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THE SPERRY 1100/60 MAINFRAME COMPUTER
DEVELOPMENT OF A USER'S HANDBOOK FOR
SUPPLY PERSONNEL

THESIS

David P. Clark
Captain, USAF

AFIT/GLM/LSM/89S-8

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THE SPERRY 1100/60 MAINFRAME COMPUTER
DEVELOPMENT OF A USER'S HANDBOOK
FOR SUPPLY PERSONNEL

THESIS

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology
Air University
In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Logistics Management

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Captain, USAF

September 1989

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Preface

Initial research revealed that although Supply managers need to be familiar with certain terms and acronyms associated with the Sperry 1100/60 computer, no single condensed reference source of such exists. AFM 67-1 Vol II, Part Two and Part Four do contain the information, but they have it spread through over 40 volumes of text. The problem is further compounded since many Supply managers are being assigned from non-Supply backgrounds. The handbook that is an appendix to this thesis is designed to help solve the terminology problem for beginner and experienced Supply managers.

To determine what to include in the handbook, 80 Supply managers of the type who would use the handbook were interviewed. Everyone had different ideas of what should be included, and some even doubted the need for such a guide. However, enough of a consensus was reached to determine what subject areas should be covered. If all goes well the handbook will be published as an Air Force Pamphlet.

My research would not have been successful without the help of my thesis advisor, Lt Col Bruce Christensen. His guidance and high expectations helped to learn and even enjoy the research process.

David P. Clark

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Abstract

The purpose of this study was to research material for and write a handbook describing terms and acronyms pertaining to Supply manager use of the Sperry 1100/60 computer. The research focused on two major areas: (1) Determine what subject material to cover in the handbook. (2) Determine how to best present information on the material covered.

The study found that Supply managers have a wide band of experience levels. Therefore, a handbook would have to satisfy the needs of both novices and those with years of experience. The needs of the novices was determined by interviews with 80 Supply managers. The needs of those with experience was determined from a HQ MAC effort in this area.

The end product of the research is a two part handbook. The first part is written in simple English and follows rules on technical writing for novice readers. The second part is for the experienced Supply manager and uses Supply vernacular for brevity and accuracy.

THE SPERRY 1100/60 MAINFRAME COMPUTER
DEVELOPMENT OF A USER'S HANDBOOK FOR SUPPLY PERSONNEL

I. Introduction

The Sperry 1000/60 Computer

Virtually all Standardized Base Supply Systems (SBSS) make use of the Sperry 1100/60 computer to store and maintain records to generate management reports (24:1-7). The Sperry 1100/60 system can support 250 terminals located throughout one or more installations (24:1-19). These terminals are an "on-line" system, which means that when a transaction is input, the computer automatically updates all records affected by the transaction (24:1-10). SBSS, with the aid of the Sperry 1100/60, provides base activities with supply needs and accounts for supplies, equipment, POL, munitions, and clothing. Material is accounted for both financially and by item (24:1-7).

Background

Training for specific hands-on operation for the Sperry 1000/60 is provided by a 48 academic day course taught by the 3400 Technical Training Wing at Lowry AFB, Colorado (23:3-165). However, this training is only for the "645X2" AFSC, who are the actual keyboard punchers. No course is provided for the "645X0" or "645X1" career fields, even though personnel from those backgrounds will need knowledge

about the Sperry 1100/60 when promoted to or initially assigned to a supervisory level position (45). Falling into this category every year are 15-20 rated supplement people and 90 new Second Lieutenants (45). These supervisory positions do not need the level of detailed knowledge required by a systems operator, but they do need to be familiar with certain aspects of the machine.

Handbook Efforts. Addressing the above issue, HQ MAC developed a "Computer Terminology Quick Reference Guide" about the Sperry 1100/60, specifically for use by Supply squadron personnel. This document compiles terms from various regulations and is well sourced and documented. However, it does have certain readability problems. Consider its definition of "Runstream" as "a group of Executive Control Language (ECL) commands along with the user defined input(s) that the executive system uses to process jobs" (96:10). In plain language, a "runstream" is just the Sperry 1100/60 term for "computer program." Someone not formally trained on the Sperry 1100/60 may have trouble figuring that out. HQ USAFE is aware of the efforts of HQ MAC and other agencies toward creating a Sperry 1100/60 user's guide, and is interested in the creation of a usable, more professional product. The ultimate goal will be to publish the guide as an official Air Force pamphlet (83).

Specific Problem

A handbook is needed that describes computer terminology and acronyms used by base level Supply personnel in conjunction with the Sperry 1100/60 computer system. This handbook will need definitions and process descriptions, as well as explain their importance and impact to Supply activities.

Investigative Questions

To create the handbook the following questions must be answered:

1. What level of knowledge do managers/supervisors need to have about the Sperry 1100/60?
2. What is the typical level of Sperry 1100/60 knowledge for a newly arrived Supply officer/NCO?
3. What paragraph structure type style, font, color, or format will result in the best readability for a manual of this sort?
4. How much of the format should be standardized with other Supply manuals?
5. What level of depth should each part of the manual have (i.e., detailed or cursory glossary)?

Scope

The handbook will apply to Air Force Supply officers/NCOs who have not been trained on the Sperry 1100/60 but will need to make operational decisions on its use and output. The handbook will not cover hands-on use.

Summary

This chapter provided a background on the Sperry 1100/60 and described the need for a handbook. The next chapter will discuss literature describing how to write such a handbook.

II. Review of the Literature

Introduction

Before writing the Sperry 1100/60 handbook, a thorough literature review was conducted to gain insight on how to write a handbook that would be useful. To be useful, the handbook must exhibit the characteristics of readability and retainability, plus be formatted so information can be quickly accessed. The primary purpose of a technical handbook is "to make the unfamiliar familiar" (112:84). Research on writing an Air Force supply manual for usefulness was performed for the recent re-write of AFM 67-1, Vol II, Part. The report generated from that research explains specific type font, writing mechanics and style, grammar, and Air Force specific items like indexing, use of acronyms, and headings (16). The report is applicable and will be a primary source for the writing mechanics of the Sperry 1100/60 handbook. This literature review will not cover the details of that particular report, but will instead focus on readability research found elsewhere.

Overview. This section will discuss published works concerning how to write for readability, how to write a technical handbook, plus how to test a prototype handbook for usefulness.

Assumption. Although this literature review includes material doubting the need to emphasize readability for a specialized handbook, no attempt will be made to prove

readability emphasis is needed for a handbook designed for novices. The premise is assumed that readability is desired.

Writing for Readability

This portion will discuss how sentence structure, paragraph structure and content, and word length relate to readability. It will also include material on readability tests.

Basic Sentence Structure. In general, writing should be "utterable," no sentence should be written that "twists the tongue, strains your throat, or gives you no place to breathe" (104:53). Also, writing should be by someone, for someone. The sentence "I love you" is much better than "There is a state of lovingness extent" (104:56). Furthermore, readability is enhanced when parallel structure is used and nouns are not used to modify nouns (104:59).

Predictability in Sentence Structure. English is a structured language so it is possible to write words that predict certain type words or phrases to follow. For example, subordinate clauses predict subordinate signs (How we do that is up to who is in charge). Also, nouns are predicted by articles and adjectives (the cat, a dog). Furthermore, verbs are predicted by the appearance of a subject (A woman _____ us that.....). Maintaining this predictability is a plus for readability (104:54). Another aspect of predictability is to use correct English words unless jargon is essential. For example, many computer

manuals use "transparent" and "invisible" as interchangeable (48:155). But in English, these words have different meanings. If someone said that the gas rising from a test tube will be transparent, one would expect to be able to see through the gas, but would expect also to see the gas itself. If the gas were described as invisible, one would not expect to see the gas at all. When a computer process is described as "transparent" to the user, this means that the process occurs without the user knowing or interfering. Since the user does not see the process at all, the term should be "invisible" to the user. Someone reading a manual written with much "computereze" jargon and terms may expect "computereze" when actual English is used. For example, one computer program was returned as faulty to the agency that wrote it because it contained the phrase "press any key to continue." The user claimed the program was not usable on his computer because his keyboard had no "any" key to press (32).

Clarify Subject-Verb Clauses. The subject and verb of every clause should be absolutely clear. This is best done by careful choice of subject and verb. For example, "Behavior problems act out their relationship. . ." is bad since a problem cannot "act out" anything (104:58). Another example of a bad subject choice is "The causes of the mutation of the genes received analysis from the scientists." This sentence does not have bad subject-verb

agreement like the previous example, but a different choice of subject could help readability, "The scientists analyzed the causes of the mutations of the genes" (104:59). Using familiar words for subjects and verbs also helps readability. However, many computer manuals are written in a "computereze" style that confuses verbs and nouns. For example, consider "PRINT COMPILATION" and "PRINT FILE." It is difficult to tell if "PRINT" in either case is a noun or a verb. A better way of writing each phrase would be "COMPILE THE PRINTOUT" and "PRINT THE FILE" respectively (48-154).

Paragraph Structure. The structure of a paragraph can affect the readability and retainability of the content. Using conventional structure, grouping concepts with attributes, and using temporal proximity are ways to structure a paragraph for readability.

Conventional Structure. "Conventional" paragraphs are those with a "topic sentence followed by connected, coherent sentences" (55:13). Sentences written outside of conventional structure were shown in a study to have longer reading times and a lower recall of passage material. This particular study used 23 paid subjects and heavy use of ANOVA style statistics (55:13).

Concepts and Attributes. Another study on paragraph structure shows that a statistically significant improvement in retainability occurs if concepts and attributes are

grouped together (33:397). In the example that follows, note how the second group of sentences is easier to remember merely because the attributes are grouped together:

A Pawn is worth one point.
A Bishop moves in a diagonal direction.
A Pawn moves in a forward direction.
A Bishop is worth three points.

A Pawn is worth one point.
A Pawn moves in a forward direction.
A Bishop is worth three points.
A Bishop moves in a diagonal direction. (33:394-395)

This study was conducted using 42 females, average age of 22 years, and Chess as the subject material. None of the test subjects had any prior knowledge of the game (6:397).

Temporal Proximity. This term refers to placing like terms or phrases close together so the reader can integrate the knowledge. For example, one can integrate the following two sentences: "In 1850, the Caledians rebelled because the king had declared martial law" and "In 1850 the rebellion was repressed." The final integrated idea would be "There was a rebellion in 1850 because the king declared martial law but it was suppressed" (41:91). A study using 64 University of California at Los Angeles graduates showed that temporal proximity combined with similarity of wording had a statistically significant improvement of knowledge integration over other paragraph designs (41:97).

General Rules for Paragraph Content. If followed, the three general rules of Fidelity, Completeness, and Conciseness will enhance technical writing (9:131).

"Fidelity" involves writing truthfully. That is, writing evenhandedly and using quantitative material when applicable. "Completeness" means writing with the "why" included. An example is when a reader is instructed to press a switch. Instead of just instructing to press the switch, some details are provided on what the switch does and how it relates to other functions. Writing "concisely" means that no unnecessary words are used and that each word counts. Although "completeness" requires detail to be included when applicable, the detail can still be written concisely (9:131).

Word Length. Word length seems to have no effect on readability or retainability, according to a study by David Dogget and Larry Richards (25:583). This same study also cited many other studies that had the same conclusion (25:583-584). An example of the unimportance of word length to readability is evident from examining two terms used in the financial world. "Float" is no easier to understand in a sentence than is "amortization" (55:29).

Readability Tests

As in many other subject areas, readability has met with attempts to quantify it. Various numerical formulas has been developed to test readability.

Description. Hundreds of readability formulas exist, but they all predict comprehension by counting only one or two features of a text. Usually counted are sentence length

and some aspect of word frequency or word length. The total of the features counted is then entered into a prescribed equation to determine 'grade placement.' This grade placement is the school grade (i.e., 12th grade is a senior in high school) reading level of the tested material. Among the various types of readability formulas is a Navy version which is now the standard for all Armed Forces publications (84:46). Although numerous readability formulas exist, all are basically similar so only three will be described here:

 Lorge Formula

 Grade Placement = $.06(X2) + .1(X3) + .1(X4) = 1.99$

 X2 = average sentence length in words

 X3 = number of prepositional phrases per hundred words

 X4 = number of hard words not on the Dale list of 769 words. (57:67)

 Dale-Chall Formula

 XC = $.1579(X1) + .0496(X2) + 3.6365$

 X(1) = % words outside Dale list of 3,000 words

 X(2) = average sentence length in words

 XC = chance of 50% accuracy at particular grade level. (57:70)

 FORECAST (developed for military applications)

 Reading Grade Level = $20.43 - (.11)(\# \text{ of one syllable words})$

 This test uses a 150 word sample and was developed from correlation of 15 variables. (57:84)

Military Research on Readability Tests. The military has done research on readability formulas applied to adults. The methodology was to 'test subjects on standardized comprehension tests and then associate those reading grade levels with the performance of the same subjects on trial passages' (84:48). One researcher, Tom Duffy, pointed out two problems with that research. One problem is that test

passages did not correspond to technical manuals or instruction booklets. The other problem is that reading grade levels assigned to the passages were arbitrary anyway (84:48).

Problems with Readability Tests. Readability tests tend to emphasize sentence length or difficulty of words, but do not take into account misplaced or dangling modifiers (94:25). Five other problems with readability formulas were pointed out by researcher Jack Selzer in an article he co-authored with Janice Redish:

1. Readability formulas are used despite a low research basis.

2. Studies show readability formulas are not reliable and valid predictors of how adults will understand technical, scientific, or legal documents.

3. Shortening sentences and words does not automatically make them easier to understand.

4. "The underlying assumption of readability formulas - that any text for any reader for any purpose can be measured with the same equation - does not mesh with our current understanding of how people process information" (84:46).

5. "Readability formulas do not take into account many features that are critical to people's ability to understand and use documents" (84:46).

One more problem with readability formulas is how grade

levels are defined. Initially, grade level was calibrated by comparing the formulas with a standardized test. To qualify for a given grade level, only 50% of the questions had to be correctly answered by 50% of the people (84:48). This means that if a document passes a readability formula at the tenth grade level, it predicts that half the people who read at the tenth grade level would comprehend half of what they read. This seems unacceptable for a technical manual where closer to 100% of the material needs to be understood (84:48).

Examples of Problems with Readability Tests. One researcher, Robert M. Gordon, tested a passage from Plato's Parmenides using the Dale-Chall readability formula. Although Paramendes is difficult to understand even for PhDs, Dale-Chale placed the passage at the fourth grade level (36:60). Gordon repeated the test with different passages from different parts of the book and achieved similar results (36:60-61). Another researcher, Jack Selzer, ranked nine sets of instructions according to the Flesch readability test (Flesch is a forerunner of Dale-Chall), then had 171 Naval Academy cadets rank the same nine sets according to "understandability." The correlation between the two was $-.65$ (94:25). Furthermore, the Lewis Carroll poem "Jabberwocky" earned a very high 90 on the Flesch scale (94:25). "Jabberwocky" was purposely designed to be meaningless. A study by Charrow and Charrow dealing with

the writing of jury instructions found that changing the instructions to aid comprehension often caused lower readability test scores (84:48). Even if readability tests were perfect in measuring readability, they would still be incomplete to measure document usefulness. For example, "a technician who wants to repair one malfunction on a C-141 airplane needs to refer to 165 pages in 41 different places in eight separate documents" (84:50). Readability formulas cannot point out the difficulty of using scattered material.

Is Readability Necessary?

Although readability seems desirable when writing for the general public, some research shows it may not be a factor for a specialized group. Thomas Means, who investigated that idea using stockholders as the "specialized group," tested the effect of different readability levels of stock reports. His information was gathered by questionnaire, of which 671 were answered (67:27). To analyze the data, the Dale-Chall formula was used as well as Spearman Rank Order Correlation Statistics. Means found no difference in effects on the stockholders because of different readability levels (67:29). To explain this, Means suspects that readability is not a factor in a homogeneous group, since all members would have a good knowledge of the subject matter (67:29).

Procedures to Write a Technical Manual

The above mentioned Thomas Duffy, along with co-authors Theodore Post and Gregory Smith, provided a process for writing a military technical manual. They explained five responsibilities:

1. Gather data
2. Learn the system
3. Learn the specification
4. Prepare the Draft

5. Test, revise, and produce the technical manual (29:76)

Surveys cited by Duffy, et al, indicate that the 'most important, most difficult, most time consuming task is to learn about the system (29:74). The authors also point out that testing should be in two distinct phases, validation and verification. Validation is a check for proper grammar and technical accuracy, while verification is a check that the intended audience can use the manual correctly. It is important that validation and verification be independent events, although many manual writing companies combine these two steps or eliminate the verification phase altogether to save money (29:75). A manual produced this way can be utterly useless. For example, a 97 page manual that describes every control on a 17 ton semi-conductor manufacturing machine, but leaves off the interrelationships between the controls is accurate, but not useful. Also, a manual that explains that the system will crash if a program

is installed with the printer turned off, and explains what to do if that event accidentally occurs is accurate. But if that information is buried in an out of the way place, the manual is not useful on that point (3:7).

Use of Color. Although the use of color in a document can increase eye appeal and aid readability, some disadvantages are present. First of all, many colors are hard to see at lower light levels. Also, red print is difficult to see if red tinted lighting is used. Red combined on a page with blue can cause refocusing problems. Blue colors make details difficult to see. Furthermore, older people need more light to distinguish color and many people are color blind (73:19). These problems are in addition to increased printing costs and interfere with user felt tip marker highlighting.

Past Problems with Writing Military Manuals. One survey involving companies that write military technical manuals indicated the general belief that in most cases the person overall responsible for writing the manual "does not understand the equipment for which the manual is being written and is unfamiliar with the skills of the personnel and the circumstances under which they work" (29:73). This was reported to be the base of many problems with writing technical manuals. The same survey indicated that the responsible individual should be "more technically qualified and less format oriented" (29:73).

Although the respondents to that survey find the format orientation distasteful, plenty of format guidance is available for military manuals. In fact, the Defense Logistics Analysis Agency has identified 480 different specifications, instructions and standards for writing military manuals (29:75). However, none of these specifications seem to be effective in a typical operational setting. According to Duffy, et al, in an article on writing military manuals, written specifications tend to cause writers to imitate the format of books previously written with those guidelines (29:76). This 'product oriented' approach is inadequate, according to 'significant research' and a 'long history of expertise.' Duffy, et al, claim that the focus should not be on format, but on expertise of the writer and the writing process (29:76). For example, if a manual is for product repair, procedural steps should be emphasized. If the goal is for the user to understand what is being done, explanations are needed. If the subject lends itself to illustrations, perhaps they should be provided (29:76). The expert writer (as opposed to the novice) should plan more, think more globally (not just look at sentences) and consider the audience more (29:76). Author R. J. Smillie adds to the writing ability requirement in an article on designing usable texts when he wrote 'It is unreasonable to expect a person not trained or experienced in writing and designing user oriented texts to

be able to make intelligent decisions regarding such factors as level of detail and the amount of explanation required" (29:77).

Usability Testing

Usability testing is the key to creating an effective manual. "The only way to know if a document is understandable and useful is to test it with a sample of appropriate users" (84:50). "An increasing number of studies suggest that testing with actual users is an essential ingredient in the development of effective manuals" (84:76).

Specific Reasons for Usability Testing. Even though a prototype document has already gone through several technical reviews, testing the document with users can reveal totally unexpected gaps and ambiguities in documentation (97:16). Scott Hubbard, the Project Leader for Computer Aided Publications at NCR adds: "a technical review validates the technical accuracy of the documentation, but not necessarily it's usability. Because reviewers are closely associated with the product being documented, many of them cannot objectively look at the documentation from a user's viewpoint" (35:169).

Methods of Usability Testing. One method of usability testing involves protocol analysis. Protocol analysis is when users are asked to vocalize their thoughts while they use the document to perform a task. This technique is

divided into two types, scenario and narrative. The scenario method has an observer standing by while the user performs a task using the manual. An example is when an observer listens to the kind of oral revisions and interpretations users make while reading a manual to learn federal regulations. Consistent patterns of misunderstanding among the users would indicate to the listener what changes need to be made. The narrative method has the user provide information after performing the task rather than while performing it (35:169). The benefit is that response will be based on a complete experience rather than just where the problems occurred (35:170). Another article, written by Mills and Dye, includes protocol analysis as a subset of 'logs.' Logs are described as any written or coded records of the user's action that are pertinent. This includes video or audio taping and keystroke recorders (68:42). Mills and Dye identify two other classes besides logs. These are objective measures and subjective measures. Objective measures include counting errors made, how many 'help' questions were asked, and time to complete tasks (especially if error free). Subjective measures examine user feelings and attitudes toward the manual, usually collected from questionnaires or interviews (68:42). All three classes of usability test will provide a list of problems and associated frequency, but each in their own way. Logs find patterns of behavior,

such as where the hang-ups occur and how the users reword the manual to themselves. This can indicate a way to rewrite parts of the manual. Objective data can be used to determine difficulty by determining when the 'help' calls and errors occurred, and from overall time to complete. Subjective data can provide general ideas. A user may like the overall organization of the manual except for Section Five (68:43). Another method of usability testing is recommended by author Marshall A. Atlas if the manual is to be used as a reference. He "recommends giving test subjects a set of typical user's problems to solve in order to test the usability of the table of contents, indexes, cross references and tabs" (2:28).

Acquiring User Input after Publication. Collecting user's opinions on a published manual is essential before writing a revision. The software industry uses questionnaires most frequently to gather user input, even though telephone surveys are more reliable. A typical question on such a survey is IBM's "Does this manual have extra, unnecessary information that gets in your way?" Another method to obtain user input is to gather copies of the old manuals to see what notes and highlights the users have added (35:171).

Conclusion

This literature review covered details on how to write a technical manual. Three general subject areas were

covered. These were how to write for readability, procedures for writing a technical manual, and how to test a prototype manual for usability.

The next chapter describes the methodology that was used to research material in order to write the Sperry 1100/60 computer handbook.

III Methodology

Research Process

The investigative questions from Chapter I are designed to determine what level of knowledge exists in the targeted group of individuals and what level is needed. The questions are also designed to determine what format and writing style would be best for a handbook of the type described in the "Specific Problem" section of Chapter I.

Level of Knowledge Needed. The general level of knowledge needed to be included in the handbook was determined by interview with HQ AFLMC/LGC personnel and from a particular Study Project Proposal Submission. Specifically, the Supply community needs a single source of basic information on the terminology and procedures associated with the Sperry 1100/60 (99,45). To determine the particular items to be contained in the handbook, the targeted users were interviewed. According to HQ AFLMC/LGSS, the targeted users of the handbook are all from base level supply units. They are: Chief of Supply, Deputy Chief of Supply, Management and Systems Officer, and Management and Systems Supervisor. (99). A total of 80 telephone interviews were conducted. Personnel from 40 different base supply units provided interviews, 10 each from four Major Commands (ATC, MAC, SAC, and TAC). All supply units contacted were CONUS. Two people per base were interviewed, one interview was either the Chief of Supply or

the Deputy Chief, the other interview was either the Management and Systems Officer or the Management and Systems Supervisor. Each interviewee was informed that research for a Sperry 1100/60 handbook was being performed, and was asked to provide input on what should be included in such a manual. Emphasis was placed on what an inexperienced newcomer would find most important. The results of these interviews are contained in Chapter IV. A demographic breakdown of the interviewees is contained in Table I. Selected characteristics of the interviewees is contained in Table II.

How to Write the Handbook. The other part of the research needed, how to write the handbook for readability, was determined by analyzing the various readability studies and articles presented in the Literature Review. Information from interviews also provided input on how to format and write the handbook. The details are provided in Chapter IV.

Data Sources. The main source for the handbook was AFM 67-1, Vol II, Part Two. Other sources included AFM 67-1, Vol II, Part Four; AFM 171-110, Vol I; AFM 171-50, Vol I; and the interviews.

Data Organization. Data will be extracted from the above mentioned sources only for subjects identified as required for the handbook by the interviews. A listing of these subjects, broken down by MAJCOM is provided in Chapter IV.

TABLE I - PERSONNEL INTERVIEWED

BASES	Chief of Supply	Deputy Chief	M & S Officer	M & S Superintendent
ATC BASES				
Chanute	X	X (CEM Acting Dep Chief)		
Columbus	X			X
Goodfellow		X	X	
Keesler		X	X	
Lackland		X		X
Laughlin		X	X	
Lowry		X	X	
Mather		X	X	
Randolph	X		X	
Reese	X	X		
MAC BASES				
Altus	X		X (Enlisted position)	
Andrews		X	X	
Charleston	X		X	
Dover	X		X	
Hurlburt		X	X	
Norton		X	X	
Kirkland	X		X	
McChord	X		X	
McGuire	X		X	
Scott	X		X	
SAC BASES				
Barksdale		X	X	
Beale	X		X	
Castle		X	X	
Grand Fork		X	X	
Griffiss		X	X	
Loring	X		X	
Offutt		X	X	
KI Sawyer	X		X	
FE Warren		X	X	
Wurtsmith		X		X
TAC BASES				
Bergstrom	X		X	
Cannon	X		X	
Davis Monthan		X	X	
Holloman	X		X	
Homestead		X	X	
Langley		X	X	
MacDill		X	X	
Moody		X		X
Myrtle Beach		X	X	
Nellis	X		X	

TABLE II - CHARACTERISTICS

	<u>ATC</u>	<u>MAC</u>	<u>SAC</u>	<u>TAC</u>
Female	2	6	3	6
Male	18	14	17	14
Chief of Supply	3	7	3	4
Deputy Chief	8	3	8	6
M & S Officer	6	10	7	9
M & S Super	3		2	1
Years in supply:				
01-05	1	6	3	1
06-10	1	4	1	1
10-15	5	1	1	2
15-20	3	2	5	3
20+	10	7	10	13
Years in job:				
01-05	15	18	12	17
06-10	4	2	6	3
10-15			1	
15-20	1		1	
20+				
Rated Supplement	0	4	0	0
Other New to Supply	0	1	2	1

Handbook Development. After analyzing the interview material, the applicable information was extracted and organized for the handbook. The readability criteria discussed in the Literature Review were applied.

Handbook Validation and Verification. When the handbook prototype was completed, it was validated and verified according to the criteria discussed in the Literature Review. "Validation" is a check for the technical accuracy of the handbook contents. This service was performed by three individuals from Gunter AFB. The

minor technical errors found were corrected for the handbook included in Appendix A.

"Verification," or the checking for proper English, was accomplished by three Air Force Institute of Technology English Insructors. All errors found have been corrected for the handbook included as Appendix A. Table III contains the names of the people who validated or verified the handbook.

Testing for Usability. The usability of the handbook format and Table of Contents was tested using 21 Air Force Institute Of Technology graduate students who had no Supply experience. A written test was administered that contained ten questions on material determined as important from the interviews. None of the test subjects were able to answer any of the questions without using the prototype handbook. The high accuracy of the answers, combined with short completion times (10 - 17 minutes), indicates that the format and Table of Contents are useful. However, 5 of the 21

Table III - Handbook Validators and Verifiers

Handbook Validators:

Msgt Kirby Broiler, SSC/SMSD, Gunter AFB AL
Msgt Juan Martinez, AFLMC/LGS, Gunter AFB AL
Tsgt Jack Merchant, SSC/SMSXX, Gunter AFB AL

Handbook Verifiers:

Maj John A. Stibravy, AFIT/LSR, WPAFB OH
Dr Freda Stohrer, AFIT/LSR, WPAFB OH
Dr David K. Vaughan, AFIT/LSR, WPAFB OH

individuals missed the same question. This indicated a problem on the readability of that particular sentence in the handbook. The handbook included as Appendix A has this problem corrected. Further usability can only be determined from field use of the handbook.

Methodology Issues

Interviews. All the information concerning what subject material to put in the handbook, plus some information on how to write it, was determined by interview. Certain questions were asked of all interviewees, but the most useful question was open ended and queried about what items or terms a newcomer should be familiar with. This question sometimes required further prompting by the interviewer, which may have led to bias. However, the interviewer was aware of the potential for bias and kept any undue influence to a minimum. Of course, the true extent of the bias can never be determined, but will be assumed negligible.

Research Problems. The author of the Sperry 1100/60 handbook has not been trained on how to write a technical handbook. Furthermore, the author has no Supply background and is not familiar with the needs and working environment of the people who will use the handbook. One source cited in the Literature Review identified the above two facts as the primary problem with how military technical manuals are written (29:73). Therefore, a heavy dependence on

interviews with people in the field was used to determine content and format for the handbook. Also, the author's lack of technical handbook writing experience and lack of Supply background put an extra emphasis on the usability testing phase.

Summary

This chapter described the method used to determine content for the handbook and how to put it together. The next chapter discusses the findings of the research.

IV. Analysis of Research to Create Handbook

The purpose of this thesis is to create a handbook on the Sperry 1100/60 for the base-level supply manager. To do this, two general areas must be discussed. First, the content of the handbook must be determined. This includes what subjects should be covered and to what extent. The second area is how to best present the material covered. This includes layout, readability, and standardization with Air Force Supply manuals. The handbook created as part of this thesis is to be published as an Air Force pamphlet.

Handbook Content

A careful examination of the interview results was used to determine handbook contents. Table IV shows subjects the interviewees felt were important enough to be included in a handbook designed for novices. Table V contains items that are a subset of "terminology" or "reports," that were mentioned specifically often enough to warrant separate attention.

Handbook Format

Most of the information concerning how to write the handbook is from sources cited in the Literature Review. However, important information on format was also provided by interviews.

Table IV - Handbook Subjects Summary

	ATC	MAC	SAC	TAC
Configuration and Capabilities	14	11	10	8
QLP and SURGE	5	6		3
Post-Post	3	4	3	3
Crossover	9	4	4	5
Recovery	1	1	1	1
Terminology and Acronyms	2	6	3	3
Program Changes and Updates	1	1	3	3
Scheduling	2	1	1	3
End of Day Processing	2	1		2
Mandatory and Opt Reports	1			
Custom Reports	4			
Z-248 and other PC Interface	1		1	2
Releveling	1	2		3
Stock Levels	2			
Terminal Security		2	2	2
Reconciliation		1		
Rejects			2	
Reasons & Consequences of Downtime			1	3
LOGMARS			2	1
Distribution of Reports and Lists				1

Table V - List of Specific Terms

	ATC	MAC	SAC	TAC
R-36	1			
DIREP	4	1	2	3
SIFS	2	4	1	4
BLAMES	2	3	1	4
D-14	1		1	
M-10	2		3	1
M-32	2		2	1
M-24	1			
Pseudo Reader		1		1
Flat File		2		
ADRSS		2		3
HAMPS		2		
D-23			1	1
D-04				1

Handbook Layout. The general layout for the handbook will be taken from an interview with Major William LeFevers, currently the Management and Systems Officer for the 437th Supply Squadron, Charleston AFB, South Carolina. Major

LeFevers is a rated supplement Officer with a total of three years in Supply and six months at his current job. This qualifies to give input on what a newcomer would need to know. He is also an Air Force Institute of Technology graduate, which makes him familiar with the writing process. Major LeFevers is the "user" best suited to explain how to format the book for newcomers. His suggested layout is as follows:

Chapter One - Hardware
Chapter Two - Software
Chapter Three - Events

This layout is well suited for organizing the subject material provided by the interviewees. However, a chapter on "reports" will have to be added to organize the handbook completely.

Use of Illustration. Since the majority of people interviewed described the need for the handbook to explain or diagram "configuration and capabilities," the subject will be described in Chapter One of the handbook. Since the subject lends itself to illustration, illustration will be used as explained in the Literature Review (29:76).

Use of Color. Multi-color print will not be used for the Sperry 1100/60 handbook. The use of color adds to the printing costs and has certain physiological disadvantages. These disadvantages are apparent in low light conditions (such as in the field or dimly lit rooms), with older people

(half the people interviewed had twenty or more years in Supply), and with the color-blind (73:19).

Handbook Readability. The following guidelines were used when the handbook was written:

1. All sentences were written in plain, grammatically correct, spoken style English (104:53-56).
2. The use of jargon was kept to a minimum. When jargon was required, it was explained in English (48:155; 32).
3. Sentences were written so that the subject and verb are obvious. Computer shorthand notation such as 'PRINT COMPILATION' (compile the printout) was not used (104:58-59; 48:154)
4. Paragraphs have conventional structure, including a topic sentence followed by related, connected sentences. Concepts and attributes are grouped together, and like terms and phrases are close together (55:13; 33:394-397; 41:97).
5. Paragraphs were written accurately, completely, and concisely (10:131).

Although many readability tests have been devised, including Air Force approved versions, none were used on the Sperry 1100/60 handbook because of extreme problems with accuracy of these tests (94:25; 84:46-50; 36:60-61). Instead, the emphasis was placed on usability testing.

Standardization with Air Force Supply Manuals. The Air Force publication most similar to the Sperry 1100/60 handbook in terms of purpose and content is AFM 67-1, Vol II,

Part Two. This manual was rewritten in 1987 to comply with a readability study done specifically for AFM 67-1, Vol II, Part Two by Tracor Applied Sciences, INC. Therefore, one of the survey questions concerned whether or not a handbook designed for newcomers should follow the format of AFM 67-1, Vol II, Part Two. Of the 80 people interviewed, only eight thought that manual had the proper format to copy for a newcomer's handbook. Therefore, the format of the manual was not used as a guide for the Sperry 1100/60 handbook. Although the format of AFM 67-1, Vol II, Part Two was generally not thought appropriate for a handbook, many commented on the easy reading mechanics. As a result, the findings of the Tracor Applied Sciences study on writing mechanics for rewriting AFM 67-1, Vol II, Part Two were used to write the handbook. The Tracor guidelines are:

1. Include an overview with large sections.
2. Give all paragraphs a number or a letter in boldface print.
3. Capitalize the beginning letters for significant words in:
 - a. organizational titles, such as "Document Control Section."
 - b. forms, such as "AF Form 9, Request for Purchase."
 - c. reports, such as "Equipment Data Report."
4. Capitalize all letters in "output document" words or phrases such as "SHP," "ITEM NOT RECORDED," or "START."

5. Capitalize for emphasis, such as 'Supply should NOT use AF Form 9.' If the message is critical, capitalize the whole sentence.

6. If a reference can be summarized in one paragraph, summarize instead of cite it. If a one paragraph summary is not possible, cite the reference with an explanation such as 'See paragraph 47b for a list of codes.' (16:11)

7. Do not use 'above' or 'below.'

8. Use boldface print for all headings and the alphanumeric system.

9. Use second person pronouns when subject is appropriate for Supply, and third person pronoun when the subject is appropriate for the customer. (16:12)

Recommendations

The Sperry 1100/60 handbook in Appendix A should be printed as is without going through any readability criteria. When a rewrite is necessary, it should be accomplished by an experienced individual from the group the handbook was designed to serve. The rewrite author can then combine his/her knowledge of the subject matter with the writing criteria explained in this thesis.

Appendix A: Sperry 1100/60 Handbook

UNITED STATES AIR FORCE

SPERRY 1100/60 HANDBOOK

PREPARED BY

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Air Force Institute of Technology
School of Systems and Logistics
10 July 1989

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SPERRY 1100/60 HANDBOOK

Introduction

Audience

This handbook provides information on the Sperry 1100/60 computer system that applies to Supply managers. For convenience, the handbook is divided into two sections. Section One is designed for novice Supply managers unfamiliar with the Sperry 1100/60, while Section Two is a glossary intended as a quick reference guide for experienced Supply managers.

Novice Supply Managers

Novice Supply Managers are those who do not have a Supply background but have been recently assigned managerial duty in a Supply organization. Specific examples of Supply jobs being filled by non-Supply background people include Chief of Supply, Deputy Chief of Supply, M & S Officer, and M & S Supervisor.

Purpose. Section One provides the novice Supply manager with the material that in-the-field Supply managers say a newcomer should concentrate on first. By using this handbook, the newcomer is spared from having to read through the massive AFM 67-1 series ignorant of what material is applicable or is initially important. This handbook is not intended to replace reading AFM 67-1, but to provide novices with information on what to learn first, thus allowing them

to be productive while they are gaining the experience needed to learn the job and understand AFM 67-1.

Overview. Section One is further divided into four general parts: Hardware, Software, Events, and Reports. Under these general parts, terms are presented and described in simple English. References are provided at the end of selected item descriptions.

How to Use Section One. The novice Supply Manager should read Section One in its entirety and in order. The material presented first is needed to understand material presented later. After the initial reading of Section One, the novice Supply manager should study the references provided at the end of selected item descriptions.

Experienced Supply Managers

Experienced Supply Managers are those who have a good working knowledge of the Sperry 1100/60 as it applies to their jobs.

Purpose. Section Two provides experienced Supply managers with a quick reference of Supply terms. These terms are written in Supply vernacular (for accuracy over readability) and references are included when applicable. Section Two will benefit Supply managers who need a quick source of information, or may be unfamiliar with the format of the 1987 revision of AFM 67-1, Vol II, Part Two.

Overview. Section Two is a glossary in alphabetical order. No references are made from Section Two to Section One; therefore, Section Two can be detached for use alone.

Section One

Hardware

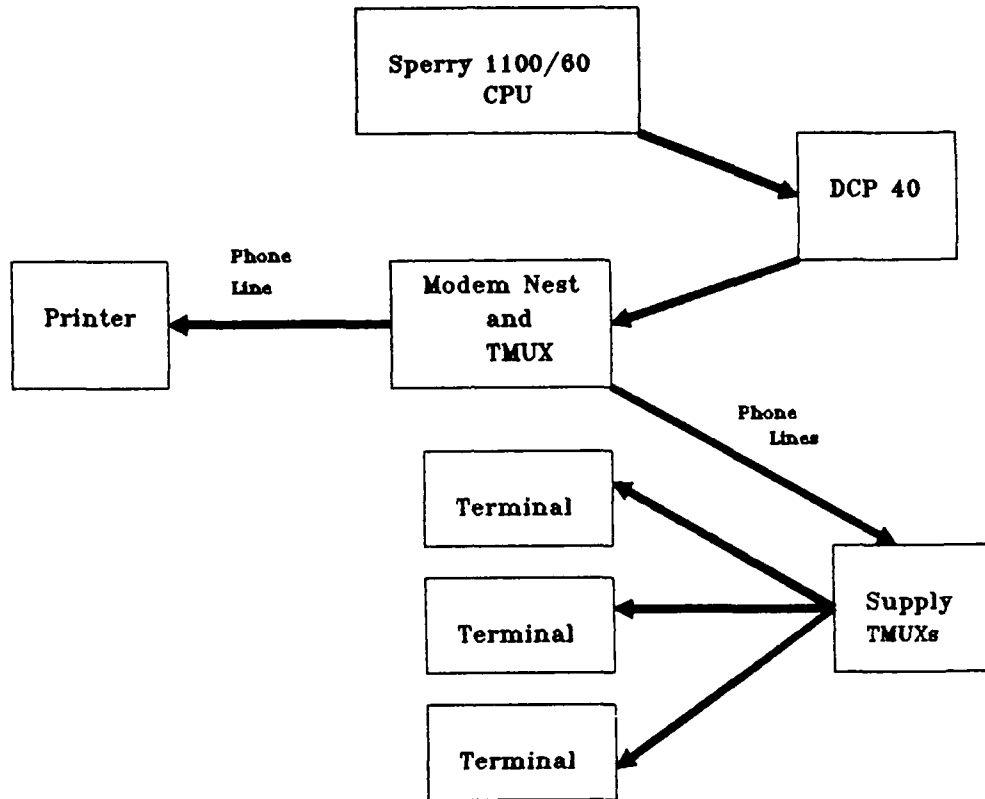
The Standard Base Supply System (SBSS) uses the Sperry 1100/60 computer to store and maintain records and to generate reports (24:1-7). This computer is not owned and operated by Supply as were previous systems. Instead, the Sperry is a base-wide system in which Supply has an account (27). The Sperry 1100/60 is an 'in-line' system, which means that whenever a Supply user inputs a transaction through any Supply terminal, the computer's programming automatically updates all Supply records affected by the transaction (24:1-7 - 1-10). Figure 1 shows the basic configuration of the Sperry 1100/60 Computer System.

Gang Concept. Each Sperry 1100/60 computer contains eight "gangs." Each gang is like a separate complete data base. In practice, one gang is used for primary processing and another for secondary processing. Therefore, a single Sperry 1100/60 could in theory be set up to support four Standard Base Supply System (SBSS) data bases. For Supply use, Gang 1 is used for primary processing and Gang 5 is used for secondary processing. The other six gangs are typically used by base agencies other than supply (22:13-7).

Crossover. "Crossover" refers to the information transfer between Gang 1 and Gang 5. During the duty day, Gang 1 is used for all on-line inputs. At the end of the

Figure 1

Basic Sperry 1100/60 System



CPU - Central Processing Unit. This is the heart of the Sperry 1100/60 Computer System. All electronic manipulation of data and arithmetic functions are performed here (42).

DCP 40 - Distribution Communications Processor. This device allows communication between the CPU and the remote terminals (98:2-5). Information can be sent to and received from the terminals simultaneously (20:2-7).

TMUX - Terminal Multiplexer. A terminal multiplexer encodes the signals from several devices so the combined information can be sent over one line. This prevents the need for a separate line for each terminal or other device to the CPU (42).

TERMINAL - This is the term for the screen and keyboard device used to communicate with the system. Typically, the terminal is the unit known as the UTS 40, but can be a Zenith Z-248, Sperry PC, or any other IBM compatible computer equipped with the proper programming (software known as an "emulator") (114).

duty day, this information is transferred to Gang 5 with a backup. Gang 5 then uses this information to produce the mandatory and optional reports for the next day. Using Gang 5 to generate the reports frees Gang 1 for further on-line processing. It would not be possible to generate reports while on-line in the same gang since the information to write the reports would be continually changing. The crossover allows the data to be "frozen" for report writing (42).

LOGMARS. Logistics Marking and Reading Symbol. This term refers to a bar code system used to identify items. This system is similar to the Universal Products Code (UPC) symbols found at supermarkets. Further details on LOGMARS are contained in AFM 67-1, Vol II, Part Two, Chapter 10, Section E (24:10-67).

SIFS. Supply Interface System. This system provides the capability to manage inbound and outbound unclassified AUTODIN (Automatic Digital Network) traffic. Inbound traffic is handled by a sub-system called **BLAMES** (Base Level AUTODIN Message Extraction System) while outbound traffic is handled by **ADRSS** (Automated Data Reports Submission System). AFM 67-1, Vol II, Part 4, Chapter 21, Section A contains further details on SIFS (22:21-3 - 21-4).

Terminal Security. The M & S Officer reviews Part 8 of the D20, Base Supply Surveillance Report. This report shows unauthorized attempts to access certain controlled material.

Any abuses should be resolved by disciplinary or administrative means. The M & S branch also receives and validates requests for organizations outside Supply to access the SBSS data base. The M & S branch also appoints a primary and alternate terminal security officer.

Branch Chiefs determine who in their branch needs access to the Sperry 1100/60 data base, and provide a list of these individuals to the terminal security officer. The terminal security officer then provides user IDs and passwords. Branch chiefs will also include names of those individuals who need access to particular controlled TRICs (Transaction Identification Code - See glossary in Section 2). A list of controlled TRICs is in AFM 67-1, Vol II, Part 4, Attachment C-1 (22:2-43, 2-47).

Software

"Software" is the term for the Sperry 1100/60 programs. The bulk of the programs are provided by HQ/SSC at Gunter AFB. These programs allow the computer to write the various reports from information contained in the data base. Although local modification of these programs is not allowed, other programs can be written using the QLP and SURGE programming languages to generate reports for unique local needs. Local programs should not be used if a HQ/SSC program can do the job (27).

QLP and SURGE. Query Language Processor and Supply System User Report Generator. Both of these languages allow

the user to write programs to read information from the data base and generate specialized reports, but neither allow changing the data base. QLP has the advantage of being easier to use than SURGE for simple retrievals. QLP, unlike SURGE, can access both the primary and secondary gangs, so QLP is best when current, up to the second information is needed. SURGE is better for more complicated listings. (117:B-76; 27)

ECL. Executive Control Language. This is the main programming language for the Sperry 1100/60 computer. Both QLP and SURGE can be accessed through it. ECL is a job control language that links the Sperry 1100/60 Operating System (OS) with applications programs (27).

FIX. Forced Record Alteration. This program is run when a change to the data base is needed. It should only be run when absolutely necessary and its use requires a signed statement from either the Chief of Supply or the M & S Officer. See AFM 67-1, Vol II, Part Four, Chapter 4, Section C for details (22:4-9).

Changes and Updates. Approximately once per month, HQ/SSC will distribute "program releases," which are modifications to old programs or entirely new software. These programs will be sent to the Installation Processing Center (IPC) and will be accompanied by amendments to AFM 67-1. The Supply M & S branch is responsible for distribution of documentation and instructions for the

program releases. Further details can be found in AFM 67-1, Vol II, Part Four, Section A (22:2-3; 27).

DIREP. Difficulty Report. This is an accountable document designed to obtain user difficulties with the Sperry 1100/60 system or the software. DIREPs are the responsibility of the Procedures and Analysis section and are completed on AF Form 1815, DIREP Worksheet. Specific information on DIREPS is contained in AFM 67-1, Vol II, Part Two, Chapter 2, Section F, paragraph 78. Attachment F-1 to that section contains an example DIREP report. Instructions on filling out a DIREP are contained in AFM 171-110, Vol I, Section 6 (24:2-141).

Flat File. This term refers to a file containing lines of data in no specified format. A flat file is created to hold data that will be used later. It is roughly comparable to a micro-computer "ASCII" file (27).

Pseudo-Reader. This is a software feature that can simulate an input device. For Supply, the input device simulated is a card reader. The old method for inputting data into the Sperry 1100/60 used punch cards. Under the new method, the pseudo-reader acts like a punch card reader, but allows the operator to enter the data in a flat file rather than on punch cards (22:14-113).

Events

An "event" is a Sperry 1100/60 related activity. Supply managers should be constantly aware of what events are taking place and why.

Downtime. The computer can go down (fail to operate) for physical or logical reasons. Physical downtime can be caused by power failure or damage, while logical downtime can be caused by crossover operation or overloaded use. Although nothing is wrong with the machine under logical downtime, the machine is still unuseable to the operator (27).

Post-Post. Post-Post is a four phase method of entering data and transactions when the Sperry 1100/60 goes down for any reason. Automated Post-Post is a microcomputer method that replaces the manual method. Manual Post-Post procedures are contained in AFM 67-1 Vol II, Part Two, Chapter 32, Section A. Section B of that chapter contains automated Post-Post procedures (24:32-9).

Chief of Supply Responsibilities for Post-Post. The Chief of Supply determines the particular phase of the four phase operation. No sequence need be followed, except that phase one must begin immediately after the computer goes down. This way, the cause of failure and expected downtime can be determined. Further responsibilities of the Chief of Supply are contained in AFM 67-1, Vol II, Part Two, Chapter

32, Attachments A-1 and B-1, for manual and automated Post-Post respectively (24:32-21).

M & S Officer Responsibilities during Post-Post. The M & S Officer's responsibilities during Post-Post operations are contained in AFM 67-1, Vol II, Part Two, Chapter 32, Attachments A-1 (manual Post-Post) and B-1 (automated Post-Post) (24:32-22).

Reconciliation. This procedure compares, on a serial number basis, what a particular Supply account has compared to what it is supposed to have. Reconciliation also can be used to compare prices or amount per unit ("ea"). The procedure is designed to make records match (27).

Recovery. When data is lost or suspect, a "recovery" is run to rebuild the data base to the last tape saved (called "IRU dump" or "Integrated Recovery Utility dump"). Data taken from the last IRU dump, plus any audit trail tapes, are used to complete the recovery. For details on recovery see AFM 67-1, Vol II, Part Two, Part 4, Chapter 13, Section C (22:13-7,27).

Releveling. When an item is issued from Supply, the Sperry 1100/60 data base is automatically adjusted to reflect the lower balance of that item. Under releveling, the data base is checked for item amounts depleted below the particular re-order levels. Any item below the required level is automatically ordered/replenished. It is very important for Supply Managers to insure releveling is

accomplished every duty day. Another routine, known as "follow-up," checks the status of orders placed by releveled. Follow-up should be performed once per week. Further details on releveled can be found in AFM 67-1, Vol II, Part Two, Chapter 19 (24:19-101; 27).

Reject. A reject notice will occur if the program edits detect an error during processing. When an error occurs, the program is stopped, all data base records are returned to the starting condition, and the reject notice is printed on the terminal screen. Reject notices indicate that certain conditions exist and action should be taken as quickly as possible, usually within one work day. Further details on reject notices are contained in AFM 67-1, Vol II, Part Two, Chapter 7, Section A. Section B of that chapter details the meaning of the individual codes (24:7-9).

End of Day (EOD) Processing. EOD processing starts with crossover and continues with processing of mandatory reports. The purpose of EOD processing is to produce the auditable and management listings for the next duty day. Therefore, EOD processing is required each duty day (27).

Reports

"Reports" are computer generated paperwork. Each report has a particular purpose and is prefixed by letter. Figure 2 lists selected prefixes with the meaning.

Figure 2 - Meaning of Prefixes

<u>Pre-fix</u>	<u>Meaning</u>
D	Daily
M	Monthly
Q	Quarterly
S	Semi-annually
A	Annual
R	As Required

Other reports, originated by MAJCOMs, may have the same prefixes but different meanings. For example, the "S" prefix is used for SAC (Strategic Air Command) reports. The MAJCOMs usually start numbering their reports at 51 or higher. For example, "S-10" is a name for a semi-annual report, while "S-51" is a name for a SAC report (27). Guidance on mandatory and optional reports is found in AFM 67-1, Vol II, Part Two, Chapter 5, Section A (24:5-19).

Scheduling of Reports and Listings. The purpose of scheduling reports and listings is to match computer use time with operational needs. The scheduling of the reports and listings is the responsibility of the Computer Operations Section of the M & S branch. Particular reports that need to be scheduled are detailed in AFM 67-1, Vol II, Part Four, Chapter 2, Section E. All computer requirements must be supported by AFM 67-1 or approved supplement, or by AF Form 2011. Further information on scheduling of reports and listings is contained in AFM 67-1, Vol II, Part Two, Chapter 5, Section A (22:2-61; 24:5-19).

Distribution of Reports. The M & S branch will designate the responsibility for distribution of Supply

oriented Sperry 1100/60 reports and listings. Chapters 5 and 6 of AFM 67-1, Vol II, Part Two contain detailed descriptions of each report. Attached to each individual report's description is a recommended distribution. Further information on distribution of reports and listings can be found in AFM 67-1, Vol II, Part Two, Chapter 5, Section A (24:5-19; 24:6-1).

Specific Reports. These reports are a representative sample which are of particular interest to Supply Managers.

D04. Daily Document Register. This document provides a management product with data concerning Supply transactions and fund expenditures. It also provides Sperry 1100/60 users with feedback from their inputs. An included funds summary can signal abuses within the system. Further information on the D04 report is in AFM 67-1, Vol II, Part Two, Chapter 5, Attachment B-4 (24:5-54).

D14. Base Supply Management Report. This document provides daily totals for item availability and customer wait time. It is a tool for determining the effectiveness of the Supply account. Also, the D14 updates ten categories of data for the Monthly Base Supply Management Report (M32). Further information on the D14 is contained in AFM 67-1, Vol II, Part Two, Chapter 5, Attachment B-14 (24:5-112).

D23. Repair Cycle Asset Management List. This document is used to monitor stock position and control of

repair cycle assets. A detailed description of the D23 is contained in AFM 67-1, Vol II, Part Two, Chapter 5, Attachment B-23 (24:5-177).

M10. The Consolidated Inventory Adjustment Document Register. This is one of the most important management documents produced by the Sperry 1100/60. The M-10 will indicate inventory imbalances, the resolution of which is the primary duty of the Inventory Section. Further information on the M10, including how to perform an analysis useful to Supply managers, is contained in AFM 67-1, Vol II, Part Two, Chapter 2, Attachment G-2. Further description of the M10 is provided in AFM 67-1, Vol II, Part Two, Chapter 5, Attachment C-10 (24:2-172, 5-284).

M24. Organizational Effectiveness Report. This document provides a management tool to measure issue and bench stock support effectiveness for each supported organization. Further details on the M24 are provided by AFM 67-1, Vol II, Part Two, Chapter 5, Attachment C-24 (24:5-357).

M32. Monthly Base Supply Management Report. This document is important for managers of SBSS (Standard Base Supply System) accounts. It provides data on overall effectiveness, identifies potential problems, provides certain statistics, and has selective inquiry capability. Generating the M32 also updates monthly and cumulative inventory accuracy stratification records. Details on the

M32 are contained in AFM 67-1, Vol II, Part Two, Chapter 5, Attachment C-32 (24:5-395).

R36. Warehouse Location Validation. This document identifies items with a serviceable balance but no assigned warehouse location or multiple warehouse locations. It also checks that an item's record warehouse location agrees with its physical warehouse location. Further detail on the R36 can be found in AFM 67-1, Vol II, Part Two, Chapter 6, Attachment B-36 (24:6-407).

Section Two

Glossary

ADRSS: Automated Data Reports Submission System. Handles outbound supply data such as AFI, BDF, ACI, AOA by writing the information onto a tape sent to the telecommunications center (TCC). ADRSS is part of the supply interface system (SIFS). AFM 67-1, Vol II (Ph IV), Part Four (96:4).

ADS: Automated Data System. The ADS code identifies the various users of the S1100/60 system, ADS GV indicates supply. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 (96:4).

BAR-CODE READER: A hand-held, portable scanner that uses a laser to light up labels for reading. Used in conjunction with logistics marking and reading symbols (LOGMARS) equipment. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 (96:4).

BASE CONSTANTS: Base constants allow each base to determine its requirement for input/output processing. The SBSS uses these data elements to validate inputs, determine processing rationale, and define output flow. AFM 67-1, Vol II (Ph IV), Part Four, Chap 6 (96:4).

BATCH PROCESSING: When requesting information from the data base in this mode, usually there is no immediate response. Batch mode uses queues. These queues hold transactions or other inputs until needed by certain runstreams (commands). In supply, there are four modes; in-line, twilight, reports, and utilities. For example, in reports mode, the system processes reports as they are input. It directs the output to a holding print/punch queue until the RPS operations directs it to an output print or punch device. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 (96:4).

BLAMES: Base-level AUTODIN Message Extract System. This system, part of SIFS, extracts the inbound supply data from the AUTODIN tape received from the telecommunications center. AFM 67-1, Vol II (Ph IV), Part Four (96:4).

CONCURRENT (On-line/Batch) PROCESSING: The ability to provide on-line and reports (end-of-day) processing at the same time for the SBSS. Terminates on-line processing at the close of each business day, assuring completion of all processed transactions, while accomplishing reports

processing against transactions for the previous day's business. AFM 67-1, Vol II (Ph IV), Part Four, Chap 13 (96:4).

CONSOLE: The S1100/60 system operator's communication device. AFM 171-110, Vol I (Ph IV) (96:4)

CONTROL PAGE: Allows the terminal operator to interact with and control certain internal UTS 40 operations. The operator can request specific functions using function control keys (XMIT, XFER, and Print). The operator uses the control page to control data transfer to and from peripheral devices, as well as the type of transmission to the host processor, and to determine the operating condition of peripheral devices. AFM 171-110, Vol I (Ph IV), Sec 9 (96:4).

CTS: Conversational Time Sharing. A powerful and efficient system for problem solving and program development and debugging. It provides a set of commands which are easy to learn and use, while also saving on user/system time by reducing the amount of command input required from the terminal, i.e., when debugging programs there is no need for printing the entire source coding to find and correct the errors. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 (96:5).

CPU: Central Processing Unit. The S1100/60 CPU executes all control and arithmetic functions which decode, analyze, and execute instructions. The CPU is multiprogrammable, allowing simultaneous placement of several programs in memory while awaiting processing. This gives the user the appearance of concurrent processing even though the CPU is actually executing hundreds of functions, one at a time. AFM 171-110, Vol I (Ph IV) (96:5).

CROSSOVER: Going from primary Gangs (1, 2, 3, 4) to secondary Gangs (5, 6, 7, 8). Crossover consists of a file or integrated recovery utility (IRU) dump, fail safe, disk copy, and mandatory reports processed on Gang 1, then transferred to Gang 5. AFM 67-1, Vol II (Ph IV), Part Four, Chap 18 (96:5).

CRT: Cathode Ray Tube. The display portion of the UTS 40 (user's terminal). AFM 171-110, Vol I (Ph IV) (96:5).

DAAS: Defense Automated Addressing System. The system for routing logistics data traffic via AUTODIN. AFM 67-1, Vol II (Ph IV), Part Four, Chap 20 (96:5).

DATA BASE: Defined as a collection of data. The purpose of a data base is to provide minimal redundancy of data, a

representation of relationships between data items and records, optimal service to application programs, independence from programs that use the data, data integrity, file security, and common methods to add, modify, and retrieve data (96:5).

DAY INPUT: Assigns the requisition dates, starting/stopping of requirements computation, follow-up, and file status. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 (96:5).

DEMAND PROCESSING: The mode which allows the user to directly enter runstreams (commands) from a UTS 40 (terminal) during any of the four supply modes; in line, twilight, reports, and utilities. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 (96:5).

DIREP: Discrepancy Report. Whenever the user encounters a problem with a software program that base level or MAJCOM cannot resolve, bases prepare and submit a discrepancy report to Data Systems Design Office (DSDO) at Gunter AFB AL. AFM 67-1, Vol II (Ph IV), Part Four, Chap 2 (96:6)

DUMP: Transferring the contents of disk to tape, which is necessary during recovery. AFM 67-1, Vol II (Ph IV), Part Four, Chaps 13 and 19 (96:6).

EOD (End-of-Day) INPUT: Used to change from in-line to twilight (or end-of-day) operation. AFM 67-1, Vol II (Ph IV), Chap 14 (96:6).

EQUIPMENT FAILURE: Lost time due to the S1100 mainframe or component/peripheral failure reported to the Sperry customer engineer. Failure of any RPS component which prevents the SBSS from processing. AFM 67-1, Vol II (Ph IV), Part Four, Chap 2 (96:6).

EXECUTIVE CONTROL LANGUAGE (ECL): The language used to communicate with the S1100/60 Executive (EXEC). The user makes requests to the EXEC in certain prescribed formats (96:6).

EXECUTIVE SYSTEM: The EXEC is a supervisor program whose job is to maintain the overall environment of the hardware. This program handles memory allocation, central processor dispatching, input and output operations, and many other services necessary for the smooth operations of a large system. AFM 171-110, Vol I (Ph IV) (96:6).

FAIL SAFE PROGRAM: Provides remote processing station (RPS) operator with the ability to produce record counts by system designator on the SBSS data base. Run under Program GV027. AFM 67-1, Vol II (Ph IV), Part Four, Chap 19 (96:6).

FILE INTERROGATION: One of four retrieval methods SBSS utilizes. Provides information in set formats on specific stock numbers, part numbers, or document numbers. AFM 67-1, Vol II (Ph IV), Part Two, Chap 23 (96:6).

FILE STATUS: Review of entire item record area made once each 90 days to update item record demand levels, identify excesses, and delete inactive item records. Run under Program GV815. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14, and Part Two, Chap 11 (96:6).

FIX: Forced Record Alteration. A modification of a software program or workaround to accomplish a specific SBSS processing requirement. Each FIX must have supportive documentation. AFM 67-1, Vol II (Ph IV), Part Four, Chap 4 (96:6).

FOLLOW-UP PROCESSING: A weekly processing that scans the detail area locating due-in details that meet MILSTRIP follow-up requirements; excess details that require follow-up action; RNB details that have sufficient age and billing not received. Program creates AF1 follow-up card for total due-in quantity if due-in meets follow-up requirements and if status not received. Also, produces AF1 card to latest known source if estimated available date has passed. Run under Program GV588. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14, and Part Two, Chap 11 (96:6).

FULL SBSS: Refers to a single autonomous SBSS (Standard Base Supply System) activity capable of including supply, equipment, fuels, and ammunition stock record accounts within system designator 01, plus any associated satellite system designators. AFM 67-1, Vol II (Ph IV), Part Four, Chap 13 (96:7).

GANG: Describes a distinct "full SBSS" (Standard Base Supply System) at a regional information processing center (IPC). The SBSS data base employs the gang-of-eight concept to support up to four (4) separate full SBSSs on a single S1100/60. Every "full SBSS" loaded has two dedicated gangs. One gang is available for primary system processing (Gangs 1, 2, 3, and 4) and a second corresponding gang is available for secondary system processing (Gangs 5, 6, 7, and 8). AFM 67-1, Vol II (Ph IV), Part Four, Chap 13 (96:7).

GANG 1 (2, 3, 4): The primary data base used for in-line processing and certain mandatory reports (96:7).

GANG 5 (6, 7, 8): Secondary data base used primarily for mandatory reports processing (96:7).

GV: The Automated Data System (ADS) code for supply. The ADS code identifies the users of the ADS on the S1100/60 system. AFM 67-1, Vol II (Ph IV), Part Four, Chap 11 (96:6).

HAMPS: Host Automated Message Processing System. This is an electronic interface for automatic transfer of data between the Base Communications Center and the Data Processing Center (DPC). AFM 67-1, Vol II (Ph IV), Part Four, Chapt 21, Section A (22:21-5).

HAND-HELD TERMINAL (HHT): Part of the logistics marking and reading symbols (LOGMARS) equipment. The HHT is a versatile, portable, and intelligent terminal that the SBSS personnel can use in a completely mobile, battery-powered mode. The HHT can transmit collected data to the S1100/60 through a UTS 40. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 (96:7).

INITIALIZATION: When the RPS (Remote Processing Station) operator is ready to start processing, all SBSS RPS equipment must be in a ready condition and the RPS must establish its session with the S1100/60. To initialize the system, see AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 (96:7).

IN-LINE PROCESSING MODE: Covers all SBSS processing from the beginning-of-day (BOD) input until the end-of-day (EOD) input. In-line processing posts individual supply transactions, updates internal supply and monetary records, creates output documents, and stores data required for later preparation of audit documents. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 (96:7).

IN-LINE TIME: When the user inputs data, i.e., turn-ins, issues, receipts, etc., some form of immediate response output is received at the time of the transaction (96:8).

INPUT-OUTPUT UNIT (IOU): Part of the S1100/60 system hardware. Controls all input/output operations and the transfer of data between main storage and the peripheral devices or vice versa. The IOU allows transfer of information entered from a terminal to the CPU or desired information back to the terminal. AFM 171-110, Vol I (Ph IV) (96:8).

IPC: Installation Processing Center. Maintains the S1100/60 system. The IPC reports to the Air Force Communications Command. AFM 171-110, Vol I (Ph IV) (96:8).

IRU DUMP: Integrated Recovery Utility. A disk-to-tape dump of the secondary data base before processing on the

secondary data base can continue. The IRU dump provides back-up security for a potential recovery of both the primary and secondary data base gangs. AFM 67-1, Vol II (Ph IV), Part Four, Chap 13 (96:8).

LOGMARS: The logistics marking and reading symbols (LOGMARS) program is the DOD project to use standard "3 of 9 bar coding" on materials and documentation to improve the accuracy and efficiency of data entry by logistics activities. The LOGMARS equipment interfaces with the UTS 40 and the S1100/60 for both input and output actions. Areas of supply that LOGMARS technology will benefit most are receiving, inventory, bench stock, and computer operations. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 (96:8).

MAIN STORAGE UNIT (MSU): Belongs to S1100/60 computer system. Commonly called the main memory, its purpose is to store programs and data for processing by the CPU. This allows the CPU to have ready access to the instructions and data for the processed program. The MSU, depending on the configuration of the system, contains 1,048K words and is expandable in 262K increments (K = thousands). AFM 171-110, Vol I (Ph IV) (96:8).

PERIPHERAL DEVICES: Includes the card reader, card punch, and line printer. The card reader is an input device which converts data on 80-column punched cards into electronic impulses which provide input to the processor. The card punch (as output device) receives data from the host processor and transfers this information to specific columns on the 80-column computer card. The line printer (also an output device) can print up to 640 lines per minute. AFM 171-110, Vol I (Ph IV) (96:8).

PID: Position Identifier. Defined as the identifier designated by S1100/60 to address a user terminal. Used by the S1100/60 to identify the actual position of the user's terminal in the telecommunications scheme. AFM 67-1, Vol II (Ph IV), Part Four, Chap 6 (96:8).

PM: Preventive Maintenance. Performed by the contractor on a scheduled basis to keep the S1100/60 equipment in proper operating condition. AFM 171-150, Vol I (96:9).

PRIMARY SYSTEM: Refers to the primary data base (Gang 1). Each SBSS maximizes in-line time on this data base (96:9).

PSEUDO READER: A software feature providing the capability of simulating an input device. During in-line processing, the RPS console operator designates the processing of inputs

from these dedicated areas. Refer to AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 (96:9).

QUEUE: Term used for a line or group of items waiting for S1100/60 processing (96:9).

QLP: Query Language Processor. One of four data retrieval methods SBSS utilizes. QLP takes file interrogation one step further in not only providing the capability to retrieve data but also to reformat and arrange output. QLP provides limited capability to produce short reports during in-line and reports processing (96:9).

RECOVERIES: In the event of a system failure, the DMS 1100 Integrated Recovery Utility (IRU) facility will recover the SBSS data base. There are two categories of recovery: unit-level recovery and system-level recovery. See AFM 67-1, Vol II (Ph IV), Part Four, Chap 13 (96:9).

REMOTE PROCESSING STATION (RPS): Functions as a location for both input and output and provides some processing capability. The RPS allows supply systems personnel to enter data and operating commands to the S1100/60. The RPS consists of the UTS 4020 cluster controller, remote terminals UTS 20W, and the UTS 40 and peripheral devices. Location is within the COS complex. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 (96:9).

REMOTE TERMINALS (UTS 40): The UTS 40 consists of a video display unit (VDU) and a free-standing keyboard. The UTS 40 provides easy, straightforward operations and serves as the operator's link to the operating system. While there is at least one UTS 40 in the RPS room, several others are used as remote devices located throughout areas of base supply. AFM 171-110, Vol I (Ph IV) (96:9).

REPORTS PROCESSING MODE: This mode covers all processing from the first report select card to the RPTEON (report end-of-night) input. Its purpose is to provide mandatory and optional reports and management products. Once SBSS enters this mode, it cannot return to in-line or twilight processing for that transaction date. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14, and Part Two, Chap 23 (96:9).

REQUIREMENTS COMPUTATION: Comparison of total assets to total requirements which may result in production of due-in cancellation requests (AC1), requisitions (AOX), or fund requirement cards. The requirements scan program performs the process under program control. AFM 67-1, Vol II (Ph IV), Part Two, Chap 11, and Part Four, Chap 14 (96:10).

ROLLBACK: The process of backing out of the effects of a particular step, both in terms of the data base and messages at a program or system failure. AFM 171-150, Vol I, and AFM 67-1, Vol II (Ph IV), Part Four, Chap 13 (96:10).

RPTEON (Report End-of-Night) INPUT: Input used to change from reports mode to utility mode. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 (96:10).

RUNSTREAM: A group of executive control language (ECL) commands along with the user-defined input(s) that the executive system uses to process jobs. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 (96:10).

SAN: System Advisory Notice. A system devised by the Standard Information Systems Center for advising S1100/60 users of problems or general information. AFM 171-103 (96:10).

SAVEALL: A scheduled, complete system dump (SAVE) (96:10).

SCAN: Term used to describe a program function which reads records over a specified area. Generally associated with the term "search" (96:10).

SCREENS PROCESSING: To establish in-line session with the host S1100/60, the user must follow sign-on procedures. Once accomplished, this provides a screen format and a general purpose screen for each TRIC/DIC authorized for input. Menu screens provide a method of calling a screen for display. There are three types: Menu--to call any screen SBSS uses; Main Menu--displays major topics; Topic Menu--groups by topic name the same type functions. AFM 67-1, Vol II (Ph IV), Part Two, Chap 34 (96:10).

SECONDARY DATA BASE BUILD: Associated with concurrent processing. During the secondary data base build, the user halts all processing on the primary gang, ensuring that no transaction processing occurs while copying the primary data base records to the secondary data base. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 (96:10).

SECONDARY DATA BASE PROCESSING: Associated with concurrent processing. After building the secondary data base and completing the data base (IRU) dump (if taken), all areas of the secondary data base are then ready for reports processing. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 (96:10).

SECONDARY TO PRIMARY DATA BASE MERGER: After the required and scheduled reports are processed against the secondary data base, the RPTEON (report end-of-night) card is

processed against the secondary data base. This will merge all SBSS data base records updated by reports processing with the primary data base records. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 (96:11).

SECONDARY SYSTEM: Defined as the secondary data base. Primarily used for reports processing (Gang 5) (96:11).

SIFS: Supply Interface Systems. Provides SBSS activities with the capability to manage inbound/outbound AUTODIN (Automatic Digital Network) traffic. SIFS initially reduces the punch card manipulation performed by supply personnel. Enhancements will eventually eliminate the use of punch card technology for inbound/outbound AUTODIN traffic. Includes ADRSS and BLAMES. AFM 67-1, Vol II (Ph IV), Part Four, and AFM 171-270, Vol I (Ph IV) (96:11).

STORAGE INTERFACE UNIT (SIU): S1100/60 hardware. The SIU consists of a high-speed buffer storage area, also called "cache" memory. Used to transfer information to the CPU from the MSU at high speed. This allows the next program to be ready and waiting for the CPU while it executes the current program. Sole purpose is to increase system performance. AFM 171-110, Vol I (Ph IV) (96:11).

STORAGE MEDIA: The two types of storage media used in the S1100/60 environment are disk and tape. Disk storage allows application programs to randomly access the data. Tape storage is used to store data that is not needed on a random basis (96:11).

SUPPLY MODES: The SBSS (Standard Base Supply System) utilizes four modes of processing: in-line, twilight, reports, and utilities. These modes define the business day for supply, i.e., in-line mode is the beginning of the business day, while utility mode is the end. These modes determine what can and cannot process at different times of the processing day. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 (96:11).

SUPPORT CONTROLLER (SC): This S1100/60 hardware provides an interface between the system support processor (SSP) and the 1100 processor. Without the SC, the SSP and 1100 processor could not communicate. AFM 171-110, Vol I (Ph IV) (96:11).

SURGE: Supply System User Report Generator. A tool for the local user of the SBSS. It allows access to the data base in a read-only mode and performance of any functions normally provided by a programming language, except writing to the data base. SURGE is a subsystem of the SBSS that provides the user with access to the data base, disk, and tape files created by the SBSS for the purpose of creating

local management reports. Replaces U1050-II Supply Assembly Language. AFM 67-1, Vol II (Ph IV), Part Four (96:11).

SYSTEM SUPPORT PROCESSOR (SSP): This S1100/60 hardware is a stand-alone processor and that portion of the S1100/60 which allows the operator to control the operation of the system. It is a minicomputer with its own operating software loaded from diskette. It can access any part of the CPU, IOU, or MSU to read or write information. Primary purposes are to aid in hardware error analysis and maintenance and provide a means to control the 1100 processor. AFM 171-110, Vol I (Ph IV) (96:12).

S1100/60 COMPUTER SYSTEM (Sperry): The central complex group consisting of the following: Central processing unit, input/output unit, main storage unit, storage interface unit, system support processor, and support controller. Maintained by IPC personnel. AFM 171-110, Vol I (Ph IV) (96:12).

TAPE FAILURE: Any time lost to tape failure. The failure of a job while in execution due to tape error. AFM 67-1, Vol II (Ph IV), Part Four, Chap 2 (96:12).

TIP: Transaction Interface Processing. The normal input/output setup that provides the user with some form of output at the time the transaction is input. During TIP, the computer is constantly creating, updating, and/or deleting records. AFM 171-110, Vol I (Ph IV) (96:12).

TIP 300 PRINTER: This LOGMARS hardware, also called the bar-code line printer, is a dot-matrix printer that has built in firmware allowing it to print "3 of 9 bar code" labels. It also prints DD Form 1348 or SBSS listings. AFM 67-1, Vol II (Ph IV), Part Four Chap 14 (96:12).

TRIC: Transaction Identification Code. This code is used to identify internal transactions within the SBSS (such as issue, turn in, due out), and to indicate the purpose and use of the data as intended by the operation. AFM 67-1, Vol II, (Phase IV) Part Two, Chapt 3, Attach 2 (24:3-76).

TWILIGHT PROCESSING MODE: This mode is all SBSS processing from the END input to the first report select (RPT) input. Its purpose is to allow processing of batch input or special runs that create transaction histories or update the SBSS data base prior to processing the first report select card. Capability exists to return to in-line processing from this mode. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 (96:12).

UTILITY PROCESSING MODE: This mode covers the period of time after reports processing and prior to initialization

(BOD) for the next SBSS processing day. The computer operator processes SURGE programs during this time. AFM 67-1, Vol II (Ph IV), Part Four, Chap 14 and Chap 19 (96:12).

UTS 20W: Universal Terminal System. The UTS 20 consists of two units--a cathode ray tube (CRT) and a keyboard. The keyboard allows the operator to enter, edit, and manipulate data by typing in specific operating instructions. The UTS 20W provides the RPS operator control over the RPS peripheral devices. AFM 171-110, Vol I (Ph IV) (96:12).

UTS 40: Universal Terminal System. See REMOTE TERMINALS.

UTS 40 KEYBOARD: Similar to that of an ordinary typewriter. The keyboard increases operator productivity. The light, responsive key action minimizes operator fatigue. The primary means of entering data into the system is through the keyboard using data keys. Once the data has been entered, the operator uses control keys to extract, edit, rearrange, and transmit the data (96:13).

UTS 4020 CLUSTER CONTROLLER: The UTS 4020 is the link between the UTS 20W and host processor. It monitors and orders the flow of data between the two systems. The UTS 4020 controls access, identification, and flow of processing to and from peripheral devices. AFM 171-110, Vol I (Ph IV) (96:13).

VDU: Visual Display Unit. Part of the UTS 40. Operator uses the VDU for file display and scanning, display of data entries, and editing. The UTS 40 is capable of displaying any accessible file in the host processor. For a quick look at data, it is possible to scan any accessible file using the VDU. AFM 171-110, Vol I (Ph IV) (96:13).

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The purpose of this study was to research material for and write a handbook describing terms and acronyms pertaining to Supply manager use of the Sperry 1100/60 computer. The research focused on two major areas: (1) Determine what subject material to cover in the handbook. (2) Determine how to best present information on the material covered.

The study found that Supply managers have a wide band of experience levels. Therefore, a handbook would have to satisfy the needs of both novices and those with years of experience. The needs of the novices was determined by interviews with 80 Supply managers. The needs of those with experience was determined from a HQ MAC effort in this area.

The end product of the research is a two part handbook. The first part is written in simple English and follows rules on technical writing for novice readers. The second part is for the experienced Supply manager and uses Supply vernacular for brevity and accuracy.

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