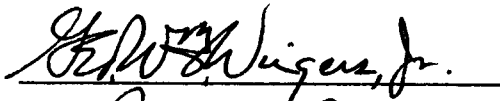
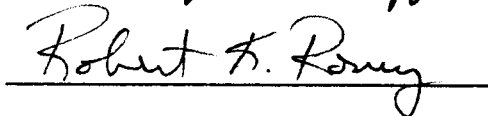


To the Graduate Council:

I am submitting herewith a dissertation written by Evonne Marie Lewis Richards entitled "Word Processing: An Approach to Software Purchase Decisions and Evaluation of Three Current Software Packages." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Vocational-Technical Education.

  
Betty J. Brown, Major Professor

We have read this dissertation  
and recommend its acceptance:

Accepted for the Council:

  
The Graduate School

WORD PROCESSING: AN APPROACH TO SOFTWARE PURCHASE DECISIONS AND  
EVALUATION OF THREE CURRENT SOFTWARE PACKAGES

A Dissertation

Presented for the

Doctor of Education

Degree

The University of Tennessee, Knoxville

Evonne Marie Lewis Richards

March 1984

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Dedicated to My  
Climber  
of Many Mountains

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## ABSTRACT

This study was conducted to aid decision makers in one important aspect of the word processing software acquisition decision, the evaluation and comparison of features. A list of sixty-seven features was compiled and summarized from the word processing literature and vendor publications. Three leading vendors of dedicated word processing equipment were chosen, IBM, Lanier, and Wang. A common word processing software package from each company was chosen for standardization. Thirty-three word processing operators representing a variety of business, service, and nonprofit organizations were selected as users of these three chosen packages. These operators were asked to rate the sixty-seven features as to usefulness in their work. These responses were used to rank the features in order of usefulness.

The top-ranked word processing features, such as automatic word wraparound and automatic centering, were those that were common to most word processing software and configurations. Factors other than the existence of these highly ranked features may be more important in the acquisition decision because these features are found on virtually all word processing software including that intended for general purpose microcomputers. The more specialized and perhaps heavily advertised features such as graphics and floating footnotes were among the lowest rated features, but may be needed in specific work environments.

Significant differences were found in the ranking of specific features by the three vendor groups. These were generally explained by differences in the quantity and type of work done by the three groups. The difference in vendor group feature rankings highlights the need for a potential purchaser of word processing software and equipment to be aware of the mix of typical applications before deciding what features would be most useful.

There was a degree of uncertainty about the existence of some features on a user's particular word processing system. Some nonthreatening method should be established for determining the extent of user knowledge regarding the specifics of the word processing package after about six months of use.

Factor analysis was used as a data reduction technique to prepare a shorter, summarized checklist of features.

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## CHAPTER I

### INTRODUCTION AND ORGANIZATION

#### Introduction

During the 1980's an abundance of information on new word processing software and hardware has been provided by over 100 manufacturers and suppliers (Whitehead, 1980), and the word processing industry is expected to continue its present growth rate of 25 percent each year (Walshe, 1981).

Many business executives, anxious to increase office productivity and save valuable dollars, are interested in obtaining word processing systems. Some who have acquired software and hardware in the last few years are now discovering that their needs are no longer being met. Little guidance has been given, in many cases, to prospective users in selecting among the myriad of features available. Although most word processing vendors claim to have superior products, choosing from among Apple's Applewriter, IBM's Displaywriter, NBI's Docuwriter, Wang's Wangwriter, or any other word processing software and hardware is an "important and complex responsibility" (Dorsett and Hatcher, 1981, p. 6) for any prospective user.

#### History of Word Processing Features

A seemingly unimportant invention by William Burt in 1829 (Manji, 1981) was destined to change man's method of transmitting written information. With this invention of the first typographer, man would

no longer be tied to his cursive script. The typographer had a simple keyboard and impressions were made on a sheet of paper wrapped around a cylinder. In spite of "its crude and humble beginnings, the typographer evolved into the Underwoods of the 1920s, then into the electric typewriters of the '50s and '60s," (Manji, 1981, p. 15) and later the electronic typewriters and word processors of the '80s.

During World War I the Hooven Company produced the first automatic typewriter (Rosen, 1977, chap. 1). Even though it had few features and was used chiefly for typing form letters, the automatic typewriter race had started and the competition for new features had begun. Developments in the following areas aided the success of word processors.

#### Editing Capabilities

One of the most useful word processing features today is the editing capability. The first automatic typewriters stored information on paper cylinders which were nearly impossible to correct after they had been created (Stewart, 1978). By 1959 a minimum amount of editing could be done to documents on the Friden Flexowriter (Hendrickson, 1979). Editing capabilities greatly increased and were simplified in 1964 when the IBM Magnetic Tape/Selectric Typewriter (MT/ST) was introduced. Editing was easily done using the backspace/strikeover method where corrections replaced original characters on magnetic tape (McCabe, 1977, chap. 2).

The IBM Magnetic Card/Selectric Typewriter II (Mag Card II), available in 1973, offered the backspace/strikeover method as well as

a special erase mechanism. Corrections were made in the typewriter memory by backspacing and typing the change, and a special "lift-off" adhesive tape made the change simultaneously on the printed page. The Mag Card II also had the ability to skip over text stored in memory in order to insert or delete material in a specific location (Datapro, March 1980). The major disadvantage was the inability of the typist to see the text when making corrections.

Editing ease was greatly improved in December of 1971 when Lexitron's word processor using a cathode ray tube (CRT) editing device, similar to a television screen, was introduced ("A Decade . . .," 1982). Two years later Vydec's CRT-based word processor displayed a full page of text. CRT's had been introduced in the late 1960's but unfortunately were not marketed commercially for word processors at that time (Rosen, 1977, chap. 1). The CRT was soon considered to be the future trend in word processing because text could be "created, edited, and verified" (Rosen, 1977, p. 11) on the CRT before the document was printed. The typist's efficiency was increased and valuable time was saved. In 1979 Lanier introduced a search and replace option which allowed users to search for any word or string of words to be modified or deleted (Lanier History, 1979).

### Pricing

The high price in 1964 of the MT/ST, considered the first popular word processor, forced many companies to rent word processing equipment for a number of years (Hendrickson, 1979). When the CPT 4200 word processor became available in 1972, the price was of key

importance. Competitive machines were still priced between \$7,500 and \$10,000, and a CPT listed at \$5,000, only slightly more than users were paying each year to rent an MT/ST from IBM. Although priced low, CPT word processors did not sell well for a while as people wanted to be sure the inexpensive product could do the job, that service support would be available, and that the company was not going out of business (Hendrickson, 1979).

By 1980 prices of word processing systems were running between \$14,000 and \$20,000. The IBM Displaywriter, a low-cost, easy-to-use word processing system, became a success when it was announced at the low price of \$7,985 ("IBM CORP: Displaywriter", no date). Within a few months a number of competitive systems, similarly priced, were offered by other word processing vendors.

### Speed

Typing speeds of office workers increased up to 50 percent and playback speeds climbed to 180 words a minute when the "golfball" typing element became available on automatic typewriters in the early 1960's (McCabe, 1977, chap. 2).

A totally new printing mechanism, the daisy wheel, was developed by Diablo Systems, Inc. in 1969 although it was not marketed on a word processor for five years ("A Decade . . .," 1982). Each spoke of the daisy print wheel contained one type character (McCabe, 1977, chap. 2). Diablo used the daisy wheel on a printer in 1972, and Xerox purchased Diablo later that year ("A Decade . . .," 1982). The print wheel technology was marketed in 1974 as part of the Xerox 800

electronic typing system capable of playback speeds of 350 words a minute in comparison to 180 words a minute on other systems (McCabe, 1977, chap. 2).

During 1976 Lanier's LTE-1 was said to print 450 words a minute (Lanier History, 1979), but A.B. Dick claimed 500 words a minute for the Magna I (Datapro, May 1977). The following year a Qume printer was advertised at 525 words a minute (McCabe, 1977, chap. 2).

Playback speeds for word processing printers have not increased substantially since the late 1970's, although high-speed laser computer printers, used in computerized word processing, are now capable of printing 18,000 lines a minute. The word processing industry continues to search for ways to increase the speed of word processing printers without sacrificing the letter-quality printout required by its users.

#### Storage Capabilities

The amount of storage available for the earliest automatic typewriters was limited to the capacity of the paper roll storage mechanism which was adapted from the player piano technology (Rosen, 1977, chap. 1). During the 1950's automatic typewriters were enhanced by the addition of a new storage medium, punched paper tape, to increase the number of stored characters. A major breakthrough occurred in 1964, however, when another storage medium, the reusable magnetic tape, was used in cartridge form on the MT/ST (Datapro, December 1980). Storage capacities, which had been limited with paper rolls and punched paper tape, increased to 28,000 characters. The

MT/ST was available with a single or dual tape station feature which doubled the storage capacity (Datapro, October 1979).

Storage problems were simplified, however, when IBM took what appeared to be a giant step backward with the introduction of the Mag Card/Selectric Typewriter (Mag Card I) in October of 1969 (Datapro, March 1980). The Mag Card I, which used flexible 3 1/2 x 7 3/8 inch page-oriented magnetic cards storing up to 5,000 characters, was IBM's solution to the needs of its users for a page-oriented storage medium that would combine the "power of the magnetic recording and automatic" (Datapro, March 1980, p. 301) playback features to simplify the recording and accessing process. Based on the popularity of the mag cards, IBM introduced four additional automatic typewriters over the next six years with mag card storage. One of the four, the Mag Card II, introduced in 1973, also offered an 8,000-character or two-page internal memory (Datapro, March 1980).

While IBM concentrated on systems using magnetic card media, other word processing vendors developed systems using cassettes storing 80,000 characters (Wohl, 1979). In July of 1973, Vydec introduced a word processor using the standard 8-inch floppy disk with a 250,000-character storage capacity (Rosen, 1977, chap. 1; Wohl, 1979). Later, a smaller and cheaper mini 5-inch diskette, capable of holding 60,000 characters, was introduced (Wohl, 1979). The mini diskette was especially useful in small office settings. In 1977 Lanier introduced the LTE-2D, a dual-disk system, which offered instant recall of approximately 300,000 characters (Lanier History, 1979). Today, hard disks, which hold between one and three hundred

million characters, (Wohl, 1979) are available for word processing systems.

### Summary

Many changes have taken place since the typographer was invented in 1829. Mechanical efficiency has been increased, and many features have been added. Editing ease, virtually nonexistent on the first automatic typewriters, has been greatly improved by the addition of the CRT and a flexible search and replace editing feature. While word processing software and hardware are becoming more intelligent, "rapidly expanding and available technology" (Goldfield, 1978, p. 36) is forcing the prices down. Typing and playback speeds have increased from that of the early automatic typewriters to over 500 words a minute on word processing printers today. Storage capacities have increased from the simple paper roll containing a short letter to hard disks capable of storing up to three hundred million characters. Truly the modern word processor has come a long way.

### Importance of the Study

The number of word processing packages has greatly increased in the last few years making the choice of word processing software difficult. With the large amount of software and hardware available, a potential user of word processing packages has a number of options. He can:

- (1) believe the first salesman that comes by,
- (2) listen to the most persuasive salesman,

- (3) accept the recommendations of a favorite salesman,
- (4) choose the least expensive software and hardware,
- (5) hire an outside consultant and take his recommendations,
- (6) consult business friends and others to find out what kind they use and what they like or dislike about it,
- (7) compare advertisements and magazine articles on available software or hardware packages and try to come up with some valid rationale for the purchase of a system, or
- (8) attempt to identify the needs of his company and then determine the most cost-effective and flexible way of meeting those needs.

There is a need for guidelines to be used in word processing software and hardware selection. Since a concise, easy-to-use checklist is not available for this purpose, a checklist of word processing features would assist a potential user in evaluating the needs of a company and the choice of word processing software and hardware to meet those needs.

#### Statement of the Problem

The problem that this study addresses is the multiplicity of software and hardware options currently available in word processing systems. Once a decision to acquire a word processing system has been made, the maker faces a bewildering array of vendors, product lines, and eager salesmen. Very little help is available to the decision maker other than pamphlets and brochures from equipment vendors.

## Purpose of the Study

The purpose of the study is to aid decision makers in evaluating and acquiring word processing software and hardware by:

- (1) identifying useful word processing features from the literature, vendors' promotional material, and the researcher's hands-on experience,
- (2) summarizing these word processing features into a questionnaire of moderate length,
- (3) allowing word processing operators from a variety of organizations, with varying lengths of experience, and using equipment from three major vendors, to rate the usefulness of these features in their daily work,
- (4) summarizing the findings of this questionnaire and case study research, including a ranking of features, so that a decision maker can see what this group thought were more important and useful features,
- (5) comparing evaluation of features from operators categorized by length of work experience and vendor type and explaining significant differences found,
- (6) reducing the questionnaire, by the use of factor analysis, to a succinct statement of questions that still capture the essence of the longer questionnaire, and
- (7) summarizing qualitative findings observed in the course of collecting the questionnaire data.

Selection guidelines for word processing software and hardware could be an aid to better choices. A concise, easy-to-use checklist would identify useful word processing features to assist potential and current users in the selection of word processing software and hardware.

#### Assumptions of the Study

Those responding to the questionnaire will be familiar enough with word processing hardware and software to respond accurately. Although these users were not selected by random sampling, another assumption is that they were not atypical of most word processing operators; there is nothing that would make them stand out as an unusual or special group of operators.

The questionnaire asked respondents to check one of five categories ranging from never used to extremely useful. For purposes of factor analysis the intervals between these five responses were assumed to be equidistant.

#### Limitations of the Study

The primary limitation of the statistical results of this study is that they are exploratory and descriptive in nature rather than inferential. The respondents were chosen in a very limited geographic area of the United States (near Chattanooga and Knoxville, Tennessee). The respondents were chosen based on their use of three particular pieces of hardware from three specific vendors and were further limited to those using the same software package on that particular

equipment. No form of random sampling was used (it was difficult to locate and contact potential respondents), and therefore the results are not inferential in nature; i.e., no effort is made to extend these results across all word processing users and across all word processing equipment and applications.

Another limitation of the study was that differences in responses among users of the three types of equipment were difficult to analyze because of the unbalanced spread of word processing experience among the vendor groups in this study. While there were zero IBM users and only one Lanier user that had twenty-four or more months of experience, only one user of Wang equipment had less than twelve months of experience. Thus, analysis of differences among the three experience categories is compounded by the nonproportional spread of vendor/equipment type across the three experience categories.

#### Delimitations of the Study

The questionnaire was the only method used to collect data on useful features in word processing software.

No attempt was made to choose equally priced software and hardware.

Word processing features were referred to as software features although some may technically be hardware related. No attempt was made to deal with the technical differences.

## Definitions of Terms

The following are definitions of important terms used in the study:

CATHODE RAY TUBE (CRT)--a unit that displays type on a television-type screen (Datapro, June 1978).

HARDWARE--a term for the physical components, "electrical, electronic, magnetic, and mechanical" ("Word Processing," 1979, p. 165).

SOFTWARE--"the materials needed to operate and control the hardware of a word processing system." ("Word Processing. A Handbook . . .," 1978, p. 37)

WORD PROCESSING--applying computer technology to the typing process in the "use of automated typing equipment to type, edit and prepare draft and final output copy" (Austreich, 1973, p. 72).

WORD PROCESSING OPERATOR/USER--a person who operates the word processing equipment.

## Organization of the Study

This study is presented in the following sequence:

Chapter One includes the introduction, the history, the importance of the study, the statement of the problem, the purposes of the study, the assumptions of the study, the limitations of the study, the delimitations of the study, and the organization of the study.

Chapter Two presents a review of related literature.

Chapter Three describes the procedures used in the development of the instrument for the study, selection of the vendors, preparation of the researcher, selection of the word processing operators, administration of the questionnaire, and the statistical methods used in the analysis of the data.

Chapter Four presents the quantitative findings of the present study.

Chapter Five presents the qualitative findings of the present study.

Chapter Six includes the summary and conclusions resulting from the study.

The Appendixes contain the questionnaire, a list of businesses used in the study, a copy of the letter sent to the word processing operators, the interview form, and an analysis of user uncertainty regarding presence of features along with supporting tables.

## CHAPTER II

### REVIEW OF RELATED LITERATURE

The literature was reviewed for research involving word processing features. Although no formal research studies were available on this topic, articles listing word processing features were found.

The lists of word processing features given in the literature (Good, 1982; Kenealy, 1982; Perry, 1982) were taken from microcomputer software, but many of the features also apply to software for dedicated word processing systems. Good (1982) and Perry (1982) compare word processing features available in several software packages, while Kenealy (1982) provides a checklist of word processing features for use in software comparison. The importance of certain word processing features for given applications was covered by Perry (1982), and others (Kenealy, 1982; McComb, 1981; McWilliams, 1982) described a variety of useful features for the office. Overall, these articles focused on a few of the available word processing features as well as the commands (i.e. delete characters, move cursor left, etc.) used.

A knowledge of the special vocabulary used by word processing vendors is an important part of equipment evaluation. Because of the vast differences in the performance capabilities of various word processing systems, a thorough knowledge of each feature is desirable. The following are descriptions and performance capabilities of a number of common word processing features.

## Word Processing Features

### Recording

The AUTOMATIC CARRIER RETURN/WORD WRAPAROUND feature allows operators to type at uniform speeds "without pausing at each line ending to execute a carrier return" ("Operational features," no date, p. 1). Words that do not fit on a line are automatically wrapped around to the next line. To maintain a more even right margin, words can be divided using the HYPHENATION feature. Hyphenation is performed automatically in some software packages while others require that users indicate the proper position of the hyphen when the word is listed for hyphenation. If the document is edited, causing hyphenated words to show up in the middle of a line, the hyphens will not be printed.

Words may be automatically CENTERED between the left and right margins. After tabbing to the center position, the cursor will backspace once for every two typed characters automatically centering the words. In other packages the words to be centered are typed at the left margin and then automatically centered when the return key is depressed. The tab key is used to indent material on the first line of a paragraph, but the AUTOMATIC INDENT feature lines up multiple lines of text at the indented level for either the left or right margin ("Operational features," no date). The UNDERLINE feature underscores single characters, or any number of words, on a word-by-word or continuous basis.

A number of useful features are available for financial text entry. AUTOMATIC COLUMN LAYOUT allows the user to type the longest figure (or word) for each column, and then columns are automatically set up within the margins. Systems without this feature require the user to figure the spacing and manually set the tabs. Once the columns are laid out, the DECIMAL TAB ALIGNMENT feature automatically aligns typed decimal figures in each column. DOUBLE UNDERLINING and LINE CONSTRUCTION features add to the attractiveness of charts and financial statements.

A number of "shortcut" word processing features are available. The PHRASE STORAGE (or GLOSSARY) feature stores frequently used information such as technical terms, standard letter closings or paragraphs which can later be retrieved with short codes. Word processing software menus, offering various options, make software packages easier to use, or "user friendly."

SPELLING VERIFICATION is available in word processing software as a proofreading aid. Text is checked against the software dictionary which may be based on Webster's dictionary, a suffix/prefix dictionary, or another list of words. Spelling features in word processing software packages differ greatly. Some signal the user with a beep when the space is typed after a misspelled (or unknown) word, and others check the entire document at once marking misspelled words on the screen and/or on paper. Users can bypass the marked words, manually change them, or allow the software to make the corrections. Some software will list a number of words the user may have intended the misspelled word to be. Words unrecognized by the

word processing software dictionary can be loaded into a user generated dictionary for future use.

PAGINATION features automatically divide a multi-page document into pages based on a prespecified number of lines for each page. When AUTOMATIC REPAGINATION is used, new page numbers are assigned after major additions and deletions. FORMAT CHANGES can be made in a document (e.g. margins of 10 and 75, then 20 and 65) when text is entered, when it is copied into a file, or when a file is modified.

### Revision

One of the most flexible editing features is the GLOBAL SEARCH feature. When a particular change needs to be made in several locations, the search feature checks the document, and sometimes the entire disk, for the words to be changed. It searches forward and/or backward in the file to locate the words; and in some software packages, the global search feature is capable of searching for a word in either upper or lower case letters ("Software module . . . .", 1982). Software packages allow the global search feature to locate any particular number or all of the occurrences of a particular word or string of words. Changes can be made all at once or one by one, interactively allowing the user to view the words on the screen before making the change or skipping to the next occurrence.

In the REPLICATION OF AN ENTIRE DOCUMENT, a second copy is made and used either as a safety backup file or a copy to be edited and printed as a new document. With DOCUMENT ASSEMBLY, new documents are compiled, or linked, from portions of previously recorded material as

well as keyboarded text. BLOCKS OF TEXT, including COLUMNS, can be marked and then copied (only the twin is relocated), moved (the original goes to a new place) or deleted (the original is erased), with a minimum number of keystrokes. In less sophisticated systems, multiple steps are required and columns or lines may have to be moved a line at a time (Datapro, December 1980). When numbered outlines or paragraphs (i.e. 1, 2 or a. b.) are edited and sections are removed, some software packages are capable of "renumbering" to provide a complete list. A TABLE OF CONTENTS, LIST OF CITATIONS or an INDEX can be compiled automatically, including page numbers, from previously marked words in the document.

### Printing

Letters and address files can be merged with the LIST/MERGE feature to produce a number of "original" letters. When multiple-page documents are printed, the WIDOW/ORPHAN PROTECTION feature prevents widows (single lines at the bottom of a page) or orphans (single lines at the top of a page) from occurring. SELECTED PAGES of a document (i.e. pages 2, 26, 99) can be printed as well as MULTIPLE COPIES of a single document. Some software allows the operator to enter a memo form and then fill in the blanks when the printer makes a PAUSE FOR TEXT ENTRY.

Capabilities of the DOUBLE-COLUMN ALIGNMENT feature vary greatly in word processing software. Some packages require the text to be typed in two columns side by side, requiring precise planning; and others accept the text in one long string with a command inserted half

way to reverse the printer roller and adjust the left margin so the rest of the text is printed beside the first column. Still others "snake" the text into double columns. A few software packages are capable of right justifying double columns.

A major time saver during the printing process is a sheet feeding device which can be attached to the printer. Some sheet feeder units feed individual sheets of paper into the printer from one paper tray. Others have two or three paper trays which allow the operator to select letterhead, second sheet, or legal paper. A small envelope device can be attached to the unit to feed individual envelopes into the printer. When a sheet feeder is not available, the operator may feed the paper and envelopes manually or may use stationary and envelopes mounted on continuous form paper, with holes punched on each side. The paper is fed into the printer with the use of a tractor feed attachment which holds the paper in position. Time can also be saved by the use of the SIMULTANEOUS INPUT/OUTPUT (or background) feature which permits a document (or documents) to be printed (or waiting in a queue) while the operator performs other keyboard tasks. Sophisticated systems, for example, can run a spelling check in the background and print a document on the printer while the user is entering or editing text.

A few of the available special characters include scientific notations and SUPERSCRIPTS and SUBSCRIPTS which can be printed one-half space above or below the normal printing line; STRIKEOUT, ("Software module . . . .", 1982) a term sometimes used for a hyphen or slash printed on top of text to show unwanted portions; or

OVERPRINTING (Chin, 1983) which is used to accent words in a foreign language. Special emphasis can also be given to words using the BOLDFACE printing which types the characters two or more times to make a darker impression.

Text can be printed using CHANGEABLE TYPE FONTS or styles (e.g. Prestige Elite, Gothic, etc.) and one or more types of CHARACTER PITCH, including the standard twelve characters per inch (Elite) or ten characters per inch (Pica). Users have a choice of pitches ranging from three to forty characters per inch with some software. Some programs allow the user to alter character pitch without interrupting the printing process on a dot matrix printer (Chin, 1983). Character spacing, which includes proportional spacing, spaces characters according to their size. A small character like an "l" might have two units while an "M" would have five units ("Word Processing," 1979). Along with proportional spacing, JUSTIFICATION of text gives documents a professional look, and on some systems the text can be justified on both the screen and printed copy. The even right-hand margin is achieved by interword spacing, where extra spaces are inserted between words, or on more sophisticated software with intercharacter spacing producing a print-like quality (Datapro, December 1980).

Documents are printed with single, double, or triple line spacing when the VARIABLE LINE SPACING feature is used to change the line spacing within a document. When using the TYPEWRITER MODE, typists use the word processor like a typewriter and text is not recorded in

memory. Software differs in that some packages display what is being typed on the screen and others show the text only on a printed page.

Single or multiple-line HEADER and FOOTER NOTATIONS can be set up, with a minimum amount of typing, to be printed on each page automatically. Page numbers can be included, and FLEXIBLE LOCATIONS are available. Some software allows FLEXIBLE types of NUMBERING such as Roman numerals to be used. Footnotes can be printed on the bottom of a page in a manuscript with the FLOATING FOOTNOTE feature which keeps the footnotes on the same page as the reference point in spite of repagination.

#### Miscellaneous

Software packages have been developed for a variety of applications. SORTING routines for alpha and numeric files make file manipulation easier, MATH package features include simple arithmetic or sophisticated functions, and GRAPHICS enhance reports. USER PROGRAMMABILITY offers programming in BASIC, Fortran, and other programming languages which allows businesses to use word processors like a small computer. MULTILINGUAL CAPABILITIES allow communication in numerous languages, and COMMUNICATION PACKAGES allow word processing systems to communicate with other word processors or mainframe computers in the office, across the hall, or around the world.

Experienced users save time by using the MENU BYPASS feature which permits the selection of multiple options at one time. The USER

PROGRAMMABLE KEY feature allows an operator to specify any given sequence of keystrokes to be repeated later.

When users begin a new document, the PASSWORD PROTECTION feature permits them to assign a password so that the document cannot be opened without typing the password. Some software packages allow passwords to be used for an entire library of documents.

TEN-KEY NUMBER PADS, similar to those found on calculators, are available on word processing systems to help increase speed for numerical entry. MATH packages also facilitate numerical projects.

PAPER HANDLING DEVICES increase user productivity by automatically feeding into the printer individual sheets and envelopes or continuous paper with individual sheets or envelopes mounted on it.

#### Summary

New features are continually being added to word processing packages making them more flexible and convenient for operators to use. Research is continuing on needed features such as a "what you see is what you get" screen displaying text in finished page formats complete with proportionally spaced and justified text along with enhanced characters, headers and footers, and page numbers just as it would appear on paper (Kenealy, 1982). The integration of text files with graphics and/or VisiCalc files is another feature currently being developed.

Other needed features include ones to handle correctly spelled, but inappropriately used, words such as there, their or they're, the "misuse of uppercase or lowercase letters, improper date formats,

incorrect punctuation, bad grammar, or illogical phrasing" (Teiser, 1982, p. 31).

## CHAPTER III

### METHODS OF PROCEDURES

The purposes of this chapter are to describe (1) procedures for compiling the questionnaire; (2) procedures for selecting the vendors; (3) preparation of the researcher; (4) procedures for selecting word processing operators; (5) techniques used in administering the questionnaires; and (6) methods of analyzing the data.

#### Compilation of Questionnaire

A search was conducted of current readings and manufacturer's literature to determine the basic word processing features available. After the researcher developed an initial copy of the questionnaire, it was reviewed by her committee and suggestions for improvement and clarity were made. Another draft included those suggestions.

A pilot study of the questionnaire was then conducted. The purpose of the pilot study was to make the researcher aware of the kinds of questions that would be encountered when the questionnaires were explained to the word processing operators. The questionnaire was given to users in two separate health organizations. These individuals, similar to those in the study, were chosen because of their varied word processing experience, their interest, and their willingness to participate. As a result of these two visits, the questionnaire was reevaluated by the researcher. An additional column heading (entitled "not needed") was added, and the column headings were reordered to make a clear distinction between two possible

answers for features not included in the word processing software (not needed, needed) or features that were included (ranging from never used to extremely useful). Four features (hyphenation, line count, variable line spacing and communications) were reworded for clarity. Two features were combined (pagination and repagination), one deleted (section numbering), and one added (programmable key). A note was made for the researcher to explain six other features. The features were listed under four subheadings: recording, revision, printing, and miscellaneous, with room for fill-ins at the end of the questionnaire. If the software package did not have a particular feature, that feature was marked as "not needed" or "needed." If the software package had the feature, its usefulness was rated/indicated as "never used, not very useful, somewhat useful, most useful or extremely useful." After the questionnaire was refined (See Appendix A) as a result of the pilot study, visits to fifteen businesses (thirty-three word processing operators) included in the study were scheduled.

#### Selection of Vendors

Three leading word processing vendors, selected by percentage of word processing equipment sales as indicated in two research studies (Archbold, 1982; Uttal, 1982), were chosen to participate in the study. Those three vendors were IBM, with eighteen percent of the sales, Wang with sixteen percent, and Lanier with seven percent of the total word processing equipment sales.

These vendors were selected because their word processing software and hardware (which will be evaluated in this study) represent that most frequently used. Each vendor was asked for guidance in the selection of one appropriate word processing software package from his company for use in the study.

#### Preparation of Researcher

In order to learn each of the three software packages recommended by the vendors, the researcher attended classes and worked through self-training programs. The training prepared the researcher for interviewing the word processing operators in the study and for answering questions regarding the word processing features listed on the questionnaire.

#### Selection of Word Processing Operators

Thirty-three word processing operators representing fifteen businesses were included in the study. Table I illustrates the wide diversity of types of organizations. Although users were not spread evenly among the different business types, ten diverse major types of organizations were represented in the study. Table II illustrates the wide diversity of organization size of those participating in the study. Criteria established for selecting the word processing operators in the study were: (1) businesses were to be in the Knoxville, or Chattanooga, Tennessee areas; (2) businesses were to own or lease (not necessarily fully utilize) one of the chosen word processing software packages; and (3) operators recommended were to

TABLE I  
TYPES OF PARTICIPATING  
BUSINESSES

| Types of Businesses                     | Number of<br>Businesses | Number of<br>Users |
|-----------------------------------------|-------------------------|--------------------|
| Church offices and church organizations | 2                       | 8                  |
| Church of God Executive Offices         |                         |                    |
| Collegedale SDA Church                  |                         |                    |
| Architectural Firms                     | 1                       | 1                  |
| Hand Prints Design                      |                         |                    |
| Accounting Firms                        | 1                       | 2                  |
| Deloitte Haskins and Sells              |                         |                    |
| Law Firms                               | 3                       | 4                  |
| Watson, Dana and Peppers                |                         |                    |
| Wolfe and Hall                          |                         |                    |
| Zepke, Neuenschwander Greenlee          |                         |                    |
| Manufacturing                           | 1                       | 1                  |
| Industrial Water Chemical               |                         |                    |
| Wholesale and Retail                    | 2                       | 3                  |
| McKee Baking Company                    |                         |                    |
| Olan Mills, Incorporated                |                         |                    |
| Engineering Firms                       | 1                       | 1                  |
| Bechtel National                        |                         |                    |
| Finance                                 | 1                       | 1                  |
| Valley Bank                             |                         |                    |
| Government                              | 2                       | 11                 |
| Air National Guard                      |                         |                    |
| Department of Energy                    |                         |                    |
| Hospital                                | 1                       | 1                  |
| North Park Hospital                     |                         |                    |
| TOTAL                                   | 15                      | 33                 |

TABLE II  
NUMBER OF COMPANIES WITH TOTAL EMPLOYEES  
AND OFFICE WORKERS

| Number of<br>Employees | <u>Total Employees</u> |         | <u>Office Staff</u>    |         |
|------------------------|------------------------|---------|------------------------|---------|
|                        | Number of<br>Companies | Percent | Number of<br>Companies | Percent |
| 1- 5                   | 2                      | 13      | 5                      | 33      |
| 6-15                   | 3                      | 20      | 2                      | 13      |
| 16-30                  | -                      | -       | -                      | -       |
| 31-50                  | 2                      | 13      | 3                      | 20      |
| 51-99                  | -                      | -       | 1                      | 7       |
| 100-249                | 1                      | 7       | 4                      | 27      |
| 250-499                | 4                      | 27      | -                      | -       |
| 500-999                | -                      | -       | -                      | -       |
| 1,000 and over         | 3                      | 20      | -                      | -       |
|                        | <hr/>                  | <hr/>   | <hr/>                  | <hr/>   |
| TOTAL                  | 15                     | 100     | 15                     | 100     |

have used the word processing software package for a minimum of three months to insure a knowledge of the features.

The names of ten to thirteen operators were requested from each vendor, and a total of thirty-three word processing operators located in the Knoxville or Chattanooga, Tennessee, areas were recommended. Each word processing operator was contacted by telephone for approval for the study, and all thirty-three agreed to participate in the study. Following the telephone calls, the operators received by mail a letter describing the study, the procedure to be followed by the researcher during the visit, the responsibilities of the operator in the study, and the date of the visit.

There was considerable diversity in the length of word processing experience. Table III summarizes length of word processing experience for all respondents. This table shows that the most experienced user (with eighty-four months of experience) had twenty-one times the length of word processing experience of the least experienced user (with four months of experience). The relatively low mean of 20.15 for months of experience indicates the recent growth of work opportunities in this area. The high standard deviation relative to the mean indicates the considerable degree of dispersion or diversity in months of experience.

#### Administration of Interview Guide and Questionnaire

The researcher held a personal interview with each word processing operator to collect the data for the present study. During the visit the researcher asked the operator the questions on the

TABLE III

TOTAL MONTHS OF WORD PROCESSING EXPERIENCE  
FOR OPERATORS LISTED BY VENDOR\*

| Total<br>Months    | IBM | LANIER | WANG | Total<br>Operators |
|--------------------|-----|--------|------|--------------------|
| 4                  | -   | 1      | -    | 1                  |
| 5                  | -   | 2      | -    | 2                  |
| 6                  | 1   | 2      | -    | 3                  |
| 8                  | 1   | 1      | -    | 2                  |
| 9                  | 1   | -      | -    | 1                  |
| 11                 | -   | -      | 1    | 1                  |
| 12                 | 3   | 1      | 2    | 6                  |
| 14                 | -   | 1      | -    | 1                  |
| 17                 | 2   | -      | -    | 2                  |
| 18                 | 1   | -      | -    | 1                  |
| 19                 | -   | 1      | 1    | 2                  |
| 23                 | 1   | -      | -    | 1                  |
| 24                 | -   | 1      | 1    | 2                  |
| 33                 | -   | -      | 2    | 2                  |
| 36                 | -   | -      | 3    | 3                  |
| 44                 | -   | -      | 1    | 1                  |
| 48                 | -   | -      | 1    | 1                  |
| 84                 | -   | -      | 1    | 1                  |
| Total<br>Operators | 10  | 10     | 13   | 33                 |

Mean = 20.15 months

Standard deviation = 16.61 months

\* May include experience on more than one type of word processing machine.

interview form which provided information on the type of business, size of the company, history of word processing in the company, length of the operator's total word processing experience, how the word processing hardware and software had been selected, how other secretaries had related to their receiving the word processing equipment, and future plans for their office as well as advice to potential word processing users.

After the interviews were complete, the word processing operators were asked to respond to the questionnaire evaluating the usefulness of those word processing features. The researcher explained how the questionnaire was to be completed, answered any questions, and then left the questionnaire(s) and a self-addressed, stamped envelope with the operator. The researcher then promised to telephone in a few days at the operator's convenience to see if any problems had arisen or if any additional questions needed to be answered. Followup telephone calls were made as previously scheduled, and after all questions were answered the researcher requested that each completed questionnaire be mailed in the supplied envelope.

#### Method of Analyzing Data

After the questionnaires were received from the thirty-three word processing operators, the data were coded into a computer file in the following manner. If a user responded that he/she did not have a particular feature but thought that it was needed or would be useful in the work, a "Y" was coded as his/her response. If he/she did not have the feature but thought that it was not needed, a "N" was coded

as the response. The five possible responses when a user did have that particular feature ranged from "never used" to "extremely useful." These five responses were coded on a 1-2-3-4-5 scale with "extremely useful" being a "5."

A chi-square test of independence of vendor type versus length of word processing experience was prepared. Means and standard deviations of usefulness ratings were computed for all features. Features were then sorted in order of usefulness. A percentage breakdown of user responses was prepared. Means, standard deviations and rankings of feature usefulness were also prepared for each vendor group. Rank correlations between vendor group rankings and experience group rankings were prepared. The Kruskal-Wallis one-way analysis of variance by ranks is a nonparametric test that was used to determine significant (at the .05 level) differences in feature rankings by vendor and experience categories. Factor analysis was applied to the four categories of features as a data reduction technique.

Factor analysis is a generic name given to a class of multivariate statistical methods whose primary purpose is data reduction and summarization. Broadly speaking, it addresses itself to the problem of analyzing the interrelationships among a large number of variables . . . , and then explaining these variables in terms of their common underlying dimensions (factors). . . . Factor analysis (unlike multiple regression, discriminant analysis or canonical correlation, in which one or more variables is explicitly considered the criterion or dependent variable, and all others the predictor or independent variables), is an interdependence technique in which all variables are simultaneously considered (Hair, 1979, p. 218).

There are three major decision steps to be made in factor analysis.

(1) Is the primary objective to summarize the variables (i.e., the user ratings on the features) of the study or to examine relationships between users of the study (the individual respondents)? If the emphasis is on variables, the first step in the analysis is the preparation of a correlation matrix between variables. This is by far the most common type of factor analysis, and is commonly called "R" factor analysis. If the emphasis is on individual respondents, a correlation maxtrix between individuals becomes the input in the factor analysis. This is called "Q" factor analysis (See Hair, 1979, p. 221; Nie, 1975, pp. 470, 473). Both "R" and "Q" factor analysis were used for this study.

(2) The second major decision is the method used to extract the factors. A variety of choices are available including Rao's canonical factoring, alpha factoring, and image factoring although the fundamental dichotomy is between a (1) principal-component solution or (2) a classical- or common-factor solution. An iterative version of method (2) was chosen for several reasons:

1. It produced the most interpretable results.
2. It is "the most widely accepted factoring method" (Nie, 1975, p. 480).
3. Those who have limited experience with factor analysis might do well to stay with this method (Nie, 1975, p. 480).

(3) The third major decision is the method of rotation to the terminal factor matrix. The two basic choices are orthogonal rotation or oblique rotation. The orthogonal approach was chosen for the following reason:

An oblique factor solution is more complex than is an orthogonal one. In fact, an entirely satisfactory analytical procedure has not been devised for oblique solutions. They are still the subject of considerable experimentation and controversy (Hair, 1979, p. 221).

There are several orthogonal rotations: quartimax, varimax, and equimax. Varimax is probably the most common and was used in this study because it simplified the analysis of the columns of the factor matrix and distributed the features or users across the various factors (rather than having them all load high on only the first factor).

Raw data from the questionnaire were assumed to be interval data for this analysis. The analysis was modeled on a factor analysis presented by Perreault and Barksdale (1979). That study also assigned intervals to responses and used a scale of 1 (strongly agree) to 5 (strongly disagree).

### Summary

This chapter has described: (1) procedures for compiling the questionnaire; (2) procedures for selecting the vendors; (3) preparation of the researcher; (4) procedures for selecting word processing operators; (5) techniques used in administering the questionnaires; and (6) methods of analyzing the data.

## CHAPTER IV

### ANALYSIS AND INTERPRETATION OF DATA

A wide variety of statistical tools was used to analyze the data. The Statistical Package for the Social Sciences (SPSS) was the primary set of computer programs used in the data analysis. Unlimited connect time and central processing unit (CPU) time were available on a Hewlett Packard 3000 computer. Selected output from SPSS was transferred to the computer's text editing system and directly modified to create the tables of this chapter without reentering the information.

Table IV identifies each of the sixty-seven features which were included on the questionnaire. Each of those features was evaluated by users for usefulness in word processing. Table III (p. 30) shows the distribution of word processing experience across vendor groups. Three categories were used to summarize this experience. Table V presents the results of a chi-square test of independence on length of word processing experience versus vendor type. These factors were not independent at a .05 significance level. The majority of Lanier users had less than one year of experience. The majority of IBM users had one to two years of experience, and the majority of Wang users had more than two years of experience.

A possible explanation of this lack of independence lies in the relative cost of the three types of equipment. Firms with sufficient resources to acquire Wang equipment have probably been involved in word processing for a longer period of time, and thus users in these

TABLE IV  
ABBREVIATIONS FOR FEATURES IN  
WORD PROCESSING PACKAGES

---

|          |                                                          |
|----------|----------------------------------------------------------|
| ATOCOLUM | = Automatic column layout                                |
| ATOECTB  | = Automatic decimal tab alignment                        |
| ATOINDEN | = Automatic indentation                                  |
| ATOUNDRD | = Automatic underlining -- continuous                    |
| ATOUNDRD | = Automatic underlining -- double underline              |
| ATOUNDRS | = Automatic underlining -- single underline              |
| ATOUNDRW | = Automatic underlining -- word-by-word                  |
| AUTOCENT | = Automatic centering                                    |
| AUTOCRWR | = Automatic carrier return/word wraparound               |
| AUTOHF   | = Automatic headers and footers                          |
|          |                                                          |
| CABOLD   | = Character attributes -- bold                           |
| CAOVERP  | = Character attributes -- overprint                      |
| CASTRIKE | = Character attributes -- overstrike                     |
| CASUPER  | = Character attributes -- superscript or subscript       |
| CITATGEN | = List of citations generator                            |
| COMCOMP  | = Communications -- with main computer system            |
| COMWP    | = Communications -- with other word processors in office |
| COPYMOVB | = Copy or move -- blocks of text                         |
| COPYMOVC | = Copy or move -- columns                                |
| COPYMOVE | = Copy or move -- entire document                        |
| COPYMOVL | = Copy or move -- link several files                     |
|          |                                                          |
| DCALIGN  | = Double-column alignment                                |
|          |                                                          |
| FLOATFOT | = Floating footnotes                                     |
| FORMCHNG | = Format changes within document                         |
|          |                                                          |
| GLOBALD  | = Global search -- delete                                |
| GLOBALF  | = Global search -- find                                  |
| GLOBALPS | = Global search -- pass or skip                          |
| GLOBALR  | = Global search -- replace                               |
| GLOSSARY | = Glossary-phrase storage                                |
| GRAPHICS | = Graphics                                               |
|          |                                                          |
| HYPHEN   | = Hyphenation                                            |
|          |                                                          |
| INDEXGEN | = Index generator                                        |
|          |                                                          |
| JUSTIF   | = Right justification of text                            |
|          |                                                          |
| LINECONH | = Line construction -- horizontal                        |
| LINECONV | = Line construction -- vertical                          |

TABLE IV (Continued)

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|          |                                                              |
|----------|--------------------------------------------------------------|
| MATH     | = Math packages                                              |
| MENUBYPS | = Menu bypass                                                |
| MERGE    | = Merging of address or text files                           |
| MULTI    | = Multilingual capabilities                                  |
| PAGREPAG | = Pagination/repagination                                    |
| PASSWORD | = Password protection for files                              |
| PAUSETE  | = Pause for text entry                                       |
| PC10     | = Pitch -- 10 Pica                                           |
| PC11     | = Pitch -- 11 Proportional spacing                           |
| PC12     | = Pitch -- 12 Elite                                          |
| PC15     | = Pitch -- 15 Micon                                          |
| PHENCONT | = Paper handling -- envelopes on continuous paper            |
| PHENFED  | = Paper handling -- envelope feeder (for single envelopes)   |
| PHSHCONT | = Paper handling -- sheets on continuous paper               |
| PHSHFED  | = Paper handling -- sheet feeder (for single sheets)         |
| PNAUTO   | = Page numbering -- automatic page numbering                 |
| PNLOCAT  | = Page numbering -- flexible number locations                |
| PNROMAN  | = Page numbering -- flex. page numbers (i.e. Roman numerals) |
| PRINTRPG | = Print repeat copies                                        |
| PRINTSPG | = Print selected parts of a file                             |
| SIMULTIO | = Simultaneous input and output                              |
| SORTING  | = Sorting alphabetic or numeric                              |
| SPELUSER | = Spelling -- user generated dictionary                      |
| SPELVERF | = Spelling -- word verification dictionary                   |
| TCNTGEN  | = Table of contents generator                                |
| TENKEYPD | = Ten-key number pad                                         |
| TYPEMODE | = Typewriter mode                                            |
| TYPESTYL | = Changeable type styles -- Gothic, Script, etc.             |
| USERPRGK | = User Programmable key                                      |
| USERPROG | = User Programmability -- Basic, Fortran, etc.               |
| VARILS   | = Variable line spacing -- 1/2, 1 1/2, etc.                  |
| WIDOWORP | = Widow and orphan line protection                           |

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TABLE V

TOTAL MONTHS OF WORD PROCESSING EXPERIENCE  
FOR OPERATORS LISTED BY VENDOR

| Total<br>Months | IBM   | LANIER | WANG  | Total<br>Operators |
|-----------------|-------|--------|-------|--------------------|
| 0-11            | 3     | 6      | 1     | 10                 |
| 12-23           | 7     | 3      | 3     | 13                 |
| 24 or more      | 0     | 1      | 9     | 10                 |
|                 | <hr/> | <hr/>  | <hr/> | <hr/>              |
| Operators       | 10    | 10     | 13    | 33                 |

Chi-square = 19.48

d.f. = 4

p &lt; .05

firms have more experience than average. Lanier equipment is the least costly of the three, and firms that used Lanier equipment had probably been involved in word processing activities only recently as prices have fallen. Thus, Lanier users have the least amount of experience. The price of IBM equipment and the experience of IBM users lie between these two extremes.

Table VI summarizes the data with respect to whether the user believed she had that particular feature on her equipment. The first two columns of numbers are for IBM users, the next two for Lanier users, and the last two for Wang users. For example, eight IBM users believed they did not have horizontal lines (LINECONH), and two did; two Lanier users believed they did not have that feature, and eight did; and three Wang users believed they did not have the feature, and ten did. Appendix E discusses possible reasons for the uncertainty of users about the existence of a particular feature on their equipment.

#### Analysis of Response Means

Table VII summarizes the seven possible responses to each question/feature on the questionnaire. The first two number columns are the number of individuals responding that they did not have the feature. The first of these two reflects the number of users that did not think the feature was needed. The second of these reflects the number that did not have that feature but thought that it was needed. The next five columns summarize the usefulness ratings on the one-to-five scale. For example, the numbers of individuals rating word-by-word underlining (ATOUNDRW) 1-2-3-4-5 were 3, 0, 5, 12, and 12

TABLE VI

USERS EVALUATION OF WHETHER  
THEY DID OR DID NOT HAVE  
PARTICULAR FEATURES

| Vendor:  | IBM |    | LANIER |    | WANG |    | Vendor:  | IBM |    | LANIER |    | WANG |    |
|----------|-----|----|--------|----|------|----|----------|-----|----|--------|----|------|----|
| No/Yes:  | N   | Y  | N      | Y  | N    | Y  | No/Yes:  | N   | Y  | N      | Y  | N    | Y  |
| AUTOCRWR | 0   | 10 | 0      | 10 | 0    | 13 | PNLOCAT  | 1   | 9  | 0      | 10 | 0    | 13 |
| AUTOCENT | 0   | 10 | 0      | 10 | 0    | 13 | PNROMAN  | 4   | 6  | 5      | 5  | 5    | 8  |
| ATOUNDRC | 0   | 10 | 0      | 10 | 0    | 13 | WIDOWORP | 0   | 10 | 0      | 10 | 6    | 7  |
| ATOUNDRW | 0   | 10 | 0      | 10 | 1    | 12 | PAUSETE  | 4   | 6  | 4      | 6  | 3    | 10 |
| ATOUNDRS | 0   | 10 | 0      | 10 | 0    | 13 | TYPEMODE | 2   | 8  | 1      | 9  | 5    | 8  |
| ATOUNDRD | 7   | 3  | 0      | 10 | 1    | 12 | PRINTSPG | 1   | 9  | 0      | 10 | 0    | 13 |
| ATOINDEN | 0   | 10 | 0      | 10 | 0    | 13 | PRINTRPG | 0   | 10 | 0      | 10 | 0    | 13 |
| HYPHEN   | 0   | 10 | 1      | 9  | 2    | 11 | SIMULTIO | 4   | 6  | 0      | 10 | 1    | 12 |
| ATODECTB | 0   | 10 | 1      | 9  | 0    | 13 | CABOLD   | 9   | 1  | 0      | 10 | 2    | 11 |
| FORMCHNG | 0   | 10 | 0      | 10 | 0    | 13 | CAOVERP  | 4   | 6  | 6      | 4  | 2    | 11 |
| GLOSSARY | 1   | 9  | 8      | 2  | 0    | 13 | CASTRIKE | 1   | 9  | 3      | 7  | 3    | 10 |
| ATOCOLUM | 0   | 10 | 9      | 1  | 5    | 8  | CASUPER  | 3   | 7  | 3      | 7  | 0    | 13 |
| LINECONV | 10  | 0  | 6      | 4  | 5    | 8  | TYPESTYL | 1   | 9  | 2      | 8  | 0    | 13 |
| LINECONH | 8   | 2  | 2      | 8  | 3    | 10 | PC10     | 1   | 9  | 0      | 10 | 0    | 13 |
| SPELVERF | 0   | 10 | 5      | 5  | 5    | 8  | PC11     | 0   | 10 | 3      | 7  | 1    | 12 |
| SPELUSER | 0   | 10 | 4      | 6  | 4    | 9  | PC12     | 0   | 10 | 0      | 10 | 0    | 13 |
| PAGREPAG | 0   | 10 | 0      | 10 | 0    | 13 | PC15     | 6   | 4  | 3      | 7  | 1    | 12 |
| GLOBALD  | 0   | 10 | 1      | 9  | 0    | 13 | VARILS   | 2   | 8  | 1      | 9  | 0    | 13 |
| GLOBALR  | 0   | 10 | 1      | 9  | 0    | 13 | MENUBYPS | 1   | 9  | 6      | 4  | 5    | 8  |
| GLOBALF  | 0   | 10 | 1      | 9  | 1    | 12 | PASSWORD | 10  | 0  | 0      | 10 | 1    | 12 |
| GLOBALPS | 3   | 7  | 1      | 9  | 5    | 8  | TENKEYPD | 9   | 1  | 1      | 9  | 6    | 7  |
| COPYMOVE | 0   | 10 | 0      | 10 | 0    | 13 | USERPRGK | 6   | 4  | 5      | 5  | 7    | 6  |
| COPYMOVB | 0   | 10 | 0      | 10 | 0    | 13 | PHSHFED  | 0   | 10 | 4      | 6  | 0    | 13 |
| COPYMOVC | 1   | 9  | 3      | 7  | 1    | 12 | PHSHCONT | 4   | 6  | 4      | 6  | 0    | 13 |
| COPYMOVL | 2   | 8  | 1      | 9  | 0    | 13 | PHENFED  | 6   | 4  | 5      | 5  | 12   | 1  |
| INDEXGEN | 8   | 2  | 3      | 7  | 1    | 12 | PHENCONT | 6   | 4  | 5      | 5  | 11   | 2  |
| CITATGEN | 9   | 1  | 3      | 7  | 4    | 9  | MATH     | 0   | 10 | 3      | 7  | 1    | 12 |
| TCONTGEN | 8   | 2  | 3      | 7  | 1    | 12 | GRAPHICS | 10  | 0  | 9      | 1  | 12   | 1  |
| MERGE    | 0   | 10 | 1      | 9  | 0    | 13 | MULTI    | 5   | 5  | 5      | 5  | 12   | 1  |
| AUTOHF   | 0   | 10 | 1      | 9  | 0    | 13 | SORTING  | 2   | 8  | 5      | 5  | 2    | 11 |
| FLOATFOT | 5   | 5  | 2      | 8  | 8    | 5  | COMWP    | 8   | 2  | 7      | 3  | 1    | 12 |
| JUSTIF   | 0   | 10 | 0      | 10 | 0    | 13 | COMCOMP  | 8   | 2  | 6      | 4  | 1    | 12 |
| DCALIGN  | 1   | 9  | 6      | 4  | 3    | 10 | USERPROG | 8   | 2  | 4      | 6  | 4    | 9  |
| PNAUTO   | 0   | 10 | 0      | 10 | 0    | 13 |          |     |    |        |    |      |    |

TABLE VII  
USEFULNESS RATINGS FOR  
ALL FEATURES

Column 1: Feature name  
Column 2: Number of individuals responding that they did not have the feature and DID NOT think it was useful.  
Column 3: Number of individuals responding that they did not have the feature but thought it WAS USEFUL.

Usefulness ratings matching one to five scale on questionnaire:

Column 4: Number responding at usefulness level 1 (Never Used).  
Column 5: Number responding at usefulness level 2 (Not Very Useful).  
Column 6: Number responding at usefulness level 3 (Somewhat Useful).  
Column 7: Number responding at usefulness level 4 (Very Useful).  
Column 8: Number responding at usefulness level 5 (Extremely Useful).  
Column 9: Mean based on Columns 3 through 7  
(Based only on those who thought they had the feature.)  
Column 10: Standard deviation based on Columns 3 through 7:  
(Based only on those who thought they had the feature.)

| Feature  | Did Not Have,<br>But Would be |            | Level of Usefulness |   |   |    |    | Mean | St. Dev. |
|----------|-------------------------------|------------|---------------------|---|---|----|----|------|----------|
|          | Useful                        | Not Useful | 1                   | 2 | 3 | 4  | 5  |      |          |
| AUTOCRWR | 0                             | 0          | 0                   | 0 | 0 | 1  | 32 | 4.97 | .17      |
| AUTOCENT | 0                             | 0          | 0                   | 0 | 0 | 7  | 26 | 4.78 | .41      |
| ATOUNDR  | 0                             | 0          | 0                   | 0 | 2 | 11 | 20 | 4.54 | .61      |
| ATOUNDRW | 1                             | 0          | 3                   | 0 | 5 | 12 | 12 | 3.93 | 1.19     |
| ATOUNDRS | 0                             | 0          | 2                   | 2 | 3 | 7  | 19 | 4.18 | 1.21     |
| ATOUNDRD | 2                             | 6          | 4                   | 1 | 5 | 8  | 7  | 3.52 | 1.38     |
| ATOINDEN | 0                             | 0          | 3                   | 2 | 2 | 10 | 16 | 4.03 | 1.28     |
| HYPHEN   | 3                             | 0          | 8                   | 2 | 7 | 10 | 3  | 2.93 | 1.38     |
| ATODECTB | 1                             | 0          | 4                   | 1 | 5 | 8  | 14 | 3.84 | 1.37     |
| FORMCHNG | 0                             | 0          | 1                   | 1 | 1 | 8  | 22 | 4.48 | .93      |
| GLOSSARY | 8                             | 1          | 2                   | 0 | 3 | 4  | 15 | 4.25 | 1.22     |
| ATOCOLUM | 6                             | 8          | 5                   | 0 | 2 | 3  | 9  | 3.57 | 1.71     |
| LINECONV | 10                            | 11         | 4                   | 2 | 2 | 2  | 2  | 2.66 | 1.55     |
| LINECONH | 5                             | 8          | 5                   | 1 | 2 | 6  | 6  | 3.35 | 1.59     |
| SPELVERF | 3                             | 7          | 4                   | 1 | 3 | 8  | 7  | 3.56 | 1.44     |
| SPELUSER | 3                             | 5          | 9                   | 1 | 4 | 5  | 6  | 2.92 | 1.65     |
| PAGREPAG | 0                             | 0          | 0                   | 0 | 4 | 11 | 18 | 4.42 | .70      |

TABLE VII (Continued)

| Feature  | Did Not Have,<br>But Would be |            | Level of Usefulness |   |    |    |    | Mean | St. Dev. |
|----------|-------------------------------|------------|---------------------|---|----|----|----|------|----------|
|          | Useful                        | Not Useful | 1                   | 2 | 3  | 4  | 5  |      |          |
| GLOBALD  | 1                             | 0          | 4                   | 0 | 3  | 8  | 17 | 4.06 | 1.34     |
| GLOBALR  | 1                             | 0          | 5                   | 0 | 2  | 9  | 16 | 3.96 | 1.42     |
| GLOBALF  | 2                             | 0          | 3                   | 0 | 3  | 6  | 19 | 4.22 | 1.25     |
| GLOBALPS | 8                             | 1          | 7                   | 0 | 3  | 3  | 11 | 3.45 | 1.74     |
| COPYMOVE | 0                             | 0          | 1                   | 1 | 1  | 6  | 24 | 4.54 | .93      |
| COPYMOVB | 0                             | 0          | 1                   | 1 | 1  | 3  | 27 | 4.63 | .92      |
| COPYMOVC | 1                             | 4          | 4                   | 2 | 7  | 3  | 12 | 3.60 | 1.47     |
| COPYMOVL | 2                             | 1          | 11                  | 2 | 1  | 4  | 12 | 3.13 | 1.83     |
| INDEXGEN | 10                            | 2          | 8                   | 4 | 6  | 1  | 2  | 2.28 | 1.30     |
| CITATGEN | 13                            | 3          | 11                  | 3 | 2  | 1  | 0  | 1.58 | .93      |
| TCONTGEN | 9                             | 3          | 10                  | 5 | 4  | 0  | 2  | 2.00 | 1.26     |
| MERGE    | 1                             | 0          | 1                   | 2 | 3  | 9  | 17 | 4.21 | 1.07     |
| AUTOHF   | 1                             | 0          | 8                   | 2 | 2  | 8  | 12 | 3.43 | 1.64     |
| FLOATFOT | 9                             | 6          | 15                  | 1 | 0  | 1  | 1  | 1.44 | 1.14     |
| JUSTIF   | 0                             | 0          | 4                   | 2 | 10 | 8  | 9  | 3.48 | 1.30     |
| DCALIGN  | 4                             | 6          | 8                   | 1 | 6  | 5  | 3  | 2.73 | 1.48     |
| PNAUTO   | 0                             | 0          | 5                   | 0 | 3  | 6  | 19 | 4.03 | 1.44     |
| PNLOCAT  | 1                             | 0          | 9                   | 1 | 6  | 9  | 7  | 3.12 | 1.54     |
| PNROMAN  | 8                             | 6          | 12                  | 1 | 2  | 2  | 2  | 2.00 | 1.49     |
| WIDOWORP | 3                             | 3          | 8                   | 2 | 2  | 4  | 11 | 3.29 | 1.75     |
| PAUSETTE | 9                             | 2          | 9                   | 1 | 2  | 1  | 9  | 3.00 | 1.87     |
| TYPEMODE | 7                             | 1          | 10                  | 7 | 7  | 0  | 1  | 2.00 | 1.04     |
| PRINTSPG | 1                             | 0          | 1                   | 0 | 3  | 13 | 15 | 4.28 | .88      |
| PRINTRPG | 0                             | 0          | 0                   | 1 | 11 | 6  | 15 | 4.06 | .96      |
| SIMULTIO | 2                             | 3          | 2                   | 1 | 2  | 5  | 18 | 4.28 | 1.21     |
| CABOLD   | 2                             | 9          | 0                   | 2 | 11 | 3  | 6  | 3.59 | 1.00     |
| CAOVERP  | 9                             | 3          | 10                  | 3 | 5  | 0  | 3  | 2.19 | 1.43     |
| CASTRIKE | 5                             | 2          | 14                  | 5 | 1  | 1  | 5  | 2.15 | 1.59     |
| CASUPER  | 5                             | 1          | 8                   | 0 | 2  | 6  | 11 | 3.44 | 1.71     |
| TYPESTYL | 3                             | 0          | 3                   | 0 | 3  | 8  | 16 | 4.13 | 1.25     |
| PC10     | 1                             | 0          | 4                   | 0 | 3  | 7  | 18 | 4.09 | 1.35     |
| PC11     | 3                             | 1          | 8                   | 4 | 3  | 6  | 8  | 3.06 | 1.62     |
| PC12     | 0                             | 0          | 6                   | 0 | 3  | 6  | 18 | 3.90 | 1.52     |
| PC15     | 8                             | 2          | 12                  | 0 | 3  | 2  | 6  | 2.56 | 1.77     |
| VARILS   | 0                             | 3          | 0                   | 1 | 10 | 5  | 14 | 4.06 | .98      |
| MENUBYPS | 9                             | 3          | 5                   | 0 | 3  | 5  | 8  | 3.52 | 1.60     |
| PASSWORD | 7                             | 4          | 10                  | 1 | 4  | 3  | 4  | 2.54 | 1.62     |
| TENKEYPD | 12                            | 4          | 10                  | 2 | 0  | 1  | 4  | 2.23 | 1.75     |
| USERPRGK | 12                            | 6          | 8                   | 0 | 1  | 1  | 5  | 2.66 | 1.91     |

TABLE VII (Continued)

| Feature  | Did Not Have,<br>But Would be |            | Level of Usefulness |   |   |   |    | Mean | St. Dev. |
|----------|-------------------------------|------------|---------------------|---|---|---|----|------|----------|
|          | Useful                        | Not Useful | 1                   | 2 | 3 | 4 | 5  |      |          |
| PHSHFED  | 3                             | 1          | 2                   | 1 | 2 | 6 | 18 | 4.27 | 1.19     |
| PHSHCONT | 8                             | 0          | 8                   | 0 | 1 | 5 | 11 | 3.44 | 1.78     |
| PHENFED  | 11                            | 12         | 2                   | 1 | 1 | 2 | 4  | 3.50 | 1.65     |
| PHENCONT | 14                            | 8          | 5                   | 0 | 0 | 2 | 4  | 3.00 | 1.94     |
| MATH     | 4                             | 0          | 8                   | 3 | 8 | 3 | 7  | 2.93 | 1.53     |
| GRAPHICS | 23                            | 8          | 2                   | 0 | 0 | 0 | 0  | 1.00 | .00      |
| MULTI    | 20                            | 2          | 10                  | 1 | 0 | 0 | 0  | 1.09 | .30      |
| SORTING  | 5                             | 4          | 3                   | 0 | 5 | 7 | 9  | 3.79 | 1.31     |
| COMWP    | 11                            | 5          | 3                   | 1 | 4 | 1 | 8  | 3.58 | 1.58     |
| COMCOMP  | 9                             | 6          | 5                   | 0 | 1 | 2 | 10 | 3.66 | 1.78     |
| USERPROG | 14                            | 2          | 10                  | 1 | 2 | 3 | 1  | 2.05 | 1.43     |

respectively. The last two columns are means and standard deviations based only on the previous five columns (using only individuals who thought they had that feature).

Table VIII shows the percentage breakdown for the five possible responses of users that said that they had a particular feature. The number of users indicating that they had a particular feature is shown in the last column. Most of the possible spaces in the matrix have nonzero percentages. There was considerable diversity in the responses of the users in this study.

Table IX contains the feature list sorted in ascending order from the lowest mean score to highest mean score. Only responses of individuals who felt they had that feature (numerical responses of 1-2-3-4-5) were used in computing the mean value. The second column of numbers for a feature is the standard deviation of responses for that feature.

The ten lowest rated features were graphics (GRAPHICS), multilingual capabilities (MULTI), floating footnotes (FLOATFOT), citations generator (CITATGEN), table of contents generator (TCONTGEN), Roman numeral page numbering (PNROMAN), typewriter mode (TYPEMODE), user programmability (USERPROG), overstrike (CASTRIKE), and overprint (CAOVERP). Most of these features are used for special applications whereas the ten highest rated features, word wraparound (AUTOCRWR), automatic centering (AUTOCENT), block copy and move (COPYMOVB), document copy and move (COPYMOVE), continuous underlining (ATOUNDR), format changes (FORMCHNG), pagination (PAGREPAG), simultaneous input and output (SIMULTIO), printing parts of a file

TABLE VIII

PERCENTAGE BREAKDOWN OF RESPONSES OF OPERATORS INDICATING  
THAT THEY HAVE A PARTICULAR FEATURE

|          | 1    | 2    | 3    | 4    | 5    | n  |
|----------|------|------|------|------|------|----|
| AUTOCRWR | 0.0  | 0.0  | 0.0  | 3.0  | 97.0 | 33 |
| AUTOCENT | 0.0  | 0.0  | 0.0  | 21.2 | 78.8 | 33 |
| ATOUNDRC | 0.0  | 0.0  | 6.1  | 33.3 | 60.6 | 33 |
| ATOUNDRW | 9.4  | 0.0  | 15.6 | 37.5 | 37.5 | 32 |
| ATOUNDRS | 6.1  | 6.1  | 9.1  | 21.2 | 57.6 | 33 |
| ATOUNDRD | 16.0 | 4.0  | 20.0 | 32.0 | 28.0 | 25 |
| ATOINDEN | 9.1  | 6.1  | 6.1  | 30.3 | 48.5 | 33 |
| HYPHEN   | 26.7 | 6.7  | 23.3 | 33.3 | 10.0 | 30 |
| ATODECTB | 12.5 | 3.1  | 15.6 | 25.0 | 43.8 | 32 |
| FORMCHNG | 3.0  | 3.0  | 3.0  | 24.2 | 66.7 | 33 |
| GLOSSARY | 8.3  | 0.0  | 12.5 | 16.7 | 62.5 | 24 |
| ATOCOLUM | 26.3 | 0.0  | 10.5 | 15.8 | 47.4 | 19 |
| LINECONV | 33.3 | 16.7 | 16.7 | 16.7 | 16.7 | 12 |
| LINECONH | 25.0 | 5.0  | 10.0 | 30.0 | 30.0 | 20 |
| SPELVERF | 17.4 | 4.3  | 13.0 | 34.8 | 30.4 | 23 |
| SPELUSER | 36.0 | 4.0  | 16.0 | 20.0 | 24.0 | 25 |
| PAGREPAG | 0.0  | 0.0  | 12.1 | 33.3 | 54.5 | 33 |
| GLOBALD  | 12.5 | 0.0  | 9.4  | 25.0 | 53.1 | 32 |
| GLOBALR  | 15.6 | 0.0  | 6.3  | 28.1 | 50.0 | 32 |
| GLOBALF  | 9.7  | 0.0  | 9.7  | 19.4 | 61.3 | 31 |
| GLOBALPS | 29.2 | 0.0  | 12.5 | 12.5 | 45.8 | 24 |
| COPYMOVE | 3.0  | 3.0  | 3.0  | 18.2 | 72.7 | 33 |
| COPYMOVB | 3.0  | 3.0  | 3.0  | 9.1  | 81.8 | 33 |
| COPYMOVC | 14.3 | 7.1  | 25.0 | 10.7 | 42.9 | 28 |
| COPYMOVL | 36.7 | 6.7  | 3.3  | 13.3 | 40.0 | 30 |
| INDEXGEN | 38.1 | 19.0 | 28.6 | 4.8  | 9.5  | 21 |
| CITATGEN | 64.7 | 17.6 | 11.8 | 5.9  | 0.0  | 17 |
| TCONTGEN | 47.6 | 23.8 | 19.0 | 0.0  | 9.5  | 21 |
| MERGE    | 3.1  | 6.3  | 9.4  | 28.1 | 53.1 | 32 |
| AUTOHF   | 25.0 | 6.3  | 6.3  | 25.0 | 37.5 | 32 |
| FLOATFOT | 83.3 | 5.6  | 0.0  | 5.6  | 5.6  | 18 |
| JUSTIF   | 12.1 | 6.1  | 30.3 | 24.2 | 27.3 | 33 |
| DCALIGN  | 34.8 | 4.3  | 26.1 | 21.7 | 13.0 | 23 |
| PNAUTO   | 15.2 | 0.0  | 9.1  | 18.2 | 57.6 | 33 |
| PNLOCAT  | 28.1 | 3.1  | 18.8 | 28.1 | 21.9 | 32 |
| PNROMAN  | 63.2 | 5.3  | 10.5 | 10.5 | 10.5 | 19 |
| WIDOWORP | 29.6 | 7.4  | 7.4  | 14.8 | 40.7 | 27 |
| PAUSETTE | 40.9 | 4.5  | 9.1  | 4.5  | 40.9 | 22 |
| TYPEMODE | 40.0 | 28.0 | 28.0 | 0.0  | 4.0  | 25 |
| PRINTSPG | 3.1  | 0.0  | 9.4  | 40.6 | 46.9 | 32 |
| PRINTRPG | 0.0  | 3.0  | 33.3 | 18.2 | 45.5 | 33 |

TABLE VIII (Continued)

|          | 1     | 2    | 3    | 4    | 5    | n  |
|----------|-------|------|------|------|------|----|
| SIMULTIO | 7.1   | 3.6  | 7.1  | 17.9 | 64.3 | 28 |
| CABOLD   | 0.0   | 9.1  | 50.0 | 13.6 | 27.3 | 22 |
| CAOVERP  | 47.6  | 14.3 | 23.8 | 0.0  | 14.3 | 21 |
| CASTRIKE | 53.8  | 19.2 | 3.8  | 3.8  | 19.2 | 26 |
| CASUPER  | 29.6  | 0.0  | 7.4  | 22.2 | 40.7 | 27 |
| TYPESTYL | 10.0  | 0.0  | 10.0 | 26.7 | 53.3 | 30 |
| PC10     | 12.5  | 0.0  | 9.4  | 21.9 | 56.3 | 32 |
| PC11     | 27.6  | 13.8 | 10.3 | 20.7 | 27.6 | 29 |
| PC12     | 18.2  | 0.0  | 9.1  | 18.2 | 54.5 | 33 |
| PC15     | 52.2  | 0.0  | 13.0 | 8.7  | 26.1 | 23 |
| VARILS   | 0.0   | 3.3  | 33.3 | 16.7 | 46.7 | 30 |
| MENUBYPS | 23.8  | 0.0  | 14.3 | 23.8 | 38.1 | 21 |
| PASSWORD | 45.5  | 4.5  | 18.2 | 13.6 | 18.2 | 22 |
| TENKEYPD | 58.8  | 11.8 | 0.0  | 5.9  | 23.5 | 17 |
| USERPRGK | 53.3  | 0.0  | 6.7  | 6.7  | 33.3 | 15 |
| PHSHFED  | 6.9   | 3.4  | 6.9  | 20.7 | 62.1 | 29 |
| PHSHCONT | 32.0  | 0.0  | 4.0  | 20.0 | 44.0 | 25 |
| PHENFED  | 20.0  | 10.0 | 10.0 | 20.0 | 40.0 | 10 |
| PHENCONT | 45.5  | 0.0  | 0.0  | 18.2 | 36.4 | 11 |
| MATH     | 27.6  | 10.3 | 27.6 | 10.3 | 24.1 | 29 |
| GRAPHICS | 100.0 | 0.0  | 0.0  | 0.0  | 0.0  | 2  |
| MULTI    | 90.9  | 9.1  | 0.0  | 0.0  | 0.0  | 11 |
| SORTING  | 12.5  | 0.0  | 20.8 | 29.2 | 37.5 | 24 |
| COMWP    | 17.6  | 5.9  | 23.5 | 5.9  | 47.1 | 17 |
| COMCOMP  | 27.8  | 0.0  | 5.6  | 11.1 | 55.6 | 18 |
| USERPROG | 58.8  | 5.9  | 11.8 | 17.6 | 5.9  | 17 |

TABLE IX

SORTED MEANS AND STANDARD DEVIATIONS FOR THOSE RESPONDENTS  
INDICATING THAT THEY HAD A PARTICULAR FEATURE

| Feature  | Mean  | Std. Dev. | Feature  | Mean  | Std. Dev. |
|----------|-------|-----------|----------|-------|-----------|
| GRAPHICS | 1.000 | .000      | MENUBYPS | 3.524 | 1.601     |
| MULTI    | 1.091 | .302      | SPELVERF | 3.565 | 1.441     |
| FLOATFOT | 1.444 | 1.149     | ATOCOLUM | 3.579 | 1.710     |
| CITATGEN | 1.588 | .939      | COMWP    | 3.588 | 1.583     |
| TCONTGEN | 2.000 | 1.265     | CABOLD   | 3.591 | 1.008     |
| PNROMAN  | 2.000 | 1.491     | COPYMOVC | 3.607 | 1.474     |
| TYPEMODE | 2.000 | 1.041     | COMCOMP  | 3.667 | 1.782     |
| USERPROG | 2.059 | 1.435     | SORTING  | 3.792 | 1.318     |
| CASTRIKE | 2.154 | 1.592     | ATODECTB | 3.844 | 1.370     |
| CAOVERP  | 2.190 | 1.436     | PC12     | 3.909 | 1.528     |
| TENKEYPD | 2.235 | 1.751     | ATOUNDRW | 3.938 | 1.190     |
| INDEXGEN | 2.286 | 1.309     | GLOBALR  | 3.969 | 1.425     |
| PASSWORD | 2.545 | 1.625     | ATOINDEN | 4.030 | 1.287     |
| PC15     | 2.565 | 1.779     | PNAUTO   | 4.030 | 1.447     |
| LINECONV | 2.667 | 1.557     | PRINTRPG | 4.061 | .966      |
| USERPRGK | 2.667 | 1.915     | GLOBALD  | 4.063 | 1.343     |
| DCALIGN  | 2.739 | 1.484     | VARILS   | 4.067 | .980      |
| SPELUSER | 2.920 | 1.656     | PC10     | 4.094 | 1.353     |
| MATH     | 2.931 | 1.534     | TYPESTYL | 4.133 | 1.252     |
| HYPHEN   | 2.933 | 1.388     | ATOUNDRS | 4.182 | 1.211     |
| PAUSETTE | 3.000 | 1.877     | MERGE    | 4.219 | 1.070     |
| PHENCONT | 3.000 | 1.949     | GLOBALF  | 4.226 | 1.257     |
| PC11     | 3.069 | 1.624     | GLOSSARY | 4.250 | 1.225     |
| PNLOCAT  | 3.125 | 1.540     | PHSHFED  | 4.276 | 1.192     |
| COPYMOVL | 3.133 | 1.833     | PRINTSPG | 4.281 | .888      |
| WIDOWORP | 3.296 | 1.750     | SIMULTIO | 4.286 | 1.213     |
| LINECONH | 3.350 | 1.599     | PAGREPAG | 4.424 | .708      |
| AUTOHF   | 3.438 | 1.645     | FORMCHNG | 4.485 | .939      |
| PHSHCONT | 3.440 | 1.781     | ATOUNDRC | 4.545 | .617      |
| CASUPER  | 3.444 | 1.717     | COPYMOVE | 4.545 | .938      |
| GLOBALPS | 3.458 | 1.744     | COPYMOVB | 4.636 | .929      |
| JUSTIF   | 3.485 | 1.302     | AUTOCENT | 4.788 | .415      |
| PHENFED  | 3.500 | 1.650     | AUTOCRWR | 4.970 | .174      |
| ATOUNDRD | 3.520 | 1.388     |          |       |           |

Scale: 1 Never Used  
 2 Not Very Useful  
 3 Somewhat Useful  
 4 Very Useful  
 5 Extremely Useful

(PRINTSPG), and sheet feeder (PHSHFED), are often used on a daily basis. These top ten features are found on virtually all dedicated word processing equipment. This finding was one of the major findings of the study. The most useful features were the ones most commonly available across vendor types. Perhaps price, service support and ergonomics are therefore more important in the selection of specific word processing equipment than the availability of some specific features.

#### Analysis of Vendor Group Feature Rankings

Tables X through XII show the mean score and standard deviation for various features for IBM, Lanier, and Wang users respectively, sorted in ascending order of mean response. A rank was assigned to each feature with the feature rated most useful assigned a rank of sixty-seven. A rank of one was assigned to the least useful feature. The ten LOWEST rated features for IBM users were vertical lines (LINECONV), password protection (PASSWORD), graphics (GRAPHICS), citations generator (CITATGEN), multilingual capabilities (MULTI), user programmability (USERPROG), floating footnotes (FLOATFOT), typewriter mode (TYPEMODE), overstrike (CASTRIKE), and overprint (CAOVERP). Only two of these were not in the bottom ten of Table IX (based on all respondents, not just IBM), namely vertical lines (LINECONV) and password protection (PASSWORD). IBM users would naturally rate password protection (PASSWORD) lower than other users because they do not have password capabilities. It is not clear why vertical lines (LINECONV) was also at the bottom of IBM's list.

TABLE X  
FEATURES SORTED BY MEAN RANKING FOR  
IBM USERS ONLY INCLUDING  
STANDARD DEVIATIONS

| Feature  | Mean  | St Dev | Rank<br>IBM | Rank<br>All | Feature   | Mean  | St Dev | Rank<br>IBM | Rank<br>All |
|----------|-------|--------|-------------|-------------|-----------|-------|--------|-------------|-------------|
| LINECONV | 0.000 | .000   | 1           | 15          | GLOSSARY  | 3.889 | 1.364  | 35          | 57          |
| PASSWORD | 0.000 | .000   | 2           | 13          | MENUBYPS  | 3.889 | 1.364  | 36          | 35          |
| GRAPHICS | 0.000 | .000   | 3           | 1           | ATOINDEN  | 4.000 | 1.155  | 37          | 47          |
| CITATGEN | 1.000 | .000   | 4           | 4           | GLOBALF   | 4.000 | 1.333  | 38          | 56          |
| MULTI    | 1.000 | .000   | 5           | 2           | PRINTSPG  | 4.111 | 1.269  | 39          | 59          |
| USERPROG | 1.000 | .000   | 6           | 8           | MERGE     | 4.200 | 1.476  | 40          | 55          |
| FLOATFOT | 1.200 | .447   | 7           | 3           | PC12      | 4.200 | 1.317  | 41          | 44          |
| TYPEMODE | 1.500 | .756   | 8           | 7           | PC10      | 4.222 | 1.302  | 42          | 52          |
| CASTRIKE | 1.556 | .527   | 9           | 9           | PHENFED   | 4.250 | 1.500  | 43          | 33          |
| CAOVERP  | 1.667 | .816   | 10          | 10          | COPYMOVE  | 4.300 | 1.252  | 44          | 64          |
| PNROMAN  | 1.833 | 1.329  | 11          | 6           | COPYMOVB  | 4.300 | 1.337  | 45          | 65          |
| PC15     | 2.000 | 2.000  | 12          | 14          | PRINTRPG  | 4.300 | .949   | 46          | 49          |
| COPYMOVL | 2.125 | 1.553  | 13          | 25          | PC11      | 4.300 | 1.252  | 47          | 23          |
| CASUPER  | 2.286 | 1.604  | 14          | 30          | SIMULTIO  | 4.333 | 1.033  | 48          | 60          |
| PAUSETE  | 2.333 | 2.066  | 15          | 21          | ATOUNDRS  | 4.400 | .966   | 49          | 54          |
| DCALIGN  | 2.444 | 1.236  | 16          | 17          | FORMCHNG  | 4.400 | .966   | 50          | 62          |
| PHSHCONT | 2.500 | 1.761  | 17          | 29          | LINECONH  | 4.500 | .707   | 51          | 27          |
| HYPHEN   | 2.700 | 1.418  | 18          | 20          | USERPRGK  | 4.500 | 1.000  | 52          | 16          |
| AUTOHF   | 2.700 | 1.494  | 19          | 28          | ATOUNDRW  | 4.600 | .516   | 53          | 45          |
| GLOBALPS | 3.000 | 1.915  | 20          | 31          | ATOCOLUM  | 4.600 | .699   | 54          | 37          |
| INDEXGEN | 3.000 | 2.828  | 21          | 12          | SPELVERF  | 4.600 | .516   | 55          | 36          |
| TCONTGEN | 3.000 | 2.828  | 22          | 25          | PAGREPAG  | 4.600 | .516   | 56          | 61          |
| PNLOCAT  | 3.000 | 1.581  | 23          | 24          | TYPESTYL  | 4.667 | .500   | 57          | 53          |
| GLOBALD  | 3.100 | 1.595  | 24          | 50          | ATOUNDRC  | 4.700 | .483   | 58          | 63          |
| GLOBALR  | 3.200 | 1.619  | 25          | 46          | SORTING   | 4.750 | .463   | 59          | 42          |
| PNAUTO   | 3.200 | 1.619  | 26          | 48          | AUTOCENT  | 4.800 | .422   | 60          | 66          |
| MATH     | 3.300 | 1.567  | 27          | 19          | PHSHFED   | 4.900 | .316   | 61          | 58          |
| ATODECTB | 3.500 | 1.509  | 28          | 43          | AUTOOCRWR | 5.000 | .000   | 62          | 67          |
| SPELUSER | 3.500 | 1.841  | 29          | 18          | CABOLD    | 5.000 | .000   | 63          | 39          |
| WIDOWORP | 3.500 | 1.841  | 30          | 26          | TENKEYPD  | 5.000 | .000   | 64          | 11          |
| COPYMOVC | 3.556 | 1.424  | 31          | 40          | PHENCONT  | 5.000 | .000   | 65          | 22          |
| VARILS   | 3.625 | .744   | 32          | 51          | COMWP     | 5.000 | .000   | 66          | 38          |
| ATOUNDRD | 3.667 | 1.528  | 33          | 34          | COMCOMP   | 5.000 | .000   | 67          | 41          |
| JUSTIF   | 3.800 | 1.229  | 34          | 32          |           |       |        |             |             |

Scale: 1 Never Used  
2 Not Very Useful  
3 Somewhat Useful  
4 Very Useful  
5 Extremely Useful

TABLE XI  
FEATURES SORTED BY MEAN RANKING FOR  
LANIER USERS ONLY INCLUDING  
STANDARD DEVIATIONS

| Feature  | Mean  | St Dev | Rank LANR | Rank All | Feature   | Mean  | St Dev | Rank LANR | Rank All |
|----------|-------|--------|-----------|----------|-----------|-------|--------|-----------|----------|
| ATOCOLUM | 1.000 | .000   | 1         | 37       | JUSTIF    | 3.100 | 1.595  | 35        | 32       |
| CAOVERP  | 1.000 | .000   | 2         | 10       | PNLOCAT   | 3.100 | 1.449  | 36        | 24       |
| GRAPHICS | 1.000 | .000   | 3         | 1        | PHSHFED   | 3.167 | 1.835  | 37        | 58       |
| MULTI    | 1.200 | .447   | 4         | 2        | SPELVERF  | 3.200 | 1.643  | 38        | 36       |
| PC15     | 1.286 | .756   | 5         | 14       | PC12      | 3.200 | 1.932  | 39        | 44       |
| FLOATFOT | 1.375 | 1.061  | 6         | 3        | HYPHEN    | 3.222 | 1.716  | 40        | 20       |
| PC11     | 1.429 | .787   | 7         | 23       | WIDOWORP  | 3.300 | 1.636  | 41        | 26       |
| PNROMAN  | 1.600 | 1.342  | 8         | 6        | COPYMOV C | 3.429 | 1.618  | 42        | 40       |
| PHENCONT | 1.600 | 1.342  | 9         | 22       | PAUSET E  | 3.500 | 1.761  | 43        | 21       |
| COMWP    | 1.667 | 1.155  | 10        | 38       | CABOLD    | 3.500 | .972   | 44        | 39       |
| TCONTGEN | 1.714 | 1.496  | 11        | 5        | COPYMOV L | 3.556 | 1.810  | 45        | 25       |
| INDEXGEN | 1.857 | 1.069  | 12        | 12       | ATOUNDRW  | 3.600 | 1.174  | 46        | 45       |
| CITATGEN | 1.857 | 1.215  | 13        | 4        | ATODECTB  | 3.778 | 1.563  | 47        | 43       |
| DCALIGN  | 2.000 | 2.000  | 14        | 17       | GLOBALR   | 3.778 | 1.716  | 48        | 46       |
| COMCOMP  | 2.000 | 2.000  | 15        | 41       | GLOBALF   | 3.778 | 1.716  | 49        | 56       |
| PASSWORD | 2.100 | 1.792  | 16        | 13       | GLOBALPS  | 3.778 | 1.716  | 50        | 31       |
| CASUPER  | 2.143 | 1.464  | 17        | 30       | VARILS    | 3.778 | .972   | 51        | 51       |
| PHSHCONT | 2.167 | 1.835  | 18        | 29       | PNAUTO    | 3.800 | 1.687  | 52        | 48       |
| USERPROG | 2.167 | 1.835  | 19        | 8        | ATOUNDRD  | 4.000 | .816   | 53        | 34       |
| SORTING  | 2.200 | 1.789  | 20        | 42       | PRINTRPG  | 4.100 | .876   | 54        | 49       |
| TENKEYPD | 2.333 | 1.803  | 21        | 11       | PC10      | 4.100 | 1.370  | 55        | 52       |
| MENUBYPS | 2.500 | 1.915  | 22        | 35       | GLOBALD   | 4.222 | 1.394  | 56        | 50       |
| USERPRGK | 2.600 | 2.191  | 23        | 16       | SIMULTIO  | 4.300 | 1.494  | 57        | 60       |
| TYPEMODE | 2.667 | 1.118  | 24        | 7        | ATOUNDR C | 4.400 | .843   | 58        | 63       |
| LINECONV | 2.750 | 1.708  | 25        | 15       | ATOUNDRS  | 4.400 | .843   | 59        | 54       |
| PHENFED  | 2.800 | 1.789  | 26        | 33       | PAGREPAG  | 4.400 | .843   | 60        | 61       |
| SPELUSER | 2.833 | 1.722  | 27        | 18       | PRINTSPG  | 4.400 | .699   | 61        | 59       |
| CASTRIKE | 2.857 | 1.864  | 28        | 9        | MERGE     | 4.444 | .726   | 62        | 55       |
| TYPESTYL | 2.875 | 1.727  | 29        | 53       | COPYMOVE  | 4.500 | 1.080  | 63        | 64       |
| AUTOHF   | 2.889 | 1.900  | 30        | 28       | FORMCHNG  | 4.600 | .516   | 64        | 62       |
| ATOINDEN | 3.000 | 1.491  | 31        | 47       | COPYMOV B | 4.700 | .949   | 65        | 65       |
| GLOSSARY | 3.000 | 2.828  | 32        | 57       | AUTOCENT  | 4.800 | .422   | 66        | 66       |
| LINECONH | 3.000 | 1.773  | 33        | 27       | AUTOCRWR  | 5.000 | .000   | 67        | 67       |
| MATH     | 3.000 | 2.000  | 34        | 19       |           |       |        |           |          |

Scale: 1 Never Used  
2 Not Very Useful  
3 Somewhat Useful  
4 Very Useful  
5 Extremely Useful

TABLE XII

FEATURES SORTED BY MEAN RANKING FOR  
WANG USERS ONLY INCLUDING  
STANDARD DEVIATIONS

| Feature  | Mean  | St Dev | Rank<br>WANG | Rank<br>All | Feature  | Mean  | St Dev | Rank<br>WANG | Rank<br>All |
|----------|-------|--------|--------------|-------------|----------|-------|--------|--------------|-------------|
| GRAPHICS | 1.000 | .000   | 1            | 1           | ATOUNDRW | 3.667 | 1.435  | 35           | 45          |
| MULTI    | 1.000 | .000   | 2            | 2           | COPYMOVE | 3.750 | 1.545  | 36           | 40          |
| CITATGEN | 1.444 | .726   | 3            | 4           | SORTING  | 3.818 | .751   | 37           | 42          |
| USERPRGK | 1.500 | 1.225  | 4            | 16          | COMWP    | 3.833 | 1.403  | 38           | 38          |
| TENKEYPD | 1.714 | 1.496  | 5            | 11          | ATOUNDRS | 3.846 | 1.573  | 39           | 54          |
| TYPEMODE | 1.750 | .886   | 6            | 7           | PRINTRPG | 3.846 | 1.068  | 40           | 49          |
| FLOATFOT | 1.800 | 1.789  | 7            | 3           | PC10     | 4.000 | 1.472  | 41           | 52          |
| TCONTGEN | 2.000 | .853   | 8            | 5           | PHENFED  | 4.000 | .000   | 42           | 33          |
| CASTRIKE | 2.200 | 1.932  | 9            | 9           | COMCOMP  | 4.000 | 1.537  | 43           | 41          |
| USERPROG | 2.222 | 1.302  | 10           | 8           | MERGE    | 4.077 | .954   | 44           | 55          |
| SPELUSER | 2.333 | 1.323  | 11           | 18          | ATODECTB | 4.154 | 1.144  | 45           | 43          |
| PNROMAN  | 2.375 | 1.768  | 12           | 6           | PC12     | 4.231 | 1.235  | 46           | 44          |
| INDEXGEN | 2.417 | 1.240  | 13           | 12          | SIMULTIO | 4.250 | 1.138  | 47           | 60          |
| SPELVERF | 2.500 | 1.309  | 14           | 36          | PAGREPAG | 4.308 | .751   | 48           | 61          |
| PHENCONT | 2.500 | 2.121  | 15           | 22          | PRINTSPG | 4.308 | .751   | 49           | 59          |
| MATH     | 2.583 | 1.240  | 16           | 19          | PHSHFED  | 4.308 | .947   | 50           | 58          |
| ATOCOLUM | 2.625 | 1.847  | 17           | 37          | AUTOHF   | 4.385 | 1.121  | 51           | 28          |
| LINECONV | 2.625 | 1.598  | 18           | 15          | FORMCHNG | 4.462 | 1.198  | 52           | 62          |
| HYPHEN   | 2.909 | 1.136  | 19           | 20          | PHSHCONT | 4.462 | 1.127  | 53           | 29          |
| CAOVERP  | 2.909 | 1.578  | 20           | 10          | ATOUNDRC | 4.538 | .519   | 54           | 63          |
| PASSWORD | 2.917 | 1.443  | 21           | 13          | TYPESTYL | 4.538 | .660   | 55           | 53          |
| WIDOWORP | 3.000 | 2.000  | 22           | 26          | VARILS   | 4.538 | .967   | 56           | 51          |
| PC11     | 3.000 | 1.414  | 23           | 23          | GLOSSARY | 4.692 | .630   | 57           | 57          |
| ATOUNDRD | 3.083 | 1.676  | 24           | 34          | GLOBALD  | 4.692 | .480   | 58           | 50          |
| PAUSETTE | 3.100 | 1.912  | 25           | 21          | GLOBALR  | 4.692 | .480   | 59           | 46          |
| PNLOCAT  | 3.231 | 1.691  | 26           | 24          | GLOBALF  | 4.750 | .452   | 60           | 56          |
| DCALIGN  | 3.300 | 1.418  | 27           | 17          | AUTOCENT | 4.769 | .439   | 61           | 66          |
| LINECONH | 3.400 | 1.578  | 28           | 27          | COPYMOVE | 4.769 | .439   | 62           | 64          |
| COPYMOVL | 3.462 | 1.898  | 29           | 25          | CASUPER  | 4.769 | .599   | 63           | 30          |
| GLOBALPS | 3.500 | 1.773  | 30           | 31          | ATOINDEN | 4.846 | .376   | 64           | 47          |
| PC15     | 3.500 | 1.679  | 31           | 14          | COPYMOVB | 4.846 | .376   | 65           | 65          |
| JUSTIF   | 3.538 | 1.127  | 32           | 32          | PNAUTO   | 4.846 | .376   | 66           | 48          |
| CABOLD   | 3.545 | 1.036  | 33           | 39          | AUTOCRWR | 4.923 | .277   | 67           | 67          |
| MENUBYPS | 3.625 | 1.685  | 34           | 35          |          |       |        |              |             |

Scale: 1 Never Used  
2 Not Very Useful  
3 Somewhat Useful  
4 Very Useful  
5 Extremely Useful

The ten features ranked highest by IBM users included six features that were not in the top ten rankings by all users: sorting (SORTING), bold characters (CABOLD), ten-key pad (TENKEYPD), continuous envelopes (PHENCONT), communication with other word processors (COMWP), and communication with the main computer (COMCOMP). Since these mean summaries disregarded the "yes"/"no" responses of users, if only one or two users said they had the feature, the mean value was computed from the numerical rating of these one or two users. Features bold characters (CABOLD) and ten-key pad (TENKEYPD) had only one IBM user with that feature, and in each case the user rated that feature at 5. The same thing occurred for communication with other word processors (COMWP), communication with the main computer (COMCOMP), and continuous envelopes (PHENCONT), but with two, two, and four users respectively. Sorting (SORTING), however, was rated on the 1-2-3-4-5 scale by eight IBM users with a mean of 4.75, a rank of fifty-nine out of the sixty-seven features (ranked from lowest to highest ratings) for IBM users. The Lanier ranking for this variable was twenty, and the Wang ranking was thirty-seven. The IBM users valued it more than the other user groups. The eight IBM users giving this feature a mean score of 4.75 were all from church-related offices using mailing lists and other lists requiring a variety of sorting procedures.

There were five features in the bottom ten of the Lanier list (Table XI) that did not appear in the bottom ten of the Table IX. Of these, 15 pitch (PC15), proportional spacing (PC11), and continuous envelopes (PHENCONT) were in the bottom half of the distribution for

all respondents. However, automatic columns (ATOCOLUM) and communication with other word processors (COMWP) were rated thirty-seven and thirty-eight respectively for all respondents and yet appeared in the bottom ten for Lanier. The low rating for communication with other word processors (COMWP) may reflect the fact that most Lanier users had single machine configurations; and, therefore, communications played a negligible role in day-to-day operations. The automatic columns (ATOCOLUM) feature was not present on Lanier systems, yet one Lanier user said she had this feature and assigned it a rating of one. The only two features in the top ten of Lanier that were not in the top ten of Table IX were single underlining (ATOOUNDRS) and merging of files (MERGE), and these were both in the top fourteen of the distribution for all respondents. Communication with the main computer (COMCOMP) was rated much lower by Lanier users (rank of eighteen) than by the total user group (rank of forty-one). No Lanier users were involved in communications and thus ranked communication with the main computer (COMCOMP) lower. Many Lanier users were in legal offices, which accounts for the importance of features such as overstrike (CASTRIKE) (Lanier ranking of twenty-eight, compared to nine overall).

Table XI shows that Wang users ranked superscripts and subscripts (CASUPER) at sixty-three out of sixty-seven, far above the rankings of fourteen and seventeen for IBM and Lanier users respectively. Most Wang users made intensive use of superscripts and subscripts. The engineering/scientific nature of much of the Wang users' material and

the corresponding need for superscript and subscript capabilities may account for that ranking.

There were no significant differences between the bottom ten features for Wang users in Table XI and the bottom ten for all respondents. User programmable keys (USERPRGK) and ten-key pad (TENKEYPD) were present in the bottom ten for Wang, but these were both in the bottom sixteen for all respondents. An analysis of the top ten features of Wang showed that six features were present that were not in the top ten of Table IX. Global delete (GLOBALD), global replace (GLOBALR), and global find (GLOBALF) are all editing or revision features and reflect the considerable emphasis of most of the Wang users on continued editing, updating and revision of both textual and tabular material. Page numbering (PNAUTO) and automatic indenting (ATOINDEN) also reflect this trend to some extent.

Correlation coefficients for rankings of features by IBM, Lanier, and Wang respondents are summarized in Table XIII:

TABLE XIII  
CORRELATION COEFFICIENTS FOR RANKINGS  
OF FEATURES BY VENDOR GROUPS

|        | IBM    | Lanier | Wang   |
|--------|--------|--------|--------|
| IBM    | 1.0000 |        |        |
| Lanier | .5902* | 1.0000 |        |
| Wang   | .5680* | .6710* | 1.0000 |

\*  $p < .05$

A similar set of coefficients was prepared for the rankings of users grouped by word processing experience into three groups as shown in Table XIV:

TABLE XIV  
CORRELATION COEFFICIENTS FOR RANKINGS  
OF FEATURES BY EXPERIENCE GROUPS

---

|         |                |         |         |         |
|---------|----------------|---------|---------|---------|
|         |                | Class 1 |         |         |
| Class 1 | 1-11 months    | 1.0000  | Class 2 |         |
| Class 2 | 11-22 months   | .8060*  | 1.0000  | Class 3 |
| Class 3 | over 24 months | .6805*  | .7493*  | 1.0000  |

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\*p < .05

Although all of the above rank correlations are significant at a  $p < .05$  level, greater differences in rankings existed among vendor groups than among word processing experience groups. The lowest correlation in experience rankings (.6805) was between groups that are farthest apart in word processing experience (class 1 and class 3).

#### User Means by Feature Category

Tables XV through XVIII summarize the user means by the four major categories of features that were listed: recording, revision, printing, and miscellaneous. Tables XV through XVII show that the fourth Lanier user had the lowest mean for "recording," "revision," and "printing" features. That user ranked miscellaneous features

TABLE XV

INDIVIDUAL MEAN RESPONSES (LOW TO HIGH)  
WITH STANDARD DEVIATIONS FOR  
THE 17 RECORDING FEATURES

| Users        | Mean  | Standard<br>Deviation |
|--------------|-------|-----------------------|
| LANIER04     | 2.647 | 1.869                 |
| WANG07       | 3.059 | 1.819                 |
| LANIER09     | 3.286 | 1.816                 |
| WANG11       | 3.333 | 1.826                 |
| WANG08       | 3.471 | .874                  |
| WANG06       | 3.562 | 1.365                 |
| WANG03       | 3.733 | 1.163                 |
| LANIER02     | 3.769 | 1.166                 |
| IBM04        | 3.786 | .975                  |
| LANIER01     | 3.800 | 1.265                 |
| IBM10        | 3.812 | 1.223                 |
| WANG12       | 3.833 | 1.801                 |
| IBM03        | 4.000 | 1.109                 |
| WANG09       | 4.059 | 1.391                 |
| WANG10       | 4.059 | 1.600                 |
| WANG01       | 4.067 | 1.624                 |
| WANG04       | 4.067 | 1.223                 |
| IBM01        | 4.071 | .616                  |
| LANIER07     | 4.077 | 1.038                 |
| LANIER10     | 4.100 | 1.370                 |
| LANIER08     | 4.143 | .864                  |
| LANIER03     | 4.167 | 1.030                 |
| IBM05        | 4.214 | .579                  |
| IBM02        | 4.267 | 1.438                 |
| WANG13       | 4.294 | .686                  |
| IBM07        | 4.429 | 1.453                 |
| IBM08        | 4.429 | 1.453                 |
| IBM09        | 4.429 | 1.453                 |
| LANIER06     | 4.462 | .660                  |
| WANG02       | 4.462 | 1.198                 |
| WANG05       | 4.667 | .651                  |
| LANIER05     | 4.846 | .376                  |
| IBM06        | 4.867 | .352                  |
| IBM USERS    | 4.229 | 1.145                 |
| LANIER USERS | 3.881 | 1.360                 |
| WANG USERS   | 3.882 | 1.400                 |
| TOTAL USERS  | 3.987 | 1.323                 |

TABLE XVI

INDIVIDUAL MEAN RESPONSES (LOW TO HIGH)  
WITH STANDARD DEVIATIONS FOR  
THE 11 REVISION FEATURES

| Users       | Mean  | Standard<br>Deviation |
|-------------|-------|-----------------------|
| LANIER04    | 1.727 | 1.618                 |
| IBM07       | 1.750 | 1.488                 |
| LANIER10    | 1.818 | 1.168                 |
| IBM09       | 2.000 | 1.852                 |
| WANG07      | 2.818 | 2.089                 |
| IBM03       | 3.000 | 1.500                 |
| IBM08       | 3.000 | 2.138                 |
| WANG03      | 3.091 | 1.136                 |
| WANG04      | 3.273 | 1.618                 |
| IBM01       | 3.286 | 1.254                 |
| WANG01      | 3.500 | 1.780                 |
| WANG08      | 3.556 | .726                  |
| WANG09      | 3.636 | 1.748                 |
| LANIER07    | 3.667 | 1.033                 |
| WANG06      | 3.700 | 1.889                 |
| LANIER06    | 3.727 | 1.849                 |
| LANIER02    | 3.857 | .690                  |
| IBM05       | 3.875 | .835                  |
| LANIER01    | 3.909 | 1.868                 |
| LANIER09    | 4.000 | 2.000                 |
| LANIER05    | 4.091 | 1.375                 |
| WANG11      | 4.091 | 1.300                 |
| WANG12      | 4.125 | 1.642                 |
| WANG10      | 4.182 | 1.401                 |
| IBM04       | 4.200 | .447                  |
| IBM10       | 4.300 | .949                  |
| LANIER08    | 4.400 | 1.075                 |
| WANG05      | 4.400 | .966                  |
| WANG13      | 4.400 | 1.265                 |
| WANG02      | 4.429 | 1.512                 |
| LANIER03    | 4.455 | 1.293                 |
| IBM02       | 4.500 | 1.414                 |
| IBM06       | 4.625 | .744                  |
| IBM USERS   | 3.443 | 1.623                 |
| LANIER USES | 3.505 | 1.704                 |
| WANG USERS  | 3.754 | 1.535                 |
| TOTAL USERS | 3.596 | 1.613                 |

TABLE XVII

INDIVIDUAL MEAN RESPONSES (LOW TO HIGH)  
WITH STANDARD DEVIATIONS FOR  
THE 24 PRINTING FEATURES

| Users        | Mean  | Standard<br>Deviation |
|--------------|-------|-----------------------|
| LANIER04     | 2.292 | 1.781                 |
| WANG07       | 2.375 | 1.637                 |
| LANIER09     | 2.500 | 1.821                 |
| IBM01        | 2.563 | 1.315                 |
| IBM08        | 2.714 | 1.927                 |
| IBM09        | 2.727 | 1.980                 |
| IBM07        | 2.773 | 1.950                 |
| IBM03        | 2.895 | 1.100                 |
| LANIER02     | 2.900 | 1.165                 |
| WANG03       | 2.957 | 1.492                 |
| LANIER05     | 3.048 | 1.746                 |
| LANIER01     | 3.143 | 1.459                 |
| LANIER07     | 3.261 | 1.602                 |
| LANIER10     | 3.357 | 1.781                 |
| WANG01       | 3.391 | 1.751                 |
| IBM04        | 3.421 | 1.261                 |
| WANG04       | 3.435 | 1.472                 |
| LANIER06     | 3.476 | 1.750                 |
| IBM02        | 3.533 | 1.457                 |
| WANG02       | 3.545 | 1.654                 |
| LANIER08     | 3.600 | .995                  |
| IBM10        | 3.739 | 1.251                 |
| WANG09       | 3.750 | 1.511                 |
| IBM05        | 3.824 | 1.425                 |
| WANG08       | 3.850 | .875                  |
| WANG06       | 3.913 | 1.411                 |
| WANG11       | 3.941 | 1.345                 |
| LANIER03     | 4.133 | 1.552                 |
| WANG12       | 4.200 | 1.207                 |
| WANG05       | 4.250 | 1.125                 |
| WANG13       | 4.333 | .913                  |
| IBM06        | 4.471 | 1.179                 |
| WANG10       | 4.619 | 1.024                 |
| IBM USERS    | 3.241 | 1.617                 |
| LANIER USERS | 3.126 | 1.630                 |
| WANG USERS   | 3.688 | 1.484                 |
| TOTAL USERS  | 3.390 | 1.585                 |

TABLE XVIII

INDIVIDUALS MEAN RESPONSES (LOW TO HIGH)  
WITH STANDARD DEVIATIONS FOR THE  
15 MISCELLANEOUS FEATURES

| Users        | Mean  | Standard<br>Deviation |
|--------------|-------|-----------------------|
| LANIER10     | 1.000 | .000                  |
| LANIER09     | 1.222 | .667                  |
| LANIER04     | 1.533 | 1.407                 |
| LANIER07     | 1.571 | 1.512                 |
| LANIER02     | 2.000 | 1.206                 |
| LANIER06     | 2.000 | 2.000                 |
| WANG07       | 2.300 | 1.767                 |
| WANG03       | 2.545 | 1.508                 |
| WANG09       | 2.556 | 1.667                 |
| LANIER03     | 2.571 | 1.950                 |
| WANG04       | 2.818 | 1.834                 |
| WANG12       | 2.833 | 1.329                 |
| IBM04        | 3.000 | 1.871                 |
| IBM01        | 3.250 | 1.258                 |
| WANG08       | 3.300 | 1.636                 |
| IBM05        | 3.333 | 1.366                 |
| IBM03        | 3.400 | 1.517                 |
| WANG11       | 3.571 | 1.397                 |
| LANIER08     | 3.636 | 1.502                 |
| WANG10       | 3.667 | 1.969                 |
| IBM10        | 3.727 | 1.679                 |
| WANG05       | 3.778 | 1.202                 |
| LANIER05     | 3.800 | 1.643                 |
| WANG13       | 3.818 | .874                  |
| WANG02       | 3.857 | 1.215                 |
| IBM07        | 4.000 | 1.852                 |
| IBM08        | 4.000 | 1.852                 |
| WANG06       | 4.000 | 1.155                 |
| IBM06        | 4.167 | 1.602                 |
| IBM09        | 4.273 | 1.618                 |
| WANG01       | 4.286 | 1.254                 |
| IBM02        | 5.000 | .000                  |
| LANIER01     | 5.000 | .000                  |
| IBM USERS    | 3.836 | 1.592                 |
| LANIER USERS | 2.272 | 1.696                 |
| WANG USERS   | 3.308 | 1.560                 |
| TOTAL USERS  | 3.127 | 1.713                 |

lower than all but two users in Table XVIII. This particular user preferred to learn by demonstration and oral tutorial methods. Consequently, her equipment's capabilities were underutilized because she did not use the hardcopy user manuals and documentation as a learning tool. This underutilization of her equipment was reflected to a degree in the low usefulness ratings she assigned across all four question type groups.

Although a variety of organizations was represented, a common factor among the respondents ranking the usefulness of features at a high level on Tables XV through XVIII was the use of the word processing equipment on an eight-hour-a-day production basis. The respondents that were consistently in the top half of user rankings for a given feature category tended to be the users who actually used the equipment more than the other respondents, and thus these features were actually more useful to them because their daily work consisted primarily of word processing activities.

Table XIX summarizes Tables XV through XVIII and provides a summary of all user groups across all features. Users ranked Lanier as first, IBM as second, and Wang as third on the basis of both average ratings of feature usefulness and months of word processing experience. IBM users rated the recording and miscellaneous features higher than the other vendor groups. Wang users rated the revision and printing features higher than the other groups. An explanation lies in the primary types of work done by IBM and Wang users in this study. Wang users made extensive revisions to lengthy documents which were printed in varying formats. Revisions and printing features were

TABLE XIX  
SUMMARY OF FOUR CATEGORIES FROM QUESTIONNAIRE  
BY MEAN RESPONSES AND GROUP

| Vendor Group                       | Mean  | Standard<br>Deviation |
|------------------------------------|-------|-----------------------|
| Summary of Recording Questions     |       |                       |
| IBM Users                          | 4.229 | 1.145                 |
| LANIER Users                       | 3.881 | 1.360                 |
| WANG Users                         | 3.882 | 1.400                 |
| All Users                          | 3.987 | 1.323                 |
| Summary of Revision Questions      |       |                       |
| IBM Users                          | 3.443 | 1.623                 |
| LANIER Users                       | 3.505 | 1.704                 |
| WANG Users                         | 3.754 | 1.535                 |
| All Users                          | 3.596 | 1.613                 |
| Summary of Printing Questions      |       |                       |
| IBM Users                          | 3.241 | 1.617                 |
| LANIER Users                       | 3.126 | 1.630                 |
| WANG Users                         | 3.688 | 1.484                 |
| All Users                          | 3.390 | 1.585                 |
| Summary of Miscellaneous Questions |       |                       |
| IBM Users                          | 3.836 | 1.592                 |
| LANIER Users                       | 2.272 | 1.696                 |
| WANG Users                         | 3.308 | 1.560                 |
| All Users                          | 3.127 | 1.713                 |
| Summary of All Questions           |       |                       |
| IBM Users                          | 3.653 | 1.543                 |
| LANIER Users                       | 3.258 | 1.669                 |
| WANG Users                         | 3.689 | 1.493                 |
| All Users                          | 3.551 | 1.572                 |

used daily and were rated most useful by Wang users. IBM users typically worked on smaller documents with fewer editing changes. More time was spent on the initial text entry process and hence IBM users rated recording questions higher than the other vendor groups.

Rank correlations of individual respondent feature ratings by the four feature categories (See Tables XV through XVIII) are shown in Table XX:

TABLE XX  
CORRELATION COEFFICIENTS FOR RANKINGS  
OF FEATURE CATEGORIES

|               | Recording | Revision | Printing | Miscellaneous |
|---------------|-----------|----------|----------|---------------|
| Recording     | 1.0000    |          |          |               |
| Revision      | .3001     | 1.0000   |          |               |
| Printing      | .2326     | .7022*   | 1.0000   |               |
| Miscellaneous | .4332*    | .2981    | .2513    | 1.0000        |

\*p < .05

Individuals rated revision and printing variables in a similar manner. To a lesser extent, individuals rated recording and miscellaneous variables in a similar manner. This result parallels the above findings that (1) Wang users rated revision and printing variables higher than other groups and (2) IBM users rated recording and miscellaneous features higher than other groups.

### Comparison of Feature Rankings

A Kruskal-Wallis one-way analysis of variance by ranks was used to detect significant differences of specific feature rankings by vendor groups. The Kruskal-Wallis analysis is a nonparametric technique that requires ordinal data. It is normally used to test a null hypothesis that all k samples are drawn from the same population. The Kruskal-Wallis chi-square was corrected for ties in rank. Results of this analysis were reported if the significance level of the Kruskal-Wallis chi-square was less than .05. For features in which rankings were not significantly different, no tables are presented. Tables XXI through XLI contain these results. Although only the relative rankings of features across groups are used in the Kruskal-Wallis analysis, the means and standard deviations are also reported to facilitate comparisons among tables in this group. The mean ranks are affected by the number of respondents stating that they had this feature, the "n" value, and are not comparable across features. The means and standard deviations are not so affected and are comparable across features.

Automatic indentation (ATOINDEN) is a feature that would be commonly used in formatting quoted material, charts, and tables--common tasks where engineering/scientific material is involved. Table XXI indicates that this feature was ranked highest by Wang users. This ranking is explained by the engineering/scientific nature of the text material for many of the Wang users in this study.

Spelling verification (SPELVERF) was rated more useful by IBM users than other vendor groups. Table XXII shows that IBM users were

TABLE XXI

ANALYSIS OF AUTOMATIC INDENTATION FEATURE RANKINGS BY  
WORD PROCESSING EQUIPMENT CLASS

| Vendor Group | Mean | Stnd Dev | N  | Mean Rank | Kruskal-Wallis Chi-Square | Significance |
|--------------|------|----------|----|-----------|---------------------------|--------------|
| IBM          | 4.00 | 1.15     | 10 | 15.35     |                           |              |
| LANIER       | 3.00 | 1.49     | 10 | 10.20     |                           |              |
| WANG         | 4.84 | .38      | 13 | 23.50     |                           |              |
| Total Group  | 4.03 | 1.06     | 33 | 17.00     | 12.953                    | p < .05      |

TABLE XXII

ANALYSIS OF SPELLING VERIFICATION FEATURE RANKINGS BY  
WORD PROCESSING EQUIPMENT CLASS

| Vendor Group | Mean | Stnd Dev | N  | Mean Rank | Kruskal-Wallis Chi-Square | Significance |
|--------------|------|----------|----|-----------|---------------------------|--------------|
| IBM          | 4.60 | .51      | 10 | 17.00     |                           |              |
| LANIER       | 3.20 | 1.64     | 5  | 10.50     |                           |              |
| WANG         | 2.50 | 1.30     | 8  | 6.69      |                           |              |
| Total Group  | 3.56 | 1.12     | 23 | 12.00     | 11.460                    | p < .05      |

TABLE XXIII

ANALYSIS OF GLOBAL DELETE FEATURE RANKINGS BY  
WORD PROCESSING EQUIPMENT CLASS

| Vendor Group | Mean | Stnd Dev | N  | Mean Rank | Kruskal-Wallis Chi-Square | Significance |
|--------------|------|----------|----|-----------|---------------------------|--------------|
| IBM          | 3.10 | 1.59     | 10 | 10.20     |                           |              |
| LANIER       | 4.22 | 1.39     | 9  | 18.22     |                           |              |
| WANG         | 4.69 | .48      | 13 | 20.15     |                           |              |
| Total Group  | 4.06 | 1.19     | 32 | 16.50     | 8.151                     | p < .05      |

TABLE XXIV

ANALYSIS OF GLOBAL REPLACE FEATURE RANKINGS BY  
WORD PROCESSING EQUIPMENT CLASS

| Vendor Group | Stnd |      | N  | Mean Rank | Kruskal-Wallis |              |
|--------------|------|------|----|-----------|----------------|--------------|
|              | Mean | Dev  |    |           | Chi-Square     | Significance |
| IBM          | 3.20 | 1.61 | 10 | 11.25     |                |              |
| LANIER       | 3.77 | 1.71 | 9  | 16.33     |                |              |
| WANG         | 4.69 | .48  | 13 | 20.65     |                |              |
| Total Group  | 3.96 | 1.31 | 32 | 16.50     | 6.691          | p < .05      |

TABLE XXV

ANALYSIS OF AUTOMATIC HEADERS AND FOOTERS FEATURE RANKINGS BY  
WORD PROCESSING EQUIPMENT CLASS

| Vendor Group | Stnd |      | N  | Mean Rank | Kruskal-Wallis |              |
|--------------|------|------|----|-----------|----------------|--------------|
|              | Mean | Dev  |    |           | Chi-Square     | Significance |
| IBM          | 2.70 | 1.49 | 10 | 12.00     |                |              |
| LANIER       | 2.88 | 1.90 | 9  | 13.94     |                |              |
| WANG         | 4.38 | 1.12 | 13 | 21.73     |                |              |
| Total Group  | 3.43 | 1.48 | 32 | 16.50     | 7.650          | p < .05      |

TABLE XXVI

ANALYSIS OF AUTOMATIC PAGE NUMBERING FEATURE RANKINGS BY  
WORD PROCESSING EQUIPMENT CLASS

| Vendor Group | Stnd |      | N  | Mean Rank | Kruskal-Wallis |              |
|--------------|------|------|----|-----------|----------------|--------------|
|              | Mean | Dev  |    |           | Chi-Square     | Significance |
| IBM          | 3.20 | 1.61 | 10 | 11.00     |                |              |
| LANIER       | 3.80 | 1.68 | 10 | 16.40     |                |              |
| WANG         | 4.84 | .37  | 13 | 22.08     |                |              |
| Total Group  | 4.03 | 1.30 | 33 | 17.00     | 9.345          | p < .05      |

TABLE XXVII  
ANALYSIS OF OVERPRINT FEATURE RANKINGS BY  
WORD PROCESSING EQUIPMENT CLASS

| Vendor Group | Mean | Std<br>Dev | N  | Mean<br>Rank | Kruskal-Wallis<br>Chi-Square | Significance |
|--------------|------|------------|----|--------------|------------------------------|--------------|
| IBM          | 1.66 | .81        | 6  | 9.42         |                              |              |
| LANIER       | 1.00 | .00        | 4  | 5.50         |                              |              |
| WANG         | 2.90 | 1.57       | 11 | 13.86        |                              |              |
| Total Group  | 2.19 | 1.25       | 21 | 11.00        | 6.719                        | p < .05      |

TABLE XXVIII  
ANALYSIS OF SUPERSCRIPTS/SUBSCRIPTS FEATURE RANKINGS BY  
WORD PROCESSING EQUIPMENT CLASS

| Vendor Group | Mean | Std<br>Dev | N  | Mean<br>Rank | Kruskal-Wallis<br>Chi-Square | Significance |
|--------------|------|------------|----|--------------|------------------------------|--------------|
| IBM          | 2.28 | 1.60       | 7  | 8.36         |                              |              |
| LANIER       | 2.14 | 1.46       | 7  | 7.79         |                              |              |
| WANG         | 4.76 | .59        | 13 | 20.38        |                              |              |
| Total Group  | 3.44 | 1.16       | 27 | 14.00        | 18.121                       | p < .05      |

TABLE XXIX  
ANALYSIS OF CHANGEABLE TYPE STYLE FEATURE RANKINGS BY  
WORD PROCESSING EQUIPMENT CLASS

| Vendor Group | Mean | Std<br>Dev | N  | Mean<br>Rank | Kruskal-Wallis<br>Chi-Square | Significance |
|--------------|------|------------|----|--------------|------------------------------|--------------|
| IBM          | 4.66 | .50        | 9  | 18.50        |                              |              |
| LANIER       | 2.87 | 1.72       | 8  | 8.94         |                              |              |
| WANG         | 4.53 | .66        | 13 | 17.46        |                              |              |
| Total Group  | 4.13 | 1.02       | 30 | 15.50        | 7.409                        | p < .05      |

TABLE XXX

ANALYSIS OF PROPORTIONAL SPACING FEATURE RANKINGS BY  
WORD PROCESSING EQUIPMENT CLASS

| Vendor Group | Mean | Std Dev | N  | Mean Rank | Kruskal-Wallis Chi-Square | Significance |
|--------------|------|---------|----|-----------|---------------------------|--------------|
| IBM          | 4.30 | 1.25    | 10 | 21.30     |                           |              |
| LANIER       | 1.42 | .78     | 7  | 6.71      |                           |              |
| WANG         | 3.00 | 1.41    | 12 | 14.58     |                           |              |
| Total Group  | 3.06 | 1.23    | 29 | 15.00     | 12.817                    | p < .05      |

TABLE XXXI

ANALYSIS OF 15 PITCH FEATURE RANKINGS BY  
WORD PROCESSING EQUIPMENT CLASS

| Vendor Group | Mean | Std Dev | N  | Mean Rank | Kruskal-Wallis Chi-Square | Significance |
|--------------|------|---------|----|-----------|---------------------------|--------------|
| IBM          | 2.00 | 2.00    | 4  | 10.00     |                           |              |
| LANIER       | 1.28 | .75     | 7  | 7.57      |                           |              |
| WANG         | 3.50 | 1.67    | 12 | 15.25     |                           |              |
| Total Group  | 2.56 | 1.52    | 23 | 12.00     | 7.257                     | p < .05      |

TABLE XXXII

ANALYSIS OF VARIABLE LINE SPACING FEATURE RANKINGS BY  
WORD PROCESSING EQUIPMENT CLASS

| Vendor Group | Mean | Std Dev | N  | Mean Rank | Kruskal-Wallis Chi-Square | Significance |
|--------------|------|---------|----|-----------|---------------------------|--------------|
| IBM          | 3.62 | .74     | 8  | 11.44     |                           |              |
| LANIER       | 3.77 | .97     | 9  | 13.00     |                           |              |
| WANG         | 4.53 | .96     | 13 | 19.73     |                           |              |
| Total Group  | 4.06 | .91     | 30 | 15.50     | 6.334                     | p < .05      |

TABLE XXXIII

ANALYSIS OF CONTINUOUS ENVELOPES FEATURE RANKINGS BY  
WORD PROCESSING EQUIPMENT CLASS

| Vendor Group | Mean | Std<br>Dev | N  | Mean<br>Rank | Kruskal-Wallis<br>Chi-Square | Significance |
|--------------|------|------------|----|--------------|------------------------------|--------------|
| IBM          | 5.00 | .00        | 4  | 9.50         |                              |              |
| LANIER       | 1.60 | 1.34       | 5  | 3.70         |                              |              |
| WANG         | 2.50 | 2.12       | 2  | 4.75         |                              |              |
| Total Group  | 3.00 | 1.20       | 11 | 6.00         | 8.315                        | p < .05      |

TABLE XXXIV

ANALYSIS OF USER PROGRAMMABLE KEYS FEATURE RANKINGS BY  
WORD PROCESSING EQUIPMENT CLASS

| Vendor Group | Mean | Std<br>Dev | N  | Mean<br>Rank | Kruskal-Wallis<br>Chi-Square | Significance |
|--------------|------|------------|----|--------------|------------------------------|--------------|
| IBM          | 4.50 | 1.00       | 4  | 12.00        |                              |              |
| LANIER       | 2.60 | 2.19       | 5  | 7.90         |                              |              |
| WANG         | 1.50 | 1.22       | 6  | 5.42         |                              |              |
| Total Group  | 2.66 | 1.57       | 15 | 8.00         | 6.392                        | p < .05      |

TABLE XXXV

ANALYSIS OF SHEET FEEDER FEATURE RANKINGS BY  
WORD PROCESSING EQUIPMENT CLASS

| Vendor Group | Mean | Std<br>Dev | N  | Mean<br>Rank | Kruskal-Wallis<br>Chi-Square | Significance |
|--------------|------|------------|----|--------------|------------------------------|--------------|
| IBM          | 4.90 | .31        | 10 | 19.30        |                              |              |
| LANIER       | 3.16 | 1.83       | 6  | 9.50         |                              |              |
| WANG         | 4.30 | .94        | 13 | 14.23        |                              |              |
| Total Group  | 4.27 | 1.04       | 29 | 15.00        | 6.860                        | p < .05      |

TABLE XXXVI

ANALYSIS OF CONTINUOUS PAPER FEATURE RANKINGS BY  
WORD PROCESSING EQUIPMENT CLASS

| Vendor Group | Mean | Std<br>Dev | N  | Mean<br>Rank | Kruskal-Wallis<br>Chi-Square | Significance |
|--------------|------|------------|----|--------------|------------------------------|--------------|
| IBM          | 2.50 | 1.76       | 6  | 9.08         |                              |              |
| LANIER       | 2.16 | 1.83       | 6  | 8.33         |                              |              |
| WANG         | 4.46 | 1.12       | 13 | 16.96        |                              |              |
| Total Group  | 3.44 | 1.47       | 25 | 13.00        | 9.000                        | p < .05      |

TABLE XXXVII

ANALYSIS OF SORTING FEATURE RANKINGS BY  
WORD PROCESSING EQUIPMENT CLASS

| Vendor Group | Mean | Std<br>Dev | N  | Mean<br>Rank | Kruskal-Wallis<br>Chi-Square | Significance |
|--------------|------|------------|----|--------------|------------------------------|--------------|
| IBM          | 4.75 | .46        | 8  | 18.00        |                              |              |
| LANIER       | 2.20 | 1.78       | 5  | 6.40         |                              |              |
| WANG         | 3.81 | .75        | 11 | 11.27        |                              |              |
| Total Group  | 3.79 | .97        | 24 | 12.50        | 9.739                        | p < .05      |

TABLE XXXVIII

ANALYSIS OF OVERPRINT FEATURE RANKINGS BY  
WORD PROCESSING EXPERIENCE CLASS

| Experience Class | Mean | Std Dev | N  | Mean Rank | Kruskal-Wallis Chi-Square | Significance |
|------------------|------|---------|----|-----------|---------------------------|--------------|
| 1-11 Months      | 1.20 | .44     | 5  | 6.80      |                           |              |
| 12-23 Months     | 1.57 | .78     | 7  | 8.86      |                           |              |
| Over 24 Months   | 3.22 | 1.56    | 9  | 15.00     |                           |              |
| Total Group      | 2.19 | 1.15    | 21 | 11.00     | 7.850                     | p < .05      |

TABLE XXXIX

ANALYSIS OF SUPERSCRIPTS/SUBSCRIPTS FEATURE RANKINGS BY  
WORD PROCESSING EXPERIENCE CLASS

| Experience Class | Mean | Std Dev | N  | Mean Rank | Kruskal-Wallis Chi-Square | Significance |
|------------------|------|---------|----|-----------|---------------------------|--------------|
| 1-11 Months      | 2.00 | 1.73    | 7  | 8.29      |                           |              |
| 12-23 Months     | 3.20 | 1.61    | 10 | 12.10     |                           |              |
| Over 24 Months   | 4.70 | .67     | 10 | 19.90     |                           |              |
| Total Group      | 3.44 | 1.37    | 27 | 14.00     | 10.853                    | p < .05      |

TABLE XL

ANALYSIS OF VARIABLE LINE SPACING FEATURE RANKINGS BY  
WORD PROCESSING EXPERIENCE CLASS

| Experience Class | Mean | Std Dev | N  | Mean Rank | Kruskal-Wallis Chi-Square | Significance |
|------------------|------|---------|----|-----------|---------------------------|--------------|
| 1-11 Months      | 4.00 | 1.00    | 9  | 14.89     |                           |              |
| 12-23 Months     | 3.54 | .93     | 11 | 11.14     |                           |              |
| Over 24 Months   | 4.70 | .67     | 10 | 20.85     |                           |              |
| Total Group      | 4.06 | .87     | 30 | 15.50     | 7.508                     | p < .05      |

TABLE XLI

ANALYSIS OF USER PROGRAMMABLE KEY FEATURE RANKINGS BY  
WORD PROCESSING EXPERIENCE CLASS

| Experience Class | Mean | Std Dev | N  | Mean Rank | Kruskal-Wallis Chi-Square | Significance |
|------------------|------|---------|----|-----------|---------------------------|--------------|
| 1-11 Months      | 4.00 | 1.73    | 5  | 10.70     |                           |              |
| 12-23 Months     | 3.00 | 2.00    | 5  | 8.80      |                           |              |
| Over 24 Months   | 1.00 | .00     | 5  | 4.50      |                           |              |
| Total Group      | 2.66 | 1.52    | 15 | 8.00      | 6.196                     | p < .05      |

unanimous in agreeing that they had this feature (n = 10). The IBM ranking on this feature was above the ranking for the other groups. Table XXIII shows that IBM users were below average in the usefulness rankings of the global delete (GLOBALD) feature.

Tables XXIV through XXVI indicate that Wang users rated global replace (GLOBALR), automatic headers and footers (AUTOHF), and page numbering (PNAUTO) higher than other vendor groups. Global replace (GLOBALR) is important for manuscripts and other textual material that involves considerable editing and numerous drafts. Automatic headers and footers (AUTOHF) and page numbering (PNAUTO) are page formatting features that help control the appearance of the printed page.

Tables XXVII and XXVIII show that overprint (CAOVERP) and superscripts and subscripts (CASUPER) were rated about twice as useful by Wang users as by other users. The specialized nature of much of the engineering/scientific text processed by Wang users in this study make those features useful. Superscripts and subscripts (CASUPER) in particular was significant at the .05 level.

Table XXIX shows changeable type styles (TYPESTYL) rated lower by Lanier users than by other groups. Most of the Lanier users were in law firms or other settings where a variety of type styles was not particularly needed or useful.

Table XXX shows that proportional spacing (PC11) was more highly rated by IBM users than other groups. Perhaps this rating was due to the large volume of correspondence handled by most of the IBM users in this study.

Wang users worked with larger documents than other user groups, and 15 pitch (PC15) would help compress these very large documents into a smaller number of pages. Table XXXI shows that Wang users rated 15 pitch (PC15) more useful than other user groups.

Table XXXII shows that Wang users rated variable line spacing (VARILS) higher than did other user groups. In general, Wang users rated the features that allowed more control over the printed page higher than the other vendor groups. Automatic headers and footers (AUTOHF) (Table XXV), page numbering (PNAUTO) (Table XXVI), overprint (CAOVERP) (Table XXVII), superscripts and subscripts (CASUPER) (Table XXVIII), 15 pitch (PC15) (Table XXXI), and variable line spacing (VARILS) (Table XXXII) were examples of this finding. Wang users also ranked continuous paper (PHSHCONT) higher than the other vendor groups (See Table XXXVI). This was due, in part, to the centralized location of printers which were shared by users involved in scientific work, and the need for many intermediate drafts of textual material.

Tables XXXIV through XXXVII show that IBM users rated a variety of features in the miscellaneous area higher than other user groups. The user programmable key (USERPRGK) was a miscellaneous feature ranked higher by IBM users than other vendor groups (See Table XXXIV). Paper handling features ranked higher by IBM users included sheet feeder (PHSHFED) (Table XXXV), and continuous envelopes (PHENCONT) (Table XXXVI). Because of the large volume of correspondence and individual letters done by IBM users, these features were highly rated. The feature sorting (SORTING) was also highly rated by IBM

users (Table XXXVII) because of the constant need to sort church lists and address files.

The Kruskal-Wallis analysis was also used to highlight significant differences among response means for the three classes of word processing experience. In general, fewer significant differences were found than when vendor group was used as the independent variable. Tables XXXVIII through XLI present these findings. Three features, overprint (CAOVERP), superscripts and subscripts (CASUPER), and variable line spacing (VARILS), were ranked highest by users having the most experience. Overprint (CAOVERP) (Table XXXVIII) and superscripts and subscripts (CASUPER) (Table XXXIX), were ranked consistently with the users with the least experience assigning the lowest ratings. Ratings for variable line spacing (VARILS) (Table XL) were inconsistent in that the middle experience class gave the feature lower rankings than did the other experience groups.

Table XLI shows a reverse pattern for the feature user programmable keys (USERPRGK). Evidently, the greater the word processing experience, the less highly rated user programmable keys (USERPRGK) was as a feature.

#### Analysis of Features by Factor Analysis

Because of the physical limitations of the computer available for data analysis for this study, it was impossible to perform a factor analysis that considered all sixty-seven features at once. An attempt at such an analysis with only thirty-three cases (users) would have probably resulted in meaningless and uninterpretable results.

As a general rule there should be four or five times as many observations as there are variables to be analyzed. This ratio is somewhat conservative, and in many instances the researcher is forced to factor analyze a set of variables when only a ratio of twice the observations to the number of variables is available (Hair, 1979, p. 219).

This rule of two observations to one variable was met in all but one of the following factor analyses.

The features included in the questionnaire were broken down into four primary groups: recording, revision, printing, and miscellaneous. The features were factor analyzed by these four subsets. Table XLIII shows the rotated factor matrix for the seventeen recording variables. One of the difficulties of constructing the questionnaire for this study was reducing the number of questions/features from a much larger master list. Factor analysis showed that this list could be simplified even more. Table XLII shows that the seventeen questions on recording could adequately be summarized as seven distinct factors. High factor loadings are underlined in Table XLII and subsequent tables. Dotted lines under factor scores indicate where variables loaded moderately high on two or more factors or where a variable was difficult to classify.

Factor 1 was entitled "auto underlining." Continuous underlining (ATOUNDRC), word-by-word underlining (ATOUNDRW), single underlining (ATOUNDRS), and double underlining (ATOUNDRD) all had high factor loadings on this factor. Factor 2 was called "line construction." Its primary constituents were vertical lines (LINECONV), and horizontal lines (LINECONH). Spelling verification (SPELVERF) and user generated dictionary (SPELUSER) loaded high on the third factor,

TABLE XLII

FACTOR LOADINGS FOR RECORDING VARIABLES  
VARIMAX ROTATED FACTOR MATRIX

|            | FACTOR 1      | FACTOR 2      | FACTOR 3      | FACTOR 4      | FACTOR 5      | FACTOR 6      | FACTOR 7      |
|------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| AUTO CRWR  | .16466        | -.06440       | -.01887       | .03315        | -.02726       | .12135        | <u>.63716</u> |
| AUTO CENT  | .21810        | -.40050       | -.04523       | -.07448       | .21861        | .10699        | <u>.43031</u> |
| ATOUNDR C  | <u>.54713</u> | -.38782       | .15932        | -.17976       | .09743        | .15308        | .06126        |
| ATOUNDR W  | <u>.78102</u> | .24027        | .21263        | .19690        | -.09865       | -.07609       | .08540        |
| ATOUNDR S  | <u>.90336</u> | -.09786       | .04451        | -.00817       | -.06152       | -.01246       | .10328        |
| ATOUNDR D  | <u>.80107</u> | -.08994       | -.00502       | -.06809       | .01992        | .26080        | .18611        |
| ATO IN DEN | -.10756       | -.05214       | .48900        | .14486        | .10379        | .01670        | .10504        |
| HYPHEN     | .02682        | .03710        | .25758        | <u>.51640</u> | -.34932       | .13844        | .13580        |
| ATODECT B  | -.06792       | .08601        | -.14147       | <u>.94088</u> | .04102        | -.00909       | -.09110       |
| FORMCHNG   | .17886        | -.00279       | .05093        | .02443        | -.05000       | <u>.90276</u> | .21113        |
| GLOSSARY   | -.09664       | .10802        | .32591        | -.02060       | <u>.92865</u> | -.02210       | .05357        |
| ATOCOLUM   | .05707        | .34753        | .37243        | -.17349       | -.15101       | -.23741       | .15801        |
| LINECONV   | -.11252       | <u>.94299</u> | -.03743       | -.04608       | .05979        | .23791        | -.11415       |
| LINECONH   | .04163        | <u>.77055</u> | .04455        | .13153        | .11526        | -.13673       | -.06591       |
| SPEL VERF  | .18639        | -.01695       | <u>.83179</u> | -.10128       | -.00706       | .02700        | -.12990       |
| SPELUSER   | .29594        | .13053        | <u>.64973</u> | -.04786       | .25736        | .09947        | -.18759       |
| PAGREPAG   | .17113        | -.00537       | .31939        | .31050        | .19444        | -.12728       | .11613        |

and thus it was called "spelling dictionary." The primary variable in factor 4 was decimal tab alignment (ATODECTB), although hyphenation (HYPHEN) loaded higher on this factor than on any other. These two features were not as closely related as most of those that loaded high on other factors. Factor 4 was labeled "automatic decimal tab alignment/hyphenation." A single variable, glossary storage (GLOSSARY), determined factor 5. Likewise, format changes (FORMCHNG) determined factor 6. Factor 7 consisted of word wraparound (AUTOCRWR) and automatic centering (AUTOCENT). Again, these features were not as closely related as the groups of features in the first three factors. This factor was called "automatic return and centering/word wraparound."

Table XLIII shows the results of factor analysis applied to the eleven revision variables. Factor 1 was called "global search features" because global delete (GLOBALD), global replace (GLOBALR), global find (GLOBALF), and global pass (GLOBALPS) all loaded high on this factor. Citations generator (CITATGEN) loaded higher on factor 1 than on any other factor but not with as high a loading(s) as the previously mentioned four features. Citations generator (CITATGEN) ranked fourth lowest (on Table IX, p. 47) in terms of usefulness. Factor 2 was called "copy/move blocks of text" because block copy and move (COPYMOVB) loaded very high on this factor. The four "COPYMOV" features did not all load high on a single factor as did the global search features (and several sets on Table XLII). The other three copy/move features--document copy and move (COPYMOVE), column copy and move (COPYMOVEC), and link files (COPYMOVL) did constitute factor 4

TABLE XLIII

FACTOR LOADINGS FOR REVISION VARIABLES  
VARIMAX ROTATED FACTOR MATRIX

|           | FACTOR 1      | FACTOR 2      | FACTOR 3      | FACTOR 4      |
|-----------|---------------|---------------|---------------|---------------|
| GLOBALD   | <u>.84329</u> | .19911        | .05273        | .11035        |
| GLOBALR   | <u>.81788</u> | .47413        | .12842        | .20191        |
| GLOBALF   | <u>.54513</u> | .41234        | .13995        | -.06655       |
| GLOBALPS  | <u>.64079</u> | .17817        | .34532        | .19136        |
| COPYMOVE  | .10504        | .40938        | .24176        | <u>.47602</u> |
| COPYMOVB  | .20230        | <u>.89587</u> | .10720        | .18351        |
| COPYMOV C | .01854        | <u>.03019</u> | -.09346       | <u>.62862</u> |
| COPYMOVL  | .40435        | .18633        | .32415        | <u>.48446</u> |
| INDEXGEN  | .25612        | .09343        | <u>.79951</u> | -.09575       |
| CITATGEN  | .45154        | -.10903       | <u>.19253</u> | .00372        |
| TCONTGEN  | .12284        | .10094        | <u>.68817</u> | .10226        |

which was called "copy/move columns, documents; link multiple files." Index generator (INDEXGEN) and table of contents generator (TCONTGEN) make up factor 3, called "index/table of contents generator." Thus eleven revision variables were summarized as four factors.

Table XLIV shows the results of factor analysis applied to the twenty-four printing variables. This analysis was the only factor analysis where the number of observations (thirty-three users) was not approximately more than double the number of variables used in the factor analysis. The results should therefore be interpreted with caution.

The common element of factor 1 appeared to be type style. Changeable type styles (TYPESTYL), proportional spacing (PC11), 12 pitch (PC12), bold characters (CABOLD), and Roman numeral page numbering (PNROMAN) were all elements of this factor. General page appearance was factor 2. Automatic headers and footers (AUTOHF), page numbering (PNAUTO), flexible page numbers (PNLOCAT), and superscripts and subscripts (CASUPER) all loaded high on factor 2. Factor 3 included specialized or seldom used page appearance characteristics, including floating footnotes (FLOATFOT), overprint (CAOVERP), and use of 15 pitch (PC15). Factor 4 consisted of two often used features--printing parts of a file (PRINTSPG) and the standard 10 pitch type (PC10) for many word processing applications. Simultaneous input and output (SIMULTIO) and overstrike (CASTRIKE) also loaded moderately high on this factor. The ability to repeat copies (PRINTRPG) and widow and orphan line protection (WIDOWORP) were two rather distant features (from each other) that loaded high on

TABLE XLIV

FACTOR LOADINGS FOR PRINTING VARIABLES  
VARIMAX ROTATED FACTOR MATRIX

|          | FACTOR 1 | FACTOR 2 | FACTOR 3 | FACTOR 4 | FACTOR 5 | FACTOR 6 | FACTOR 7 | FACTOR 8 | FACTOR 9 |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| MERGE    | .23669   | .05649   | .05847   | .14013   | .10084   | -.03418  | .75189   | -.15887  | -.07999  |
| AUTOHF   | -.04986  | .74815   | .26625   | .22967   | -.00552  | .08257   | .14566   | .11151   | -.12645  |
| FLOATFOT | .41192   | .23358   | .68124   | -.22092  | -.17561  | .26016   | .20109   | .08294   | .02361   |
| JUSTIF   | .02423   | .11499   | .07072   | .03812   | .04518   | .69915   | -.15094  | .11682   | -.05140  |
| DCALIGN  | -.05152  | .30967   | .44888   | -.16235  | .07180   | .38737   | -.66052  | -.26744  | .02869   |
| PNAUTO   | -.10204  | .82190   | .15721   | .07199   | -.14685  | .05029   | -.21448  | .14962   | -.09583  |
| PNLOCAT  | .17061   | .73876   | .01853   | -.17268  | .03983   | .24415   | .05629   | .05218   | .40254   |
| PNROMAN  | .50943   | .46758   | .32769   | -.10456  | .03683   | .09275   | .19736   | .25111   | .12598   |
| WIDOWORP | .07399   | -.03529  | .15122   | .18487   | .69081   | .10888   | .08970   | .02272   | .29812   |
| PAUSETTE | .01696   | .04393   | .10804   | -.25250  | .33519   | -.07819  | .01865   | .05262   | .01769   |
| TYPEMODE | .09893   | -.02915  | -.10032  | -.04322  | .13110   | -.07819  | -.05223  | -.04969  | .62386   |
| PRINTSPG | .18593   | .00602   | .20946   | .67629   | .11404   | -.17093  | .12935   | -.09678  | .02395   |
| PRINTRPG | .02982   | -.12378  | -.25261  | .11840   | .91680   | .09888   | -.01688  | -.21401  | -.05955  |
| SIMULTIO | .13288   | .15106   | .19170   | .48022   | .19329   | .52138   | .26370   | -.06697  | .01479   |
| CABOLD   | .72520   | -.10844  | .03390   | .10704   | -.00136  | .19650   | .18831   | .09136   | .11315   |
| CAOVERP  | .17186   | .27135   | .65381   | -.00544  | -.02991  | -.08425  | -.12468  | .29173   | .06251   |
| CASTRIKE | -.29268  | .16651   | .25533   | .47308   | -.00658  | .10746   | -.10600  | .43393   | .51308   |
| CASUPER  | .08223   | .55069   | .40945   | -.06356  | .04730   | -.33502  | -.39015  | .22930   | -.33982  |
| TYPESTYL | .75122   | .24487   | .03595   | .37623   | .11971   | -.10734  | -.16019  | -.01217  | -.26857  |
| PC10     | .12345   | .03330   | -.22973  | .55840   | -.01552  | .23388   | .08619   | .07677   | -.06531  |
| PC11     | .69753   | -.04690  | .11862   | .02934   | -.04138  | .12186   | .13800   | -.01744  | .05808   |
| PC12     | .82071   | .02396   | .21858   | .05988   | .19386   | -.39698  | -.02044  | -.03265  | .04676   |
| PC15     | .15755   | .16152   | .63929   | .21959   | .15480   | .13747   | -.03897  | -.07508  | -.25080  |
| VARILS   | .08676   | .26554   | .09923   | -.04953  | -.09463  | .10799   | -.07574  | .84556   | -.05211  |

factor 5. Factor 6 included right justification (JUSTIF) and simultaneous input and output (SIMULTIO), and the capability of handling two tasks at once (e.g. editing and printing). Factor 7 included the merging of files (MERGE) and double-column alignment (DCALIGN). Variable line spacing (VARILS) constituted factor 8. The high loading variables on factor 9 were typewriter mode (TYPEMODE) and overstrike (CASTRIKE).

Table XLV summarizes the fifteen miscellaneous features in six factors. Although sorting (SORTING) was the highest variable on factor 1, communication with the main computer (COMCOMP) and continuous paper (PHSHCONT) and continuous envelopes (PHENCONT) were also present. All four of these features have elements of a main computer system. Virtually all printing on larger computer systems is done via continuous paper (or forms). Larger computer systems are used for sorting in numerous applications and are often required to communicate with other computer systems. Factor 1 was named "computer-like capabilities." Factor 2 was entitled "special feeders" and consisted of sheet feeder (PHSHFED) and envelope feeder (PHENFED). Factor 3 was called "computer-like capabilities--II" or "advanced/extended capabilities." Factor 3 consisted of fairly specialized features such as math packages (MATH), graphics (GRAPHICS), and user programmability (USERPROG). The user programmable keys (USERPRGK) also loaded moderately high on this factor. Factor 4 was called "IBM features." Both menu bypass (MENUBYPS) and communication with other word processors (COMWP) were found more often on IBM equipment. Factor 5 was the ten-key pad (TENKEYPD). Factor 6 could probably be

TABLE XLV

FACTOR LOADINGS FOR MISCELLANEOUS VARIABLES  
VARIMAX ROTATED FACTOR MATRIX

|          | FACTOR 1      | FACTOR 2      | FACTOR 3      | FACTOR 4      | FACTOR 5      | FACTOR 6      |
|----------|---------------|---------------|---------------|---------------|---------------|---------------|
| MENUBYPS | .21089        | .16724        | .03554        | <u>.91055</u> | .00739        | .19803        |
| PASSWORD | .07268        | -.00543       | -.07523       | .11598        | <u>.43383</u> | -.25459       |
| TENKEYPD | -.08132       | .06324        | .19454        | -.22326       | <u>.94086</u> | .08439        |
| USERPRGK | .15531        | .16083        | .39577        | .23770        | -.04177       | <u>.44270</u> |
| PHSHFED  | .12355        | <u>.62113</u> | -.04198       | .22324        | .10277        | .04845        |
| PHSHCONT | <u>.41893</u> | -.11833       | .22413        | -.07493       | -.06326       | -.41885       |
| PHENFED  | .07027        | <u>.83430</u> | .03325        | .00146        | -.03384       | .17147        |
| PHENCONT | <u>.59831</u> | .39214        | .13579        | .07304        | -.14321       | .17979        |
| MATH     | -.01175       | -.14492       | <u>.63496</u> | .21557        | .35262        | -.11942       |
| GRAPHICS | .25848        | .17818        | <u>.48481</u> | .11743        | -.04408       | -.26311       |
| MULTI    | .19209        | .17351        | -.23553       | .12242        | -.18239       | <u>.73570</u> |
| SORTING  | <u>.93881</u> | .04036        | .01041        | .21333        | .12066        | .11348        |
| COMWP    | .34897        | .47363        | .14174        | <u>.55012</u> | -.32746       | .00060        |
| COMCOMP  | <u>.60877</u> | .33918        | .27004        | .32758        | -.00931       | -.03832       |
| USERPROG | .09168        | .00632        | <u>.71299</u> | -.10924       | -.02845       | -.00031       |

ignored. Multilingual capabilities (MULTI), which loaded high on this factor, was the second lowest rated feature on Table IX, p. 47). User programmable keys (USERPRGK), which was also fairly high on factor 6, was described in conjunction with factor 3. Continuous paper (PHSHCONT) was surprisingly high on factor 6 and negatively related to this factor. Therefore no name was assigned to factor 6.

In summary, factor analysis was a useful tool in reducing the number of main issues in the set of questions to a more manageable level. Only in the area of printing variables was this analysis not particularly successful, probably due in part to the large number of variables relative to the small number of cases. Table XLVI contains a list of twenty-six questions based on the above factor analysis that summarizes the initial sixty-seven questions on the questionnaire.

#### Analysis by Users

Table XLVII presents a "Q" factor analysis by respondents. At least nine pairs of users in the same department, location, or work area were loaded on the same factor. The pairs of users were as follows:

IBM01 and IBM02  
IBM03 and IBM04  
IBM05 and IBM06 (IBM10 was in the same organization  
but different department)  
IBM07, IBM08, and IBM09 (all three in the same  
department)  
LANIER05 and LANIER06  
WANG01 and WANG02  
WANG03 and WANG05  
WANG06, WANG11, and WANG12 (all three in the same  
department)  
WANG08 and WANG10

TABLE XLVI

REVISED QUESTIONNAIRE BASED ON FACTOR ANALYSIS  
OF USER RESPONSES REGARDING USEFULNESS  
OF PARTICULAR FEATURES

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RECORDING FEATURES:

1. Are there adequate underlining features to meet your requirements?
2. Is vertical and horizontal line construction adequate?
3. Are the spelling packages and related updating procedures sufficient for your needs?
4. Are alignment features adequate, including decimal tab alignment and automatic hyphenation (making a more evenly aligned right hand margin)?
5. Is a glossary-phrase storage feature present?
6. Are format changes within a document easily accomplished?
7. Are the standard convenience features for text entry present, including automatic centering and automatic carrier return with word wraparound?

REVISION FEATURES:

1. Are the global search (find, delete, or replace) features adequate for your editing needs?
2. Can blocks of text be easily moved or copied?
3. Are the other copy/move capabilities of the equipment adequate, including copying columns, linking several files, or copying entire documents?
4. Can an index or table of contents be automatically generated?

PRINTING FEATURES

1. Are the various type styles available on the equipment adequate for your needs?

TABLE XLVI (Continued)

- 
2. Do you have enough control over page appearance (automatic headers, footers, and page numbers, flexible page number locations, and super/subscript capabilities) with this equipment?
  3. Do you need specialized page appearance features, including overprinting and printing footnotes?
  4. Do you need the ability to print only selected parts of a document or the ability to print while continuing other text editing activities?
  5. Do you need widow and orphan line protection?
  6. Do you need right-justified margins?
  7. Do you need the ability to merge address or text files or to handle specialized alignment problems (double column alignment)?
  8. Do you need variable line spacing capabilities (1/2, 1, 1 and 1/2, etc.)?
  9. Do you need to be able to use the equipment as a typewriter (typewriter mode and overstriking selected portions of printed text)?

MISCELLANEOUS FEATURES

1. Do you need "computer-like" capabilities on your equipment (ability to sort various fields in alphabetic or numeric order, the ability to communicate with the firm's main computer system, and the ability to print on continuous forms)?
  2. Do you need special paper feeding equipment such as sheet and envelope feeders?
  3. Do you need advanced "computer-like" capabilities such as user programmable "soft" keys or graphics or math packages?
  4. Do you need the ability to bypass time-consuming "menus" once you have learned the system well?
  5. Do your applications require a ten-key number pad?
  6. Do you need multilingual capabilities?
-

TABLE XLVII

FACTOR LOADINGS FOR INDIVIDUAL RESPONDENTS  
VARIMAX ROTATED FACTOR MATRIX

|          | FACTOR 1 | FACTOR 2 | FACTOR 3 | FACTOR 4 | FACTOR 5 | FACTOR 6 | FACTOR 7 | FACTOR 8 | FACTOR 9 |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| IBM01    | .17398   | .17544   | .10755   | .15796   | .09904   | .11462   | .70251   | .22604   | .17777   |
| IBM02    | .24151   | .30893   | .00216   | .12454   | .40094   | -.00515  | .49696   | -.05794  | .21204   |
| IBM03    | .29890   | .20010   | -.08316  | .69864   | .09904   | .15370   | .20377   | .17514   | .20202   |
| IBM04    | .24252   | .19988   | .11284   | .67644   | .09090   | .23332   | .28613   | -.14597  | .04068   |
| IBM05    | .34635   | -.06016  | .66023   | .06260   | -.02732  | .14491   | .12303   | .04626   | .12543   |
| IBM06    | .36088   | .22738   | .54452   | .20002   | -.13025  | .32044   | .19218   | .11688   | .25846   |
| IBM07    | .30950   | .09104   | .53086   | .13126   | .17157   | .15368   | -.07844  | .17214   | .04062   |
| IBM08    | .82992   | .02217   | .28234   | .12518   | -.02463  | .01037   | .13338   | .11316   | -.12347  |
| IBM09    | .87646   | .00949   | .22811   | .13081   | .13861   | .04651   | .14241   | .12815   | -.03259  |
| IBM10    | .80938   | -.00036  | -.04579  | .10528   | .12398   | .10570   | .05320   | .08734   | .12618   |
| LANIER01 | .22833   | .45887   | -.01182  | .35935   | .58466   | .10298   | .07329   | -.02509  | .05336   |
| LANIER02 | .23247   | .08713   | .05225   | .27966   | .40167   | .16417   | .43198   | .08258   | -.00757  |
| LANIER03 | -.15309  | .20541   | .16290   | .12023   | .48439   | .21657   | .01825   | .11528   | .13426   |
| LANIER04 | .35123   | .32013   | .23519   | .00953   | .32069   | -.08034  | .36414   | .11576   | -.19051  |
| LANIER05 | -.07733  | .83025   | .00896   | .14590   | .17102   | .03220   | .12549   | .12893   | .16734   |
| LANIER06 | .10375   | .83751   | .20131   | .06066   | .20612   | .17355   | .18253   | .17123   | .00585   |
| LANIER07 | .39263   | .26805   | .31011   | .11423   | .26743   | .17639   | .27567   | .16320   | -.14517  |
| LANIER08 | -.02213  | .11126   | .21152   | .15846   | .11565   | -.03404  | .10600   | .09415   | .73215   |
| LANIER09 | .27151   | .11407   | .09980   | .00298   | .61713   | .09547   | .18606   | .16983   | .03736   |
| LANIER10 | .10373   | .40847   | .16564   | .20568   | .02121   | .05825   | .44380   | .32600   | -.20889  |
| WANG01   | .26897   | .19693   | .21555   | .08931   | .20075   | .22263   | .11998   | .64972   | .12424   |
| WANG02   | .30436   | .29754   | .06410   | .18489   | .06129   | .25665   | .15208   | .60767   | .12956   |
| WANG03   | .07231   | .01401   | .40269   | .70911   | .09961   | .08499   | -.07113  | .32647   | .06269   |
| WANG04   | .05978   | .05306   | .21940   | .38383   | .09006   | .46732   | .26693   | .03975   | -.02985  |
| WANG05   | -.02471  | .34771   | .25575   | .42187   | .24304   | .08297   | .21163   | .36883   | .06799   |
| WANG06   | .00064   | .05428   | .28414   | .47171   | .40329   | .17784   | .10592   | .18909   | .08547   |
| WANG07   | .15226   | -.06372  | .13703   | .29103   | .00953   | .52288   | -.08851  | .30753   | -.12346  |
| WANG08   | .02258   | .28785   | .08366   | .12006   | .16871   | .80675   | .07872   | .09847   | -.09568  |
| WANG09   | .09981   | .07444   | .22394   | .11003   | .38073   | .07825   | .28461   | .44784   | -.03712  |
| WANG10   | -.07994  | .17965   | .43363   | .20739   | .25959   | .43002   | .02318   | .29495   | .04148   |
| WANG11   | .02398   | .31679   | .58640   | .18021   | .30449   | .11062   | .11491   | .18715   | .00239   |
| WANG12   | -.01048  | .06315   | .44509   | .08621   | .17431   | .22342   | .36203   | .01886   | .14745   |
| WANG13   | .14568   | -.06462  | .27569   | .01385   | .13508   | .51440   | .12590   | .07629   | .21594   |

The power of factor analysis was illustrated by this technique's ability to correctly classify many sets of users into categories with their peers merely by the way the operators rated the usefulness of the various features. Only two users were not loaded on the same factor with those they work with. User WANG04 was in the same office with WANG03 and WANG05 (a general word processing service area). She had a substantial loading (.3838) with them on factor 4, but loaded slightly higher on factor 6. However, users WANG08 and WANG10 (in factor 6) were in the same overall firm, and user WANG04 may even have performed work for the department where WANG08 and WANG10 worked. The other user not classified with her cohorts was WANG09. However, she had been with this particular firm for only six weeks, though her total word processing experience was four years. Thus her responses reflected her prior work experience, not her current needs and priorities.

Based on the types of work by the respondents loading high on a particular factor, the factors can be "named" as follows:

- Factor 1 = emphasis on heavy letter output, particularly with merged files
- Factor 2 = law firms and legal applications
- Factor 3 and 4 = general word processing applications including correspondence; also larger documents including journal manuscripts and reports
- Factor 5 = record keeping (financial records at a bank trust department and medical records at a hospital, for example)
- Factor 6 = engineering and project management applications
- Factor 7 = executive secretaries
- Factor 8 = CPA firms
- Factor 9 = architectural firms (particular emphasis on problem solving)

Factors 3 and 4 contained the most diversity, but the other factors contained remarkably similar respondents.

#### Chapter Summary

Feature ratings in Table IX, p. 47, summarize the research findings. Some of the specialized and highly promoted features were given relatively low usefulness ratings. Unless there is a known need for such features as multilingual capabilities and graphics, there is little point in paying extra for such features. To a large extent the more common features found across almost all word processing units, including microcomputers, were rated highest. Word wraparound (AUTOCRWR) was the highest rated of all features. Automatic centering (AUTOCENT), the second highest rated feature, also eliminates the drudgery of manual or electric typewriters--the necessity for exact counting and spacing of centered headings or text and the need to refigure if margins change. Document copy and move (COPYMOVE) and block copy and move (COPYMOVEB) were rated highly, as was continuous underlining (ATOUNDR).

Specialized features such as superscripts and subscripts (CASUPER) are important. Indeed, the Wang users ranked this feature as very important. But most Wang users were engineering/scientific oriented. Their needs called for continuous use of this feature. An organization desiring to use word processing equipment efficiently and effectively must carefully analyze its own needs and make sure that the features to meet those needs are present in the equipment and software that it purchases.

A Kruskal-Wallis one-way analysis of variance by ranks was used to detect significant differences in feature rankings by the various vendor groups. Most differences were explained on the basis of major types of work done by vendors in that group.

Factor analysis was used as a data reduction technique to develop a shorter feature list. Factor analysis was also used to classify many sets of users in categories with their peers by the way the operators rated the usefulness of the various features.

## CHAPTER V

### QUALITATIVE FINDINGS

In addition to collecting responses to the questionnaire, this study attempted to probe more deeply into respondents' recommendations for prospective word processing users. Information was collected on the equipment selection process, operator training, reactions to word processing by peers, and the arrangement of word processing equipment in the office. These qualitative items are summarized in this chapter.

#### Persons Responsible for Equipment Selection

Of the thirty-three word processing operators, representing 15 businesses, 13 (all Wang) indicated that their equipment selection was made at the corporate level; twelve (seven IBM, five Lanier) indicated that management had chosen their equipment without consulting them (two were employed elsewhere at that time). The remaining eight (three IBM, five Lanier) were involved in the equipment selection process. Four represented companies which obtained word processing equipment for the first time. The other four were employed by companies that had previously obtained word processing equipment, and each, incidentally, remained with the same vendor's equipment. Secretaries were involved in purchase decisions when individual, but not multiple, word processors were obtained.

Reasons most frequently given for equipment selection by the eight word processing operators were: ease of learning--5; vendor

reputation--3; communications or data processing capabilities--3, price--2; and vendor support and service--2.

### Suggestions for Word Processing Equipment Selection

Word processing users gave numerous suggestions on equipment selection which have been divided into five areas: (1) determine needs; (2) plan for the future; (3) study features; (4) talk to several vendors; and (5) talk to word processing operators.

#### Determine Needs

Users emphasized that needs should be determined first. No one outside the user's office can determine these needs. If assistance is needed, a potential buyer should find a consultant, or someone who can help outline needs. Too many users make quick purchase decisions before a thorough study is done, and they are disappointed and end up considering the technology a bad investment.

#### Plan for the Future

A second suggestion from users was to plan for future growth. There is a tendency to underestimate what will be needed in the future, and equipment can be outgrown fast. The longer equipment is used, the more applications will be discovered for it. Leasing for a year to be sure the equipment will do the job may be a valid option. Equipment with a broad range of capabilities (e.g. BASIC and CP/M, data processing, or communications with other word processors and main frame computers) should be considered.

### Study Features

Users advised buyers to study the features and their benefits and to try out the features and see how they work. Vendors' equipment may differ in operation for the same feature. Software should be selected first and then the equipment should be purchased to go with it. Equipment must have enough space for the selected software and applications for which it will be used.

### Talk to Several Vendors

A prospective user should talk with a number of vendors and observe equipment demonstrations while focusing on a previously outlined set of needs. Prospective users may request names of current users with similar applications, such as communicating with a mainframe computer, and confer with those persons about software features and their applicability. A data processing manager or another knowledgeable person may be asked to assist in studying vendor-supplied information.

### Talk to Experienced Word Processing Operators

The names of word processing operators can be obtained from vendors. Those operators can be consulted about their likes and dislikes regardless of the type of equipment they use. Vendor claims for equipment and software can be compared with the operators' experience for verification. Technical school or community college personnel may furnish information about choices of equipment or software.

## Training and Recommendations for Operators

When an equipment lease or purchase agreement has been signed, arrangements are made for the operator's training. Operators in this study had advice for prospective users on the subject of training. "Word processors are a marvelous tool that make work easier and save time, so make the most of the initial training sessions," stated one operator.

Most advice reflected experiences of the word processing operators. Operators suggested that initial training be done over a two or three-day period away from the office in a location such as the vendor's office. "If the training has to be done in the office," commented one operator, "have someone else cover for you, lock the door, and don't even let the boss in." Another suggested that anyone purchasing word processing equipment for a secretary who is new on the job at a time when major deadlines are coming up will encounter serious problems in scheduling.

Others suggested that during the training program an open mind and positive attitude are important because the office will always be changing and adaptable secretaries who are willing to try something new will be in great demand. While one operator explained that learning to use the equipment involved only basic principles such as "if you opened it and got into it, you just have to remember to get out of it," another said that the 30-90 day slump that her vendor warned her about actually turned out to be a disaster period of nearly six months. However, she was forced to train herself on the job when

she had a 200-page document two weeks overdue. One seasoned word processing operator suggested that during the training program operators should "crash it, destroy data, and learn that it takes hours to re-enter the information, but there is NOTHING that cannot be reconstructed!"

Another suggested that additional training be taken in the form of computer programming classes especially for those using the equipment for a broader scope than word processing. Classes give a basic understanding of files, moving data around, and the language of computers. Even though programming skills may not be used, a knowledge of what can be done in programming and a knowledge of basic data processing principles are especially important for those involved in communications.

#### How Non Users Related to Equipment

When asked how other non-word processing operators related to word processing, operators listed items in three areas: (1) skill; (2) lack of knowledge; and (3) attitudes.

##### Skill

Comments regarding skills involved operators' genuine concerns that some people would take so long to learn how to use the equipment that it would not be worth it for the company to have them trained. Others indicated that they believed a few people would be incapable of learning to use the equipment. One operator indicated that in her firm word processors had not been purchased in a needed area because

the bosses had not felt the secretaries would learn to use the machines. One operator mentioned that she has been working with two secretaries for nearly two years and still has not been able to teach them more than the basic functions of the word processing equipment. She indicated that one of them had also attended two different formal training classes.

#### Lack of Knowledge

Sometimes opinions are based on a lack of knowledge, and operators mentioned that some of the employees had never seen a word processor before and didn't see a need for one. They did not realize what the machine could do and had no idea what could be accomplished on the equipment. A couple of operators said other secretaries would bring their work to them because all they had to do was "push a button."

#### Attitudes

Attitudes play an important role in the success or failure of potential word processing operators. These operators indicated that some secretaries had no skills in word processing, had no desire to learn, and were too set in their ways to change. Some of these secretaries had the equipment forced on them. Opinions were expressed that possibly the equipment would never be fully utilized unless attitudes were changed.

Some secretaries were afraid of using the word processor, and lacked confidence in their ability to use it. These same people were also curious, liked the machinery, and were anxious to know how it

worked and what could be done with it. Others indicated that, overall, non-word processing users were taking a more positive attitude than in the past; and one operator pointed out that use of word processing equipment had spread rapidly in her company after the first word processor was delivered.

#### Arrangement of Word Processing Equipment in Office

The personal interviews with thirty-three word processing users took place in various locations including offices, reception areas, and conference rooms. The researcher visited twenty-one of the thirty-three word processing operators in their offices and observed the location and arrangement of the word processing equipment. Several operators expressed dissatisfaction with the location of their word processing equipment.

The key problems included printers located three to five feet from the CRTs, and CRTs positioned to one side of the keyboard. The CRTs to one side were often turned at an angle in order to fit on the desk's small typewriter table. One operator had put a piece of plywood under her CRT on the narrow typewriter table in order to allow room for placement of the keyboard in front of the screen. One convenient arrangement had two side-by-side desks with the typewriter tables back-to-back, providing a large area for the CRT and keyboard. The printer was located close to the CRT. Another problem with the location of equipment involved inadequate electrical wiring for a word processing system. A serious problem was solved in one office when dedicated electrical plugs were installed for each CRT and printer.

The arrangement of the word processing equipment was not a problem in word processing centers located in three of the fifteen businesses as special tables, desks, and acoustical partitions had been purchased.

## CHAPTER VI

### SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this chapter is to summarize the study and its findings and present conclusions and recommendations for future research.

#### Summary of Findings

The overall purpose of the study was to aid decision makers in evaluating and acquiring word processing software and hardware by developing a checklist for selection. A list of word processing features was developed and evaluated as part of this study. Thirty-three word processing operators provided information on the usefulness of word processing features of three software packages. These thirty-three operators had a variety of word processing experience and were distributed across a diverse group of businesses and other organizations. A major outcome of this study was the list of features evaluated by usefulness (See Table IX, p. 47). The ten most highly rated features were word wraparound (AUTOCRWR), automatic centering (AUTOCENT), block copy and move (COPYMOVB), document copy and move (COPYMOVE), continuous underlining (ATOUNDRC), format changes (FORMCHNG), pagination (PAGREPAG), simultaneous input and output (SIMULTIO), printing parts of file (PRINTSPG), and sheet feeder (PHSHFED). These highly rated features were often the most common and least specialized features.

There was a surprising degree of uncertainty about the existence of some features on a user's particular word processing system. Most employers and word processing operators wanted to ensure full usage of the capabilities of their equipment if those features were really needed in their applications or would increase productivity.

Pronounced differences in the ratings of a feature across vendor groups were found. Superscript and subscript capability (CASUPER) is a prime example. This feature was rated much more useful by Wang users than by IBM or Lanier users primarily because of the type of work done by the Wang users of this study.

Factor analysis was used to summarize this list of sixty-seven features to a shorter list of twenty-six features (Table XLVI). Table XLVIII presents this shortened list sorted in order of decreasing importance. A potential purchaser of word processing software and equipment could use this sorted list to evaluate a particular product. The higher the question is on the list, the more certain the user should be that the feature or set of features is present.

The qualitative findings include the following suggestions on equipment selection:

- (1) Thoroughly analyze the organization's needs before making a decision.

- (2) Plan and allow for future growth.

- (3) Study and try out important features to see how they work.

Vendors' equipment may differ in operation for the same feature.

TABLE XLVIII

REVISED QUESTIONNAIRE BASED ON FACTOR ANALYSIS  
OF USER RESPONSES SORTED IN ORDER OF  
DECREASING USEFULNESS

- 
1. Are the standard convenience features for text entry present, including automatic centering and automatic carrier return with word wraparound?
  2. Can blocks of text be easily moved or copied?
  3. Are format changes within a document easily accomplished?
  4. Is a glossary-phrase storage feature present?
  5. Do you need the ability to merge address or text files or to handle specialized alignment problems (double column alignment)?
  6. Do you need the ability to print only selected parts of a document or the ability to print while continuing other text editing activities?
  7. Do you need variable line spacing capabilities (1/2, 1, 1 and 1/2, etc.)?
  8. Are there adequate underlining features to meet your requirements?
  9. Are the global search (find, delete, or replace) features adequate for your editing needs?
  10. Do you need special paper feeding equipment such as sheet and envelope feeders?
  11. Do you need right-justified margins?
  12. Are the other copy/move capabilities of the equipment adequate, including copying columns, linking several files, or copying entire documents?
  13. Do you need widow and orphan line protection?
  14. Do you need the ability to bypass time-consuming "menus" once you have learned the system well?

TABLE XLVIII (Continued)

- 
15. Do you have enough control over page appearance (automatic headers, footers, and page numbers, flexible page number locations, and super/subscript capabilities) with this equipment?
  16. Do you need "computer-like" capabilities on your equipment (the ability to sort various fields in alphabetic or numeric order, the ability to communicate with the firm's main computer system, and the ability to print on continuous forms)?
  17. Are alignment features adequate, including decimal tab alignment and automatic hyphenation (making a more evenly aligned right hand margin)?
  18. Are the various type styles available on the equipment adequate for your needs?
  19. Are the spelling packages and related updating procedures sufficient for your needs?
  20. Is vertical and horizontal line construction adequate?
  21. Can an index or table of contents be automatically generated?
  22. Do your applications require a ten-key number pad?
  23. Do you need to be able to use the equipment as a typewriter (typewriter mode and overstriking selected portions of printed text)?
  24. Do you need specialized page appearance features, including overprinting and printing footnotes?
  25. Do you need advanced "computer-like" capabilities such as user programmable "soft" keys or graphics or math packages?
  26. Do you need multilingual capabilities?
-

(4) Talk with several vendors and visit current user sites for each before making the decision.

(5) Talk to the word processing operators at those sites and consult with them about their likes and dislikes regarding their specific configuration.

Table XLVI, p. 84, gives the potential purchaser of word processing software and equipment a concise and powerful tool to use in the acquisition decision. However, since most currently available word processing packages have the more highly ranked features, it is quite possible that the acquisition decision may be based on considerations other than software features. Levels of maintenance and support, price, operator training, and equipment ergonomics are all important considerations. Thus Table XLVI might be used to eliminate a few word processing packages from consideration that do not contain one or more highly rated features.

The Kruskal-Wallis analysis of vendor differences feature rankings highlighted the need for a potential purchaser of word processing software and equipment to be aware of the mix of typical applications to be done on the word processing equipment. The question including superscript and subscript capabilities is number fifteen of twenty-six in Table XLVIII, yet this feature was much more highly ranked by the Wang users because of the nature of their typical applications. Consideration of the specific word processing requirements of the potential purchaser is more important than just checking features off a list. The analysis of specific requirements should take a long-term view. For example, communication capabilities

with other word processors or with the company's mainframe may not be needed currently, yet in several years they may be deemed essential.

Finally, the degree of uncertainty about the existence or nonexistence of specific features on the equipment (See Appendix E) has important implications for managers and supervisors of word processing operators. Operators will not be efficient with a particular word processing system if their learning experience on the equipment terminates with a short training course offered by a vendor. Supervisors should monitor the continual learning process of an operator so that all available features on a particular package are utilized if needed. Only then can peak operator efficiency be realized.

### Conclusions

Based on the findings of this study, the following conclusions are made:

(1) The top-ranked word processing features are part of most word processing software packages and configurations. Therefore, other factors may be more important in the acquisition decision.

(2) Significant differences in vendor group rankings indicate that application mix and type of work performed are important factors in the relative rankings of specific features.

(3) Factor analysis of responses yielded a shorter, summarized checklist of features. Factor analysis also correctly classified sets of users into categories (factors) with peers and shows great

potential for establishing major types of environments for word processing users.

### Recommendations

A number of areas for research are identified as a result of this study:

(1) A similar questionnaire should be used for a larger, random sample (without case study follow-up). Such a study could identify characteristics or features that best discriminate among the previously identified work environments.

(2) The checklist of features developed in this study should be used as a checklist for operators selecting a package to rank order features by their usefulness.

(3) A study could be conducted to address the issue of operator or secretarial input into decisions on the acquisition of word processing equipment. Are operators more contented or satisfied (or possibly even more productive) if they have had a role in the acquisition decision?

(4) Productivity in all areas of business has been a major issue of the last decade. How should productivity be measured in word processing activities? What characteristics distinguish more productive operators from those that are less productive? What can be done to improve productivity of word processing operators?

(5) This study has concentrated on the usefulness of existing features. Additional research should be done to allow the evaluation of the types of work done in a particular office to be linked to the

need for specific features. For example, many word processing operators have little need for superscripts and subscripts. However, the Wang users in this study rated this feature very high because of the nature of their typical applications--scientific/engineering textual material.

Other recommendations include:

(1) Potential purchasers of word processing packages and software are encouraged to utilize one of the two feature checklists presented in this study (See Appendix A and Table XLVI, p. 84).

(2) Potential purchasers should make certain that the more important (highly ranked) features of Tables IX and XLVI (pp. 47, 84) are present in the software or package that they acquire.

(3) Some nonthreatening method should be established for determining the extent of user knowledge regarding the specifics of the word processing package in use. Specifically, operator uncertainty regarding the existence of features on her configuration should be reduced.

(4) Potential purchasers of word processing equipment should carefully analyze their applications mix, determine what features are specifically needed for this mix, and ensure that those features are present in the configurations under consideration. Those features may not be among highly ranked features of Table IX.

Word processing has come of age. More and more organizations are realizing the extensive benefits that result from office automation. Unfortunately, the hardware and software decision is often made

without careful analysis of either the needs of the organization and the capabilities of the word processing hardware/software package. This study should give the potential purchaser of word processing software and equipment the initial questions regarding features.

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## APPENDIXES

APPENDIX A

QUESTIONNAIRE

APPENDIX A  
QUESTIONNAIRE

WORD PROCESSING EQUIPMENT USED: \_\_\_\_\_

Here are features of word processing software packages. For the package which you use, rate the usefulness of each of these features. Circle the "X" that corresponds with your evaluation of the feature. CIRCLE ONE "X" FOR EACH FEATURE LISTED.

| MY WORD PROCESSING PACKAGE: DOES NOT HAVE THESE FEATURES    |            |        | DOES HAVE THESE FEATURES |                 |                 |             |                  |
|-------------------------------------------------------------|------------|--------|--------------------------|-----------------|-----------------|-------------|------------------|
| The feature is:                                             | Not Needed | Needed | Never Used               | Not Very Useful | Somewhat Useful | Very Useful | Extremely Useful |
| <b>RECORDING</b>                                            |            |        |                          |                 |                 |             |                  |
| Automatic carrier return/word wraparound                    | X          | X      | X                        | X               | X               | X           | X                |
| Automatic centering                                         | X          | X      | X                        | X               | X               | X           | X                |
| Automatic underlining:                                      |            |        |                          |                 |                 |             |                  |
| Continuous                                                  | X          | X      | X                        | X               | X               | X           | X                |
| Word-by-Word                                                | X          | X      | X                        | X               | X               | X           | X                |
| Single underline                                            | X          | X      | X                        | X               | X               | X           | X                |
| Double underline                                            | X          | X      | X                        | X               | X               | X           | X                |
| Automatic indent (e.g. quotes)                              | X          | X      | X                        | X               | X               | X           | X                |
| Hyphenation                                                 | X          | X      | X                        | X               | X               | X           | X                |
| Auto. decimal tab alignment                                 | X          | X      | X                        | X               | X               | X           | X                |
| Format changes within document (e.g. 10 & 75, then 20 & 65) | X          | X      | X                        | X               | X               | X           | X                |
| Glossary (phrase storage)                                   | X          | X      | X                        | X               | X               | X           | X                |
| Automatic column layout                                     | X          | X      | X                        | X               | X               | X           | X                |
| Line construction: Vertical                                 | X          | X      | X                        | X               | X               | X           | X                |
| (e.g. charts) Horizontal                                    | X          | X      | X                        | X               | X               | X           | X                |
| Spelling:                                                   |            |        |                          |                 |                 |             |                  |
| word verification dictionary                                | X          | X      | X                        | X               | X               | X           | X                |
| user generated dictionary                                   | X          | X      | X                        | X               | X               | X           | X                |
| Pagination/repagination                                     | X          | X      | X                        | X               | X               | X           | X                |

| MY WORD PROCESSING PACKAGE: DOES NOT HAVE THESE FEATURES |            |        | DOES HAVE THESE FEATURES |                 |                 |             |                  |
|----------------------------------------------------------|------------|--------|--------------------------|-----------------|-----------------|-------------|------------------|
| The feature is:                                          | Not Needed | Needed | Never Used               | Not Very Useful | Somewhat Useful | Very Useful | Extremely Useful |
| REVISION                                                 |            |        |                          |                 |                 |             |                  |
| Global search:                                           |            |        |                          |                 |                 |             |                  |
| Delete                                                   | X          | X      | X                        | X               | X               | X           | X                |
| Replace                                                  | X          | X      | X                        | X               | X               | X           | X                |
| Find                                                     | X          | X      | X                        | X               | X               | X           | X                |
| Pass/Skip                                                | X          | X      | X                        | X               | X               | X           | X                |
| Copy/Move:                                               |            |        |                          |                 |                 |             |                  |
| Entire document                                          | X          | X      | X                        | X               | X               | X           | X                |
| Blocks of text                                           | X          | X      | X                        | X               | X               | X           | X                |
| Columns                                                  | X          | X      | X                        | X               | X               | X           | X                |
| Link several files                                       | X          | X      | X                        | X               | X               | X           | X                |
| Index generator                                          | X          | X      | X                        | X               | X               | X           | X                |
| List of citations generator                              | X          | X      | X                        | X               | X               | X           | X                |
| Table of contents generator                              | X          | X      | X                        | X               | X               | X           | X                |
| PRINTING                                                 |            |        |                          |                 |                 |             |                  |
| Merging of address or text files for personalized copy   | X          | X      | X                        | X               | X               | X           | X                |
| Automatic headers & footers                              | X          | X      | X                        | X               | X               | X           | X                |
| Floating footnotes                                       | X          | X      | X                        | X               | X               | X           | X                |
| Right justification of text                              | X          | X      | X                        | X               | X               | X           | X                |
| Double-column alignment                                  | X          | X      | X                        | X               | X               | X           | X                |
| Page numbering:                                          |            |        |                          |                 |                 |             |                  |
| Automatic page numbering                                 | X          | X      | X                        | X               | X               | X           | X                |
| Flexible number locations                                | X          | X      | X                        | X               | X               | X           | X                |
| Flexible page numbering (e.g. Roman numerals)            | X          | X      | X                        | X               | X               | X           | X                |
| Widow/Orphan line protection                             | X          | X      | X                        | X               | X               | X           | X                |
| Pause for text entry                                     | X          | X      | X                        | X               | X               | X           | X                |

| MY WORD PROCESSING PACKAGE: DOES NOT HAVE THESE FEATURES                       |            |        | DOES HAVE THESE FEATURES |                 |                 |             |                  |
|--------------------------------------------------------------------------------|------------|--------|--------------------------|-----------------|-----------------|-------------|------------------|
| The feature is:                                                                | Not Needed | Needed | Never Used               | Not Very Useful | Somewhat Useful | Very Useful | Extremely Useful |
| Typewriter mode                                                                | X          | X      | X                        | X               | X               | X           | X                |
| Print selected parts of a file (e.g. pages 2, 4, 7)                            | X          | X      | X                        | X               | X               | X           | X                |
| Print multiple/repeat copies (e.g. 5 each)                                     | X          | X      | X                        | X               | X               | X           | X                |
| Print one file while editing another (background or simultaneous input/output) | X          | X      | X                        | X               | X               | X           | X                |
| Character attributes:                                                          |            |        |                          |                 |                 |             |                  |
| Bold print (darker print)                                                      | X          | X      | X                        | X               | X               | X           | X                |
| Overprinting (e.g. é)                                                          | X          | X      | X                        | X               | X               | X           | X                |
| Strikeout ( <del>unwanted text</del> )                                         | X          | X      | X                        | X               | X               | X           | X                |
| Superscripts and Subscripts                                                    | X          | X      | X                        | X               | X               | X           | X                |
| Changeable type styles (Prestige elite, gothic, or script, etc.)               | X          | X      | X                        | X               | X               | X           | X                |
| Pitch change:                                                                  |            |        |                          |                 |                 |             |                  |
| 10 (Pica)                                                                      | X          | X      | X                        | X               | X               | X           | X                |
| 11 (PSM) Proportional Spac.                                                    | X          | X      | X                        | X               | X               | X           | X                |
| 12 (Elite)                                                                     | X          | X      | X                        | X               | X               | X           | X                |
| 15 (Micon)                                                                     | X          | X      | X                        | X               | X               | X           | X                |
| Variable line spacing (e.g. 1/2, 1 1/2, 2 1/2)                                 | X          | X      | X                        | X               | X               | X           | X                |
| MISCELLANEOUS                                                                  |            |        |                          |                 |                 |             |                  |
| Menu bypass                                                                    | X          | X      | X                        | X               | X               | X           | X                |
| Password protection for files                                                  | X          | X      | X                        | X               | X               | X           | X                |
| Ten-key number pad                                                             | X          | X      | X                        | X               | X               | X           | X                |
| User programmable key                                                          | X          | X      | X                        | X               | X               | X           | X                |

| MY WORD PROCESSING PACKAGE: DOES NOT HAVE THESE FEATURES |            |        | DOES HAVE THESE FEATURES |                 |                 |             |                  |
|----------------------------------------------------------|------------|--------|--------------------------|-----------------|-----------------|-------------|------------------|
| The feature is:                                          | Not Needed | Needed | Never Used               | Not Very Useful | Somewhat Useful | Very Useful | Extremely Useful |
| Paper handling:                                          |            |        |                          |                 |                 |             |                  |
| Sheet feeder for individual sheets                       | X          | X      | X                        | X               | X               | X           | X                |
| Sheets mounted on continuous paper                       | X          | X      | X                        | X               | X               | X           | X                |
| Envelope feeder for individual envelopes                 | X          | X      | X                        | X               | X               | X           | X                |
| Envelopes mounted on continuous paper                    | X          | X      | X                        | X               | X               | X           | X                |
| Math packages                                            | X          | X      | X                        | X               | X               | X           | X                |
| Graphics                                                 | X          | X      | X                        | X               | X               | X           | X                |
| Multilingual capabilities (e.g. Spanish, German, etc.)   | X          | X      | X                        | X               | X               | X           | X                |
| Sorting (Alpha. or Numeric)                              | X          | X      | X                        | X               | X               | X           | X                |
| Communications capabilities with:                        |            |        |                          |                 |                 |             |                  |
| other WP machines in office                              | X          | X      | X                        | X               | X               | X           | X                |
| main computer system                                     | X          | X      | X                        | X               | X               | X           | X                |
| User programmability (e.g. BASIC, Fortran, etc.)         | X          | X      | X                        | X               | X               | X           | X                |
| Others:                                                  |            |        |                          |                 |                 |             |                  |
|                                                          | X          | X      | X                        | X               | X               | X           | X                |
|                                                          | X          | X      | X                        | X               | X               | X           | X                |
|                                                          | X          | X      | X                        | X               | X               | X           | X                |
|                                                          | X          | X      | X                        | X               | X               | X           | X                |
|                                                          | X          | X      | X                        | X               | X               | X           | X                |
|                                                          | X          | X      | X                        | X               | X               | X           | X                |
|                                                          | X          | X      | X                        | X               | X               | X           | X                |

PLEASE DO NOT OMIT ANY FEATURES--EVALUATE THE USEFULNESS OF EACH TO YOU.

APPENDIX B

BUSINESSES USED IN STUDY

## APPENDIX B

### BUSINESSES USED IN STUDY

(Businesses are listed under city and vendor names.)

#### BY CITY:

##### Chattanooga Area\*

Church of God Exec. Offices  
Collegedale SDA Church  
Deloitte Haskins and Sells  
Industrial Water Chemical  
McKee Baking Company  
North Park Hospital  
Olan Mills, Incorporated.  
Watson, Dana and Peppers  
Wolfe and Hall

##### Knoxville Area\*\*

Air National Guard  
Bechtel  
Hand Prints Design  
Union Carbide  
Valley Bank  
Zepke, Neuenschwander and  
Greenlee

#### BY VENDOR:

##### IBM

Church of God Exec. Offices  
Collegedale SDA Church  
McKee Baking Company

##### LANIER

Air National Guard  
Hand Prints Design  
Industrial Water Chemical  
North Park Hospital  
Olan Mills, Incorporated.  
Valley Bank  
Watson, Dana and Peppers  
Wolfe and Hall  
Zepke, Neuenschwander, and  
Greenlee

##### WANG

Bechtel  
Deloitte Haskins and Sells  
Union Carbide

\* The Chattanooga area includes Chattanooga, Hixson, Collegedale, and Cleveland, Tennessee, as well as La Fayette, Georgia.

\*\* The Knoxville area includes Knoxville and Oak Ridge, Tennessee.

APPENDIX C

LETTER TO PARTICIPANTS

APPENDIX C

LETTER TO PARTICIPANTS

College of Education  
The University of Tennessee  
Knoxville, TN 38916

Date

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Dear \_\_\_\_\_:

Thank you for your willingness to take part in my study on word processing features. As you suggested, I will plan to meet you on \_\_\_\_\_ at \_\_\_\_\_.

As I mentioned to you on the telephone, I am a graduate student at the University of Tennessee in Knoxville in the Vocational-Technical Education Department. In partial fulfillment for the Ed.D. degree, I am writing a dissertation entitled Word Processing: An Approach to Software Purchase Decisions and Evaluation of Three Current Software Packages.

The purpose of my study is to identify the most useful features found in word processing software. Using a checklist which I have developed, participants in this study will evaluate the usefulness of common word processing features. All data will be kept confidential and completely anonymous. Neither the company nor any individual will be identified in the report of the researcher. The result of this study will assist potential users in the selection of word processing equipment.

If you would like, you may have a copy of the final results of the study. Those results should be useful to your company in future selection of word processing systems.

Sincerely yours,

Evonne Richards

APPENDIX D

INTERVIEW FORM

APPENDIX D  
INTERVIEW FORM

VENDOR/EQUIPMENT INFORMATION:

| VENDOR<br>(Circle One) | HARDWARE | DATE INSTALLED | SOFTWARE | DATE INSTALLED |
|------------------------|----------|----------------|----------|----------------|
|------------------------|----------|----------------|----------|----------------|

|     |       |       |       |       |
|-----|-------|-------|-------|-------|
| IBM | _____ | _____ | _____ | _____ |
|-----|-------|-------|-------|-------|

|        |       |       |       |       |
|--------|-------|-------|-------|-------|
| LANIER | _____ | _____ | _____ | _____ |
|--------|-------|-------|-------|-------|

|      |       |       |       |       |
|------|-------|-------|-------|-------|
| WANG | _____ | _____ | _____ | _____ |
|------|-------|-------|-------|-------|

BUSINESS FIRM:

COMPANY \_\_\_\_\_

LOCATION \_\_\_\_\_

MAILING ADDRESS \_\_\_\_\_

TITLE OF RESPONDENT \_\_\_\_\_ PHONE # \_\_\_\_\_

LENGTH OF WORD PROCESSING EXPERIENCE \_\_\_\_\_

DEPARTMENT \_\_\_\_\_

NAME OF SUPERVISOR \_\_\_\_\_

SIZE OF COMPANY:

Number of employees (OVERALL COMPANY)

- |           |                |
|-----------|----------------|
| (1) 1- 5  | (5) 51- 99     |
| (2) 6-15  | (6) 100-249    |
| (3) 16-30 | (7) 250-499    |
| (4) 31-50 | (8) 500-999    |
|           | (9) Over 1,000 |

Number of OFFICE employees (THIS OFFICE COMPLEX ONLY)

- |           |                |
|-----------|----------------|
| (1) 1- 5  | (5) 51- 99     |
| (2) 6-15  | (6) 100-249    |
| (3) 16-30 | (7) 250-499    |
| (4) 31-50 | (8) 500-999    |
|           | (9) Over 1,000 |

IN WHAT AREA OF BUSINESS IS YOUR FIRM ENGAGED?

- (1) Advertising/Publishing
- (2) Banking/Finance
- (3) Education/Research
- (4) Engineering/Construction
- (5) General Business Service
- (6) Government
- (7) Insurance
- (8) Legal
- (9) Manufacturing
- (10) Medical/Health Care
- (11) Transportation
- (12) Utilities/Communications
- (13) Wholesale/Retail
- (14) Other:

WHY WAS THIS HARDWARE CHOSEN?

- \_\_\_ No choice, someone else chose it.
- \_\_\_ Given to us by another office
- \_\_\_ Vendor reputation
- \_\_\_ Human Engineering (operator likes using the unit)
- \_\_\_ Ease of learning
- \_\_\_ Price
- \_\_\_ Vendor Support/Service
- \_\_\_ Operator Training Plan
- \_\_\_ Overall system capabilities
- \_\_\_ Features (Describe)
- \_\_\_ Others (Describe)

WHY WAS THIS LEVEL OF SOFTWARE CHOSEN?

- \_\_\_ No choice, someone else chose it
- \_\_\_ Given to us by another office
- \_\_\_ Vendor's recommendation
- \_\_\_ Price limitations
- \_\_\_ Features (Describe)
- \_\_\_ Others (Describe)

INSTRUCTIONS:

1. Rate usefulness of these features to you NOW.
2. I will call in two days to see if you have questions.
3. Feel free to write comments on the checklist.

QUESTIONS:

1. How did your company get into word processing?
2. How did you personally get involved?
3. Did your company consider a centralized word processing center?
4. How did other secretaries relate to you getting the new equipment? (i.e. interested, threatened, could care less)
5. Future plans for your office
6. Advice to people looking for word processing equipment.

## APPENDIX E

### ANALYSIS OF USER UNCERTAINTY

## APPENDIX E

### ANALYSIS OF USER UNCERTAINTY

Table VI (p. 40) summarizes the data with respect to whether the user felt she had that particular feature on her equipment. The first two columns of numbers are for IBM users, the next two for Lanier users, and the last two for Wang users. For example, eight IBM users felt that they did NOT have horizontal lines (LINECONH), and two felt that they did; two Lanier users felt that they did not have horizontal lines (LINECONH), and eight felt that they did; and three Wang users felt that they did not have horizontal lines (LINECONH), and ten felt that they did.

A possible interpretation of Table VI is that it reflects the degree to which all respondents understood the specific questions being asked. If all users understood the features and capabilities of their equipment perfectly, the only confusion would be in understanding the meaning of the specific questions asked. Considerable effort was exerted in attempting to control for this type of confusion. A draft of the questionnaire was tried on two users, and their suggestions were incorporated into the final draft. The respondents in this study were contacted by phone or in person and specifically asked if they had any questions regarding the meaning of questions in the questionnaire.

A second possible interpretation of Table VI is that it reflects the degree of users' uncertainty about whether their equipment/software configuration had that particular feature. Workers may

perfectly understand the questionnaire meaning, but not completely understand their own equipment's capabilities. If only one user differed from others in her vendor class, probably that user was unclear about her equipment's capabilities. One example is password protection (PASSWORD). Only one Wang user said that this capability was not present, while twelve said it was. It is doubtful that a user could be confused on the meaning of this question, so evidently one user was confused about the existence of this feature. There are thirty-six features where only one member of a vendor group differed from all others in that group.

A third possible interpretation of Table VI (p. 40) is that each user clearly understood both the questionnaire and her own equipment. Therefore, this table summarizes actual differences in features in the equipment used by the respondents. Considerable efforts were made to control for the type of equipment and software used. However, every vendor had some degree of flexibility in the options and accessories offered to clients, particularly with respect to the spelling packages and the miscellaneous features such as envelope feeder (PHENFED), multilingual capabilities (MULTI), communication with other word processors (COMWP), and communication with the main computer (COMCOMP).

A fourth interpretation of this table reflects elements of each of the three interpretations above in amounts that vary from question to question. Some questions, such as the first three: word wraparound (AUTOCRWR), automatic centering (AUTOCENT), and continuous underlining (ATOUNDR), reflect no uncertainty from any source. Most

of the questions in the first three major categories of the questionnaire (recording, revision, printing) reflected only small amounts of uncertainty from all sources.

An effort was made to see if any uncertainty about the existence or nonexistence of certain features was related to years of experience. It would be logical to assume that a user's knowledge of the equipment/software's features would grow as her experience on that system increases. Therefore, a series of summary tables by vendors was prepared to detect whether the minority of users who said they did not have a particular feature had a lower mean years of experience than the majority group for that vendor. Tables XLIX through LI summarize this information for the three sets of vendors. The first two columns following the feature reflect the number of users in this vendor class that answered (1) do not have the feature and (2) do have the feature, respectively. The numbers agree with those in the summary Table VI (p. 40). The next two columns reflect the mean and standard deviation of experience in months, respectively, for those users that said they did NOT have this feature. The next two columns reflect the mean and standard deviation of months of experience for those saying that they did have the feature. The IBM user with the least experience (six months) disagreed with the nine others on double-column alignment (DCALIGN), printing parts of a file (PRINTSPG), overstrike (CASTRIKE), and menu bypass (MENUBYPS). She also disagreed on ten-key pad (TENKEYPD), but it is quite possible her particular configuration did not have one. It seems reasonable to

TABLE XLIX

DETAILED BREAKDOWN OF YES/NO  
ANSWERS FOR IBM USERS

This table contains the detailed breakdown of YES/NO (I have the feature/I don't have the feature) for IBM users.

Column 1 = Feature name

Column 2 = Number of IBM users that said they did NOT have feature

Column 3 = Number of IBM users that said they DID have feature

Column 4 = Mean score of months of experience of group from Column 2.

Column 5 = Standard Deviation of months of experience of group from Column 2.

Column 6 = Mean score of months of experience of group from Column 3.

Column 7 = Standard Deviation of months of experience of group from Column 3.

| Feature Name | Number No | Number Yes | Mean No | St. Dev. No | Mean Yes | St. Dev. Yes |
|--------------|-----------|------------|---------|-------------|----------|--------------|
| AUTOCRWR     | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| AUTOCENT     | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| ATOUNDR      | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| ATOUNDRW     | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| ATOUNDRS     | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| ATOUNDRD     | 7         | 3          | 14      | 5.29        | 12.00    | 6.00         |
| ATOINDEN     | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| HYPHEN       | 0         | 10         | 0       | 0           | 13.40    | 5.20         |
| ATODECTB     | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| FORMCHNG     | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| GLOSSARY     | 1         | 9          | 12      | 0           | 13.55    | 5.54         |
| ATOCOLUM     | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| LINECONV     | 10        | 0          | 13.4    | 5.25        | 0        | 0            |
| LINECONH     | 8         | 2          | 13      | 5.65        | 15.00    | 4.24         |
| SPELVERF     | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| SPELUSER     | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| PAGREPAG     | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| GLOBALD      | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| GLOBALR      | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| GLOBALF      | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| GLOBALPS     | 3         | 7          | 15.33   | 2.88        | 12.57    | 5.99         |
| COPYMOVE     | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| COPYMOVB     | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| COPYMOVC     | 1         | 9          | 17      | 0           | 13.00    | 5.40         |
| COPYMOVL     | 2         | 8          | 17      | 0           | 12.50    | 5.55         |
| INDEXGEN     | 8         | 2          | 12.37   | 5.42        | 17.50    | .71          |
| CITATGEN     | 9         | 1          | 13      | 5.40        | 17.00    | 0            |
| TCONTGEN     | 8         | 2          | 12.37   | 5.42        | 17.50    | .71          |
| MERGE        | 0         | 10         | 0       | 0           | 13.40    | 5.25         |

TABLE XLIX (Continued)

| Feature Name | Number No | Number Yes | Mean No | St. Dev. No | Mean Yes | St. Dev. Yes |
|--------------|-----------|------------|---------|-------------|----------|--------------|
| AUTOHF       | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| FLOATFOT     | 5         | 5          | 11.8    | 3.89        | 15.00    | 6.36         |
| JUSTIF       | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| DCALIGN      | 1         | 9          | 6       | 0           | 14.22    | 4.84         |
| PNAUTO       | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| PNLOCAT      | 1         | 9          | 12      | 0           | 13.55    | 5.54         |
| PNROMAN      | 4         | 6          | 13.25   | 2.5         | 13.50    | 6.77         |
| WIDOWORP     | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| PAUSETTE     | 4         | 6          | 13.25   | 2.5         | 13.50    | 6.77         |
| TYPEMODE     | 2         | 8          | 9       | 4.24        | 14.50    | 5.09         |
| PRINTSPG     | 1         | 9          | 6       | 0           | 14.22    | 4.84         |
| PRINTRPG     | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| SIMULTIO     | 4         | 6          | 13      | 6.87        | 13.66    | 4.58         |
| CABOLD       | 9         | 1          | 12.88   | 5.30        | 18.00    | 0            |
| CAOVERP      | 4         | 6          | 11.75   | 4.5         | 14.50    | 5.82         |
| CASTRIKE     | 1         | 9          | 6       | 0           | 14.22    | 4.84         |
| CASUPER      | 3         | 7          | 13.33   | 6.35        | 13.42    | 5.28         |
| TYPESTYL     | 1         | 9          | 12      | 0           | 13.55    | 5.54         |
| PC10         | 1         | 9          | 17      | 0           | 13.00    | 5.40         |
| PC11         | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| PC12         | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| PC15         | 6         | 4          | 12.33   | 4.58        | 15.00    | 6.48         |
| VARILS       | 2         | 8          | 12      | 0           | 13.75    | 5.89         |
| MENUBYPS     | 1         | 9          | 6       | 0           | 14.22    | 4.84         |
| PASSWORD     | 10        | 0          | 13.4    | 5.25        | 0        | 0            |
| TENKEYPD     | 9         | 1          | 14.22   | 4.84        | 6.00     | 0            |
| USERPRGK     | 6         | 4          | 12.66   | 4.08        | 14.50    | 7.23         |
| PHSHFED      | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| PHSHCONT     | 4         | 6          | 13      | 5.22        | 13.66    | 5.75         |
| PHENFED      | 6         | 4          | 13.66   | 4.58        | 13.00    | 6.87         |
| PHENCONT     | 6         | 4          | 12.66   | 4.08        | 14.50    | 7.23         |
| MATH         | 0         | 10         | 0       | 0           | 13.40    | 5.25         |
| GRAPHICS     | 10        | 0          | 13.4    | 5.25        | 0        | 0            |
| MULTI        | 5         | 5          | 11.6    | 6.73        | 15.20    | 2.94         |
| SORTING      | 2         | 8          | 9       | 4.24        | 14.50    | 5.09         |
| COMWP        | 8         | 2          | 13.5    | 5.31        | 13.00    | 7.07         |
| COMCOMP      | 8         | 2          | 13.5    | 5.31        | 13.00    | 7.07         |
| USERPROG     | 8         | 2          | 13.5    | 5.31        | 13.00    | 7.07         |

TABLE L  
DETAILED BREAKDOWN OF YES/NO  
ANSWERS FOR LANIER USERS

This table contains the detailed breakdown of YES/NO (I have the feature/I don't have the feature) for LANIER users.

Column 1 = Feature name  
 Column 2 = Number of LANIER users that said they did NOT have feature  
 Column 3 = Number of LANIER users that said they DID have feature  
 Column 4 = Mean score of months of experience of group from Column 2  
 Column 5 = Standard Deviation of months of experience of group from Column 2.  
 Column 6 = Mean score of months of experience of group from Column 3  
 Column 7 = Standard Deviation of months of experience of group from Column 3.

| Feature Name | Number No | Number Yes | Mean No | St. Dev. No | Mean Yes | St. Dev. Yes |
|--------------|-----------|------------|---------|-------------|----------|--------------|
| AUTOCRWR     | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| AUTOCENT     | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| ATOUNDR      | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| ATOUNDRW     | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| ATOUNDRS     | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| ATOUNDRD     | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| ATOINDEN     | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| HYPHEN       | 1         | 9          | 4       | 0           | 10.88    | 6.69         |
| ATODECTB     | 1         | 9          | 4       | 0           | 10.88    | 6.69         |
| FORMCHNG     | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| GLOSSARY     | 8         | 2          | 8.75    | 6.64        | 16.00    | 2.82         |
| ATOCOLUM     | 9         | 1          | 9.33    | 6.46        | 18.00    | 0            |
| LINECONV     | 6         | 4          | 7.66    | 4.22        | 14.00    | 8.48         |
| LINECONH     | 2         | 8          | 5.5     | .707        | 11.37    | 7.02         |
| SPELVERF     | 5         | 5          | 10.6    | 8.47        | 9.80     | 5.31         |
| SPELUSER     | 4         | 6          | 9.75    | 9.53        | 10.50    | 5.04         |
| PAGREPAG     | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| GLOBALD      | 1         | 9          | 14      | 0           | 9.77     | 6.94         |
| GLOBALR      | 1         | 9          | 14      | 0           | 9.77     | 6.94         |
| GLOBALF      | 1         | 9          | 14      | 0           | 9.77     | 6.94         |
| GLOBALPS     | 1         | 9          | 14      | 0           | 9.77     | 6.94         |
| COPYMOVE     | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| COPYMOVB     | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| COPYMOVC     | 3         | 7          | 14      | 9.16        | 8.57     | 5.34         |
| COPYMOVL     | 1         | 9          | 24      | 0           | 8.66     | 4.87         |
| INDEXGEN     | 3         | 7          | 14.66   | 9.01        | 8.28     | 5.05         |
| CITATGEN     | 3         | 7          | 14.66   | 9.01        | 8.28     | 5.05         |
| TCONTGEN     | 3         | 7          | 14.66   | 9.01        | 8.28     | 5.05         |

TABLE L (Continued)

| Feature Name | Number No | Number Yes | Mean No | St. Dev. No | Mean Yes | St. Dev. Yes |
|--------------|-----------|------------|---------|-------------|----------|--------------|
| MERGE        | 1         | 9          | 4       | 0           | 10.88    | 6.69         |
| AUTOHF       | 1         | 9          | 4       | 0           | 10.88    | 6.69         |
| FLOATFOT     | 2         | 8          | 5       | 1.41        | 11.50    | 6.88         |
| JUSTIF       | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| DCALIGN      | 6         | 4          | 11.16   | 7.38        | 8.75     | 6.18         |
| PNAUTO       | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| PNLOCAT      | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| PNROMAN      | 5         | 5          | 5.6     | 1.51        | 14.80    | 6.72         |
| WIDOWORP     | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| PAUSETTE     | 4         | 6          | 5       | .816        | 13.66    | 6.62         |
| TYPEMODE     | 1         | 9          | 4       | 0           | 10.88    | 6.69         |
| PRINTSPG     | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| PRINTRPG     | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| SIMULTIO     | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| CABOLD       | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| CAOVERP      | 6         | 4          | 7.66    | 4.22        | 14.00    | 8.48         |
| CASTRIKE     | 3         | 7          | 10.33   | 4.72        | 10.14    | 7.71         |
| CASUPER      | 3         | 7          | 7.66    | 5.50        | 11.28    | 7.22         |
| TYPESTYL     | 2         | 8          | 5       | 1.41        | 11.50    | 6.88         |
| PC10         | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| PC11         | 3         | 7          | 7.66    | 3.78        | 11.28    | 7.58         |
| PC12         | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| PC15         | 3         | 7          | 6.33    | 1.52        | 11.85    | 7.44         |
| VARILS       | 1         | 9          | 5       | 0           | 10.77    | 6.81         |
| MENUBYP'S    | 6         | 4          | 11.5    | 7.03        | 8.25     | 6.55         |
| PASSWORD     | 0         | 10         | 0       | 0           | 10.20    | 6.67         |
| TENKEYPD     | 1         | 9          | 4       | 0           | 10.88    | 6.69         |
| USERPRGK     | 5         | 5          | 7.4     | 3.97        | 13.00    | 8.06         |
| PHSHFED      | 4         | 6          | 5.75    | 1.70        | 13.16    | 7.22         |
| PHSHCONT     | 4         | 6          | 5.75    | 1.70        | 13.16    | 7.22         |
| PHENFED      | 5         | 5          | 9.4     | 8.29        | 11.00    | 5.47         |
| PHENCONT     | 5         | 5          | 9.4     | 8.29        | 11.00    | 5.47         |
| MATH         | 3         | 7          | 12      | 0.58        | 9.42     | 5.22         |
| GRAPHICS     | 9         | 1          | 9.33    | 6.46        | 18.00    | 0            |
| MULTI        | 5         | 5          | 9.4     | 8.29        | 11.00    | 5.47         |
| SORTING      | 5         | 5          | 10.8    | 7.94        | 9.60     | 6.02         |
| COMWP        | 7         | 3          | 10.42   | 7.02        | 9.66     | 7.23         |
| COMCOMP      | 6         | 4          | 7.16    | 3.60        | 14.75    | 8.13         |
| USERPROG     | 4         | 6          | 7.75    | 4.5         | 11.83    | 7.75         |

TABLE LI  
DETAILED BREAKDOWN OF YES/NO  
ANSWERS FOR WANG USERS

This table contains the detailed breakdown of YES/NO (I have the feature/I don't have the feature) for WANG users.

Column 1 = Feature name  
 Column 2 = Number of WANG users that said they did NOT have feature  
 Column 3 = Number of WANG users that said they DID have feature  
 Column 4 = Mean score of months of experience of group from Column 2  
 Column 5 = Standard Deviation of months of experience of group from Column 2  
 Column 6 = Mean score of months of experience of group from Column 3  
 Column 7 = Standard Deviation of months of experience of group from Column 3

| Feature Name | Number No | Number Yes | Mean No | St. Dev. No | Mean Yes | St. Dev. Yes |
|--------------|-----------|------------|---------|-------------|----------|--------------|
| AUTOCRWR     | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| AUTOCENT     | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| ATOUNDRC     | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| ATOUNDRW     | 1         | 12         | 6       | 0           | 33.66    | 20.77        |
| ATOUNDRS     | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| ATOUNDRD     | 1         | 12         | 6       | 0           | 33.66    | 20.77        |
| ATOINDEN     | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| HYPHEN       | 2         | 11         | 6       | 0           | 33.45    | 21.77        |
| ATODECTB     | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| FORMCHNG     | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| GLOSSARY     | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| ATOCOLUM     | 5         | 8          | 3.8     | 3.73        | 33.87    | 23.89        |
| LINECONV     | 5         | 8          | 4       | 3.32        | 33.75    | 24.02        |
| LINECONH     | 3         | 10         | 7       | 3.07        | 35.90    | 21.67        |
| SPELVERF     | 5         | 8          | 5.8     | 2.65        | 38.87    | 22.63        |
| SPELUSER     | 4         | 9          | 3.25    | 3.04        | 38.55    | 21.19        |
| PAGREPAG     | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| GLOBALD      | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| GLOBALR      | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| GLOBALF      | 1         | 12         | 2       | 0           | 35.66    | 19.62        |
| GLOBALPS     | 5         | 8          | 3.4     | 1.30        | 40.37    | 21.88        |
| COPYMOVE     | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| COPYMOVB     | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| COPYMOVC     | 1         | 12         | 6       | 0           | 33.66    | 20.77        |
| COPYMOVL     | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| INDEXGEN     | 1         | 12         | 2       | 0           | 35.66    | 19.62        |
| CITATGEN     | 4         | 9          | 8.75    | 1.84        | 31.66    | 14.00        |
| TCONTGEN     | 1         | 12         | 2       | 0           | 35.66    | 19.62        |
| MERGE        | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| AUTOHF       | 0         | 13         | 0       | 0           | 33.84    | 19.89        |

TABLE LI (Continued)

| Feature Name | Number No | Number Yes | Mean No | St. Dev. No | Mean Yes | St. Dev. Yes |
|--------------|-----------|------------|---------|-------------|----------|--------------|
| FLOATFOT     | 8         | 5          | 2.5     | 3.88        | 36.00    | 13.43        |
| JUSTIF       | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| DCALIGN      | 3         | 10         | 5       | 1.73        | 33.50    | 22.95        |
| PNAUTO       | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| PNLOCAT      | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| PNROMAN      | 5         | 8          | 2.6     | 3.66        | 28.37    | 16.43        |
| WIDOWORP     | 6         | 7          | 1.5     | 1.33        | 27.28    | 17.43        |
| PAUSET       | 3         | 10         | 1       | 6.24        | 34.70    | 22.71        |
| TYPEMODE     | 5         | 8          | 8.8     | 5.35        | 30.75    | 25.17        |
| PRINTSPG     | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| PRINTRPG     | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| SIMULTIO     | 1         | 12         | 6       | 0           | 33.66    | 20.77        |
| CABOLD       | 2         | 11         | 6       | 0           | 33.45    | 21.77        |
| CAOVERP      | 2         | 11         | 4       | 6.97        | 35.63    | 20.57        |
| CASTRIKE     | 3         | 10         | 1       | 6.24        | 34.70    | 22.71        |
| CASUPER      | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| TYPESTYL     | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| PC10         | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| PC11         | 1         | 12         | 6       | 0           | 33.66    | 20.77        |
| PC12         | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| PC15         | 1         | 12         | 3       | 0           | 33.91    | 20.78        |
| VARILS       | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| MENUBYPS     | 5         | 8          | 1.6     | 4.72        | 29.00    | 16.11        |
| PASSWORD     | 1         | 12         | 6       | 0           | 33.66    | 20.77        |
| TENKEYPD     | 6         | 7          | 1       | 1.96        | 44.85    | 19.13        |
| USERPRGK     | 7         | 6          | 7.28    | 4.48        | 29.83    | 13.96        |
| PHSHFED      | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| PHSHCONT     | 0         | 13         | 0       | 0           | 33.84    | 19.89        |
| PHENFED      | 2         | 1          | 9.66    | 3.57        | 84.00    | 0            |
| PHENCONT     | 1         | 2          | 8.36    | 3.42        | 64.00    | 28.28        |
| MATH         | 1         | 12         | 8       | 0           | 32.66    | 20.30        |
| GRAPHICS     | 2         | 1          | 5.08    | 0.25        | 19.00    | 0            |
| MULTI        | 2         | 1          | 3.66    | 0.77        | 36.00    | 0            |
| SORTING      | 2         | 11         | 2       | 0           | 37.81    | 19.03        |
| COMWP        | 1         | 12         | 6       | 0           | 33.66    | 20.77        |
| COMCOMP      | 1         | 12         | 6       | 0           | 33.66    | 20.77        |
| USERPROG     | 4         | 9          | 3       | 5.09        | 38.66    | 20.57        |

believe that these disagreements could be the result of her very limited experience on the IBM equipment.

Similarly, the Lanier user with the shortest amount of experience (four months) disagreed with the other nine Lanier users on hyphenation (HYPHEN), decimal tab alignment (ATODECTB), merging of files (MERGE), automatic headers and footers (AUTOHF), and typewriter mode (TYPEMODE). The least experienced Wang user had eleven months of experience but agreed with all of the other twelve Wang users on feature availability. There were three features, global find (GLOBALF), index generator (INDEXGEN), and table of contents generator (TCONTGEN) for which one Wang user with twelve months of experience disagreed with the other twelve Wang users.

However, the data summarized in Tables XLIX through LI do not uniformly support the notion that years of experience will lead to complete knowledge of the existing features of one's equipment. In each vendor set, examples can be found where the sole user disagreeing from the rest of the group had more years of experience than the others. In the Lanier group, global delete (GLOBALD), global replace (GLOBALR), global find (GLOBALF), and global pass (GLOBALPS) all had a single respondent say that these features did not exist. This respondent had more months of experience than the average of the nine users that said these features did exist. A similar situation existed for link files (COPYMOVL) but for a different dissenting user. For the IBM group, column copy and move (COPYMOVC), citations generator (CITATGEN), and bold characters (CABOLD) are examples of this phenomena. Word-by-word underlining (ATOUNDRW), double underlining

(ATOUNDRD), column copy and move (COPYMOVC), simultaneous input and output (SIMULTIO), proportional spacing (PC11), and 15 pitch (PC15) illustrate the same situation among Wang users. These represent the extremes of the spectrum. There are many questions (particularly in the last fifteen features of the miscellaneous group where hardware configurations may differ) where the users within a vendor group are more evenly divided on the presence of a feature. In these situations there are not the pronounced differences in mean experience for the (1) have and (2) do not have groups.

In summary, Table VI (p. 40) is best explained by a combination of user uncertainty about equipment features and possible differences in actual equipment configurations.

## VITA

Evonne Marie Lewis Richards was born in Chillicothe, Ohio, on August 10, 1951. She attended elementary school in Auburn, Washington and received her high school diploma from Auburn Academy in June, 1969. She then attended Walla Walla College where she received her Associate of Arts degree in secretarial science in June, 1971. Over the next six years she held full-time office positions in Guatemala, Michigan, California and Tennessee as she followed her husband and his career. As a result of continuing her education at each location, she received her Bachelor of Science degree in Office Administration in August, 1976, from Pacific Union College in Angwin, California; her secondary teaching credentials in office education from Southern College, Collegedale, Tennessee in 1978; and her Master of Arts degree with a major in Secondary Education: Business Education from Loma Linda University, Loma Linda, California in 1981.

Upon completion of her M.A. requirements she was accepted into the doctoral program in the Fall of 1980, and began her studies while continuing to supervise a word processing center. In March, 1984 she received the Doctor of Education degree in Vocational-Technical Education with an emphasis in Business Education. She is Assistant Professor in the Division of Business and Office Administration at Southern College, Collegedale, Tennessee, and supervises the Word Processing Center as well as working with college staff on a distributed word processing program. Her husband, Dr. E. William

Richards, Jr., is currently Associate Professor of Accounting at Southern College.

The author is the daughter of Mr. and Mrs. Stanley B. Lewis of Centralia, Washington, and the daughter-in-law of Mr. and Mrs. Evan W. Richards, Sr. of Bryant, Alabama.