tools developed to analyze monitor data were designed specifically for the BIJOU project. Monitoring is crucial to the understanding of user and system performance. One of the most important steps that must be taken to advance our understanding of office system use is to develop standard monitoring tools available in all office systems.

Almost all Operating Systems come with tools that can be used to analyze the workload, performance, capacity, and availability of computer systems. There should be no exception to this pattern with office automation systems like PROFS. Future research and development should concentrate on the development of standard monitoring tools and reports from the system. It is not sufficient for the vendor to supply 'user accounting exits' in the code to allow each installation to develop their own monitoring. Programs should come with the system to capture and analyze this data.

Our research has shown the utility of maintaining a database of user information. The ability to analyze usage patterns in relation to user characteristics such as job classification, unit, age, sex, and years of employment at the university has been particularly revealing. The variables used to characterize the individuals is only the most elementary. Knowing more about the way the individual fits into the organizational structure of the university, pre-PROFS communications patterns of users, and more comprehensive measures of user computing expertise would be very useful. With this type of information more complete models could be used to better explain behavior patterns.

One of the concepts that was explored in this book was the amount of time a user spent performing tasks as opposed to being positioned at a screen where a task could be performed. The research developed criteria which could be systematically applied and which could indicate the portion of total time a user spent in a PROFS function that was active time. It is important to have this information because it gives the analyst a clue where the programming effort should be applied to improve the product and what the user is actually doing with the product.

More refined monitoring is necessary to be able to improve the quality of measurement of active time. The most important change would be continuous monitoring of user actions including document editing and performing operating systems function while in the PROFS system. The quantity of data collected under this plan would be voluminous, but it would be the only way to obtain accurate information on active time usage of the system.

An important methodological tool that was used throughout the analysis was failure-time models. The purpose of these models was to characterize the 'birth' and 'death' of PROFS users, i.e. when they began using PROFS and PROFS functions, and when they stopped. With the models it was possible to calculate the probabilities of participants continuing to use PROFS and the rates of demise. Extended forms of the models incorporated user characteristics into them to explain variations between individuals in the rates and times of adoption of PROFS functions.

One research goal was not met. An objective of the investigation was to determine the temporal sequence with which users began sustained usage of PROFS functions. We were not able to analyze this because the monitoring program was not fully operational at the beginning of the experiment and it operated only intermittently at the middle of the experiment.

Continuous monitoring data would allow the 'advent' models and 'failure time' models to be applied. When a user is free to decide on the learning sequence to be employed in mastering a complex programming product, the researcher has a valuable experimental environment available. Watching the behavior of users and their success or failure allows the information to be used in developing training packages which will improve the odds that the user will have enough knowledge about the system to make an intelligent decision about continuing to use it.

Two approaches were taken to analyzing the sequence with which PROFS tasks were performed. At the macro level, the failure-time models discussed previously were used and at the micro level, analysis of the transitions within specific functions were explored. To the user the PROFS system appears to be organized hierarchically but analysis reveals a number of network-like transition paths. Our investigation of the transitions involved calculating the probability of users following certain function key - menu paths to accomplish a goal. This analysis was exploratory in that only a few functions and a few algorithms were investigated to model user patterns. Future research should explore longer sequences of keystrokes and develop directed graphs of interaction patterns. It would be especially useful to compare the directed graphs of users with different demographic characteristics.

The results of this type of analysis are important for system designers and trainers. The designers provide the user a system with enough flexibility to be used in unexpected ways and still meet the user's requirements. The graphs of user patterns give the designer considerable insight into how a user goal is accomplished with the PROFS system. If the designer finds convoluted patterns, this may be a clue that the system flow of operation needs improvement, that more tailored functions are required, or that repackaging of existing functions may be necessary.

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APPENDIX B: EQUIVALENCES BETWEEN IBM-PROFS AND BIJOU-PROFS SCREEN NAMES

Equivalences Between IBM-PROFS and BIJOU PROFS Screen Names

Screen Number	Screen Name IBM-PROFS	Screen Name BIJOU-PROFS
B00	Process Schedule	Calendar
C00	Open the Mail	Review In-Basket
D01	Search for Documents	Search for Document
E50	Note Log List	Manage Notelog
F00	Prepare Document	Prepare a Document
X03	Add an Automatic Reminder	Set a Reminder
E04	Send a Note	Send a Note
E07	Send a Message	Send Immediate Message
D00	Process the Mail Log	Manage Maillog
N00	Personal Directory Maintenance	Personal Directory
A05	Process Documents from Other Sources	File Documents
T20	Process an Author Profile	Author Profile
T30	Process a Distribution List	Manage Distribution Lists

APPENDIX C: MENU SCREENS

Menu Screens

Any detailed understanding of the analysis presented in this book requires the reader to see the information contained on each PROFS screen. This appendix contains reproductions of the screens. The appendix is organized according to Main Menu functions. Section C.1 contains all menu that follow from Screen A001 - the first main menu. Section C.2 gives the menus and screens that follow from Screen A002, and section C.3 does the same for Screen A003.

C.1 Main Menu Page One

```
+-----------------------------------------------------------------------------+
|MDC-BIJ            P R O F S   M A I N   M E N U     CAO-SYSTEM        A00|
|  Press one of the following PF keys.                                       |
|  PF1  Calendar                                       Time:   1:45 PM       |
|  PF2  Review In-Basket                                                     |
|  PF3  Search for Document                       1985   SEPTEMBER   1985    |
|  PF4  Manage Notelogs             *------*       S   M   T   W   T   F   S |
|  PF5  Prepare a Document          | PAGE |       1   2   3   4   5   6   7 |
|  PF6  Set a Reminder              | ONE  |       8   9  10  11  12  13  14 |
|  PF7  Send a Note                 *------*      15  16  17  18  19  20  21 |
|  PF8  Send Immediate Message                    22  23  24  25  26  27  28 |
|                                                 29  30                     |
| PF10  Menu Page Two                                   Day of Year: 248     |
| PF11  Menu Page Three                                                      |
|                                                   PF9 Help     PF12 End   |
| -------------------------------------------------------------------------- |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
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|                                                                            |
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|===>                                                                        |
+-----------------------------------------------------------------------------+
```

C.1.1 Calendar

```
+------------------------------------------------------------------------------+
|                              PROCESS SCHEDULES                           BOO|
|                                                                              |
| Schedule For:  Michael Cooper                      Time:    2:37 PM          |
| Schedule Date:      /    /                                                   |
|                                                1985   SEPTEMBER   1985      |
| Press one of the following PF keys.             S   M   T   W   T   F   S   |
|                                                 1   2   3   4   5   6   7   |
|  PF1  Look at or change the schedule             8   9  10  11  12  13  14   |
|  PF2  Choose another schedule                   15  16  17  18  19  20  21   |
|  PF3  Choose a conference room                  22  23  24  25  26  27  28   |
|  PF4  Change to the next day                    29  30                       |
|  PF5  Change to the previous day                      Day of Year: 248      |
|  PF6  Look at the whole month                                                |
|  PF7  Schedule a meeting                                                     |
|  PF8  Print a schedule                                                       |
|                                                                              |
| PF10  Change to the next month                                               |
| PF11  Change to the previous month                                           |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
| PF9 Help    PF12 Return                                                      |
|                                                                              |
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|                                                                              |
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+------------------------------------------------------------------------------+
```

C.1.1.1 Choose Another Schedule

```
+------------------------------------------------------------------------------+
|                          CHOOSE ANOTHER SCHEDULE                          B01|
|                                                                              |
| Type the number of the schedule you want and press ENTER===>                 |
|                                                                              |
|  1  John C. Doe          Read Access                                         |
|                                                                              |
|                                                                              |
| PF9 Help    PF12 Return                                                      |
|                                                                              |
+------------------------------------------------------------------------------+
```

C.1.1.2 Look At Or Change The Schedule

```
+----------------------------------------------------------------------------+
|                          LOOK AT OR CHANGE THE SCHEDULE                 B02|
| Schedule for: Michael Cooper                   Date:  9 / 05 / 85 , Thursday|
|                                                                            |
| BEGIN   END     DESCRIPTION                                                |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
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|                                                                            |
|                                                                            |
| PF1 Move PF2 Copy PF3 Quit PF4 Next PF5 Prev. PF6 Month PF9 Help PF12 Return|
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+
```

C.1.1.3 Choose A Conference Room

```
+-----------------------------------------------------------------------------+
|                          CHOOSE A CONFERENCE ROOM                        B03|
|                                                                             |
| Type the number of the room you want and press ENTER===>                    |
|                                                                             |
|  1  Room B-49 Evans Hall (contact Nancy Kato - NRKATO)                      |
|  2  Room 305 Banway (contact Millie Gonzales - EMG-ISO)                     |
|                                                                             |
|                                                                             |
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| PF9 Help    PF12 Return                                                     |
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|                                                                             |
|                                                                             |
|                                                                             |
+-----------------------------------------------------------------------------+
```

C.1.1.4 Print The Schedule

```
+------------------------------------------------------------------------------+
|                              PRINT THE SCHEDULE                          B04|
|                                                                              |
| Change the ones you want and press ENTER. Printer==> 1 Days==>30 Copies==> 1|
|                                                                              |
|  1  6670 Laser Printer, 212 Evans (CAO Staff Only)                           |
|  2  BIJOU Staff Printer, BIJOU staff only                                    |
|  3  Line Printer, Basement of Evans Hall                                     |
|  4  6670 Laser Printer, 307 Banway (AIS staff Only)                          |
|                                                                              |
|                                                                              |
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| PF9 Help    PF12 Return                                                      |
|                                                                              |
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|                                                                              |
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|                                                                              |
|                                                                              |
+------------------------------------------------------------------------------+
```

C.1.1.5 Look At The Whole Month

```
+-----------------------------------------------------------------------------+
|                        LOOK AT THE WHOLE MONTH                          B05|
| Schedule for: Michael Cooper                   Date: 09 / 05 / 85           |
|    Sunday      Monday    Tuesday    Wednesday  Thursday    Friday    Saturday|
| +-------+----------+----------+----------+----------+----------+----------+ |
| |     1 |        2 |        3 |        4 |        5 |        6 |        7 | |
| | ..... | ........ | ........ | ........ | ........ | ........ | ........ | |
| +-------+----------+----------+----------+----------+----------+----------+ |
| |     8 |        9 |       10 |       11 |       12 |       13 |       14 | |
| | ..... | ........ | ........ | ........ | ........ | ........ | ........ | |
| +-------+----------+----------+----------+----------+----------+----------+ |
| |    15 |       16 |       17 |       18 |       19 |       20 |       21 | |
| | ..... | ........ | ........ | ........ | ........ | ........ | ........ | |
| +-------+----------+----------+----------+----------+----------+----------+ |
| |    22 |       23 |       24 |       25 |       26 |       27 |       28 | |
| | ..... | ........ | ........ | ........ | ........ | ........ | ........ | |
| +-------+----------+----------+----------+----------+----------+----------+ |
| |    29 |       30 |          |          |          |          |          | |
| | ..... | ........ |          |          |          |          |          | |
| +-------+----------+----------+----------+----------+----------+----------+ |
| |       |          | Note:                                                | |
| |       |          |                                                      | |
| +-------+----------+------------------------------------------------------+ |
| PF1 Look at the Day              PF3 Rooms  PF4 Next Day  PF5 Previous Day  |
| PF7 Groups  PF8 Print  PF9 Hlp  PF10 NextMonth  PF11 Prev.Month  PF12 Return|
|                                                                             |
|                                                                             |
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|                                                                             |
|                                                                             |
+-----------------------------------------------------------------------------+
```

C.1.1.6 Schedule A Meeting

```
+--------------------------------------------------------------------------------+
|                              SCHEDULE A MEETING                            B06|
|                                                                                |
| Type in the information below.                                                 |
|                                                                                |
|    Search from this date: 09 / 05 / 85                                         |
|    To this date:          09 / 05 / 85                                         |
|    Amount of time needed: Hours __ Minutes __                                  |
|                                                                                |
|    Check the following schedules.  Type one conference room name and/or        |
|    user name per space.  When you have finished, press ENTER.                  |
|                                                                                |
|    ______________________________  ______________________________              |
|    ______________________________  ______________________________              |
|    ______________________________  ______________________________              |
|    ______________________________  ______________________________              |
|    ______________________________  ______________________________              |
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|    ______________________________  ______________________________              |
|    ______________________________  ______________________________              |
|                                                                                |
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| PF9 Help    PF12 Return                                                        |
|                                                                                |
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|                                                                                |
+--------------------------------------------------------------------------------+
```

C.1.2 Review In-Basket

```
+----------------------------------------------------------------------------------+
|                                OPEN THE MAIL                                 C00|
|                                                                                  |
|  Press the PF key for the document you want.                                     |
|       ----FROM----       -----TO-----          TYPE  DUE DATE  DOCUMENT NO.     |
|  PF1  JAS-OCA --UCBCAO   MLW-BIJ --UCBCAO      Reply           08/28/85 12:42|
|          Subject: Quarterly reports                                              |
|  PF2  MDC-BIJ --UCBCMSB  MLW-BIJ --UCBCMSB     Note            08/23/85 17:00|
|          Subject: Logit Analysis                                                 |
|  PF3  OCAATS  --UCBCMSB  MLW-BIJ --UCBCMSB     Forward         08/23/85 17:00|
|          Subject: The psc proc option                                            |
|  PF4  KJI-BIJ --UCBCAO   MLW-BIJ --UCBCAO      Reply           08/21/85 16:39|
|          Subject: Monitor Data Book                                              |
|  PF5  Paul E. Lugo       Michael Wiseman       Note            08/21/85 09:03|
|          Subject: Monitor Data Book                                              |
|  PF6  Danziger           MLW-BIJ --UCBCAO      Other           86128HDC0001  |
|          Subject: "Antipoverty Policy:  Effects on                               |
|  PF7  Wiseman, Michael   Ottaway, Alan         Final           85234CA00001  |
|          Subject: SAS Interactive Editing for Data                               |
|  PF8  Mike               Karl Iorio            Draft           85222CA00004  |
|          Subject: Search Results                                                 |
|                                                                                  |
|                                                                                  |
|                                                          Screen    1 of     1 |
| To look at all of these documents, type ALL here and press ENTER===>             |
| PF9 Help    PF10 Next Screen    PF11 Previous Screen    PF12 Return             |
+----------------------------------------------------------------------------------+
```

C.1.2.1 From Typing ALL on C00

```
+--------------------------------------------------------------------------------+
|                            PROCESS THE INCOMING MAIL                        C06|
| Press one of the following PF keys.                                            |
|                                                                                |
| PF1  Look at all documents                                                     |
| PF2  File them in the mail log and erase them from the incoming mail           |
| PF3  Keep all documents in the incoming mail and the mail log                  |
|                                                                                |
|                                                                                |
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| PF9 Help    PF12 Return                                                        |
+--------------------------------------------------------------------------------+
```

C.1.2.2 Choose to look at 'Note', 'Reply' or 'Forward' type mail

```
+----------------------------------------------------------------------------+
|                            LOOK AT THE NOTE                             E01|
| From: JAS-OCA --UCBCAO                      Date and time  08/28/85 12:42:16 |
| To: MLW-BIJ --UCBCAO                                                       |
|                                                                            |
| *** Reply to note of 08/28/85 11:23                                        |
| From    : Jerome A. Smith        2-5965       ID: jas-oca                  |
| Subject: Quarterly reports                                                 |
| Great.  I'll look forward to receiving a draft of the report on Monday.    |
| Jerry                                                                      |
|                          E N D  O F  N O T E                               |
|                                                                            |
|                                                                            |
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|                                                                            |
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|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
| PF1 Alternate PFs  PF2 File NOTE      PF3 Keep  PF4 Erase  PF5 Forward Note |
| PF6 Reply PF7 Resend PF8 Print PF9 Help PF10 Next PF11 Previous PF12 Return |
+----------------------------------------------------------------------------+
```

C.1.2.3 Choices from Screen E01

C.1.2.3.1 PF5 FORWARD NOTE

```
+----------------------------------------------------------------------------------+
|                              LOOK AT THE NOTE                                 E12|
| From: JAS-OCA --UCBCAO                         Date and time  08/28/85 12:42:16 |
| To: MLW-BIJ --UCBCAO                                                             |
|                                                                                  |
| *** Reply to note of 08/28/85 11:23                                              |
| From    : Jerome A. Smith        2-5965      ID: jas-oca                          |
| Subject: Quarterly reports                                                       |
| Great.  I'll look forward to receiving a draft of the report on Monday.          |
| Jerry                                                                            |
|                            E N D   O F   N O T E                                 |
|                                                                                  |
| PF1 Up   PF2 Down   PF9 Help   PF10 Next Screen   PF11 Previous Screen           |
|                              FORWARD THE NOTE                                 E11|
| Forward to:                                                                      |
| From    : Michael Wiseman        2-5092      ID: MLW-BIJ                          |
| Subject: Quarterly reports                                                       |
|                                                                                  |
|                                                                                  |
|                                                                                  |
|                                                                                  |
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|                                                                                  |
|                                                                                  |
| PF1 Top   PF2 Bottom   PF3 Erase Line   PF4 Add Line   PF5 Nulls Off   PF6 Format |
| PF7 Send   PF9 Help   PF10 Next Screen   PF11 Previous Screen   PF12 Cancel      |
+----------------------------------------------------------------------------------+
```

C.1.2.3.2 PF6 REPLY

```
+------------------------------------------------------------------------------+
|                              LOOK AT THE NOTE                           E12|
| From: JAS-OCA --UCBCAO                      Date and time  08/28/85 12:42:16 |
| To: MLW-BIJ --UCBCAO                                                         |
|                                                                              |
| *** Reply to note of 08/28/85 11:23                                          |
| From    : Jerome A. Smith        2-5965       ID: jas-oca                    |
| Subject: Quarterly reports                                                   |
| Great.  I'll look forward to receiving a draft of the report on Monday.      |
| Jerry                                                                        |
|                            E N D  O F  N O T E                               |
|                                                                              |
| PF1 Up  PF2 Down  PF9 Help  PF10 Next Screen  PF11 Previous Screen           |
|                             REPLY TO THE NOTE                            E02|
| Reply to: JAS-OCA --UCBCAO                                                   |
| From    : Michael Wiseman        2-5092       ID: CLW-BIJ                    |
| Subject: Quarterly reports                                                   |
|                                                                              |
|                                                                              |
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|                                                                              |
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|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
| PF1 Top  PF2 Bottom  PF3 Erase Line  PF4 Add Line  PF5 Nulls Off  PF6 Format |
| PF7 Send  PF9 Help  PF10 Next Screen  PF11 Previous Screen  PF12 Cancel      |
+------------------------------------------------------------------------------+
```

C.1.2.3.3 PF7 RESEND

```
+---------------------------------------------------------------------------+
|                           LOOK AT THE NOTE                             E12|
| From: JAS-OCA --UCBCAO                    Date and time  08/28/85 12:42:16 |
| To: MLW-BIJ --UCBCAO                                                      |
|                                                                           |
| *** Reply to note of 08/28/85 11:23                                       |
| From    : Jerome A. Smith        2-5965      ID: jas-oca                  |
| Subject: Quarterly reports                                                |
| Great.  I'll look forward to receiving a draft of the report on Monday.   |
| Jerry                                                                     |
|                            E N D  O F  N O T E                            |
|                                                                           |
| PF1 Up  PF2 Down  PF9 Help  PF10 Next Screen  PF11 Previous Screen        |
|                            SEND THE NOTE AGAIN                         E13|
| Resend to:                                                                |
| To: MLW-BIJ --UCBCAO                                                      |
|                                                                           |
| *** Reply to note of 08/28/85 11:23                                       |
| From    : Jerome A. Smith        2-5965      ID: jas-oca                  |
| Subject: Quarterly reports                                                |
| Great.  I'll look forward to receiving a draft of the report on Monday.   |
| Jerry                                                                     |
|                                                                           |
|                                                                           |
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|                                                                           |
|                                                                           |
|                                                                           |
|                                                                           |
|                                                                           |
|                                                                           |
| PF1 Top  PF2 Bottom  PF3 Erase Line  PF4 Add Line  PF5 Nulls Off  PF6 Format |
| PF7 Send  PF9 Help  PF10 Next Screen  PF11 Previous Screen  PF12 Cancel   |
+---------------------------------------------------------------------------+
```

C.1.2.4 Alternate PFs

C.1.2.4.1 PF4 ADD LOG COMMENTS

```
+--------------------------------------------------------------------------------+
|                              LOOK AT THE NOTE                              E12|
| From: JAS-OCA --UCBCAO                       Date and time  08/28/85 12:42:16 |
| To: MLW-BIJ --UCBCAO                                                          |
|                                                                               |
| *** Reply to note of 08/28/85 11:23                                           |
| From    : Jerome A. Smith       2-5965       ID: jas-oca                      |
| Subject: Quarterly reports                                                    |
| Great.  I'll look forward to receiving a draft of the report on Monday.       |
| Jerry                                                                         |
|                            E N D  O F  N O T E                                |
|                                                                               |
| PF1 Up  PF2 Down  PF9 Help  PF10 Next Screen  PF11 Previous Screen            |
|                   ADD PERSONAL COMMENTS TO YOUR NOTE LOG                    E03|
| Comments:                                                                     |
|                                                                               |
|                                                                               |
|                                                                               |
|                                                                               |
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|                                                                               |
| PF1 Top  PF2 Bottom  PF3 Erase Line  PF4 Add Line  PF5 Nulls Off  PF6 Format |
| PF7 Add  PF9 Help  PF10 Next Screen  PF11 Previous Screen  PF12 Cancel        |
+--------------------------------------------------------------------------------+
```

C.1.2.4.2 PF5 SEND A NOTE

```
+---------------------------------------------------------------------------+
|                            LOOK AT THE NOTE                            E12|
| From: JAS-OCA --UCBCAO                   Date and time  08/28/85 12:42:16 |
| To: MLW-BIJ --UCBCAO                                                      |
|                                                                           |
| *** Reply to note of 08/28/85 11:23                                       |
| From    : Jerome A. Smith        2-5965       ID: jas-oca                 |
| Subject: Quarterly reports                                                |
| Great.  I'll look forward to receiving a draft of the report on Monday.   |
| Jerry                                                                     |
|                           E N D  O F  N O T E                             |
|                                                                           |
| PF1 Up  PF2 Down  PF9 Help  PF10 Next Screen  PF11 Previous Screen        |
|                              SEND A NOTE                               E04|
| Send to:                                                                  |
| From    : Michael Wiseman        2-5092       ID: MLW-BIJ                 |
| Subject:                                                                  |
|                                                                           |
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|                                                                           |
| PF1 Top  PF2 Bottom  PF3 Erase Line  PF4 Add Line  PF5 Nulls Off  PF6 Format |
| PF7 Send  PF9 Help  PF10 Next Screen  PF11 Previous Screen  PF12 Cancel   |
+---------------------------------------------------------------------------+
```

C.1.3 Choose A 'Final' Document

```
+----------------------------------------------------------------------------+
|                      PROCESS THE INCOMING MAIL                         C01|
| From:     Wiseman, Michael                  Document No.:  85234CA00001 |
| Subject:  SAS Interactive Editing for Data Ent   Type:  Final             |
| ---------------------------------------------------------------------------|
|                                                                            |
| Press one of the following PF keys.                                        |
|                                                                            |
| PF1  Look at the document                                                  |
| PF2  File in the mail log and erase from the incoming mail                 |
| PF3  Keep in the incoming mail and the mail log                            |
| PF4  Erase from the incoming mail and the mail log                         |
| PF5  Forward the document                                                  |
| PF6  Look at the distribution list                                         |
| PF7  Change the mail log information                                       |
| PF8  Print the document                                                    |
|                                                                            |
|PF10  Look at the next screen                                               |
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| PF9 Help    PF12 Return                                                    |
+----------------------------------------------------------------------------+
```

C.1.3.1 CHOOSE PF10 LOOK AT THE NEXT SCREEN

```
+--------------------------------------------------------------------------------+
|                          PROCESS THE INCOMING MAIL                          C04|
|                                                                                |
|  From:     Wiseman, Michael                   Document No.: 85234CA00001 |
|  Subject:  SAS Interactive Editing for Data Ent   Type:  Final              |
|  ----------------------------------------------------------------------------|
|                                                                                |
|  If you do not want to work with the final document, type the number of the |
|  draft copy you want to work with here first===>                            |
|                                                                                |
|  Now, press one of the following PF keys.                                   |
|                                                                                |
|  PF1  Look at the document                                                  |
|  PF2  Copy the document into your personal storage                          |
|                                                                                |
| PF11  Go back to the previous screen                                        |
|                                                                                |
|                                                                                |
| PF9 Help    PF12 Return                                                     |
+--------------------------------------------------------------------------------+
```

C.1.3.2 Choose a 'Draft' document

```
+-----------------------------------------------------------------------+
|                       PROCESS THE INCOMING MAIL                    C02|
| From:     Michael Cooper                  Document No.:  85227CA00004 |
| Subject:  Search Results                  Type:  Draft                |
| ----------------------------------------------------------------------|
|                                                                       |
| Press one of the following PF keys.                                   |
|                                                                       |
| PF1  Look at the document                                             |
| PF2  File in the mail log and erase from the incoming mail            |
| PF3  Keep in the incoming mail and the mail log                       |
| PF4  Erase from the incoming mail and the mail log                    |
| PF5  Forward the document                                             |
| PF6  Look at the distribution list                                    |
| PF7  Change the mail log information                                  |
| PF8  Print the document                                               |
|                                                                       |
|PF10  Look at the next screen                                          |
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| PF9 Help    PF12 Return                                               |
+-----------------------------------------------------------------------+
```

C.1.3.3 PF10 LOOK AT THE NEXT SCREEN

```
+--------------------------------------------------------------------------------+
|                        PROCESS THE INCOMING MAIL                            C07|
|                                                                                |
|  From:     Michael Cooper                   Document No.: 85227CA00004 |
|  Subject:  Search Results                   Type:  Draft                        |
|  ------------------------------------------------------------------------------|
|                                                                                |
|  If you want to work with a copy other than the most current, type the number|
|  you want to work with here first===>                                          |
|                                                                                |
|  Now, press one of the following PF keys.                                      |
|                                                                                |
|  PF1  Look at the document                                                     |
|  PF2  Copy the document into your personal storage                             |
|  PF3  Change the document                                                      |
|                                                                                |
| PF11  Go back to the previous screen                                           |
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| PF9 Help    PF12 Return                                                        |
+--------------------------------------------------------------------------------+
```

C.1.3.4 Choose an 'Other' document

```
+------------------------------------------------------------------------------+
|                          PROCESS THE INCOMING MAIL                        C02|
| From:     Danziger                          Document No.:  86128HDC0001     |
| Subject:  "Antipoverty Policy:  Effects on the   Type:  Other               |
| ---------------------------------------------------------------------------- |
|                                                                              |
| Press one of the following PF keys.                                          |
|                                                                              |
| PF2  File in the mail log and erase from the incoming mail                   |
| PF3  Keep in the incoming mail and the mail log                              |
| PF4  Erase from the incoming mail and the mail log                           |
| PF5  Forward the document                                                    |
| PF7  Change the mail log information                                         |
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| PF9 Help    PF12 Return                                                      |
+------------------------------------------------------------------------------+
```

C.1.4 Search For Document

```
+-----------------------------------------------------------------------------+
|                          SEARCH FOR DOCUMENTS                           D01|
|                                                                             |
| If you are not searching your own mail log, type:          (User-ID).  Type |
| the information you want below.  To change the search, press the PF Key(s). |
|   Time period:                        /                                     |
|                 --------------------   --------------------                |
|   From:                      /                    /                         |
|  AND           ------------------   ------------------   ------------------ |
|   Key word:                     /                       /                   |
|  AND            --------------------   --------------------   ------------------|
|   To:                        /                    /                         |
|  AND           ------------------   ------------------   ------------------ |
|   Identifier:       /     /                                                 |
|  AND              ---   ---   ---                                           |
|   Type:             /   /                                                   |
|  AND                -   -   -                                               |
|   Action:                /            /                                     |
|                ----------   ----------   ----------                         |
|  PF1  Find documents due:                                                   |
|                                ---------------------                        |
|  PF2  Find the documents that have all the key words                       |
|  PF3  Replace AND with OR in the search above                               |
| Now, press ENTER to start the search.                                       |
| PF9 Help    PF12 Return                                                     |
|                                                                             |
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+-----------------------------------------------------------------------------+
```

C.1.4.1 SCREEN REACHED WHEN SEARCH FINDS DOCUMENTS

```
+---------------------------------------------------------------------------+
|                       COMPLETED SEARCH FOR DOCUMENTS                  D03|
|                                                                           |
|  PROFS found:     21 document(s).                                         |
|                                                                           |
|  Now, press one of the following PF keys.                                 |
|                                                                           |
|  PF1  Look at the list of documents found with the mail log comments      |
|  PF2  Look at the list of documents found without the mail log comments   |
|  PF3  Save the list of documents found in a file                          |
|  PF4  Change the previous search information                              |
|  PF5  Repeat the previous search without any key words                    |
|  PF6  Repeat the previous search with the time period expanded            |
|  PF7  Start the search again with new search information                  |
|  PF8  Print the mail log information for the list of documents found      |
|                                                                           |
|                                                                           |
|                                                                           |
| PF9 Help    PF12 Return                                                   |
+---------------------------------------------------------------------------+
```

C.1.4.2 FROM PF1 ON SCREEN D03

```
+----------------------------------------------------------------------------+
|                        LIST OF THE DOCUMENTS FOUND                     D04|
|                                                                           |
|  Press the PF key for the document you want.                              |
|      ----FROM----     -----TO-----       ACTION   IDENT TYPE  DOCUMENT NO. |
|  PF1  Wiseman, Michael                                 Final 85239CA00002 |
|         Subject: Economics 1, Lecture 1                                   |
|                                                                           |
|         Comments:                                                         |
|  PF2  Wiseman, Michael Fleeter, Howard                 Final 85239CA00001 |
|         Subject:  Econ 1 T.A.  Meeting                                    |
|                                                                           |
|         Comments:                                                         |
|  PF3  Wiseman, Michael                                 Draft 85238CA00002 |
|         Subject: Economics 1, Lecture 1                                   |
|                                                                           |
|         Comments:                                                         |
|  PF4  Wiseman, Michael                                 Draft 85238VMB0001 |
|         Subject: Economics 1 Lectures                                     |
|                                                                           |
|         Comments:                                                         |
|  PF5  Snow, F.         File                            Draft 85228VMB0015 |
|         Subject:  Plan for final report                                   |
|                                                       Screen    1 of    6 |
|         Comments:                                                         |
|                                                                           |
|                                                                           |
|                                                                           |
|                                                                           |
|                                                                           |
| To look at all of these documents, type ALL here and press ENTER===>      |
| PF9 Help    PF10 Next Screen    PF11 Previous Screen    PF12 Return       |
+----------------------------------------------------------------------------+
```

C.1.4.3 FROM PF2 ON SCREEN D03

```
+--------------------------------------------------------------------------------+
|                         LIST OF THE DOCUMENTS FOUND                         D06|
|                                                                                |
|  Press the PF key for the document you want.                                   |
|       ----FROM----      -----TO-----        ACTION    IDENT TYPE  DOCUMENT NO. |
|  PF1  Wiseman, Michael                                      Final 85239CA00002 |
|          Subject: Economics 1, Lecture 1                                       |
|  PF2  Wiseman, Michael Fleeter, Howard                      Final 85239CA00001 |
|          Subject: Econ 1 T.A. Meeting                                          |
|  PF3  Wiseman, Michael                                      Draft 85238CA00002 |
|          Subject: Economics 1, Lecture 1                                       |
|  PF4  Wiseman, Michael                                      Draft 85238VMB0001 |
|          Subject: Economics 1 Lectures                                          |
|                                                                                |
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|                                                                                |
|                                                             Screen  1 of    5 |
| To look at all of these documents, type ALL here and press ENTER===>           |
| PF9 Help    PF10 Next Screen    PF11 Previous Screen    PF12 Return            |
+--------------------------------------------------------------------------------+
```

C.1.4.4 SCREEN FROM CHOOSING A 'FINAL' DOCUMENT FROM SCREEN D04 OR D06

```
+------------------------------------------------------------------------+
|                    PROCESS THE DOCUMENT FOUND                      D08|
|                                                                        |
|  From:     Wiseman, Michael              Document No.: 85239CA00002  |
|  Subject:  Economics 1, Lecture 1        Type:  Final                 |
|  ----------------------------------------------------------------------|
|                                                                        |
|  Press one of the following PF keys.                                  |
|                                                                        |
|  PF1  Look at the document                                            |
|  PF2  Erase from the list of documents found                          |
|  PF3  Keep in the list of documents found                             |
|  PF4  Erase from the list of documents found and the mail log         |
|  PF5  Forward the document                                            |
|  PF6  Look at the distribution list                                   |
|  PF7  Look at or change the mail log information                      |
|  PF8  Print the document                                              |
|                                                                        |
| PF10  Look at the next screen                                         |
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| PF9 Help    PF12 Return                                               |
+------------------------------------------------------------------------+
```

C.1.4.5 FROM PF10 ON SCREEN D08

```
+--------------------------------------------------------------------------------+
|                       PROCESS THE DOCUMENT FOUND                           D02|
|                                                                                |
|  From:      Wiseman, Michael                   Document No.: 85239CA00002 |
|  Subject:   Economics 1, Lecture 1             Type:  Final                |
|  ------------------------------------------------------------------------------|
|                                                                                |
|  If you do not want to work with the final document, type the number of the |
|  draft copy you want to work with here first===>                              |
|                                                                                |
|  Now, press one of the following PF keys.                                     |
|                                                                                |
|  PF1   Look at the document                                                   |
|  PF2   Copy the document into your personal storage                           |
|                                                                                |
| PF11   Go back to the previous screen                                         |
|                                                                                |
|                                                                                |
| PF9 Help    PF12 Return                                                       |
+--------------------------------------------------------------------------------+
```

C.1.4.6 SCREEN FROM CHOOSING A 'DRAFT' DOCUMENT FROM SCREEN D04 OR D06

```
+--------------------------------------------------------------------------+
|                      PROCESS THE DOCUMENT FOUND                       D11|
|                                                                          |
|  From:     Wiseman, Michael                Document No.: 85238CA00002    |
|  Subject:  Economics 1, Lecture 1          Type:  Draft                  |
|  ------------------------------------------------------------------------|
|                                                                          |
|  Press one of the following PF keys.                                     |
|                                                                          |
|  PF1  Look at the document                                               |
|  PF2  Erase from the list of documents found                             |
|  PF3  Keep in the list of documents found                                |
|  PF4  Erase from the list of documents found and the mail log            |
|  PF5  Forward the document                                               |
|  PF6  Look at the distribution list                                      |
|  PF7  Look at or change the mail log information                         |
|  PF8  Print the document                                                 |
|                                                                          |
| PF10  Look at the next screen                                            |
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| PF9 Help    PF12 Return                                                  |
+--------------------------------------------------------------------------+
```

C.1.4.7 FROM PF10 ON SCREEN D11

```
+------------------------------------------------------------------------------+
|                         PROCESS THE DOCUMENT FOUND                        D09|
|                                                                              |
|  From:     Wiseman, Michael                     Document No.: 85238CA00002  |
|  Subject:  Economics 1, Lecture 1               Type:  Draft                 |
|  ----------------------------------------------------------------------------|
|                                                                              |
|  If you want to work with a draft copy other than the most current, type the |
|  number you want to work with here first===>                                 |
|                                                                              |
|  Now, press one of the following PF keys.                                    |
|                                                                              |
|  PF1  Look at the document                                                   |
|  PF2  Copy the document into your personal storage                           |
|  PF3  Change the document                                                    |
|                                                                              |
| PF11  Go back to the previous screen                                         |
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| PF9 Help    PF12 Return                                                      |
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```

C.1.4.8 FROM PF3 ON SCREEN D09

```
+----------------------------------------------------------------------------+
|                        PROCESS THE DOCUMENT                            F01|
|                                                                            |
|  Document No.:  52270004                                                   |
|  Type:          Draft                                                      |
|  --------------------------------------------------------------------------|
|                                                                            |
|  Press one of the following PF keys.                                       |
|                                                                            |
|  PF1  Look at the document                                                 |
|  PF2  Change the document                                                  |
|  PF3  Assign a new document number                                         |
|  PF4  Proofread the document                                               |
|  PF5  File and send the document as a Final document                       |
|  PF6  File the document in your personal storage for further changes       |
|  PF7  File the document for further changes by you and the reviewers       |
|  PF8  Print the document                                                   |
|                                                                            |
|                                                                            |
|                                                                            |
|  To erase the document from your personal storage, type DELETE below and   |
|  press ENTER.                                                              |
|                                                                            |
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| PF9 Help                                                                   |
| ===>                                                                       |
+----------------------------------------------------------------------------+
```

C.1.4.9 FROM PF3 ON SCREEN F01

```
+------------------------------------------------------------------------------+
|                         ASSIGN A NEW DOCUMENT NUMBER                     F03|
|                                                                              |
|  The document number currently assigned is:  55270004                       |
|                                                                              |
|  Press ENTER to assign a new document number.  If you do                     |
|  not want to assign a new document number, press PF12.                       |
|                                                                              |
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| PF9 Help    PF12 Return                                                      |
+------------------------------------------------------------------------------+
```

C.1.4.10 FROM PF4 ON SCREEN F01

```
+--------------------------------------------------------------------------+
|                          PROOFREAD THE DOCUMENT                       F05|
|                                                                          |
|  Document No.:  52270004                                                 |
|  Type:  Draft                                                            |
|  ------------------------------------------------------------------------|
|                                                                          |
|  Press one of the following PF keys.                                     |
|                                                                          |
|  PF1  Check the spelling                                                 |
|  PF2  Check the spelling in context                                      |
|  PF3  Check the phrasing within a sentence                               |
|  PF4  Check the reading comprehension level                              |
|       Type the grade level to use===>  8 (Choose from grades 4-16)       |
|                                                                          |
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| PF9 Help    PF12 Return                                                  |
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```

C.1.4.11 FROM PF5 ON SCREEN F01

```
+------------------------------------------------------------------------------+
|                        SEND THE FINAL DOCUMENT                            F06|
|                                                                              |
|                                                                              |
|  R30      Type the number of days (preceded by R) you want to keep the       |
|  -------- most current draft copy of the document, or the date when all      |
|           draft copies can be erased.  Note:  Final documents will not       |
|           be erased.                                                         |
|                                                                              |
|  If you want one of the following, press the PF key(s).                      |
|                                                                              |
|  PF1  Restrict those who can see the document to                             |
|       you and the people on the distribution list                            |
|  PF2  Assign the document distribution information      SELECTED             |
|  PF8  Print the document                                                     |
|                                                                              |
|  Press ENTER when you have made your choices.                                |
|                                                                              |
| PF9 Help    PF12 Return                                                      |
+------------------------------------------------------------------------------+
```

C.1.4.12 FROM PF7 ON SCREEN F01

```
+-----------------------------------------------------------------------------+
|                   FILE THE DOCUMENT FOR CHANGE BY REVIEWERS             F08|
|                                                                             |
|  R30      Type the number of days (preceded by R) you want to keep the      |
|  -------- most current draft copy of the document, or type the date when    |
|           all draft copies can be erased.                                   |
|                                                                             |
|  2         Type the number of draft copies of the document you              |
|  -         want to keep.                                                    |
|                                                                             |
|  If you want one of the following, press the PF key(s).                     |
|                                                                             |
|  PF1  Restrict those who can see the document to                            |
|       you and the people on the distribution list                           |
|  PF2  Assign the document distribution information                          |
|  PF8  Print the document                                                    |
|                                                                             |
|  Press ENTER when you have made your choices.                               |
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| PF9 Help    PF12 Return                                                     |
+-----------------------------------------------------------------------------+
```

C.1.4.13 FROM PF8 ON SCREEN D03

```
+------------------------------------------------------------------------------+
|                         PRINT THE MAIL LOG INFORMATION                    F30|
|                                                                              |
|  Press the PF key(s) to choose the way you want the information printed.     |
|                                                                              |
|  PF1  Print without the mail log comments                                    |
|                                                                              |
|  CHOOSE ONLY ONE OF THE FOLLOWING.                                           |
|                                                                              |
|  PF2  Print in sequence by document number                                   |
|  PF3  Print in alphabetic sequence by the last                               |
|       name of the person who wrote the document ("FROM")                     |
|  PF4  Print in alphabetic sequence by the last                               |
|       name of the person(s) to whom the document                             |
|       was sent ("TO")                                                        |
|                                                                              |
|  Then, press ENTER.                                                          |
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| PF9 Help    PF12 Return                                                      |
+------------------------------------------------------------------------------+
```

C.1.5 Manage Note Logs

```
+--------------------------------------------------------------------------------+
|                          N O T E   L O G   L I S T                         E50 |
|DMSNLG029I Valid action codes are V (view) C (change) S (sort) P (print).       |
|*   Log          Size     Last Changed                                          |
|- --------      ------   -------- --------                                      |
|  NOTE             52    8/28/85 15:00:28                                       |
|  BTSS             14    8/27/85  9:23:55                                       |
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|                                                                                |
|Place the cursor on the name of the log you want and Press a PF key or          |
|Enter Action code(s) under the * and press ENTER.                               |
|                                                                                |
|PF1 View   PF2 Change  PF4 Sort                                                 |
|PF8 Print  PF9 Help                                           PF12 RETURN       |
+--------------------------------------------------------------------------------+
```

C.1.5.1 From PF1 on Screen E50

```
+------------------------------------------------------------------------------+
|                         LOOK AT THE NOTE LOG                              E08|
|                                                                              |
|  Press the PF key for the note you want.                                     |
|      ----FROM----        -----TO-----               TYPE     DATE and TIME   |
|  PF1  MDC-BIJ --UCBCAO    ADR-OCA --UCBCAO           Note     08/28/85 15:00|
|         Subject: document proofread                                          |
|  PF2  MDC-BIJ --UCBCAO    DTK-OCA --UCBCAO           Reply    08/27/85 09:07|
|         Subject: janus                                                       |
|  PF3  MDC-BIJ             Bijou Secretary            Forward  08/22/85 16:31|
|         Subject: John Freeman's Paper                                        |
|                                                                              |
|                                                                              |
|                                                                Screen   1 of  |
| To look at all of these notes, type ALL here and press ENTER===>             |
| PF9 Help    PF10 Next Screen    PF11 Previous Screen    PF12 Return          |
+------------------------------------------------------------------------------+
```

C.1.5.2 Screen from choosing a note on Screen E08

```
+------------------------------------------------------------------------------+
|                              LOOK AT THE NOTE                            E20|
| From: JAS-OCA --UCBCAO                       Date and time  08/28/85 12:42:16 |
| To: MLW-BIJ --UCBCAO                                                          |
|                                                                               |
| From    : Jerome A. Smith        2-5965       ID: jas-oca                     |
| Subject: Quarterly reports                                                    |
| Great.  I'll look forward to receiving a draft of the report on Monday.       |
| Jerry                                                                         |
|                                                                               |
|                                                                               |
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|                                                                               |
| PF1 Alternate PFs                    PF3 Keep  PF4 Erase  PF5 Forward Note   |
| PF6 Reply PF7 Resend PF8 Print PF9 Help PF10 Next PF11 Previous PF12 Return  |
+------------------------------------------------------------------------------+
```

C.1.5.3 From PF2 on Screen E50

```
+--------------------------------------------------------------------------+
|                               CHANGE THE NOTE     LOG              E53   |
|                                                                          |
|                                                                          |
|                                                                          |
|MSG FROM: MDC-BIJ --UCBCAO   TO: ADR-OCA --UCBCAO        08/28/85 15:00:27 |
|To: ADR-OCA --UCBCAO   April Roy                                          |
|                                                                          |
|From    : Michael Cooper        2-1692      ID: MDC-BIJ                   |
|Subject: document proofread                                               |
|April,                                                                    |
|   Sorry to be so slow in getting back to you.                            |
|Here are some things that I noticed:                                      |
|                                                                          |
|1.  P. 30, first line after NETWORK ADDRESSES, 'persons' should be        |
|    'person's'.                                                           |
|                                                                          |
|2.  p. 53, 2nd paragraph under Input Mode:  That paragraph reads as if    |
|    a line got deleted in editing.                                        |
|                                                                          |
|3.  p.55, description of 'an':  instead of 'starting with this line' it   |
|    should be 'after this line'.                                          |
|                                                                          |
|4.  p. 64, MAILPASS description:  I tried this and since I did not have   |
|    an old password, it asked for the new password again.  It then asked  |
|    for my logon password or a blank to terminate the request.  (This     |
|    is probably not too important, since it prompts you for specific      |
|    answers.)                                                             |
|                                                                          |
|The document is very impressive.  Writing clear documentation is difficult |
|PF1 First Note  PF2 Last Note  PF4 Erase Note  PF5 Next Note PF6 Previous Note|
|PF7 Xfer PF8 Copy PF9 Help  PF10 Next Screen  PF11 Previous Screen PF12 Return|
|====>                                                                     |
+--------------------------------------------------------------------------+
```

C.1.6 Prepare A Document

```
+---------------------------------------------------------------------------+
|                          PREPARE DOCUMENTS                            F00|
|                                                                           |
|  Press one of the following PF keys.                                      |
|                                                                           |
|  PF1  Prepare a document using the Standard document style.               |
|  PF2  Prepare a document using another document style.  Type the name of |
|       the style you want below and press the PF key.  Or, to look at     |
|       the list of available document styles, just press the PF key.      |
|                                                                           |
|                 --------                                                  |
|  PF3  Change a draft document.  Type the document number below first.    |
|       Then press the PF key.                                              |
|                                                                           |
|                 -------- ----                                             |
|                                                                           |
| PF9 Help    PF12 Return                                                   |
+---------------------------------------------------------------------------+
```

C.1.6.1 From PF1 on F00

```
+------------------------------------------------------------------------------+
| Document No.:  1                DOCUMENT HEADING                          F51|
|                                                                              |
| Type in the information below and then press PF7.                            |
|             *****  Standard Memo Format  *****                               |
|                                                                              |
| NAME OF AUTHOR PROFILE:                                                      |
|                                                                              |
| ADDRESSEE(S):                                                                |
|                                                                              |
| SUBJECT:                                                                     |
|                                                                              |
| TYPIST'S INITIALS:                                                           |
|                                                                              |
| ATTACHMENT? Y/YES, N/NO/NULL, OR YOUR OWN TEXT:                              |
|                                                                              |
| COPY LIST:                                                                   |
|                                                                              |
|  ***     Press PF7 to enter text...     ***                                  |
|* * * END OF RANGE (LINE=15) * * *                                            |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
||...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+...|
|PF1 Look At  PF2 Add Line PF3 Erase Line PF4 Tab PF5 Split/Join PF6 Alt PFKs |
|PF7 Next Part  PF8 Prev. Part PF9 Help  PF10 Forward  PF11 Backward  PF12 File|
|====>                                                                         |
+------------------------------------------------------------------------------+
```

C.1.6.2 From PF7 on Screen F51

```
+--------------------------------------------------------------------------------+
| Document No.:  1                  DOCUMENT TEXT                             F52|
|DMSXMD573I INPUT MODE:                                                          |
| Type the document text below and press PF12 to file the document.             |
|                                                                                |
|                                                                                |
|* * * TOP OF RANGE (LINE=16) * * *                                              |
|                                                                                |
|                                                                                |
|                                                                                |
|                                                                                |
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|                                                                                |
|                                                                                |
|                                                                                |
|                                                                                |
|                                                                                |
||...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+...|
|PF1 Look At PF4 Tab PF7 Next Part PF8 Prev. Part PF9 Help PF10 Power PF12 File|
|To enter COMMANDS, get out of 'INPUT MODE' by pressing ENTER KEY with no text.|
|                                                                                |
+--------------------------------------------------------------------------------+
```

C.1.6.3 Choice of document styles (PF2 on Screen F00)

```
+--------------------------------------------------------------------------------+
|                        LIST OF AVAILABLE DOCUMENT STYLES                    F04|
|                                                                                |
|  Press the PF key for the document style you want.                             |
|                                                                                |
|  PF1  OCAFORMW Office of Computing Affairs Formal White (off-campus)           |
|                                                                                |
|  PF2  OCAFORMB Office of Computing Affairs Formal Blue (on-campus)             |
|                                                                                |
|  PF3  OCAMEMO  Office of Computing Affairs Informal Memorandum                 |
|                                                                                |
|  PF4  STANDARD Basic Memo Format                                               |
|                                                                                |
|  PF5  BUSINESS Formal Business Letter                                          |
|                                                                                |
|  PF6  FREEFORM No predefined formatting done - use your own Script commands    |
|                                                                                |
|  PF7  QUICK    A Quick Freeform - no author profile required                   |
|                                                                                |
|  PF8  ISOREQ   Project Requirement Form                                        |
|                For developing and refining system/program requirements        |
|                                                                                |
|                                                                                |
|                                                                                |
|                                                                                |
|                                                                                |
|                                                                                |
|                                                                                |
|                                                                                |
|                                                             Screen   1 of    2|
| PF9 Help    PF10 Next Screen    PF11 Previous Screen    PF12 Return            |
|===>                                                                            |
+--------------------------------------------------------------------------------+
```

This screen varied depending on the department's document needs. Choice of each different document style brought up a different version of screen F51. One sample follows. The screen for inputting text was again F52.

C.1.6.4 Sample of screen F51 from choosing a document style on F04

```
+---------------------------------------------------------------------------+
| Document No.:  3                DOCUMENT HEADING                       F51|
|                                                                           |
| Type in the information below and then press PF7.                         |
|                                                                           |
| ---- This is the IST formal white (off campus) letter - ISTFORMW ----     |
| ----     To be copied onto white IST or CO letterhead      ----           |
| ---- * ALWAYS use the IST arrangement file when printing this format * ---- |
|                                                                           |
| NAME OF AUTHOR PROFILE:                                                   |
|                                                                           |
| Enter "Y" if this letter is to use Chancellor's Office letterhead.        |
| Otherwise, Information Systems & Technology letterhead will be assumed:   |
|                                                                           |
| Name and address of addressee (use PF2 for more lines):                   |
|                                                                           |
| SUBJECT:                                                                  |
|                                                                           |
| Enter the salutation (including punctuation)                              |
|                                                                           |
| Enter "Y" if there are attachments:                                       |
|                                                                           |
| Enter names for the carbon copy list (use PF2 for more lines):            |
|                                                                           |
|      --- Part 1 of 2 --- Use PF7 ('Next Part') to reach Next Part ---     |
|* * * END OF RANGE (LINE=21) * * *                                         |
|                                                                           |
|                                                                           |
|                                                                           |
||...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+...|
|PF1 Look At  PF2 Add Line PF3 Erase Line PF4 Tab PF5 Split/Join PF6 Alt PFKs |
|PF7 Next Part  PF8 Prev. Part PF9 Help  PF10 Forward  PF11 Backward  PF12 File|
|===>                                                                       |
+---------------------------------------------------------------------------+
```

C.1.6.5 Change a draft document (PF3 on Screen F00 or PF12 on Screens F51 & F52)

```
+------------------------------------------------------------------------------+
|                          PROCESS THE DOCUMENT                             F01|
|                                                                              |
|  Document No.:  52270004                                                     |
|  Type:          Draft                                                        |
|  ----------------------------------------------------------------------------|
|                                                                              |
|  Press one of the following PF keys.                                         |
|                                                                              |
|  PF1  Look at the document                                                   |
|  PF2  Change the document                                                    |
|  PF3  Assign a new document number                                           |
|  PF4  Proofread the document                                                 |
|  PF5  File and send the document as a Final document                         |
|  PF6  File the document in your personal storage for further changes         |
|  PF7  File the document for further changes by you and the reviewers         |
|  PF8  Print the document                                                     |
|                                                                              |
|                                                                              |
|                                                                              |
|  To erase the document from your personal storage, type DELETE below and     |
|  press ENTER.                                                                |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
| PF9 Help                                                                     |
| ===>                                                                         |
+------------------------------------------------------------------------------+
```

C.1.6.6 From PF2 on Screen F01

```
+----------------------------------------------------------------------+
| Document No.:  5227004        DOCUMENT HEADING                  F51|
|                                                                      |
| Type in the information below and then press PF7.                    |
|              *****  Standard Memo Format  *****                      |
|                                                                      |
| NAME OF AUTHOR PROFILE:                                              |
|wiseman                                                               |
| ADDRESSEE(S):                                                        |
|Jerome Smith                                                          |
|Office of Computing Affairs                                           |
| SUBJECT:                                                             |
|Choice of document styles                                             |
| TYPIST'S INITIALS:                                                   |
|                                                                      |
| ATTACHMENT? Y/YES, N/NO/NULL, OR YOUR OWN TEXT:                      |
|N                                                                     |
| COPY LIST:                                                           |
|Paul Lugo                                                             |
|  ***      Press PF7 to enter text...     ***                         |
|* * * END OF RANGE (LINE=15) * * *                                    |
|                                                                      |
|                                                                      |
|                                                                      |
|                                                                      |
|                                                                      |
|                                                                      |
|                                                                      |
|                                                                      |
||...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+...|
|PF1 Look At  PF2 Add Line PF3 Erase Line PF4 Tab PF5 Split/Join PF6 Alt PFKs |
|PF7 Next Part  PF8 Prev. Part PF9 Help  PF10 Forward  PF11 Backward  PF12 File|
|====>                                                                 |
+----------------------------------------------------------------------+
```

C.1.6.7 From PF7 on Screen F51

```
+--------------------------------------------------------------------------------+
| Document No.:  5227004       CHANGE DOCUMENT TEXT                          F53|
|                                                                                |
| Press PF12 when you have finished changing the document text.                  |
|                                                                                |
|                                                                                |
|* * * TOP OF RANGE (LINE=26) * * *                                              |
|.pp                                                                             |
|The text for any document style will go here.                                   |
|It can be changed and rewritten.                                                |
|* * * END OF RANGE (LINE=28) * * *                                              |
|                                                                                |
|                                                                                |
|                                                                                |
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|                                                                                |
|                                                                                |
|                                                                                |
|                                                                                |
||...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+...|
|PF1 Look At  PF2 Add Line PF3 Erase Line PF4 Tab PF5 Split/join PF6 Alt PFKs   |
|PF7 Next Part  PF8 Prev. Part PF9 Help  PF10 Forward  PF11 Backward  PF12 File|
|====>                                                                           |
+--------------------------------------------------------------------------------+
```

C.1.6.8 From PF3 on Screen F01

```
+--------------------------------------------------------------------------------+
|                        ASSIGN A NEW DOCUMENT NUMBER                         F03|
|                                                                                |
|  The document number currently assigned is:  5227004                           |
|                                                                                |
|  Press ENTER to assign a new document number.  If you do                       |
|  not want to assign a new document number, press PF12                          |
|                                                                                |
|                                                                                |
| PF9 Help    PF12 Return                                                        |
+--------------------------------------------------------------------------------+
```

C.1.6.9 From PF4 on Screen F01

```
+----------------------------------------------------------------------------------+
|                         PROOFREAD THE DOCUMENT                               F05|
|                                                                                  |
|  Document No.:  52270004                                                         |
|  Type:  Draft                                                                    |
|  --------------------------------------------------------------------------------|
|                                                                                  |
|  Press one of the following PF keys.                                             |
|                                                                                  |
|  PF1  Check the spelling                                                         |
|  PF2  Check the spelling in context                                              |
|  PF3  Check the phrasing within a sentence                                       |
|  PF4  Check the reading comprehension level                                      |
|       Type the grade level to use===>  8 (Choose from grades 4-16)               |
|                                                                                  |
|                                                                                  |
| PF9 Help    PF12 Return                                                          |
+----------------------------------------------------------------------------------+
```

C.1.6.10 From PF5 on Screen F01

```
+--------------------------------------------------------------------------+
|                       SEND THE FINAL DOCUMENT                          F06|
|                                                                          |
|                                                                          |
|  30      Type the number of days (preceded by R) you want to keep the    |
| -------- most current draft copy of the document, or the date when all   |
|          draft copies can be erased.  Note:  Final documents will not    |
|          be erased.                                                      |
|                                                                          |
| If you want one of the following, press the PF key(s).                  |
|                                                                          |
| PF1  Restrict those who can see the document to                          |
|      you and the people on the distribution list                        |
| PF2  Assign the document distribution information      SELECTED         |
| PF8  Print the document                                                  |
|                                                                          |
| Press ENTER when you have made your choices.                            |
|                                                                          |
|                                                                          |
| PF9 Help    PF12 Return                                                  |
+--------------------------------------------------------------------------+
```

C.1.6.11 From PF7 on Screen F01

```
+----------------------------------------------------------------------------+
|                    FILE THE DOCUMENT FOR CHANGE BY REVIEWERS          F08|
|                                                                            |
|  30      Type the number of days (preceded by R) you want to keep the      |
| -------- most current draft copy of the document, or type the date when    |
|          all draft copies can be erased.                                   |
|                                                                            |
| 2         Type the number of draft copies of the document you              |
| -         want to keep.                                                    |
|                                                                            |
| If you want one of the following, press the PF key(s).                     |
|                                                                            |
| PF1  Restrict those who can see the document to                            |
|      you and the people on the distribution list                           |
| PF2  Assign the document distribution information                          |
| PF8  Print the document                                                    |
|                                                                            |
| Press ENTER when you have made your choices.                               |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
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|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|PF9 Help    PF12 Return                                                     |
+----------------------------------------------------------------------------+
```

C.1.7 Set A Reminder

```
+------------------------------------------------------------------------------+
|                        ADD AN AUTOMATIC REMINDER                         X03|
|                                                                              |
| To have PROFS remind you of an                      Time:    2:57 PM         |
| event, type in the date and time                                             |
| you want to be reminded.  Also,                  1985    SEPTEMBER    1985   |
| type in the note you want PROFS                   S    M    T    W    T    F    S |
| to show you at that time.                         1    2    3    4    5    6    7 |
|                                                   8    9   10   11   12   13   14 |
| Date:  09/05/85                                  15   16   17   18   19   20   21 |
|        --------------------                      22   23   24   25   26   27   28 |
| Time:                                            29   30                       |
|        -------                                        Day of Year: 248       |
| Note:                                                                        |
|                                                                              |
| ---------------------------------------------------------------------------- |
|                                                                              |
| To have PROFS remind you several times, type below the number of times you  |
| want the reminder repeated and the number of minutes between each reminder. |
|                                                                              |
| Times:    Minutes:                                                           |
|        -          --                                                         |
| Then, press ENTER to send the information to PROFS.                          |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
| PF9 Help    PF10 Next Month    PF11 Previous Month    PF12 Return           |
+------------------------------------------------------------------------------+
```

C.1.8 Send A Note

```
+------------------------------------------------------------------------------+
|                                SEND A NOTE                                E04|
| Send to:                                                                     |
| From    : Michael Cooper          2-1692          ID:  MDC-BIJ               |
|                                                                              |
|                                                                              |
| Subject:                                                                     |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
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|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
| PF1 Top  PF2 Bottom  PF3 Erase Line  PF4 Add Line  PF5 Nulls Off  PF6 Format |
| PF7 Send  PF9 Help  PF10 Next Screen  PF11 Previous Screen  PF12 Cancel      |
+------------------------------------------------------------------------------+
```

C.1.9 Send Immediate Message

```
+------------------------------------------------------------------------------+
|                              SEND A MESSAGE                               E07|
|                                                                              |
|  Send to:                                                                    |
|           -------------------------------------------------------------------|
|                                                                              |
|  Message text:                                                               |
|                ------------------------------------------------------------- |
|                                                                              |
| -----------------------------------------------------------------------------|
|                                                                              |
| -----------------------------------------------------------------------------|
|                                                                              |
| Type the information above and press PF7 to send.                           |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
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|                                                                              |
|                                                                              |
|                                                                              |
| PF7 Send    PF9 Help    PF12 Cancel                                          |
+------------------------------------------------------------------------------+
```

C.2 Main Menu Page Two

```
+--------------------------------------------------------------------------------+
|  MDC-BIJ              P R O F S    M A I N    M E N U      CAO-SYSTEM    A00|
| Press one of the following PF keys.                                            |
| PF1  Manage Maillog                                      Time:    2:58 PM      |
| PF2  Personal Directory                                                        |
| PF3  File Documents                                1985    SEPTEMBER    1985   |
| PF4  View Central Directory     *------*           S    M    T    W    T    F    S |
| PF5  Prepare a Document         | PAGE |           1    2    3    4    5    6    7 |
| PF6  Author Profiles            | TWO  |           8    9   10   11   12   13   14 |
| PF7  Manage Distribution Lists  *------*          15   16   17   18   19   20   21 |
|                                                   22   23   24   25   26   27   28 |
|                                                   29   30                         |
| PF10  Menu Page Three                                   Day of Year: 248       |
| PF11  Menu Page One                                                            |
|                                                   PF9 Help     PF12 End        |
| ------------------------------------------------------------------------------ |
|                                                                                |
|                                                                                |
|===>                                                                            |
+--------------------------------------------------------------------------------+
```

C.2.1 Manage Mail Log

```
+----------------------------------------------------------------------------+
|                        PROCESS THE MAIL LOG                            D00|
|                                                                            |
|  Press one of the following PF keys.                                       |
|                                                                            |
|  PF1  Search for documents                                                 |
|  PF2  Add mail log information for a printed document received             |
|       from another source                                                  |
|  PF3  Forward mail log information for a printed document                  |
|  PF4  Change the mail log information                                      |
|  PF5  Erase mail log information                                           |
|  PF6  Look at the mail log information                                     |
|  PF8  Print the mail log information                                       |
|                                                                            |
|                                                                            |
|                                                                            |
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|                                                                            |
|                                                                            |
|                                                                            |
| PF9 Help    PF12 Return                                                    |
+----------------------------------------------------------------------------+
```

C.2.1.1 FROM PF1 ON SCREEN D00

```
+------------------------------------------------------------------------------+
|                           SEARCH FOR DOCUMENTS                           D01|
|                                                                              |
| If you are not searching your own mail log, type:         (User-ID).  Type   |
| the information you want below.  To change the search, press the PF Key(s).  |
|   Time period:                        /                                      |
|                 --------------------   --------------------                 |
|   From:                    /                     /                           |
|  AND       -----------------   -----------------   -----------------         |
|   Key word:                   /                     /                        |
|  AND        --------------------   --------------------   ------------------|
|   To:                      /                     /                           |
|  AND       -----------------   -----------------   -----------------         |
|   Identifier:      /     /                                                   |
|  AND          ---   ---   ---                                                |
|   Type:            /   /                                                     |
|  AND              -   -   -                                                  |
|   Action:             /            /                                        |
|            ----------   ----------   ----------                              |
|  PF1  Find documents due:                                                    |
|                                  --------------------                        |
|  PF2  Find the documents that have all the key words                         |
|  PF3  Replace AND with OR in the search above                                |
| Now, press ENTER to start the search.                                        |
| PF9 Help    PF12 Return                                                      |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
+------------------------------------------------------------------------------+
```

Screen progression continues here as from Search for a Document.

C.2.1.2 FROM PF2 ON SCREEN D00

```
+----------------------------------------------------------------------------+
|             ADD MAIL LOG INFORMATION FOR A PRINTED DOCUMENT            D15|
|                                                                            |
|  Type the information below.  Then, press one of the following PF keys.   |
|                                                                            |
|  From:                                                                     |
|            ----------------                                                |
|  To:                                                                       |
|            ----------------                                                |
|  Subject:                                                                  |
|            ---------------------------------------------------------------- |
|                                                                            |
|            ------------------------------------------------------------    |
|  Comments:                                                                 |
|            ---------------------------------------------                   |
|  Action:                        Due date:                                  |
|            ----------                    --------------------              |
|  Identifier:                    Type:                                      |
|            ---                        -                                    |
|                                                                            |
|  PF1  Add to the mail log                                                  |
|  PF2  Add to the mail log and forward to others                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
| PF9 Help    PF12 Return                                                    |
+----------------------------------------------------------------------------+
```

C.2.1.3 FROM PF3 ON SCREEN D00

```
+----------------------------------------------------------------------------+
|                  ASSIGN THE REVIEWER DISTRIBUTION INFORMATION          H05|
|                                                                            |
|  Type the distribution for document:                below. Then press PF1 or |
|  PF2 to send the document locally.    -------- ----                         |
|                                                                            |
|         USER NAME          USER NAME           USER NAME          USER NAME |
|                                                                            |
|         --------           --------            --------           --------  |
|                                                                            |
|         --------           --------            --------           --------  |
|                                                                            |
|         --------           --------            --------           --------  |
|                                                                            |
|         --------           --------            --------           --------  |
|                                                                            |
|         --------           --------            --------           --------  |
|                                                                            |
|  PF1  Send the document and attach a routing slip                          |
|  PF2  Send the document without a routing slip                             |
|                                                                            |
| PF10  Add more names to the list                                           |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
| PF9 Help    PF12 Return                                                    |
+----------------------------------------------------------------------------+
```

C.2.1.4 FROM PF4 ON SCREEN D00

```
+----------------------------------------------------------------+
|                 CHANGE THE MAIL LOG INFORMATION            D17 |
|                                                                |
|  Type the document number and press ENTER===>                  |
|                                             -------- ----      |
|                                                                |
|                                                                |
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|                                                                |
| PF9 Help    PF12 Return                                        |
+----------------------------------------------------------------+
```

C.2.1.5 FROM CHOOSING A DOCUMENT ON SCREEN D17

```
+------------------------------------------------------------------------+
|                    CHANGE THE MAIL LOG INFORMATION                  D18|
|                                                                        |
| Type the changes you want for document no.: 85239CAO 0002              |
|                                                                        |
| From:       Wiseman, Michael                                           |
|             ----------------                                           |
| To:                                                                    |
|             ----------------                                           |
| Subject:    Economics 1, Lecture 1                                     |
|             --------------------------------------------------------  |
|                                                                        |
|             ----------------------------------------------------      |
| Comments:                                                              |
|             ----------------------------------------                  |
| Action:                         Due date:                              |
|             ----------                   -------------------           |
| Identifier:                     Type: M                                |
|             ---                         -                              |
|                                                                        |
| Now, press ENTER to change the mail log information.                   |
|                                                                        |
|                                                                        |
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|                                                                        |
| PF9 Help    PF12 Return                                                |
+------------------------------------------------------------------------+
```

C.2.1.6 FROM PF5 ON SCREEN D00

```
+--------------------------------------------------------------------------------+
|                          ERASE MAIL LOG INFORMATION                        D19|
|                                                                                |
|  Type in the document number(s) to be erased from the mail log.               |
|                                                                                |
|               DOCUMENT NO.                        DOCUMENT NO.                |
|                                                                                |
|               -------- ----                        -------- ----               |
|                                                                                |
|               -------- ----                        -------- ----               |
|                                                                                |
|               -------- ----                        -------- ----               |
|                                                                                |
|               -------- ----                        -------- ----               |
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|               -------- ----                        -------- ----               |
|                                                                                |
|  Now, press ENTER.                                                             |
|                                                                                |
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| PF9 Help    PF12 Return                                                        |
+--------------------------------------------------------------------------------+
```

C.2.1.7 FROM PF6 ON SCREEN D20

```
+------------------------------------------------------------------------+
|                    LOOK AT THE MAIL LOG INFORMATION                D20|
|                                                                        |
| Press the PF key for the document you want.                            |
|     ----FROM----     -----TO-----       ACTION   IDENT TYPE  DOCUMENT NO. |
| PF1  Wiseman, Michael                                Final 85239CA00002 |
|        Subject: Economics 1, Lecture 1                                 |
|                                                                        |
|        Comments:                                                       |
| PF2  Wiseman, Michael Fleeter, Howard                Final 85239CA00001 |
|        Subject: Econ 1 T.A. Meeting                                    |
|                                                                        |
|        Comments:                                                       |
| PF3  Carleson                                        Draft 85238HDC0005 |
|        Subject: "The Reagan Welfare Reforms"                           |
|                                                                        |
|        Comments:  Robert B. Carleson                                   |
| PF4  Wiseman, Michael                                Draft 85238CA00001 |
|        Subject: Economics 1 Lectures                                   |
|                                                                        |
|        Comments:                                                       |
|                                                                        |
|                                                                        |
|                                                                        |
|                                                      Screen    1 of    6 |
| To look at all of these documents, type ALL here and press ENTER==>    |
| PF9 Help    PF10 Next Screen    PF11 Previous Screen    PF12 Return    |
+------------------------------------------------------------------------+
```

C.2.1.8 FROM ENTERING ALL ON THE COMMAND LINE ON SCREEN D20

```
+-------------------------------------------------------------------------------+
|                        PROCESS THE MAIL LOG INFORMATION                   D21|
|                                                                               |
|  Press one of the following PF keys.                                          |
|                                                                               |
|  PF1  Look at all the documents                                               |
|  PF3  Keep all the documents in the mail log                                  |
|  PF4  Erase all the documents from the mail log                               |
|                                                                               |
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| PF9 Help    PF12 Return                                                       |
+-------------------------------------------------------------------------------+
```

C.2.1.9 FROM CHOOSING A FINAL DOCUMENT ON SCREEN D20

```
+---------------------------------------------------------------------------+
|                      PROCESS THE MAIL LOG INFORMATION                  D22|
|                                                                           |
|  From:     Wiseman, Michael                   Document No.:  85239CA00002 |
|  Subject:  Economics 1, Lecture 1             Type:  Final                |
|  -------------------------------------------------------------------------|
|                                                                           |
|  Press one of the following PF keys.                                      |
|                                                                           |
|  PF1  Look at the document                                                |
|  PF3  Keep in the mail log                                                |
|  PF4  Erase from the mail log                                             |
|  PF5  Forward the document                                                |
|  PF6  Look at the distribution list                                       |
|  PF7  Look at or change the mail log information                          |
|  PF8  Print the document                                                  |
|                                                                           |
| PF10  Look at the next screen                                             |
|                                                                           |
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| PF9 Help    PF12 Return                                                   |
+---------------------------------------------------------------------------+
```

C.2.1.10 FROM PF10 ON SCREEN D22

```
+---------------------------------------------------------------------------+
|                          PROCESS THE MAIL LOG INFORMATION              D26|
|                                                                           |
|  From:     Wiseman, Michael              Document No.:  85239CA00002     |
|  Subject:  Economics 1, Lecture 1        Type:  Final                    |
|  -------------------------------------------------------------------------|
|                                                                           |
|  If you do not want to work with the final document, type the number of the |
|  draft copy you want to work with here first===>                         |
|                                                                           |
|  Now, press one of the following PF keys.                                 |
|                                                                           |
|  PF1  Look at the document                                                |
|  PF2  Copy the document into your personal storage                        |
|                                                                           |
| PF11  Go back to the previous screen                                      |
|                                                                           |
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|                                                                           |
| PF9 Help    PF12 Return                                                   |
+---------------------------------------------------------------------------+
```

C.2.1.11 FROM CHOOSING A DRAFT DOCUMENT ON SCREEN D20

```
+--------------------------------------------------------------------------------+
|                      PROCESS THE MAIL LOG INFORMATION                       D24|
|                                                                                 |
|  From:     Wiseman, Michael                    Document No.:  85238CA00001     |
|  Subject:  Economics 1 Lectures                Type:  Draft                     |
|  -------------------------------------------------------------------------------|
|                                                                                 |
|  Press one of the following PF keys.                                            |
|                                                                                 |
|  PF1  Look at the document                                                      |
|  PF3  Keep in the mail log                                                      |
|  PF4  Erase from the mail log                                                   |
|  PF5  Forward the document                                                      |
|  PF6  Look at the distribution list                                             |
|  PF7  Look at or change the mail log information                                |
|  PF8  Print the document                                                        |
|                                                                                 |
| PF10  Look at the next screen                                                   |
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| PF9 Help    PF12 Return                                                         |
+--------------------------------------------------------------------------------+
```

C.2.1.12 FROM PF10 ON SCREEN D24

```
+----------------------------------------------------------------------+
|                  PROCESS THE MAIL LOG INFORMATION                 D27|
|                                                                      |
|  From:     Wiseman, Michael            Document No.:  85238CA00001   |
|  Subject:  Economics 1 Lectures        Type:  Draft                  |
|  --------------------------------------------------------------------|
|                                                                      |
|  If you want to work with a draft copy other than the most current, type the |
|  number you want to work with here first===>                         |
|                                                                      |
|  Now, press one of the following PF keys.                            |
|                                                                      |
|  PF1  Look at the document                                           |
|  PF2  Copy the document into your personal storage                   |
|  PF3  Change the document                                            |
|                                                                      |
| PF11  Go back to the previous screen                                 |
|                                                                      |
|                                                                      |
| PF9 Help    PF12 Return                                              |
+----------------------------------------------------------------------+
```

C.2.1.13 FROM CHOOSING AN OTHER DOCUMENT ON SCREEN D20

```
+------------------------------------------------------------------------------+
|                      PROCESS THE MAIL LOG INFORMATION                     D23|
|                                                                              |
|  From:     Carleson                       Document No.:  85238HDC0005        |
|  Subject:  "The Reagan Welfare Reforms"   Type:  Other                       |
|  ----------------------------------------------------------------------------|
|                                                                              |
|  Press one of the following PF keys.                                         |
|                                                                              |
|  PF3  Keep in the mail log                                                   |
|  PF4  Erase from the mail log                                                |
|  PF5  Forward the mail log information                                       |
|  PF7  Look at or change the mail log information                             |
|                                                                              |
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|                                                                              |
| PF9 Help    PF12 Return                                                      |
+------------------------------------------------------------------------------+
```

C.2.2 Personal Directory

```
+------------------------------------------------------------------------+
|          P E R S O N A L   D I R E C T O R Y   M A I N T E N A N C E   N00 |
|                                                                        |
|                                                                        |
|                                                                        |
|         PF1     Look at the nickname entries.                          |
|                                                                        |
|         PF2     Update or delete the entry for:  ________ . (enter a nickname) |
|                                                                        |
|         PF3     Add a new entry.                                       |
|                                                                        |
|         PF4     Update the note personalization information.           |
|                                                                        |
|                                                                        |
|                                                                        |
| Press Corresponding PF Key                     PF9 Help    PF12 RETURN |
|                                                                        |
+------------------------------------------------------------------------+
```

C.2.2.1 FROM PF1 ON SCREEN N00

```
+-------------------------------------------------------------------------------+
|                    P E R S O N A L   D I R E C T O R Y                   N001 |
|Place the cursor on an entry and press the appropriate PF Key.                 |
|Nickname Node ID  User ID  Option   Class    * Name              Dept  Phone   |
|________ ________ ________ _______ _______     __________________ ____  ______ |
|JENNIFER UCBECON  JVB-ECO                    * Jennifer Brown     ECON  2-3581 |
|RANNAH   UCBGSPP  RJB-SPP                    * Rannah Burns       GSPP  2-4670 |
|GENNY    UCBLIS   GDM-LIS                    * Genevieve McNeil   LIS   2-1464 |
|ROBING   UCBECON  EC1Y$6                     * Robin Gaster       ECON         |
|FRANK    UCBCMSB  FDS-IBM                    * Frank Snow         IBM          |
|TIM      UCBCAO   TJS-BIJ                    * Tim Sullivan       GSPP  2-3475 |
|FREEMAN  UCBSBA   JHF-SBA                    * John Freeman       SBA          |
|CASEY    UCBSBA   CR-SBA                     * Casey Roberts      SBA   2-4436 |
|NANCYK   UCBECON  E1H1+ECO                   * Nancy Kerrebrock   ECON  2-6971 |
|JEFFC    UCBECON  EC1X$2                     * Jeff Church        ECON         |
|JOHNCL   UCBECON  EC1X$3                     * John Clark         ECON         |
|DILIPD   UCBECON  EC1X$4                     * Dilip Dutta        ECON         |
|JOHNCH   UCBECON  EC1X$5                     * John Church        ECON         |
|DANG     UCBECON  EC1X$6                     * Dan Gleiseer       ECON         |
|INDERJIT UCBECON  EC1X$7                     * Inderjit Kohli     ECON         |
|ALANO    UCBECON  EC1X$8                     * Alan Ottaway       ECON         |
|SOLIO    UCBECON  EC1X$9                     * Soli Ozel          ECON         |
|JOHNPR   UCBECON  EC1X$10                    * John Praveen       ECON         |
|ERICR    UCBECON  EC1X$11                    * Eric Rueter        ECON         |
|AMINS    UCBECON  EC1X$12                    * Amin Sarkar        ECON         |
|WILLIAMW UCBECON  EC1X$13                    * William Winter     ECON         |
|LAURAW   UCBECON  LDT-ECO                    * Laura Tyson        ECON  2-6083 |
|DARRELLH UCBECON  E1H2+ECO                   * Darrell Hoerter    ECON  2-6971 |
|LILLIANA UCBECON  EC1Y$2                     * Lillian Arce       ECON         |
|LEEB     UCBECON  EC1Y$3                     * Lee Badgett        ECON         |
|PF1 Update/Delete  PF2 Add  PF5 Add to list: ________  PF6 Find: ________      |
|PF10 Next Screen PF11 Previous Screen          PF9 Help PF3 END PF12 RETURN    |
|                                                                               |
+-------------------------------------------------------------------------------+
```

C.2.2.2 FROM PF2 ON SCREEN N00

```
+------------------------------------------------------------------------+
|                D I R E C T O R Y   U P D A T E / D E L E T E    N002  |
|                                                                        |
|                                                                        |
| Nickname:  JENNIFER                                                    |
|                                                                        |
| Node ID:   UCBECON                                                     |
|                                                                        |
| User ID:   JVB-ECO                                                     |
|                                                                        |
| Name:      Jennifer Brown                                              |
|                                                                        |
| Dept:      ECON                                                        |
|                                                                        |
| Phone:     2-3581                                                      |
|                                                                        |
| Option:                                                                |
|                                                                        |
| Mail Class:                                                            |
|                                                                        |
|Make the desired changes and press ENTER                                |
|or press PF1 to confirm the deletion.                                   |
|                                                                        |
|                                                                        |
|                                                                        |
|                                                                        |
|                                                                        |
|                                                                        |
|                                                                        |
|PF1 Delete                                                              |
|                                      PF9 Help  PF3 END  PF12 RETURN   |
|                                                                        |
+------------------------------------------------------------------------+
```

C.2.2.3 FROM PF3 ON SCREEN N00

```
+--------------------------------------------------------------------------+
|                      D I R E C T O R Y   A D D                 N003     |
|                                                                          |
|                                                                          |
| Nickname:                                                                |
|                                                                          |
| Node ID:                                                                 |
|                                                                          |
| User ID:                                                                 |
|                                                                          |
| Name:                                                                    |
|                                                                          |
| Dept:                                                                    |
|                                                                          |
| Phone:                                                                   |
|                                                                          |
| Option:                                                                  |
|                                                                          |
| Mail Class:                                                              |
|                                                                          |
|Enter the information and press ENTER.                                    |
|                                                                          |
|                                                                          |
|                                                                          |
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|                                                                          |
|                                         PF9 Help  PF3 END  PF12 RETURN |
|                                                                          |
+--------------------------------------------------------------------------+
```

C.2.2.4 FROM PF4 ON SCREEN N00

```
+----------------------------------------------------------------------+
|                  N O T E   P E R S O N A L I Z A T I O N        N004 |
|                                                                      |
|                                                                      |
|                                                                      |
|Salutation:   From   : Michael Cooper        2-1692     ID: MDC-BIJ   |
|                                                                      |
|                                                                      |
|                                                                      |
|                                                                      |
|Closing:                                                              |
|                                                                      |
|                                                                      |
|                                                                      |
|                                                                      |
|Print Label:                                                          |
|                                                                      |
|                                                                      |
|                                                                      |
|                                                                      |
|Make the desired changes and press ENTER.                             |
|                                                                      |
|                                                                      |
|                                                                      |
|                                                                      |
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|                                                                      |
|                                                                      |
|                                                                      |
|                                                                      |
|                                   PF9 Help   PF3 END   PF12 RETURN  |
|                                                                      |
+----------------------------------------------------------------------+
```

C.2.3 File Documents

```
+----------------------------------------------------------------------+
|                 PROCESS DOCUMENTS FROM OTHER SOURCES              A05|
|                                                                      |
|  Press on of the following PF keys.                                  |
|                                                                      |
|  PF1  Add mail log information for a document printed on paper       |
|  PF2  Add and change a document file and its mail log information    |
|                                                                      |
|                                                                      |
|                                                                      |
|                                                                      |
|                                                                      |
|                                                                      |
| PF9 Help    PF12 Return                                              |
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+----------------------------------------------------------------------+
```

C.2.3.1 FROM PF1 ON SCREEN A05

```
+----------------------------------------------------------------------------+
|                ADD MAIL LOG INFORMATION FOR A PRINTED DOCUMENT          D15|
|                                                                            |
| Type the information below.  Then, press one of the following PF keys.    |
|                                                                            |
| From:                                                                      |
|            ----------------                                                |
| To:                                                                        |
|            ----------------                                                |
| Subject:                                                                   |
|            ---------------------------------------------------------------- |
|                                                                            |
|            ------------------------------------------------------------    |
| Comments:                                                                  |
|            ---------------------------------------------                   |
| Action:                              Due date:                             |
|            ----------                           --------------------       |
| Identifier:                          Type:                                 |
|            ---                                  -                          |
|                                                                            |
| PF1  Add to the mail log                                                   |
| PF2  Add to the mail log and forward to others                             |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
| PF9 Help    PF12 Return                                                    |
+----------------------------------------------------------------------------+
```

C.2.3.2 From PF2 on Screen A05

```
+-----------------------------------------------------------------------------------+
|          ADD AND CHANGE A DOCUMENT FILE AND ITS MAIL LOG INFORMATION         F13|
|                                                                                   |
| Type the file name here:                        (filename filetype filemode)     |
|                         --------------------    (the default filemode is A1)     |
| Type the mail log information below, if you want it included.                    |
|                                                                                   |
| From:                                                                             |
|              ----------------                                                     |
| To:                                                                               |
|              ----------------                                                     |
| Subject:                                                                          |
|              ----------------------------------------------------------------    |
|                                                                                   |
|              ----------------------------------------------------------------    |
| Comments:                                                                         |
|              ---------------------------------------------                        |
| Action:                             Due date:                                     |
|              ----------                         ---------------------             |
| Identifier:                         Type:                                         |
|              ---                           -                                       |
| Now, press ENTER.                                                                 |
|                                                                                   |
|                                                                                   |
|                                                                                   |
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|                                                                                   |
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|                                                                                   |
|                                                                                   |
| PF9 Help    PF12 Return                                                           |
+-----------------------------------------------------------------------------------+
```

C.2.3.3 FROM CHOOSING A DOCUMENT ON SCREEN F13

```
+------------------------------------------------------------------------------+
|         ADD AND CHANGE A DOCUMENT FILE AND ITS MAIL LOG INFORMATION      F14|
|                                                                              |
|  Press one of the following PF keys.                                         |
|                                                                              |
|  PF1  Add a new document file to which you will be making changes.           |
|       Type the number of draft copies of the document that you want          |
|       to save here===>    (4 is the maximum number)                          |
|  PF2  Add a document file to which no changes will be made                   |
|  PF3  Change a document file you previously added                            |
|                                                                              |
|  Press the PF key(s) for additional document file information.               |
|                                                                              |
|  PF4  Restrict those who can see the document to you and                     |
|       the people on the document distribution list                           |
|  PF5  Assign the document distribution information                           |
|                                                                              |
|  Press ENTER to add or change the document file and its mail log information.|
|                                                                              |
|                                                                              |
| PF9 Help    PF12 Return                                                      |
+------------------------------------------------------------------------------+
```

C.2.4 Author Profiles

```
+-----------------------------------------------------------------------------+
|                        PROCESS AN AUTHOR PROFILE                        T20|
|                                                                             |
|                                                                             |
|  Press one of the following PF keys.                                        |
|                                                                             |
|  PF1  Add a new author profile                                              |
|  PF2  Change an author profile                                              |
|       ________                                  If you want to work with a  |
|  PF3  Erase an author profile                   specific author profile,    |
|       ________                                  type in the name before     |
|  PF4  Look at an author profile                 you press the PF key.       |
|       ________                                                              |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
| PF9 Help     PF12 Return                                                    |
|===>                                                                         |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
+-----------------------------------------------------------------------------+
```

C.2.4.1 FROM PF1 ON SCREEN T20

```
+---------------------------------------------------------------------------------+
|                          ADD A NEW AUTHOR PROFILE                            T21|
|                                                                                 |
|  Type in the information below.  Then press PF12.                              |
|  Name (1-8 characters) for this profile:                                       |
|                                                                                 |
|  Author's name (the way the person signs his/her name):                        |
|                                                                                 |
|  Author's title (if not typically used, leave out):                            |
|                                                                                 |
|  Author's initials (for example, gjj):                                         |
|                                                                                 |
|  Name of the Company for whom this person works:                               |
|                                                                                 |
|  Name of the Department in which this person works:                            |
|                                                                                 |
|  Internal address (for example, building and floor):                           |
|                                                                                 |
|  City, State, and Zip Code:                                                    |
|                                                                                 |
|  Telephone number including area code:                                         |
|                                                                                 |
|  System name/User name (for example, CHICAGO1/SJOHNSON):                       |
|                                                                                 |
| PF8 Quit    PF9 Help    PF12 File    ===>                                       |
|                                                                                 |
|                                                                                 |
|                                                                                 |
|                                                                                 |
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|                                                                                 |
|                                                                                 |
+---------------------------------------------------------------------------------+
```

C.2.4.2 FROM PF2 ON SCREEN T20

```
+---------------------------------------------------------------------------+
|                                                                           |
|                       CHANGE AN AUTHOR PROFILE                        T22|
|                                                                           |
|  To change an author profile, type X next to your choice(s) below.        |
|  When you have made your choice(s) on this screen, press ENTER.           |
|                                                                           |
|                                                                           |
|                                                                           |
| PF8 Quit  PF9 Help  PF10 Next Screen  PF11 Previous Screen  PF12 Return   |
|===>                                                                  PAGE |
| ----------------------------------------------------------------------    |
|   Choice    Author Profile                                                |
|     _          WISEMAN                                                    |
| ******************************** BOTTOM OF DATA ***************************|
|                                                                           |
|                                                                           |
+---------------------------------------------------------------------------+
```

C.2.4.3 CHANGE AUTHOR PROFILE

```
+-----------------------------------------------------------------------------+
|                          CHANGE THE AUTHOR PROFILE                       T23|
|                                                                             |
|  Type your changes below.  Then press PF12.                                 |
|  Profile name:                                                              |
| ADVCHR                                                                      |
|  Author's name:                                                             |
| Michael Wiseman                                                             |
|  Author's title:                                                            |
| Chairman, BIJOU Advisory Committee                                          |
|  Author's initials:                                                         |
| MW                                                                          |
|  Company name:                                                              |
| UC Berkeley                                                                 |
|  Department name:                                                           |
| Economics                                                                   |
|  Internal address:                                                          |
| 250 Barrows                                                                 |
|  City, State, and Zip Code:                                                 |
| Campus                                                                      |
|  Telephone number:                                                          |
| 2-1785                                                                      |
|  System name/User name:                                                     |
|                                                                             |
| PF8 Quit    PF9 Help    PF12 File    ===>                                   |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
+-----------------------------------------------------------------------------+
```

C.2.4.4 FROM PF3 ON SCREEN T20

```
+----------------------------------------------------------------------------+
|                                                                            |
|                        ERASE AN AUTHOR PROFILE                        T24|
|                                                                            |
|  To erase an author profile, type X next to your choice(s) below.          |
|  When you have made your choice(s) on this screen, press ENTER.            |
|                                                                            |
|                                                                            |
|                                                                            |
| PF8 Quit  PF9 Help  PF10 Next Screen  PF11 Previous Screen  PF12 Return    |
|===>                                                                 PAGE  |
| ---------------------------------------------------------------------      |
|   Choice    Author Profile                                                 |
|     _          WISEMAN                                                     |
| ******************************* BOTTOM OF DATA ****************************|
|                                                                            |
+----------------------------------------------------------------------------+
```

C.2.4.5 ERASE AUTHOR PROFILE

```
+------------------------------------------------------------------------------+
|                          ERASE THE AUTHOR PROFILE                         T25|
|                                                                              |
| Press PF12 to erase the following author profile.                            |
| Profile name:                                                                |
|BAIZE                                                                         |
| Author's name:                                                               |
|Harold Baize                                                                  |
| Author's title:                                                              |
|                                                                              |
| Author's initials:                                                           |
|HRB                                                                           |
| Company name:                                                                |
|BIJOU                                                                         |
| Department name:                                                             |
|Psychology                                                                    |
| Internal address:                                                            |
|681 Barrows Hall                                                              |
| City, State, and Zip Code:                                                   |
|UC Berkeley, Berkeley, CA 94720                                               |
| Telephone number:                                                            |
|549-2199                                                                      |
| System name/User name:                                                       |
|                                                                              |
|PF8 Quit    PF9 Help    PF12 Erase    ===>                                    |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
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|                                                                              |
|                                                                              |
|                                                                              |
+------------------------------------------------------------------------------+
```

C.2.4.6 FROM PF4 ON SCREEN T20

```
+------------------------------------------------------------------------------+
|                                                                              |
|                          LOOK AT AN AUTHOR PROFILE                       T26|
|                                                                              |
|  To look at an author profile, type X next to your choice(s) below.          |
|  When you have made your choice(s) on this screen, press ENTER.              |
|                                                                              |
|                                                                              |
|                                                                              |
| PF8 Quit  PF9 Help  PF10 Next Screen  PF11 Previous Screen  PF12 Return      |
|===>                                                                    PAGE |
| --------------------------------------------------------------------------- |
|   Choice     Author Profile                                                  |
|     _           WISEMAN                                                     |
| ******************************* BOTTOM OF DATA ******************************|
|                                                                              |
|                                                                              |
+------------------------------------------------------------------------------+
```

C.2.4.7 LOOK AT AUTHOR PROFILE

```
+--------------------------------------------------------------------------------+
|                          LOOK AT THE AUTHOR PROFILE                        T27|
|                                                                                |
|  The following information is in the author profile.                          |
|  Profile name:                                                                 |
| ADVCHR                                                                         |
|  Author's name:                                                                |
| Michael Wiseman                                                                |
|  Author's title:                                                               |
| Chairman, BIJOU Advisory Committee                                             |
|  Author's initials:                                                            |
| MW                                                                             |
|  Company name:                                                                 |
| UC Berkeley                                                                    |
|  Department name:                                                              |
| Economics                                                                      |
|  Internal address:                                                             |
| 250 Barrows                                                                    |
|  City, State, and Zip Code:                                                    |
| Campus                                                                         |
|  Telephone number:                                                             |
| 2-1785                                                                         |
|  System name/User name:                                                        |
|                                                                                |
| PF9 Help    PF12 Return    ===>                                                |
|                                                                                |
|                                                                                |
|                                                                                |
|                                                                                |
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|                                                                                |
|                                                                                |
|                                                                                |
+--------------------------------------------------------------------------------+
```

C.2.5 Manage Distribution Lists

```
+-----------------------------------------------------------------------------+
|                        PROCESS A DISTRIBUTION LIST                      T30|
|                                                                             |
|                                                                             |
|  Press one of the following PF keys.                                        |
|                                                                             |
|  PF1  Add a new distribution list                                           |
|                                                  If you want to work with a |
|  PF2  Change a distribution list                 specific distribution list,|
|       ________                                   type in the name before you|
|  PF3  Erase a distribution list                  press the PF key.          |
|       ________                                                              |
|  PF4  Look at a distribution list                                           |
|       ________                                                              |
|                                                                             |
|                                                                             |
|                                                                             |
| PF9 Help    PF12 Return                                                     |
|===>                                                                         |
|                                                                             |
+-----------------------------------------------------------------------------+
```

C.2.5.1 FROM PF1 ON SCREEN T30

```
+--------------------------------------------------------------------------+
|                    ADD THE TEMP    DISTRIBUTION LIST                  T31|
|                                                                          |
|                                                                          |
| Press one of the following PF keys.                                      |
|                                                                          |
| PF1  Choose nicknames to add to the list from your                       |
|      main nickname file                                                  |
| PF2  Choose nicknames to add to the list from your                       |
|      alternate nickname file.  Type the name below                       |
|      ________ OFSMCNTL A1                                                |
| PF3  Add a name to the list                                              |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
| PF8 Quit    PF9 Help    PF12 File                                        |
|===>                                                                      |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+
```

C.2.5.2 CHOOSE NICKNAMES TO ADD

```
+----------------------------------------------------------------------------+
|                                                                            |
|                CHOOSE NICKNAMES TO ADD TO THE TEMP     LIST            T32|
|                                                                            |
|  To add a nickname to the distribution list, type X next to your choice(s) |
|  below.  When you have made your choice(s) on this screen, press ENTER.    |
|                                                                            |
|                                                                            |
|                                                                            |
| PF8 Quit  PF9 Help  PF10 Next Screen  PF11 Previous Screen  PF12 Return    |
|===>                                                                   PAGE |
| -------------------------------------------------------------------------- |
|   Choice    Nickname    Comments/Name                                      |
|     _       JENNIFER    Jennifer Brown     ECON  2-3581                    |
|     _       RANNAH      Rannah Burns       GSPP  2-4670                    |
|     _       GENNY       Genevieve McNeil   LIS   2-1464                    |
|     _       FRANK       Frank Snow         IBM                             |
|     _       TIM         Tim Sullivan       GSPP  2-3475                    |
|     _       FREEMAN     John Freeman       SBA                             |
|     _       CASEY       Casey Roberts      SBA   2-4436                    |
|     _       NANCYK      Nancy Kerrebrock   ECON  2-6971                    |
|     _       JEFFC       Jeff Church        ECON                            |
|     _       JOHNCL      John Clark         ECON                            |
|     _       DILIPD      Dilip Dutta        ECON                            |
|     _       JOHNCH      John Church        ECON                            |
|     _       DANG        Dan Gleiser        ECON                            |
|     _       INDERJIT    Inderjit Kohli     ECON                            |
|     _       ALANO       Alan Ottaway       ECON                            |
|     _       SOLIO       Soli Ozel          ECON                            |
|     _       JOHNPR      John Praveen       ECON                            |
|     _       ERICR       Eric Rueter        ECON                            |
|     _       AMINS       Amin Sarkar        ECON                            |
|     _       WILLIAMW    William Winter     ECON                            |
+----------------------------------------------------------------------------+
```

C.2.5.3 ADD NAME TO LIST

```
+----------------------------------------------------------------------------+
|                     ADD A NAME TO THE TEMP    LIST                     T33 |
|                                                                            |
|                                                                            |
|  Type in the system name(s) and user name(s) you want to add to the        |
|  distribution list below.  When you have finished, press PF12.             |
|                                                                            |
|                                                                            |
|   Name                    Comments/Name                                   |
|   _______________         ________________________________________        |
|   _______________         ________________________________________        |
|   _______________         ________________________________________        |
|   _______________         ________________________________________        |
|   _______________         ________________________________________        |
|   _______________         ________________________________________        |
|   _______________         ________________________________________        |
|   _______________         ________________________________________        |
|   _______________         ________________________________________        |
|   _______________         ________________________________________        |
|   _______________         ________________________________________        |
|   _______________         ________________________________________        |
|   _______________         ________________________________________        |
|   _______________         ________________________________________        |
| PF1 Add More    PF8 Quit    PF9 Help    PF12 Return                        |
|===>                                                                        |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+
```

C.2.5.4 FROM PF2 ON SCREEN T30

```
+----------------------------------------------------------------------+
|                                                                      |
|                    CHANGE A DISTRIBUTION LIST                     T34|
|                                                                      |
|  To change a distribution list, type X next to your choice(s) below. |
|  When you have made your choice(s) on this screen, press ENTER.      |
|                                                                      |
|                                                                      |
|                                                                      |
| PF8 Quit  PF9 Help  PF10 Next Screen  PF11 Previous Screen  PF12 Return |
|===>                                                             PAGE |
| ------------------------------------------------------------------   |
|   Choice   Distribution List                                         |
|     _          EC1TA                                                |
|     _          EC1TAWI                                              |
|     _          PAYPROJ                                              |
| ******************************* BOTTOM OF DATA ******************************|
|                                                                      |
+----------------------------------------------------------------------+
```

C.2.5.5 CHANGE DISTRIBUTION LIST

```
+------------------------------------------------------------------------------+
|                     CHANGE THE EC1TA    DISTRIBUTION LIST               T40|
|                                                                              |
|                                                                              |
|  Press one of the following PF keys.                                         |
|                                                                              |
|  PF1  Choose nicknames to add to the list from your                          |
|       main nickname file                                                     |
|  PF2  Choose nicknames to add to the list from your                          |
|       alternate nickname file.  Type the name below                          |
|       ________ OFSMCNTL A1                                                   |
|  PF3  Add a name to the list                                                 |
|  PF4  Change a name in the list                                              |
|  PF5  Erase a name from the list                                             |
|  PF6  Look at the names in the distribution list                             |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
| PF8 Quit    PF9 Help    PF12 File                                            |
|===>                                                                          |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
|                                                                              |
+------------------------------------------------------------------------------+
```

C.2.5.6 CHANGE NAME IN DISTRIBUTION LIST

```
+--------------------------------------------------------------------------+
|                                                                          |
|                 CHANGE A NAME IN THE EC1TA    LIST                   T41|
|                                                                          |
|  To change a name in the distribution list, type X next to your choice(s) |
|  below.  When you have made your choice(s) on this screen, press ENTER.  |
|                                                                          |
|                                                                          |
|                                                                          |
| PF8 Quit  PF9 Help  PF10 Next Screen  PF11 Previous Screen  PF12 Return  |
|===>                                                                 PAGE |
| ------------------------------------------------------------------------ |
|   Choice     Name                            Comments/Name               |
|     _        ROBING              Robin Gaster       ECON                  |
|     _        NANCYK              Nancy Kerrebrock   ECON  2-6971         |
|     _        JEFFC               Jeff Church        ECON                  |
|     _        JOHNCL              John Clark         ECON                  |
|     _        DILIPD              Dilip Dutta        ECON                  |
|     _        JOHNCH              John Church        ECON                  |
|     _        DANG                Dan Gleiser        ECON                  |
|     _        INDERJIT            Inderjit Kohli     ECON                  |
|     _        ALANO               Alan Ottaway       ECON                  |
|     _        SOLIO               Soli Ozel          ECON                  |
|     _        JOHNPR              John Praveen       ECON                  |
|     _        ERICR               Eric Rueter        ECON                  |
|     _        AMINS               Amin Sarkar        ECON                  |
|     _        WILLIAMW            William Winter     ECON                  |
|     _        LAURAW              Laura Tyson        ECON  2-6083         |
|     _        DARRELLH            Darrell Hoerter    ECON  2-6971         |
|     _        LILLIANA            Lillian Arce       ECON                  |
|     _        LEEB                Lee Badgett        ECON                  |
|     _        SEUNGB              Seung-Gwan Baek    ECON                  |
|     _        BASANTAC            Basanta Chaudhuri  ECON                  |
+--------------------------------------------------------------------------+
```

C.2.5.7 FROM PF3 ON SCREEN T30

```
+--------------------------------------------------------------------------+
|                                                                          |
|                    ERASE A NAME FROM THE EC1TA   LIST               T43|
|                                                                          |
|  To erase a name from the distribution list, type X next to your choice(s) |
|  below.  When you have made your choice(s) on this screen, press ENTER.   |
|                                                                          |
|                                                                          |
|                                                                          |
| PF8 Quit  PF9 Help  PF10 Next Screen  PF11 Previous Screen  PF12 Return  |
|===>                                                                PAGE |
| ------------------------------------------------------------------------ |
|   Choice   Name                        Comments/Name                      |
|     _      ROBING              Robin Gaster        ECON                   |
|     _      NANCYK              Nancy Kerrebrock    ECON  2-6971           |
|     _      JEFFC               Jeff Church         ECON                   |
|     _      JOHNCL              John Clark          ECON                   |
|     _      DILIPD              Dilip Dutta         ECON                   |
|     _      JOHNCH              John Church         ECON                   |
|     _      DANG                Dan Gleiser         ECON                   |
|     _      INDERJIT            Inderjit Kohli      ECON                   |
|     _      ALANO               Alan Ottaway        ECON                   |
|     _      SOLIO               Soli Ozel           ECON                   |
|     _      JOHNPR              John Praveen        ECON                   |
|     _      ERICR               Eric Rueter         ECON                   |
|     _      AMINS               Amin Sarkar         ECON                   |
|     _      WILLIAMW            William Winter      ECON                   |
|     _      LAURAW              Laura Tyson         ECON  2-6083           |
|     _      DARRELLH            Darrell Hoerter     ECON  2-6971           |
|     _      LILLIANA            Lillian Arce        ECON                   |
|     _      LEEB                Lee Badgett         ECON                   |
|     _      SEUNGB              Seung-Gwan Baek     ECON                   |
|     _      BASANTAC            Basanta Chaudhuri   ECON                   |
+--------------------------------------------------------------------------+
```

C.2.5.7 FROM PF4 ON SCREEN T30

```
+------------------------------------------------------------------------+
|                                                                        |
|                LOOK AT THE NAMES IN THE EC1TA    LIST              T44|
|                                                                        |
| The following information is in the distribution list.                 |
|                                                                        |
|                                                                        |
| PF9 Help    PF10 Next Screen    PF11 Previous Screen    PF12 Return    |
|===>                                                              PAGE |
| ---------------------------------------------------------------------- |
|   Name                             Comments/Name                       |
|   ROBING              Robin Gaster        ECON                         |
|   NANCYK              Nancy Kerrebrock    ECON  2-6971                 |
|   JEFFC               Jeff Church         ECON                         |
|   JOHNCL              John Clark          ECON                         |
|   DILIPD              Dilip Dutta         ECON                         |
|   JOHNCH              John Church         ECON                         |
|   DANG                Dan Gleiser         ECON                         |
|   INDERJIT            Inderjit Kohli      ECON                         |
|   ALANO               Alan Ottaway        ECON                         |
|   SOLIO               Soli Ozel           ECON                         |
|   JOHNPR              John Praveen        ECON                         |
|   ERICR               Eric Rueter         ECON                         |
|   AMINS               Amin Sarkar         ECON                         |
|   WILLIAMW            William Winter      ECON                         |
|   LAURAW              Laura Tyson         ECON  2-6083                 |
|   DARRELLH            Darrell Hoerter     ECON  2-6971                 |
|   LILLIANA            Lillian Arce        ECON                         |
|   LEEB                Lee Badgett         ECON                         |
|   SEUNGB              Seung-Gwan Baek     ECON                         |
|   BASANTAC            Basanta Chaudhuri   ECON                         |
|   MARYK               Mary King           ECON                         |
|   HIROL               Hiro Lee            ECON                         |
+------------------------------------------------------------------------+
```

C.3 Main Menu Page Three

```
+--------------------------------------------------------------------------------+
|   MDC-BIJ              P R O F S   M A I N   M E N U      CAO-SYSTEM   A00|
|  Press one of the following PF keys.                                           |
|  PF1  .                                               Time:   3:02 PM          |
|  PF2  Update Names for Schedule Selection                                      |
|  PF3  .                                           1985   SEPTEMBER   1985     |
|  PF4  Change Password          *------*            S    M    T    W    T    F    S |
|  PF5  .                        | PAGE |            1    2    3    4    5    6    7 |
|  PF6  .                        | THREE|            8    9   10   11   12   13   14 |
|  PF7  .                        *------*           15   16   17   18   19   20   21 |
|                                                   22   23   24   25   26   27   28 |
|                                                   29   30                        |
| PF10  Menu Page One                                          Day of Year: 248 |
| PF11  Menu Page Two                                                            |
|                                                       PF9 Help     PF12 End |
| ----------------------------------------------------------------------------- |
|                                                                                |
|                                                                                |
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|==>                                                                             |
+--------------------------------------------------------------------------------+
```

APPENDIX D: ACKNOWLEDGMENTS

Acknowledgments

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