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THE ZOG TECHNOLOGY DEMONSTRATION PROJECT: A SYSTEM EVALUATION OF USS CARL VINSON (CVN 70)

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19 ABSTRACT

The objective of this project was to conduct an evaluation of ZOG, a general purpose information management system, as installed aboard the Navy aircraft carrier USS CARL VINSON (CVN 70). The evaluation addressed the viability of moving a developing system directly from an academic environment to an operating Navy platform. ZOG was implemented on a distributed network of 28 PERQ microcomputers connected through an Ethernet communications system. The evaluation was conducted during implementation of the ZOG system while the CARL VINSON was on its initial cruise in 1983. Data were collected through surveys and interviews with users and by the automatic capturing of information from the PERQ terminals. The system user community grew to include 30 users comprised primarily of department and division heads and others in the ship management chain of command. The majority of intended functional applications were developed and many unexpected applications of the ZOG system were developed by users. It was found that the Ship' Organization and

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Regulation Manual (SORM) was not suitable as an organizing vehicle for all ZOG functional applications. ZOG did provide the means for a unique high technology Weapons Elevator Maintenance Training Manual that allowed instant updating of system changes. An extension of ZOG called AIRPLAN resulted in a new functional application that provided on-line information about carrier air operations throughout the ship. ZOG system usage increased during the deployment as more applications were added. The menu selection characteristic of ZOG was readily accepted by system users and, generally, gave ready access to the entire data base. The rapid response capability of the ZOG/PERQ system was demonstrated as was the hierarchically structured data base generally acceptable to users. The hardware suite used for the CARL VINSON ZOG system was not sufficiently reliable for sustained operational use aboard an aircraft carrier. The ZOG system was sufficiently successful to merit immediate transition to advanced development as an automated management system. The Weapons Elevator Maintenance Training Manual project should also be transitioned to advance development to provide a broader maintenance application. Future installations of ZOG system prototypes must have a substantial set of general applications in place so that users can perceive immediate benefits from the system. The ZOG system should be interfaced with other shipboard computer systems to ensure maximum effectiveness of all systems.

FOREWORD

The evaluation of the ZOG Technology Demonstration Project was conducted within exploratory development program element 62757N, task area RF57-525 under the sponsorship of the Office of Naval Research (ONR). The purpose of this research was to evaluate a developing computer-based information system as it evolved during initial implementation on an operating Navy vessel, the aircraft carrier USS CARL VINSON (CVN 70). The results of this evaluation are intended for individuals in organizations involved with the development and implementation of automated management information systems within operational military environments.

Appreciation is extended to CAPT P. M. Curran (ONR, Code 270) for his continual administrative and technical support throughout the evaluation effort. A special acknowledgement is extended to the officers and crew of the CARL VINSON. In particular, the efforts of the original and succeeding commanding officers of the CARL VINSON, CAPT Richard L. Martin and CAPT Thomas Mercer, are appreciated. The other members of the CARL VINSON's ZOG project team also deserve recognition. These include CAPT G. L. Beck, CDR M. Frost, LCDR T. Kral, LCDR R. Shoop, LCDR P. Fischbeck, and LCDR R. Anderson. Appreciation is also extended to Dr. D. McCracken and Dr. R. Akscyn from Carnegie-Mellon University for their assistance with the evaluation data. A final acknowledgement is extended to Mr. J. A. Jeffers, from David Taylor Navy Ship Research and Development Center, for his assistance in managing the efforts of several organizations that were simultaneously attempting to complete system development and accomplish the evaluation.

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SUMMARY

Problem

Management of weapons systems aboard modern ships has placed a tremendous demand on the decision making capabilities of shipboard personnel. The coordination of shipboard evolutions has become extremely complex and taxes the ability of managers to conduct immediate and long-range planning. Despite progress in automating some administrative functions, no system has been developed that totally supports management decision making and planning. The Navy must continue to explore and evaluate ways to reduce this problem. ZOG, a rapid-response, large network menu selection computer interface, offers one approach to systematic storing and retrieving management information.

Objective

The objective of this project was to evaluate ZOG, a general purpose information management system, as installed aboard a Navy aircraft carrier. The evaluation addressed the viability of moving a developing system directly from an academic environment to an operating Navy platform and assessed the use and contribution of the system. ZOG was implemented on a distributed network of 28 PERQ minicomputers connected through an Ethernet communications system.

Approach

The evaluation was conducted during implementation of the ZOG system aboard the carrier USS CARL VINSON (CVN 70) on its initial cruise in March through October 1983. Several data gathering visits were made both during and after the cruise to assess the use of ZOG in support of shipboard management planning, evaluation, and training functions. Data were collected through surveys and interviews with users and through the automatic capturing of information from the PERQ machines. These data were analyzed to determine the extent of functional system use, ease of learning and using ZOG, growth of the data base, system reliability, and attitudes of users towards the system.

Findings

During the CARL VINSON deployment, the ZOG system provided management support to the command, administration, communications, operations, weapons, engineering, and PERQ shipboard management divisions. The active system user community grew to include 30 users comprised primarily of department and division heads and others in the ship management chain of command. No prior computer training or experience was required for users to successfully interact with the ZOG system. Training to use ZOG was successfully developed and conducted both individually on-line and in small groups. The majority of intended functional applications were developed, and many unexpected applications of the ZOG system were developed by the users. The extensibility of the system was demonstrated notably by the development of AIRPLAN, an expert system used to support shipboard aircraft launch and recovery operations. The planning function was greatly supported during the cruise. User attitudes were generally quite positve towards the system. Although there were significant problems attributable to high temperatures, electrical power fluctuations, continuous vibration, and software instability.

Conclusions

1. The ZOG Technology Demonstration Project met its program goal of expediting the transition of technology from basic to applied research status by implementation aboard an operating carrier.

2. The ZOG system on CARL VINSON provided significant functional support to shipboard management despite experiencing an initial high rate of hardware and software failures.

3. The Ship's Organization and Regulation Manual (SORM) was not suitable as an organizing element for all ZOG functional applications, as was originally conceived.

4. The ZOG system was an excellent mechanism for development of a high technology Weapons Elevator Maintenance Training Manual that allowed immediate on-line incorporation of system changes.

5. The ZOG system and the integrated video disk player provided an ideal technology for presenting weapons elevator maintenance training.

6. The ZOG system supported training management.

7. The AIRPLAN extension of ZOG represented an important new functional application that provided on-line information about carrier air operations throughout the ship.

8. The ZOG system supported an increasing number and variety of ship functions as the system matured and users became more familiar with ZOG.

9. CARL VINSON users accepted and used the ZOG system increasingly during the deployment to perform their duties.

10. ZOG system usage rate increased during the deployment as more applications and subnets were added.

11. The menu selection characteristic of ZOG was readily accepted by system users and, generally, gave ready access to the entire data base.

12. The goal of providing the user with a system capable of rapid response was met by the ZOG/PERQ system.

13. The large-network, hierachically structured ZOG data base was generally acceptable to system users.

14. ZOG did not require the user to have any background or experience in computers for a majority of the system's use.

15. The ZOG training provided CARL VINSON users during deployment was adequate, but was not updated sufficiently to make optimum use of evolving system capabilities.

16. The hardware suite used for the CARL VINSON ZOG system was not sufficiently reliable for sustained operational use aboard an aircraft carrier.

17. Hardware problems necessitated a commitment of ship's maintenance technicians beyond what was expected, thereby placing an unanticipated burden on the technicians and the spare parts supply.

18. The ZOG system was clearly capable of providing beneficial support to shipboard management, although the software must be improved and stabilized before being implemented on other ship management systems.

19. The technology test-bed concept aboard CARL VINSON resulted in the development of systems better suited to operational Navy requirements and led to improved technical skills of the operational Navy personnel associated with the projects.

Recommendations

The following recommendations are based on the evaluative information gathered during shipboard visits and onsite observation. These recommendations are directed towards both the operational Navy fleet and the Navy research community.

1. The ZOG system merits immediate transition to advanced development as an automated management system in support of shipboard planning, management, training, and evaluation applications.

2. The technology test-bed concept should continue to be supported aboard CARL VINSON, and other selected platforms, to ensure maximum benefit from applied technological developments and to provide an efficient alternative to the procurement process permitting iterative system development within the context of research.

3. The research community should consider developing future versions of a ZOG-like system using the Department of Defense language, ADA, to take full advantage of its transportability and its capacity for supporting concurrent processing.

4. The Weapons Elevator Maintenance Training Manual project should be transitioned to advanced development so additional instructional sequences can be developed, interface deficiencies can be eliminated, and the maintenance training portion of the project can be further developed to provide a broader maintenance application.

5. Future installations of ZOG system prototypes should have a substantial set of general applications in place so new and potential users can perceive immediate benefits from the system.

6. The ZOG system should be interfaced with other shipboard computer systems to ensure maximum effectiveness of all systems.

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1.0 INTRODUCTION

1.1 Background

Research in user-system interfaces for computers shows significant promise towards helping users realize the potential of their automated system. The ZOG Technology Demonstration Project, sponsored by the Office of Naval Research (ONR), was designed to accelerate the transfer of computer technology from the research laboratory to the fleet. Specifically, the project attempted to transfer a developing human-computer interface system from an academic setting directly to an operating Navy ship. This accelerated technology transfer shortened the time from conceptual development to operational utility. The intent of reducing development by early implementation is to promote feedback from the fleet users and maximize the system's effectiveness.

The human-computer interface, referred to here as ZOG, is part of a larger project involving development of a wide range of computer technologies, including artifcial intelligence and a long-range computer telecommunications system employing satellites. The syllable ZOG was selected as a name and is not an acronym. The ZOG system was but a portion of the entire information handling environment established aboard USS CARL VINSON (CVN 70). This environment includes a prototype automated system, Wang, that supports the personnel/administrative components of ship activities. For the purposes of this report, however, the evaluation focuses on the ZOG interface and its accompanying computer system.

1.2 Problem

The Navy is facing the problem of managing and operating ships that are extremely complex and sophisticated. Multiple interrelated weapons and sensor systems place a great demand on the information processing capability of senior shipboard personnel. The complexity of shipboard evolutions are taxing not only day-to-day decision making, but also the long-range planning activities of management personnel. While there has been considerable progress in automating some administrative functions, such as report preparation and the maintenance of instructions, manuals, pay and personnel records, and medical and equipment records, no system has yet been developed that supports management activities involving decision making, planning, and evaluation. These functions require more flexibility than the typical data processing system provides.

The Naval Research Advisory Committee (NRAC) (1980) conducted a study to determine whether the Navy would be able to man the proposed fleet and the extent to which emerging technology will reduce these manning problems. The NRAC reported that there was a "lack of an adequate level of development of new man-machine technology to meet the Navy's needs, particularly in light of new systems concepts and advanced hardware technologies currently under development and in light of changing manpower availabilities." The NRAC report recommended that the Navy should "establish a program to improve the productivity aboard ships by [illegible], developing, and applying labor-saving methods and automation of selected [illegible] such as facilities maintenance, ship administration, materials handling and system [illegible]s, consistent with Condition I and III watchstanding requirements."

The Comptroller General of the United States (1981) issued a report titled "Effectiveness of U.S. Forces Can Be Increased through Improved Weapon System Design." The report indicated a need for the Secretary of Defense to improve the logistic support, human factors, and quality assurance factors in weapon system acquisition. A specific

recommendation was "to ensure that all major systems are subjected to adequate testing and examination from a human factors standpoint throughout the acquisition process, particularly in the developmental stages."

The ZOG project was designed to satisfy the Navy's need for shipboard systems to support management decision making and planning functions. The ONR requirement for system evaluation during development resulted in this evaluation. The users of an automated management system will be the management level chain of command, i.e., the Commanding Officer (CO), the Executive Officer (XO), heads of departments, and relevant work center managers on board the ship. The ZOG technology project addressed the requirements of this operational chain of command.

As part of the technology transfer evaluation, the matching of technology to training requirements in a specific area of operational concern was examined. The maintenance of the weapons elevators resident on a carrier provided a training requirement that seemed to be amenable to employment of the video disk technology. Early in the construction of CARL VINSON, a Weapons Elevator Maintenance Training Manual was developed by production of a video disk of elevator operational and maintenance procedures. Access to the information contained in the automated manual was conducted by means of the ZOG system and an appropriate computer interface to the disk player. This portion of the project brought together the technologies of the video disk and the ZOG interface and directed them at a specific operational training requirement.

1.3 Objective

The objective of this effort was to develop and evaluate the ZOG automated management system as used aboard CARL VINSON during its first full deployment in 1983. Because of the developmental nature of the ZOG system, the evaluation was an analysis of the growth of the system and its functionality in support of ship operations. Additionally, the objective included examining the extent to which the automated Weapons Elevator Maintenance Training Manual was employed on the ship. The evaluation was not intended to be the final assessment of a fully developed and operationally implemented system. The ZOG project was structured so that data about system usage would be obtained routinely and, periodically, relayed back to system developers. This information permitted a shore site to aid in the ongoing development activities and to accumulate data for the evaluation. Detailed discussion of the evaluation design is presented in a subsequent section.

1.4 ZOG Development History

1.4.1 Initial Development of ZOG

ZOG was conceived during a 1972 Carnegie-Mellon University (CMU) Summer Workshop for cognitive psychologists (Newell, McCracken, Robertson, & Akscyn, 1982). During the workshop, a computer system was developed to serve as a uniform interface for gaining access to a multitude of different programs with which the users were not familiar. The resulting interface system was called ZOG and is conceptually similar to the system employed on board CARL VINSON. Although the system worked, its response rate was inadequate for the required task.

1.4.2 The Development of a Problem-Oriented Medical Information System (PROMIS)

In 1975 personnel from the University of Vermont Medical School developed PROMIS to provide rapid response information support for medical applications. PROMIS was similar in concept to ZOG, but provided a touch-screen response system with a response time of approximately one-half second. Two participants of the CMU Summer Workshop, Dr. Allen Newell and Dr. George G. Robertson, served on a technical advisory committee involved in the development of PROMIS. As a result of the success of PROMIS for medical applications, CMU personnel decided to investigate the development of a user interface system that would work in a larger and more complex computer science context.

1.4.3 Initial Support by the ONR

The development of a generalized complex ZOG system for computer science applications in 1975 marked the initial support of ZOG by ONR. The initial system was developed on several time-shared PDP-10 mainframe computers and, subsequently, on VAX/11-780 computers. Anticipating the advent of personal computers, CMU personnel initiated the development of ZOG for a scientific personal computer environment. The computer that best provided the necessary power and capabilities at that time was the PERQ computer, manufactured by the Three Rivers Computer Corporation (later renamed PERQ Systems, Inc.). Accordingly, the PERQ was selected for use in the personal computer development environment.

1.4.4 Operational Navy Interest in the ZOG System

In 1980, CAPT Richard Martin, the prospective CO of the yet to be commissioned CARL VINSON, was interested in implementing an improved management capability aboard ship. CAPT Martin visited CMU with the intent of learning about advanced computer technology that would be exported to the ship in the near term. After learning about ZOG, he became convinced that it represented an ideal mechanism for not only improving shipboard management functioning but also serving as a "floating test-bed" for research and development aboard CARL VINSON. ZOG would serve as the computer system uniting advanced computer technologies involving management, administration, telecommunications, and artificial intelligence.

1.4.5 The ONR ZOG Technology Demonstration Project

As a result of CAPT Martin's interest and ONR's desire to accelerate technology transfer, a formal ZOG Technology Demonstration Project was established, in March 1981, to develop ZOG for early implementation on CARL VINSON. The plan was to involve fleet users at the earliest opportunity, to shorten development time, and to improve the utility of the final research product. When the project was initiated, three shipboard functions were targeted for using the ZOG system: planning and evaluation, the Ship's Organization and Regulations Manual (SORM), and weapons elevator maintenance training. As part of the total project, ONR established an independent evaluation team to provide an objective assessment of how the overall system affected the three selected shipboard functional areas.

2.0 APPROACH

2.1 System Evaluation Need

While most developmental projects include a summative evaluation, there is often also a need for formative evaluation throughout the developmental process. In the case of the ZOG system, early formative evaluation was appropriately provided through the auspices of the system developers, CMU personnel. These individuals, experts in computer science, were ideally suited for making the judgments necessary for system development. Additionally, since the ZOG system was being used daily within their own professional academic work environment, they were able to alter the system to accommodate the requirements of users in the computer science department. As the system was transferred to an operating Navy ship, CARL VINSON, an evaluation was initiated that was both formative and summative. With the evaluation on CARL VINSON occurring while system development continued, assessment information was passed back to the shipboard developers to assist them in their efforts, and information was acquired throughout the cruise for overall system evaluative purposes. Accordingly, the evaluation had to be simultaneously formative and summative.

2.2 Evaluation Participants

Participants in the evaluation served in a variety of roles. The Navy Personnel Research and Development Center (NAVPERSRANDCEN) was selected as the primary evaluation organization responsible for the structure and conduct of the assessment. NAVPERSRANDCEN personnel, over the course of the evaluation, included three research psychologists and a computer programmer.

The David Taylor Navy Ship Research and Development Center (DTNSRDC), as the executive agent for the total project, has had continuing managerial responsibility throughout the project development and evaluation. Personnel from DTNSRDC, including two computer scientists and a computer programmer, also participated in the at-sea evaluations.

Since the implementation site for the technology demonstration project was CARL VINSON, ship personnel were responsible for conducting the system implementation and assisting with evaluation efforts by providing access to the system and, most importantly, assistance to system users. Additional responsibilities for the carrier personnel included the collection of machine usage data throughout the cruise. Personnel contributing to the ZOG project and evaluation included the entire management department, heads of departments the CO, XO, and the users from the ship's departments. Two persons were assigned to CMU to work directly with CMU system developers to improve the system's operational utility during CARL VINSON's deployment.

Because of the need for CMU researchers to identify, sort, and collate the statistical data prior to evaluative analysis, CMU was part of the statistical data conduit and provided evaluative suggestions and information aperiodically throughout the project. Overall project sponsorship and guidance was provided by ONR. Project management personnel from ONR also participated in the at-sea evaluations.

2.3 Evaluation Design

The general ZOG evaluation philosophy was that the best measure of system success is the use or nonuse of the system. In a draft paper regarding evaluation, Newell

(1982) stated this basic premise: "ZOG is a success to the extent that it becomes used for actual operations, and to the extent that such use continues and expands." In agreement with that premise, the evaluation team was guided by this philosophy in conduct of the present evaluation. Because the evaluation was conducted during system development, however, it was not possible to employ before and after deployment measures. Additionally, differences in the schedules, missions, systems, and conditions aboard other similar aircraft carriers precluded making meaningful cross-ship comparisons. The ZOG/CARL VINSON system served as its own control, and the evaluation sought to measure changes over time. Accordingly, the basic criteria for this evaluation were quantitative and qualitative changes throughout the deployment. That is, to the extent that the system was used, expanded, and modified, the criteria represented positive supportive evidence for this use of the ZOG technology.

During planning, evaluators recognized that frequent intervention with an operating ship would be disruptive to the daily activities of the ship's personnel. Accordingly, the evaluation tactics focused on using data obtainable from the ZOG system itself. Because the ZOG system had been developed as part of a basic research computer science project, the system had extensive statistical data gathering capabilities. These capabilities were used to gather shipboard data, thereby minimizing interventions with CARL VINSON personnel. Data were collected from the system regularly and unobtrusively, although no attempt was made to hide from ship's personnel the knowledge of data collection via the system. Use of the system machine data collection did not obviate contact with individual system users. Periodic evaluation visits to the ship were conducted to determine the extent of system usage and degree of user acceptance, and to actually make an independent assessment of system change. Evaluation information obtained during periodic at-sea evolutions was used to assist with system development throughout the cruise. Therefore, the evaluation did impact system usage.

In summary, the philosophy underlying the ZOG project evaluation was that is would be automated and objective where possible, it would permit a chronological tracking of the evolutionary change of the applications supported by the system, it would include the subjective judgments of the users, and it would assess all shipboard functional areas where the ZOG system might have impact. Because the ZOG project is a demonstration of the use of a developing technology transitioning to an operational environment, comprehensive cost analyses that generally accompany assessments of in-place prototypes were impossible, or inappropriate, to perform.

2.4 Data Collection Procedures and Instruments

This section describes the procedures and instruments that were used to collect the data used in the evaluation. The process is described in three subsections: shipboard data collection, machine/system data collection, and data analysis procedures. While some data were gathered prior to CARL VINSON's deployment, most data were collected during the cruise, 1 March (the ship departed Norfolk) to 29 October 1983 (arrived at Alameda Naval Station).

2.4.1 Shipboard Data Collection Procedures

This section describes the procedures and instruments used to gather data during visits by evaluation team members to the ship.

2.4.1.1 Ship Visit Procedures. Initial plans called for visiting the ship monthly. This planned frequency of visits was quickly ruled out because of the excessive interference

with the ship's operational schedule and travel restrictions. Because of CARL VINSON's operational commitments and difficulty of travel, only three visits to the ship took place. Two visits occurred during the cruise, 14 to 20 July 1983 and 25 September to 1 October 1983, and one visit followed the cruise, 31 January to 2 February 1984. The visits during the cruise were scheduled so the presence of the evaluation team would not interfere with ship's personnel during port visits. The postcruise visit was planned to conclude data collections.

The procedures followed during each visit included an initial project/system briefing by the manager of each of the key system components, distribution of log forms to be completed by users during the evaluation visit, conduct of interviews with each user and selected nonusers, distribution and completion of questionnaires, and the extraction of system data from the machines. To minimize visit periods, some evaluation team members conducted interviews while other members observed, administered questionnaires, and made other assessments. During the two cruise visits, user group meetings were conducted so that the evaluation team could meet with all users at the same time. These meetings proved to be particularly beneficial in providing formative evaluative feedback that could then be used to refine the shipboard system and to help direct the current efforts of the ZOG management group on board the ship.

2.4.1.2 Data Collection Instruments. The following five data collection instruments were used during the first evaluation visit to CARL VINSON, July 1983. Copies of all data forms are contained in Appendix A.

a. ZOG/PERQ User Interview Form. This form was used by an evaluation team member to structure the interview conducted with each individual user. The interview from solicited information about the user's shipboard responsibilities, background, schooling, computer experience, experience with ZOG, ship functions performed with the ZOG system, and attitudes towards the system. Some users were not available for interviews and completed the form and returned it to the evaluators, but the form was used primarily in a structured interview format. This ensured that all interviewees were asked the same core questions. Interviews lasted from 20 minutes to 1 hour, depending upon the person's level of involvement with ZOG. Although a similar form was used during the second cruise visit, September 1983, changes were made in the form based on results from the initial cruise visit and to capture information available after the first ship visit. Second visit form items were directed towards activities occurring since the first visit and less on user background. These modified interview forms approximated the Delphi type of survey that relies on collective expert opinion on one occasion to reshape and refocus the issues discussed during a second contact.

b. ZOG System Use Data: Observer Form. Evaluators used this form to assess the skill level of each individual using the ZOG system. This form was used only to observe the user working with the ZOG system and was usually completed during an interview. One evaluation team member interviewed and another member was near the interviewee to observe his use of ZOG.

c. PERQ Workstation Ergonomics Assessment. This form was used on a sample of users to judge the ergonomic characteristics of each of the workstations where a PERQ computer was used to access the ZOG system. This form was also completed during those interviews that occurred at a PERQ workstation by an evaluation team member not directing the structured interview.

d. ZOG System Support of Training. Evaluators compiled information on this form about the extent of ZOG use in support of training functions. This form was also used during the second cruise visit, September 1983, and was completed during interviews with individuals who had training related functions.

e. ZOG/PERQ System Use and Reliability Log. Data about system use and reliability were gathered on this form during the periods that the evaluation team was aboard CARL VINSON. A new copy of the form was placed near each PERQ computer each full day the team was aboard ship.

One form, used only during the September 1983 evaluation visit, was the ZOG Technology Evaluation Anonymous Questionnaire. This form was distributed to ZOG users during the users' group meeting to elicit totally anonymous attitudes about the ZOG system and its use on the ship. The completed forms were returned to an evaluation team member.

2.4.3.1 Information Sources Regarding Functional Uses of System. Information about the functional uses of the ZOG system was obtained partly through individual interviews. Additional details were obtained during conversations with management department personnel and other department heads. The most conclusive data regarding system use, however, was the information extracted directly from the system and obtained from ship-generated documents. After the ship visits, documents representing ship functions were matched with user statistics sent from CARL VINSON via CMU to NAVPERSRANDCEN for analysis.

2.4.1.4 System Configuration and Maintainability Data. System configuration and maintainability records were collected similarly to functional use data. General and sometimes quite detailed accounts about configuration changes and maintenance of the system were provided during interviews and small group discussions.

2.4.2 Machine/System Data Collection

Collection of data from the ZOG system involved the periodic extraction of user statistics from each of the PERQ computers that make up the system on board CARL VINSON. These data were of value not only in indicating system usage for evaluation purposes, but also in providing feedback to the system developer. To satisfy both evaluators and system managers and developers, machine data were extracted and transferred in a sequentially dependent manner as follows:

2.4.2.1 CARL VINSON. Machine data collection activities on board CARL VINSON were part of the routine data base maintenance procedures performed by the system management department. These procedures, at midpoint in the cruise, included a daily data base backup performed at each machine and a weekly backup performed for all machines from a single management computer. The backup procedures ensured that changes in the data base, resident in each machine, were retained even if the particular machine failed.

After a machine was in operation for 20 minutes, a statistical summary of user activity was automatically generated. These statistical data were maintained in a statistics file on that machine. Approximately every 4 to 6 weeks, statistics file were transferred from the hard disks onto a floppy disk. This transfer required personnel to go to individual machines and manually transfer the files during a 16-hour period for all machines on the system. The statistics, on floppy disks, were then sent to CMU.

2.4.2.2 CMU. When CMU received the statistics disks from the ship, they sorted and grouped the data to facilitate subsequent analysis (McCracken, 1983).

a. Exception and change logs were extracted to permit system developers to analyze system errors or faults.

b. Statistic frames were extracted, merged, labeled, and edited to include complete subnet; that is, related content area identification.

c. Agent (PASCAL programs) environment frames were extracted, labeled, and edited to substitute proper subnet identification.

d. Entries were made in a master statistics index, including propagating changes to a copy of an index maintained on CMU's ZOG VAX.

e. Floppy disks of results were prepared and mailed to NAVPERSRANDCEN.

2.4.2.3 NAVPERSRANDCEN. Data were received at NAVPERSRANDCEN in sets of 12 to 16 floppy disks. Upon receipt of a data set, a log was made of all the machine name statistics files that were contained in the set. The initial step in the processing was the mounting of the data from the floppy disks to the PERQ machine used for analysis purposes. After all files were copied onto the hard disk, each file was edited to ensure that no large gaps were found in the data. CMU had preprocessed the data sets, thereby requiring a change in the format of the file for use with the NAVPERSRANDCEN version of ZOG. After editing, each file was processed using the analysis agent program developed at NAVPERSRANDCEN. The agent summarized the data and the results were placed in a separate directory file. The results were also stored in a separate ZOG subnet so they could be used for additional analyses at a later date. Analysis results were provided to the evaluation team.

2.4.3 Data Summarization Procedures

The evaluation data was comprised of two main categories: data obtained from the ship visits, including the interview/questionnaire information and documents obtained from the ship, and data obtained from the ZOG system PERQ computers. The ship visit data were collated in standard formats. Because the evaluation was more of a case study than a controlled experiment, comparative statistical analyses were not possible. Summary descriptive statistics are presented as appropriate. Analysis of the machine data extracted from the ZOG system does not lend itself to comparative analysis for the same reason. The ZOG agent developed at NAVPERSRANDCEN for analysis of system data was designed to summarize the data by machine, the total system, and for varying time periods. The machine data often exceeded the memory storage limits of the two Model II PERQs used for analysis purposes. Consequently, machine data analysis involved dividing files between the analysis machines, thereby relocating portions of the data base to permit additional analyses.

3.0 FINDINGS

The findings from this evaluation are presented in seven sections: (1) a description of the ZOG system, (2) the ZOG user, (3) shipboard functional use of ZOG, (4) system maintainability, (5) PERQ computer data analysis, (6) ZOG user interface issues, and (7) postdeployment system changes.

3.1 ZOG System Description and Configuration

The description of the ZOG system and its configuration is based upon the system as it exists on board CARL VINSON, as compared to the ZOG system structure at CMU. While information is presented regarding initial versions of the system implemented on the ship, the major emphasis is placed on describing the system as it existed at the end of the deployment. This section is divided into a general description of the ZOG computer system, a second section describing the system configuration on board CARL VINSON, and a final section presenting the system development that occurred during the 1983 development.

3.1.1 ZOG System Description

This ZOG description presents the characteristics of ZOG as a user-computer interface. ZOG is described by its developers as "a rapid response, large-network, menu-selection system used for man-machine communications" (Robertson, McCracken, & Newell, 1981). This interface permits the user to interact with a computer by selecting choices from a displayed menu of options. While menu selection is not unique, the additional characteristics of rapid-response through a large-network data base make the system quite powerful despite its apparent simplicity. As the system evolved at CMU, an additional major characteristic, known as active selection, was articulated to describe the system. Each feature will be discussed separately.

3.1.1.1 Menu Selection. The ZOG system exploits menu selection by presenting unlimited displays of information by means of selection options that are presented as menus on each PERQ display. Each display, called a frame, is composed of a title, text, a set of selection options unique to part of the data base, and a set of generic options for systematically maneuvering through the frames in any other part of the data base or accessing certain ZOG system utility programs. An option is selected via a single keystroke from a keyboard or a mouse.

There are two types of selection options unique to the data base: OPTIONS, selected by entering a single number, and LOCAL PADS, selected by entering a single uppercase letter. The OPTIONS permit movement down into more detailed portions of the hierarchical data base, while the LOCAL PADS are used to refer to related information in another portion of the total data base. A third kind of selection option, GLOBAL PADS, is generic to the ZOG system and is selected by entering the first lowercase letter of the GLOBAL PADS designation. GLOBAL PADS are used to perform generic movements within the data base, such as going to the previous frame or the next frame or getting to certain ZOG utility programs, such as editors. The ZOG system has two editors, called ZED and SLED, that are used to create and modify the frames that make up the ZOG data base. The display location of the components of the ZOG frame, including the different selection options, are depicted in Figure 1.

The benefit of a menu selection interface with a computer is that available options for moving within the computer's data base are self-explanatory. Therefore, the options are highly appropriate for a user new to the particular system. The disadvantage of menu selection is that for experienced users the use of options that must be exercised to move through a data base appears time-consuming and overly restrictive. In order to circumvent this criticism, ZOG was designed to respond quickly, regardless of the location in the data base being accessed. Additionally, the system provides selection mechanisms, called agents, that automatically activate programs that operate on the data base. These characteristics of rapid response and active selection will be described in the following sections.

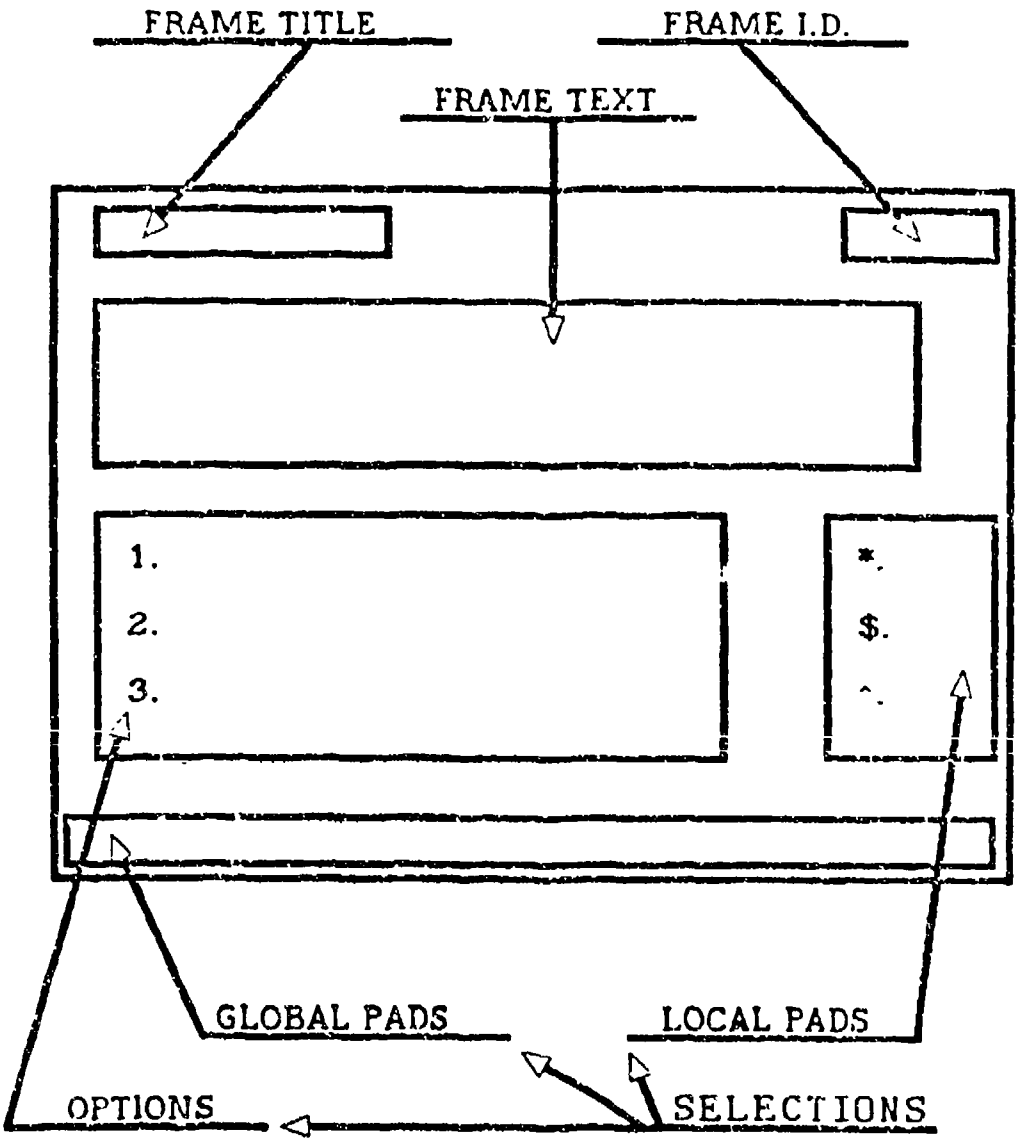

Figure 1. ZOG primary data structure: Frame.

3.1.1.2 Rapid Response. The ideal ZOG system would have an immediate response from keystroke to display of the selected frame. The practical design goal for the actual system was approximately .25 seconds or essentially "instantly" for a user (Robertson et al., 1981). The ZOG system in use at CMU and operating within a VAX 11/780 computer regularly approaches this design goal. For the shipboard ZOG system, the response time from keystroke to display of the selected frame was generally from .5 to 1.5 seconds when the system was operating normally and was quite adequate for user acceptance.

3.1.1.3 Large-network Data Base. The frames that make up the data base are connected according to a hierarchical structure. The higher level frames of a hierarchy provide the most general information. The selection options contained on a frame permit movement to lower level frames that generally contain more detailed information. The connection of frames into a network results in a hierarchical tree structure. As a matter of convention, the frame in the highest level of the hierarchy is referred to as the top frame. All of the connected frames of a particular topic make up a subnet, or a portion of the entire ZOGnet data base.

While the total data base is structured into a single network, the variety of topics results in the creation of a number of unique subnets, each with a top level frame and a set of lower level frames. This proliferation of subnets with different topics requires a mechanism for moving not only within a subnet, but across subnets. By using the LOCAL PADS to connect related frames, different subnets can be created using frames from other subnets. The GLOBAL PADS and LOCAL PADS can then be used to move within a subnet or change to a different subnet. Figure 2 illustrates the hierarchical data base network structure characteristic of the ZOG system and the relationship between frames.

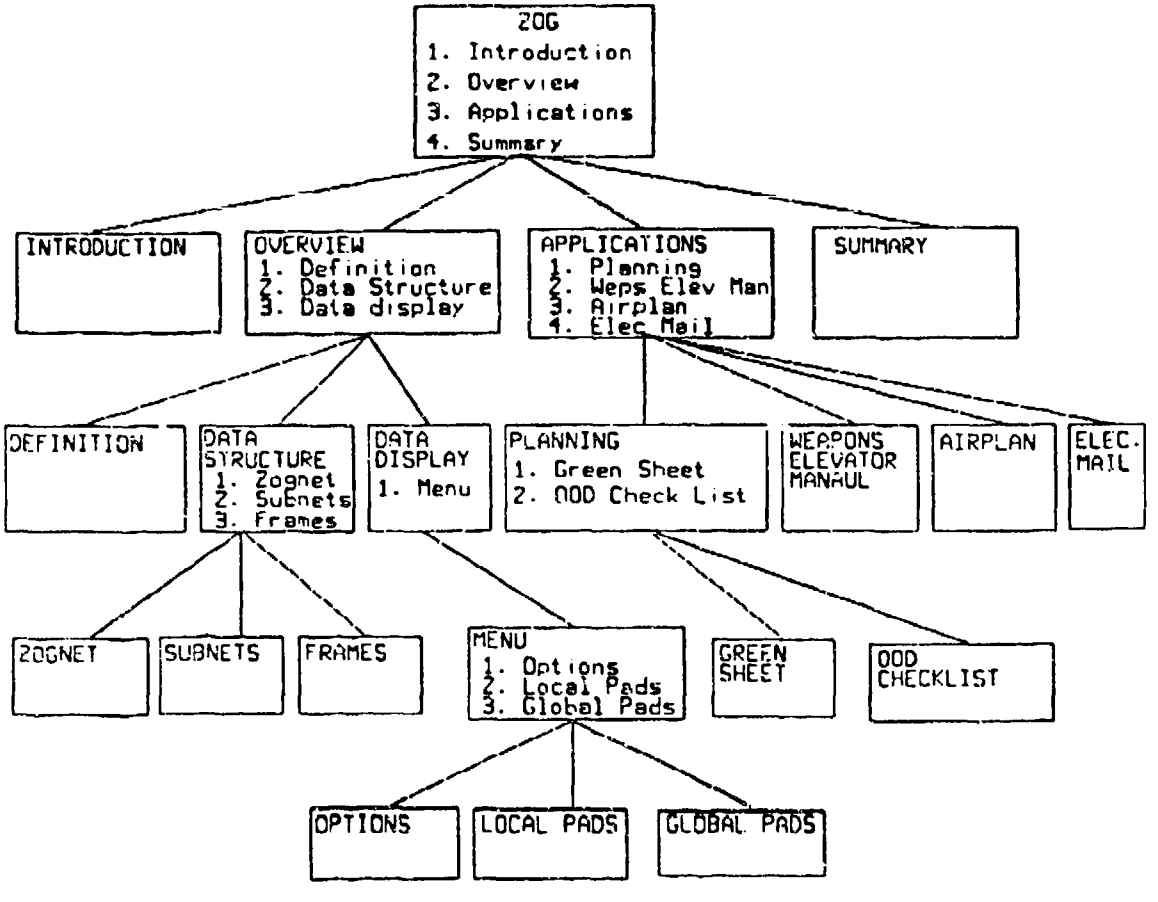

Figure 2. Hierarchial tree structure

Although Figure 2 depicts a very small number of frames, the actual data base may be comprised of thousands of frames. The data base can grow, with the network expanding, as new information is entered via the creation of new frames. One subnet may vary from one to hundreds of frames, with the total data base consisting of one to hundreds of subnets. The capability of the user to expand the data base through creation of new subnets, almost without limit, is sometimes referred to as user extensibility. The important aspect to this extensibility is there is virtually no constraint on the form of the subnet. The primary constraint is the requirement to format the information into ZOG frame components. The upper boundary of the entire data base size is determined by the peripheral memory storage capacity of the particular machine system and not by the structure of the data base. For example, the data base for the CARL VINSON at the end of the cruise was in excess of 44,860 frames contained in more than 680 unique subnets, not including system software.

3.1.1.4 Active Selection. Certain functions can be invoked that initiate an action which can move a user through a net, control communications, modify frames, produce a printed copy, or turn on an agent program. The dynamic operation of these actions and agent programs speeds up access to the data base and performs updates or modifications to the data base information. While not visible to the user, the operation of ZOG agents is vital to the system fully functioning. The intent is to have users create agents that will operate automatically and will provide an even more powerful computing environment for the naive and sophisticated user alike.

3.1.2 ZOG System Configuration Aboard CARL VINSON

The initial predeployment use of ZOG on board CARL VINSON was through telephone lines connecting the ship to the CMU VAX 11/780 computer in Pittsburgh. Although this implementation was operable only when CARL VINSON was in port, it permitted preliminary use of ZOG and, most importantly, facilitated communication between the ship and ZOG system developers at CMU. With this limited implementation, ZOG was not intended to be used by shipboard personnel for immediate shipboard applications. The system was used, however, for planning predeployment ship's trials. The system was used mostly in a developmental manner. The developers at CMU interacted with the Navy personnel on CARL VINSON to determine the efficacy of various system enhancements. Broad-base functional use of ZOG did not occur until after a number of PERQ computers supporting ZOG were installed in late 1982. The system configuration presented in this report includes only that which was in use during the 1983 cruise.

3.1.2.1 The Hardware Configuration. The ZOG system was implemented on Model I PERQ computers. The initial implementation was as a stand-alone system with the data base contained on one machine available only to users of that machine. Each PERQ was configured with 1-megabyte random access memory, 1-megabyte floppy disk drive, 24-megabyte Winchester hard disk drive memory, a 4K byte writable storage, a graphics tablet and mouse, and PERQ operating systems (POS) using a PASCAL compiler. As system development progressed, the configuration was changed to permit local area networking of the PERQs aboard CARL VINSON by means of the Xerox Corporation Ethernet. In addition to the PERQs, two Canon laser printers were on the Ethernet. Networking the PERQs and the printers together was facilitated because the necessary coaxial cable had been laid throughout the hull during ship construction. The connecting of the machines, via the Ethernet cable, permitted an important system development in which the total system data base was distributed across all of the machines.

The original plan was to locate PERQs with all department heads and other command individuals. Funding constraints limited the total number of PERQs delivered to CARL VINSON, immediately prior to the cruise, to 28 machines. These machines were placed in those shipboard locations where individuals were, or were expected to become, key users of the ZOG system. Table 1 lists in alphabetical order the location of the machines and the primary intended responsibility for that component of the ZOG system. The locations in Table 1 represent the location, after some initial moving of machines, to accommodate differing departmental needs and utilization of the networked system. The 28th PERQ on the ship was not associated with the ZOG project, but was part of the larger technology transfer effort. This additional machine was used in a separate information system designed to support tactical ship movements.

Throughout the cruise, the PERQ locations and functions remained essentially the same. The locations of the AIRPLAN and VAIR machines within their original compartments were changed to better meet the operational needs of the users. Machines were occasionally relocated if a particular machine with a high functional requirement malfunctioned. A lesser used machine temporarily replaced the defective machine until it could be repaired. Because of the extent of malfunctions, the CAG and COMM machines were used as replacement machines for virtually the entire cruise. Excluding the machines dedicated to AIRPLAN, to support the printers, and to serve as a spare, 19 PERQs remained available for shipboard functional use. These 19 PERQs provided the majority of the information regarding the functional utility of the ZOG system. These interconnected machines were located throughout CARL VINSON from the Air Boss' compartment on the 010 level down to the 3-level deck where the Personnel Department PERQ was located.

3.1.2.2 The Software Configuration. While CARL VINSON departed Norfolk on 1 March 1983 for operations in the Caribbean, delay in development of software that supports a distributed data base and local area networking on the PERQ I prevented implementation of a distributed ZOG system until 14 March. The fact that the CMU developers were able to deliver a distributed system without the assistance of a distributed POS during this time was remarkable. Final distributed system development and implementation was accomplished by the CMU developers aboard CARL VINSON during the first 2 weeks of March. This version, referred to as version 17.5, allowed operation of the networked distributed data base and automatic data collection for this evaluation. With ZOG, the large screen display of the PERQ was split into two standard ZOG frames present simultaneously. This software feature permits a user to keep one frame on display while also browsing through a series of related frames. A full list of the ZOG software and "netware," current on 25 March 1983, is included as Appendix B. After completing software installation, the CMU developers departed the ship which then left the Caribbean for the Mediterranean Sea area. Figure 3 depicts the interrelationships of the major software components of the ZOG/PERQ system. Note in Figure 3 that the ZOG program serves as the direct interface, not only with the data base contained on the hard disk storage, but also with all the components of the operating system.

3.1.2.3 System Management Structure. Management of the ZOG system was performed by the CMU development group which included a CARL VINSON officer expert in computer systems, a software maintenance organization, the shipboard ZOG management group, and a coordinating manager.

While CMU had primary responsibility for ZOG software development, Mellon Institute was contracted for ZOG software maintenance and documentation responsibilities. The intention was for Mellon Institute, located near CMU, to provide any necessary

Table 1

Location and Intended Responsibility of PERQ Computers Aboard CARL VINSON

	Machine Designation	Location	Intended Responsibility
1.	Air Operations (Ops)	Air Ops Office	Support AIRPLAN system
2.	AirOutPut	Air Ops Office	Support AIRPLAN system
3.	Carrier Air Group (CAG)	CAG Office	Provide information to CDR Air Group
4.	CanonA	Printer room	Interface with Canon laser printer
5.	CanonB	Management Office	Support printer and system development
6.	Communications (COMM)	COMM Office	Support COMM department
7.	Development Group (DEV)	Management Office	Support system development and departments
8.	Engineering Department (ENGO)	Engineer Office	Supporting ENGO
9.	Medical Department (HMED)	Medical Office	Support HMED
10.	Aviation Intermediate Maintenance Department (IMDO)	AIMD Office	Support AIMD
11.	Input A	Air Ops Office	Support AIRPLAN system
12.	Input B	Air Ops Office	Support AIRPLAN system
13.	Management Department (MGTO)	Conference room	Integrate conference room with ship system
14.	Navigation Department (NAVO)	Ship's bridge	Provide information to/from bridge
15.	Ops Department (OPSO)	Ops Office	Integrate Ops office with ship system
16.	Strike OPS Department (OXOW)	Strike Ops Office	Coordinate ship's activities via Green Sheet
17.	Personnel Department (PERS)	PERS Office	Support PERS
18.	Reactor Department (REAC)	REAC Office	Support REAC
19.	Spare	Electronic Material Officer (EMO)	Used for spare parts
20.	Supply Department (SUPO)	SUPO Office	Support SUPO
21.	Chaplain and Training Department (TRNG)	Chaplain's Office	Support TRNG
22.	Air Boss (VAIR)	VAIR Office	Provide AIRPLAN PERQs
23.	Weapons Department (WEPS)	WEPS Office	Support WEPS
24.	Weapons Elevator Maintenance (WELV)	WELV Office	Support WELV
25.	XADM	Air Ops Office	Manage AIRPLAN PERQs
26.	YYXO	XO Office	Provide information to/from XO
27.	ZZCO	CO Cabin	Provide information to/from CO

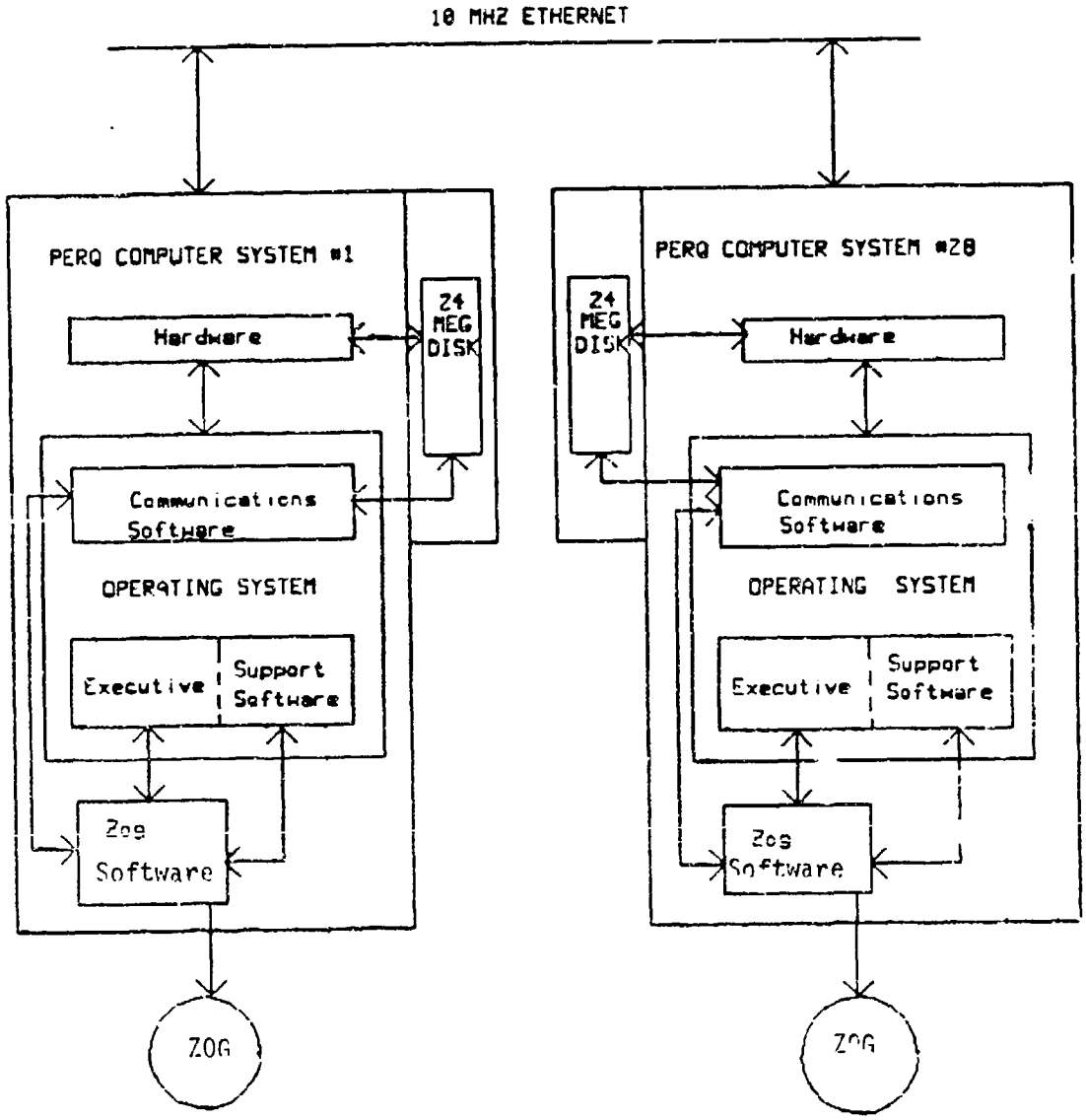

Figure 3. ZOG system software relationships.

software maintenance and to transfer system changes to the CARL VINSON ZOG system. CARL VINSON personnel assigned to the ZOG management group would then provide any further debugging or agent creation efforts. To facilitate more rapid software support, the software responsibility was transferred to the CMU developers midway through the cruise. CARL VINSON personnel subsequently interacted directly with CMU system developers for software support.

A computer system analyst from DTNSRDC served as the coordinating manager, referred to within the project as the executive agent, to provide a continuing and coordinating function across all the organizations and individuals involved in the system development and evaluation.

On board CARL VINSON, the ZOG system management function resided in the ship's Management Department. At the beginning of the cruise, the Management Department comprised three divisions: PERQ Research and Development (R&D), Wang, and Special Projects. The primary responsibility of this department was to manage the unique computing systems on the ship. The Special Projects Division was charged with managing the variety of projects that comprised the ship's technology transition effort of which the ZOG project was one. The Wang Division was responsible for ensuring the continuing effectiveness of the Wang computer system. The Wang system, also made up of computers that were networked together, was installed when CARL VINSON was under construction and had assumed the task of providing routine personnel, supply, and administrative support. The PERQ R&D Division was responsible for debugging ZOG software, maintaining system operability, and developing new ZOG agents to support operational needs. Within the department, there were four lieutenant commanders, all with master's degrees in computer science or operations research, who had some share of the responsibility of ZOG system management. The four officers volunteered to be assigned to the Management Department, even though this assignment required extra duty. Additionally, there were four enlisted personnel, three data programmers (DPs), and one Aviation Storekeeper (AK2) who were assigned to provide software support for all computing systems under the department's scope of responsibility. Departmental responsibilities for the ZOG system included maintaining the software, managing the data base, training and supporting users, ensuring that the PERQs were operating, conducting preventive maintenance, and making preliminary diagnosis of hardware malfunctions.

3.1.3 ZOG System Development During the Cruise

The ZOG management group on CARL VINSON maintained an operating system and supported a small but growing group of system users. As might be expected, though, maintaining a distributed version of ZOG that was newly developed and installed immediately before deployment was not accomplished without problems. The ZOG group experienced a combination of hardware and software problems that were particularly debilitating during the first half of the cruise. Accordingly, this section will describe the ZOG system developments that occurred during the cruise in terms of these problems and enhancements that were made to resolve them.

3.1.3.1 Software Problems and System Versions. In order to provide a networked ZOG system, version 17.5 was installed and operating on the PERQs by 14 March 1983. The networking feature permitted any PERQ to access data stored at any other PERQ workstation. In addition to the networking capability, the major change in this system involved the incorporation of automatic statistical gathering capabilities. Development of the networked distributed data base system represented the first time such a system has been successfully installed on a Navy ship.

For maximum efficiency, the data base was distributed so subnets used by a particular PERQ were located on the hard disk storage of the PERQ. For example, ZOG subnets that pertained to the Weapons Elevator Department were resident on the weapons elevator PERQ. This arrangement reduced the need to access other workstations. In some cases portions of the data base were duplicated on other PERQs. This duplication was done generally for subnets that had a high expected usage. Problems with the network functioning increased the requirement to ensure that certain PERQs had particular components of the data base in its own hard disk storage. Early in the cruise, system operating problems were the driving force behind data base management on CARL VINSON.

Early problems with ZOG were, to a great extent, masked by PERQ hardware problems. The hardware problems involved the Ethernet boards (directly affecting network functioning), power supply failures, and display board failures. Unexpected system problems involving noise interference also negatively affected network functioning, particularly during the day when there was generally more activity on the ship. The stability of the previous version of ZOG, combined with the relatively small system additions, led CARL VINSON personnel to first suspect that the ZOG operating system might be too big for the POS to handle. This concern for the ability of POS to support ZOG adequately remained with the ZOG group throughout the cruise.

The problems encountered by a ZOG user during this early part of the cruise included difficulty getting a user started and logged into ZOG, unexplained "crashes" out of ZOG, and intermittent inability to use the network to access portions of the data base resident in other machines. These problems made it very difficult for new users to acquire any facility with the system. The new user could not determine whether the system was working properly or how to recover from entry errors. An additional problem was that to collect statistics efficiently, the system automatically logged users off if there was no activity at a terminal for 20 minutes. Once logged off, the user would not be able to enter the ZOG system without additional command entry. This became a nuisance for users and affected their acceptance of ZOG. System problems affected the experienced ZOG users as well. The lack of system reliability prevented unattended use of the system. For example, completing unattended backup procedures from a central machine by maintenance personnel was not possible, because the system would experience an interruption or crash that required a user intervention before the program would continue to run.

In an effort to resolve these system problems, version 19.1 of ZOG was released to CARL VINSON on 21 June 1983. This version reorganized the software to reduce ZOG intermodule dependencies that contributed to system instability, altered the statistical data gathering modules, and introduced some enhancements. Additionally, the automatic user logoff feature was turned off.

While version 19.1 did provide some improvement in system operation, the system remained unreliable. This unreliability was primarily due to the inadequate interface between the Ethernet handling software and the rest of the POS. During their first visit (July 1983) to CARL VINSON, the evaluation team believed a major effort was needed to resolve this system interruption problem that all users were experiencing. The evaluation team considered improved reliability of paramount importance for any significant increase of functional use. As a result of the evaluation team's concern, a ZOG management team member was sent to Pittsburgh to work with the system developers and maintainers at CMU, Mellon Institute, and PERQ Systems, Inc. to improve system reliability.

As a result of this special effort, a new version of POS and ZOG were soon sent to CARL VINSON. After some shipboard modifications to accommodate the test-bed version of the system, the modified version, 20.1, was implemented on CARL VINSON PERQs in late July. A mail system was also added to this version. The mail system allowed users to send ZOG frames directly to individuals as a message system. To use the mail system, the login procedure was modified to take users directly to their own unique top frame. This facilitated getting directly to the user's subnets of interest and the user's mail frame. Some software code modification occurred with virtually every new version of the ZOG system. In the rush to provide improved versions to the ship as soon as possible, updates of ZOG were sent to the ship before being fully integrated with the

current test-bed version. ZOG management team members assumed they could complete final code debugging prior to actual implementation on the ship's machines. This assumption was probably unrealistic because of the operational commitments of the ZOG management group and their debugging capabilities. The distance between CARL VINSON and system developers at CMU made communications and software transfer difficult. Differences in software versions at the different locations and differences in system load made the isolation of software deficiencies difficult at best.

Another version of ZOG, 23.1, was released to CARL VINSON PERQs during early October 1983. This update included additional code changes designed to minimize the interruptions and implement system enhancements described in the next section. Near the end of the deployment, there was general consensus among system developers that the interrupt problem was a function of difficulties in the interfacing of the ZOG and PERQ operating systems. PERQ Systems, Inc. personnel were not available to provide sufficient development support for the POS version on board CARL VINSON. Consequently, the interruption problem had to be resolved by programming ZOG around the limitations posed by the POS.

3.1.3.2 System Software Enhancements. Major ZOG enhancements implemented during the cruise included the addition of ZOG actions providing frame/subnet protection, incorporation of PERQ shell utilities (system functions) into the ZOG environment, the transferring of all ZOG system code into ZOG frames to provide a consistent software environment, and the addition of a mail system, mentioned previously. Although it was not really a part of the ZOG software, the successful incorporation into ZOG of AIRPLAN, a system for monitoring air operations, was a significant enhancement to the total system. The addition of AIRPLAN did require extensive ZOG code restructuring. Throughout the cruise ZOG agents were created, both at CMU and on board CARL VINSON, and were implemented as they became available. These agents, in general, facilitated use of ZOG by (a) improving access to frames and subnets, (b) improving the dynamic actions that ZOG would automatically perform on the data base as a result of invoking an agent, and (c) by improving the ability to summarize data base information.

3.2 The ZOG/CARL VINSON User

This section describes the shipboard personnel who are ZOG system users, their education and computer background, the training received by them, and the growth of the ZOG user community during the cruise. Data describing the ZOG user came from interviews, questionnaires, and actual observation of users. Because of operational commitments, some infrequent users and users who received only the functional output of the ZOG system did not complete questionnaires or participate in the interviews.

3.2.1 Types of ZOG Users

Because of the varying degree of involvement with the ZOG system across users, the description of the users will be presented in four categories. The general class of user, who interacted directly with the PERQ machine to either input or extract information, comprises three categories. These categories are superusers, expert, and browsers. The fourth category is the secondary user who receives the output of the ZOG system, but not directly from the machine. In other words, there are a number of CARL VINSON personnel who are affected by the ZOG system, to some extent, but receive information in the form of a copy of ZOG-generated oral or written instructions. Because of the difficulty in both identifying secondary users and determining the extent to which ZOG affected their behavior, this report focuses on the primary users who interact directly with the ZOG system.

Superusers are defined as those ZOG management personnel who used all of the system's capabilities frequently. This primary user group consists of the four key officers and one enlisted member from the Management Department. The superusers are able to exercise all the capabilities of ZOG, including creating and running ZOG agents. Because they are members of the ZOG group, as contrasted with a ship's department, their duties were concentrated in support of the ZOG system. This group of five superusers were present throughout the cruise, and their individual ZOG skill levels undoubtedly increased during the deployment.

Expert users are defined as those individuals in any department who, during the cruise, developed sufficient skill to exercise the basic functions of ZOG and could use the ZOG agents to some extent. This is a broad category, because some users were only barely able to use some ZOG functions, such as the editors, and other users were very accomplished in interacting with ZOG and POS. This expert category includes the majority of users who made a functional use of the system in order to accomplish activities associated with their respective departments. Throughout the cruise, the evaluation team identified 23 expert users, 3 in the management department and 20 in other departments or positions. Both the first CARL VINSON CO, his replacement, and the XO were classified as expert ZOG system users.

The third category of primary users consists of browsers. That is, individuals who developed ZOG facility sufficient to move around within the ZOG data base but would seldom, if ever, use the editor to create frames or subnets. Although a browser generally did not directly create or modify subnets, browsers would direct a subordinate to create certain subnets. In other words, browsers could be less skillful in physically interacting with the ZOG/PERQ system, but could still use the ZOG system indirectly for management purposes. The evaluation team identified five users who were browsers and essentially did not progress beyond that level of proficiency with ZOG. Included in the five browsers were two department heads, one of whom used the system extensively by having a subordinate do any necessary subnet development.

There were 30 users in the three categories of superuser, expert, and browser. The user data contained in this report are based on information obtained from these 30 primary users. While there were a number of other users who may have interacted with ZOG in some capacity, the inability to reliably identify these users either through questioning of the Management Department or by examination of login identifications prevented any detailed data gathering for these personnel. The actual number of user names contained on a list of users at the end of the cruise was 66. This list, however, included individuals who had detached from CARL VINSON during the cruise and did not include one of the officers in the ZOG management group. Consequently, the list of 66 users should be assumed to be an estimate of the total number of users who had sufficient interaction with the system to be included as a user.

3.2.2 ZOG User Computer Background

Of the five superusers in the Management Department, all four officers had received master of science degrees in computer science or operations research from the Navy Post-Graduate School in Monterey. Their experience with computers, consequently, was extensive. They all had had some experience with several languages, such as FORTRAN, COBOL, assembly, and PASCAL, the language in which ZOG was written. The enlisted member of this group, although not a recipient of a college degree, had some experience with BASIC, COBOL, FORTRAN, and PASCAL languages since becoming attached to CARL VINSON. This individual, with little prior computer experience, became a key member of the ZOG group.

Of the 23 expert users, 4 had no prior computer experience. The remaining 19 had varying experiences, from minimal contact with an Apple computer and the BASIC programming language to very extensive college courses in computers and extensive experience with several languages. The predominant extent of experience included some formal courses and experience in FORTRAN, along with experience in the BASIC language as a consequence of owning or working with a personal computer. Most of the expert users also interacted with the ship's Wang computer system for functional use, although they did not usually perform any programming on the Wang.

Of the five browser users, three had had no prior computer experience before encountering the ZOG system. The other two browsers had had some familiarity with the BASIC language through use of a personal computer.

3.2.3 User Education

Without exception, the officers had all attained at least a bachelor's degree, although not all in a computer related major. All of the Management Department officers had received master of science degrees in computer science. The enlisted member had completed some college, none related to computers.

3.2.4 ZOG User Training

3.2.4.1 Description of ZOG Training. ZOG user training took a variety of forms prior to and throughout the cruise period. These forms included an initial ZOG training class, completion of the ZOG tutorial implemented on the ZOG system , study of the User's Guide, study of the on-line ZOG documents, one-on-one tutoring, and independent study for the ZOG Pocket Guide. The following paragraphs will describe each of these forms of training. Typically, a user would participate in several of these forms of training. Table 2 lists the frequencies that ZOG users reported for each category of training they experienced. Because each user completed two and three types of training, the total frequency (30) exceeds the number of users providing information on the questionnaires.

Table 2

Frequency of Users Completing Categories of ZOG Training

ZOG Training Category	Frequency
Initial group training class	24
The ZOG on-line tutorial	23
ZOG User's Guide	19
One-on-one training	12
On-line ZOG documents	0
The ZOG Pocket Guide	2

a. Initial group training. Approximately 3 months prior to the cruise, the CMU ZOG developers conducted an initial class on ZOG on board CARL VINSON. Participants in this class were those who were aware they would be using the system. This initial class training was given to 40 individuals. However, many of the participants in this initial class did not continue on to become ZOG users. The training itself lasted approximately 4 hours and included an initial coverage of the ZOG capabilities, methods for maneuvering though the subnets, and use of the ZOG editor, ZED.

During the cruise, similar group training classes were conducted by the ZOG management team. These classes were approximately the same length, but usually had under eight students in each class, thereby permitting a greater degree of individual instruction. These classes were for individuals who were definitely going to become active ZOG users. Some of the classes were conducted to teach only specific topics.

b. The ZOG tutorial. An on-line tutorial, requiring about 2 hours and covering the basic ZOG functions, was implemented on the ZOG system prior to the beginning of the cruise. To use the tutorial an individual only had to be logged in to the system as a guest. The guest login would permit the new user to practice ZOG commands without any danger of changing the data base. The tutorial served as a good initial hands-on experience because the user had to make ZOG inputs to proceed through the training. At the completion of the tutorial, the new users were browsing though the existing ZOG data base on their own. By far the majority of users completed this tutorial whether or not they had completed the initial training class or any other form of training. Based upon the user questionnaire data, there were seven comments requesting expansion of the tutorial training. Evaluation team members who used the tutorial also thought that the tutorial was extremely good hands-on experience and that it should be expanded.

c. The ZOG User's Guide. The ZOG User's Guide is a booklet prepared by CMU system developers that provides detailed instruction in using the ZOG system. The User's Guide was provided to users during the group training class or when an individual requested it. The evaluation team found the User's Guide to be a good document for the relatively inexperienced user, particularly if access to a PERQ machine was limited. It included numerous illustrations, concrete examples of frames, and was written at a readability level suitable for shipboard personnel. Use of the User's Guide was not intended to supersede actual interaction with the ZOG system by using the on-line tutorial or by simple browsing though the subnets to learn how to interact with ZOG.

d. One-on-one ZOG training. One of the functions of the ZOG management group was to provide assistance to users through one-on-one interaction. While Table 2 shows that only 12 users indicated they had undergone one-on-one training, this figure is undoubtedly low. The reason for the low estimate is that most people did not think in terms of training when they called upon a management group member for assistance. Consequently, users did not perceive themselves going through a "training session" when receiving this individual help or when completing the questionnaire. During the interviews, however, there were comments made indicating that some users would have liked to have had more personal assistance.

e. On-line ZOG documents. There were several documents on the ZOG system that provided instruction in its operation. These documents included the ZOG User's Guide, the ZOG Management User's Guide, the Agent Writer's Guide, and the ZOG Tutorial. While these documents were available, no user indicated use of these documents. This reported lack of use may have been because the documents were not necessary, they were not useful, or the users may have forgotten that they actually did use the documents.

f. The ZOG Pocket Guide. Early in the cruise, this Pocket Guide covering the basic ZOG commands was developed by the ZOG management group and was distributed to users. While the guide was extremely helpful, changes in the ZOG software version dated the original pocket guide. A revised version of the pocket guide was distributed to shipboard users during the last month of the deployment. A copy of the Pocket Guide is included in this report as Appendix C. Users reported great satisfaction with the Pocket Guide and grew to depend on it more than any other form of documentation.

3.2.4.2 User Perception of Ease of Learning ZOG. When the users were asked to rate "How easy you think ZOG is to learn," 1 indicated extremely easy, 22 checked easy, 4 difficult, and no one indicated that learning ZOG was extremely difficult. During both evaluation visits to the ship, users were asked whether they needed more training or practice to feel comfortable using ZOG. For the first visit, only three users responded to this item, and all indicated they needed more training to be comfortable. During the second visit in late September, when the same set of users were questioned, nine users indicated no need for additional training or practice and four indicated the need for more practice. The average length of ZOG experience for these users was reported as 47 weeks. (This mean time was high because the ZOG management personnel had more experience.)

During the second evaluation visit, eight "new" users responded to this same item, the need for more training, and four indicated no need. These users had an average ZOG experience time of 12 weeks. These data suggested a need for more training or practice during the early learning stage, lasting 2 to 4 months, but as experience was acquired users needed less additional training.

When asked how the training could be improved, the users mainly suggested that the on-line tutorial be expanded and revised. That response was consistent with the second most frequent suggestion for more hands-on experience. Several comments indicated that the group training should be more "how to" oriented rather than "this is what ZOG is." Several users also requested more individual instruction.

Another interesting comparison is the responses of these same experienced users versus new users on a ratable question regarding how comfortable users are with the ZOG system. These data are presented in Table 3.

Table 3

User Ratings of Degree of Comfort Using ZOG System

User Groups	Comfortable using ZOG		Discomfort using ZOG	
	Extremely	Fairly	Mild	Extreme
New (N = 12)	0	7	5	0
Experienced (N = 13)	9	3	1	0

Again, the experienced users indicated a greater degree of comfort with the ZOG system. In this case, the added experience with ZOG appeared correlated with a greater degree of comfort actually using the system, as compared with needing more training to feel comfortable with the system.

3.2.4.3 ZOG User Group Meetings

a. General ZOG user meetings. During the first visit, the evaluation team requested a meeting of all ZOG users. The meeting was called and approximately 20 CARL VINSON personnel attended. This was the first meeting of all ZOG users on board the carrier. During this meeting, activities of the ZOG management group were discussed and, importantly, the users had an opportunity to express their opinions about various aspects of the ZOG system. Feedback from users after the meeting revealed that many of them valued the meeting and thought it fulfilled a user requirement. At the suggestion of the evaluation team, the Management Department conducted group ZOG users meetings monthly thereafter.

After attending two users' meetings, the evaluation team recommended that the ZOG management group institute two kinds of meetings. A high-level user meeting should be held to permit those who are expert in ZOG to exchange information regarding technical functioning of the system. A second kind of meeting for all users, but oriented toward the beginning ZOG user, was recommended to present general system information, solicit problems, and discuss system use at a basic and ship-functional level.

The Management Department initiated a "ZOG Users Group News" letter following the initial users' meeting. The newsletters, distributed soon after the users' meeting, contained information from the meeting, answers to questions raised at the meetings, plans for future activities, and notices about changes in the ZOG system. The newsletters proved to be an excellent method for facilitating communication among the users. Copies of four of the newsletters prepared during the cruise are contained in Appendix D. These newsletters document critical system incidents that were affecting ZOG users.

b. XO's Division Officer user meeting. Following the first evaluation team visit, the XO initiated meetings involving representatives from each division office. The purpose of these meetings was to introduce ZOG and have representatives develop subnets that would be immediately useful. The intent was to develop a Division Officer's Handbook that might include schedules for schools, leave, transfers, and job duty turnover subnets. At the time of the second visit, the second of these meetings was held and attended by about 20 individuals. At this point virtually none of the attendees had completed any ZOG training or experience. They were users in the sense that they were just learning about ZOG and were beginning to conceptualize some practical applications. Although no subsequent meetings of the complete group occurred during the remainder of the cruise, the meetings were an excellent idea and certainly would have produced greater division involvement with ZOG.

3.2.5 Growth in the Number of ZOG Users

At the beginning of the evaluation, the practical benefits of the ZOG system were anticipated to result in many CARL VINSON personnel becoming active ZOG users. This kind of user growth occurred with the ZOG system as it was developed and implemented at CMU and in other organizations.

There were, however, some critical factors that served to limit the number of system users and user interest. As a management system, the ZOG computers were located on the desks of department heads for their use. These locations did not allow many subordinates to have free access to the system. A second factor was the unreliability of the hardware and the software systems. Particularly during the first half of the cruise, the system was so unstable that inexperienced users had difficulty making ZOG operate; if it did crash, they were unsure of what corrective action to take. Users were not sure of whether a malfunction was due to equipment failure or to system software deficiencies. Consequently, potential users did not actively seek out system access and beginners did not generally pursue subnet development activities. As with any new computer system, initial time and effort was required to learn the system and develop a data base. Problems with system reliability and access discouraged potential users from using the system. There were, however, some notable exceptions of users who overcame these drawbacks and proceeded to actively develop useful subnets. These users and the applications they developed will be discussed in more detail in sections on functional uses of the system.

The user statistics component of the ZOG system was designed to collect information for each uniquely identified system user. Users would logon when seated at the PERQ workstation and logoff when they were through using the system. Because of the unreliability of the system and the length of time to logon, the machines were often turned on and logged into ZOG using the guest logon. The machines remained logged into ZOG under the guest logon, regardless of who was using them. This practice of using the standard guest logon totally preempted any identification of exactly which user was using the system. Similarly, users would log themselves into the system, but would leave the workstation logged under their ID throughout the day, while other people used the workstation. Starting with the first evaluation visit, attempts by the evaluation team to get the users to logon individually were largely unsuccessful. Consequently, it was not possible to identify users from the machine system data.

Lists of users were obtained from the ZOG management team during the visits. These lists determined who would complete questionnaires and be interviewed. Active ZOG users were identified by contacting individuals on the lists. Accordingly, the following numbers of "true" ZOG users, including ZOG management group members, were identified during the first and second visits and at the end of the cruise. The number of users in the ZOG Management Department was essentially constant, four officers and five enlisted personnel, and is included in the following numbers.

a. First visit (July 1983)--23 users.

b. Second visit (September 1983)--30 users.

c. End of cruise (October 1983)--30 users.

Rather than growing larger in numbers, the size of the user group remained relatively constant at about 20 functional users during the first half of the cruise. This group grew in size shortly after implementation of the major ZOG software version that improved system reliability. While there may be a relationship between the size of the user population and system development, growth in the number of users is more likely to be a function of availability of machines. A natural limitation to user growth was the existence of only 19 machines that were operative and were used for functional purposes. It could be expected, though, that the robustness of the system would have an impact on user growth.

3.3 Shipboard Functional Uses of ZOG

This section describes the shipboard functional uses of the ZOG system. These data are the heart of the evaluation because they indicate the functional value of the system to the operational Navy. First described are the shipboard functional applications that ZOG was originally projected to support; second, the unexpected functional applications of ZOG that occurred during the course of the deployment; and third, the integration of ZOG with the AIRPLAN expert system. A final section reveals the relationship of ZOG system growth to system development during the cruise.

3.3.1 Expected System Use

When the ZOG Technology Demonstration Project was being conceived, three primary applications were envisioned for the system on board CARL VINSON. These applications were to support planning and evaluation, the development and use of the SORM, and weapons elevator maintenance training. The idea behind these three applications was that they involve ship's management on both a short- and long-term basis, represent a broad range of functional activities, and consist of tasks that may be performed once or repeatedly. So, the ZOG system would be demonstrated over a range of shipboard functions. While each of these areas will be discussed separately, there is some natural overlap of functions. The overlap is dealt with in this report by arbitrarily classifying functions into separate categories. Instances of unexpected support of planning activities with ZOG will be discussed in a following sections.

3.3.1.1 Planning and Evaluation. The function of planning and evaluation is a continual activity for shipboard management personnel. Ship's evolutions are constantly being scheduled for both the immediate and distant future. Even as CARL VINSON was completing the 1983 deployment, planning was underway for the postdeployment period and the 1984 deployment. In this area of ship's planning, an automated management system may be most beneficial to the Navy.

a. Intended use. The intended use of ZOG was to support the planning and evaluation activities of CARL VINSON management personnel who are necessary for conducting ship's evolutions. This was to be done with the development of subnets that would list the procedural steps to be performed. Management personnel could modify the subnet to accommodate their needs and resources. All personnel would have access to the subnet and would know the schedule of events. The ZOG system would provide a management decision aid in making better and more timely decisions. Subnets listed the task steps or decision factors, the actual accomplisher, and the expected completion dates for each activity. This planning and evaluation function enabled the comparison of projected completion times with actual completion times. Implementation of a subnet required management personnel to receive information either from a PERQ or from a hard copy of the subnet. Management could act on the information by taking a specific action or by entering modifying or additional information into the ZOG system.

ZOG is designed to support both one-time activities and repeated activities. This is done by creating a ZOG subnet that lists the steps to be accomplished for a particular ship evolution. The details can be included for one specific performance of the activity or for a general performance. The subnet is then referred to as either a specific or a generic plan for that function respectively. After an activity or task is developed as a subnet, a ZOG agent (program) can be run that updates expected completion dates and times. This updating of a subnet plan can be done for both specific and generic plans.

During the first half of the cruise, the approach taken to generate major planning subnets was to have managers meet to specify all of the detailed steps necessary for accomplishing the generic activity. This approach resulted in very useful, detailed plans for ship's evolutions. A few of these generic plans represented portions of the SORM. Consequently, this ZOG planning activity also supported SORM development. The disadvantage of this approach to plan development is that management meetings occurred infrequently, partly because of the involvement of so many departments.

The effect that ZOG had on management planning for the entire ship is best seen through the CARL VINSON Green Sheets that provide the ship's daily operational schedule. This on-line planning capability allowed department heads to input their future activities. The ZOG system then produced a daily ship's schedule that was printed and distributed throughout the ship. By entering information through ZOG, department heads did not have to repeatedly submit and revise hard copy. The responsibility for generating the Green Sheet was placed with the Assistant Operations Strike Officer who had had little computer experience prior to working with the ZOG system. Generation of the daily Green Sheet involved taking the ZOG input from the department heads and invoking the agents that compile and print the final daily plan. Approximately 2 hours were required to complete Green Sheet preparation after department heads had provided their input. An example of the Green Sheet from the CARL VINSON deployment is presented in Figure 4. While permission was granted to include the Green Sheet in this report well after the completion of the deployment, all dates have been removed.

ZOG-supported planning influenced the operation of the ship even at an individual crewmember level. Figure 5 is included as a specific example of the generic task plan for getting under way and leaving port. This type of planning document is frequently referred to as a Gannt chart. The particular task plan in Figure 5 was actually used by the Officer of the Deck while getting CARL VINSON under way from Hong Kong, as reflected by the penciled notations on the second page of the figure.

For each subtask on the Leave Port Checklist, the task, accomplisher, ZOG frame identification, and completion day and time are included. As the task plan becomes a subnet on ZOG, errors and omissions are corrected. As indicated previously, a ZOG agent can be invoked that would permit the appropriate updating of days and times for all subtasks. The notable fact about the specific task plans, such as those contained in Figure 5, is the subnet may be accessed on the ZOG system by many managers, and it can be used in a printed checklist away from the ZOG system by secondary subordinate users.

Other examples of specific plans developed and implemented during the deployment are included as Appendix E. As an example of the breadth of this planning capability, this appendix includes a plan for scheduled events during one of the ZOG evaluation team visits. Other plans in Appendix E are the Management Department Duty Officer's Inport Schedule and the Chaplain's Plans for the Command Religious Program.

As intended, the system was used to support the personal planning of individual crewmembers. Figure 6 displays a portion of the Reactor Officer's Six-week Plan, as an example. This plan was used to evaluate whether certain tasks were completed by established deadlines.

The examples of ZOG-supported planning presented in this section are typical. The evaluation function was expected to be supported by ZOG through a continual monitoring and updating when tasks were accomplished. The examples in the following section show how this was accomplished by the ZOG system.

Task - Accomplisher - Frameid	Dates
Conduct 1983 Deployment - ZZCO - OXOWPlan8	[redacted]
Set the Special Sea and Anchor Detail - BMOW - EnrFre194	0630-0730
Set Material Condition Yoke - OOD [ALL] [GS] - CVPlan9	0700
Muster On Station - XXD3 [XXD3] [ALL] [GS] - CVPlan10	0745
Moor/Anchor at designated site - NAVO - EnrFre201	0830
Port Visit Fremantle Australia - OPSO - SecondNAS4	0830 [redacted]
Secure the Special Sea and Anchor Detail - OOD - EnrFre203	0845-0900
Set Material Condition Yoke - OOD [ALL] [GS] - CVPlan11	1700
Eight O'Clock Reports - YYXO [YYXO] [ALL] [GS] - CVPlan41	1830

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Figure 4. CARL VINSON daily Green Sheet schedule.

Task - Accomplisher - Frameid	Dates					
Conduct 1983 Deployment - ZZCO - OXOWPlan5	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Conduct Transit to Perth - OPSO - EnrFre1	0800					
Hold All Trash and Garbage on Station - BMOW - EnrFre198	0230-0330					
Test the ship's whistle mechanically and electrically - BMOW - EnrFre199	0530-0630					
Test the General, Chemical, Collision and Aircraft crash alarms - JOOD - EnrFre200	0545-0600					
Set the Special Sea and Anchor Detail - BMOW - EnrFre194	0630-0730					
Set Alert Helo Condition II - VAIR - EnrFre195	0700-0730					
Set Material Condition Yoke - OOD [ALL] [GS] - CVPlan9	0700					
Topside Personnel Shift to the Uniform for Entering Port (if applicable) - BMOW - EnrFre196	0715-0800					
Make Departmental Readiness Reports to Strike Ops (J-7191) - HODS - EnrFre197	0730-0745					
Muster On Station - XXD3 [XXD3] [ALL] [GS] - CVPlan10	0745					
Moor/Anchor at designated site - NAVO - EnrFre201	0830					
Port Visit Fremantle Australia - OPSO - SecondNAS4	0830	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Secure the Special Sea and Anchor Detail - OOD - EnrFre203	0845-0900					
Shift the OOD Watch from the Bridge to the Quarterdeck - OOD - EnrFre204	0845-0855					
Set Material Condition Yoke - OOD [ALL] [GS] - CVPlan11	1700					

Figure 4. (Continued)

Task - Accomplisher - Frameid	Dates					
Eight O'Clock Reports - YYXO [YYXO] [ALL] [GS] - CVPlan41	1830					
Set Material Condition Yoke - OOD [ALL] [GS] - CVPlan9		0700				
Muster On Station - XXD3 [XXD3] [ALL] [GS] - CVPlan10		0745				
Set Material Condition Yoke - OOD [ALL] [GS] - CVPlan11		1700				
Eight O'Clock Reports - YYXO [YYXO] [ALL] [GS] - CVPlan42		1830				
Set Material Condition Yoke - OOD [ALL] [GS] - CVPlan9			0700			
Muster On Station - XXD3 [XXD3] [ALL] [GS] - CVPlan10			0745			
Roman Catholic Mass in Ship's Chapel - YYCH [GS] - EnrFre213			0900-0955			
Protestant Divine Worship in Ship's Chapel - YYCH [GS] - EnrFre214			1000-1100			
Set Material Condition Yoke - OOD [ALL] [GS] - CVPlan11			1700			
Set Material Condition Yoke - OOD [ALL] [GS] - CVPlan9				0700		
Muster On Station - XXD3 [XXD3] [ALL] [GS] - CVPlan10				0745		
Set Material Condition Yoke - OOD [ALL] [GS] - CVPlan11				1700		
Eight O'Clock Reports - YYXO [YYXO] [ALL] [GS] - CVPlan37				1830		
Set Material Condition Yoke - OOD [ALL] [GS] - CVPlan9					0700	
Muster On Station - XXD3 [XXD3] [ALL] [GS] - CVPlan10					0745	

Figure 4. (Continued)

Task - Accomplisher - Frameid	Dates					
Submit Logistics Request (LOGREQ) - OPSO - LeaveCkList223	[redacted]	0900				
Make authorized information available to the media - YXPA - LeaveCkList215	0900	0900				
Verify time for getting underway with CO - CDO - LeaveCkList322			0630-0700			
Brief the crew concerning upcoming operations via closed circuit TV - OXOZ - LeaveCkList214			0900	0900		
Publish expiration of liberty time in the POD - XADM - LeaveCkList301			0900	[redacted]	0900	
Verify event times in the Greensheet and POD - OPSO - LeaveCkList320			0900-1000			
Conduct presail briefing - OPSO - LeaveCkList224				0300-0400		
Provide service steam to the catapults - ENGO - LeaveCkList298				2100	[redacted]	0700
Verify schedule for lighting off reactors with the CO - REAC - LeaveCkList321				2100	0900	
Submit Movement Report (MOVEREP) - OPSO - LeaveCkList217					0900-1300	
Submit Unit Report (UNITREP) - OPSO - LeaveCkList225					0900-1300	
Inspect the pier and initiate action to correct discrepancies (if applicable) - CDO - LeaveCkList229					0900-1500	
Drain whistle system piping and line up steam to the ship's whistle - ENGO - LeaveCkList293					0900-1500	
Make propulsion plant systems ready for getting underway - ENGO - LeaveCkList297					0900	
Pass over the IMC: "Liberty expires for all hands on board CARL VINSON at [....]" - BMOW - LeaveCkList302 - See Note 1					1500	

Figure 5. Leave port checklist for Hong Kong.

Task - Accomplisher - Frameid	Dates	
Inpect hangar bays and initiate corrective action to ensure that all gear has been properly stowed or secured - CDO - LeaveCkList236	0300-0500	
Verify all rolling stock and aircraft secured for sea - VAIR - LeaveCkList265	0500	
Make the anchors ready for sea - DECK - LeaveCkList278	~~0500-0700~~	
Hoist boats and vehicles onboard (if applicable) - DECK - LeaveCkList231	0600-0800	TCK
~~Rig in boat booms~~ and accommodation ladders (if applicable) - DECK - LeaveCkList274	0600-0800	TCK
Determine senior ship in the area - OOD - LeaveCkList219	0700-0730	MSW
Request permission from SOPA and embarked Flag to get underway - OPSO - LeaveCkList220	0700-0730	MSW
Verify the availability of tugs, pilot and crane (as applicable) - OPSO - LeaveCkList222	0700-0800	TCK
Contact Strike Ops (7191) for update of checklist items and status of significant events - OOD - LeaveCkList237	0700-0800	TCK
Record RF circuit speaker assignments on OOD's Status Board - OOD - LeaveCkList291	0700-0730	TCK
Review anticipated tactical signals - OOD - LeaveCkList295	0700-0730	TCK (c)
Pass over the IMC: "Go to your stations all the Special Sea and Anchor Detail, CARL VINSON expects to get underway at [. ...]" - EMOW - LeaveCkList306	0700	TCK
Report the ready lifeboat manned - DECK - LeaveCkList308	0700	TCK
Man the IJV sound powered phone circuit - OOD - LeaveCkList309	0700-0845	TCK

Figure 5. (Continued)

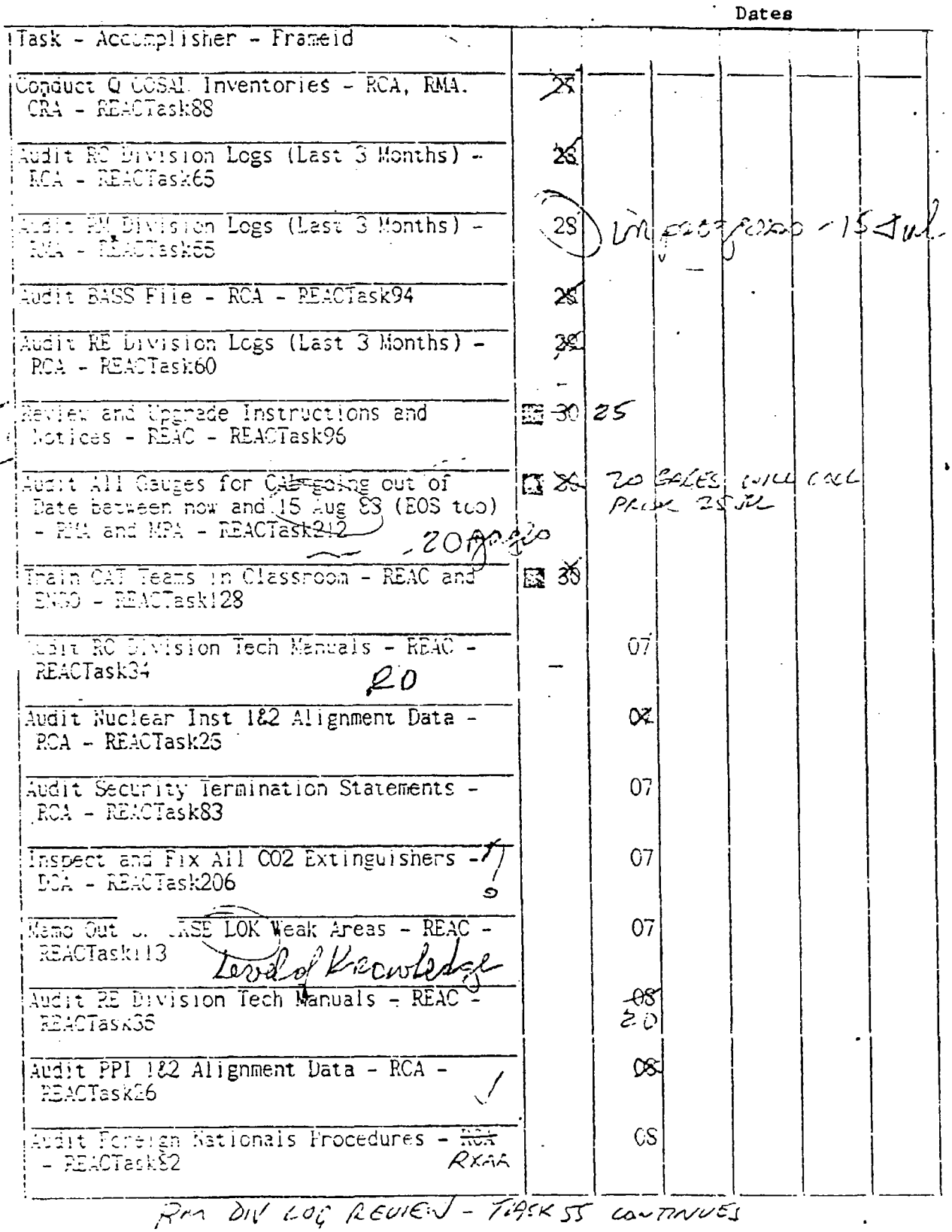


Figure 6. Reactor Officer 6-week plan.

b. Actual ZOG use in support of planning. Two standard types of ZOG plans were established in the departments. One was the specific responsibility task net that displays the hierarchical relationships of the tasks, and the other was the specific responsibility (task) time line that displays the time relationships of the tasks. As a result of a ZOG action, selection of a task on the time line plan brings up a display of the same task in the specific task net. This action yields more detailed information about the task regarding the accomplisher, completion date, resources, etc. These formally structured subnets exist for the following units: Air Officer, Aviation Intermediate Maintenance Department, Management Department, Engineering Department, Medical Department, Navigation Department, Operations Department, Personnel Department, Reactor Department, Strike Operations Officer, Supply Department, Senior Chaplain, Weapons Department, and the XO.

Most of these subnets were created in December 1982 before the cruise. Examination of these nets revealed that, while subnet structures were in place, only half of the subnets were developed beyond a skeletal structure. During this cruise additional, more useful subnets were created and tailored to the individual's specific needs. Midway through the cruise, a fundamental change was made in the way ZOG appeared when a user logged on to the system. This change enabled a user to be presented with their own unique "top frame" upon logon, instead of the ZOG data base top frame. There were two important consequences. First, the users were immediately at the index of their own subnets and did not have to maneuver through the data base to get at their subnets. Second, the users could tailor their top frame to their particular style of frame creation and lists of tasks or information.

When the unique top frame was initiated, there was a dramatic increase in the use of ZOG, the number of subnets in use, and the facility with the system. While it may be this increase in use was due to 2 additional months of experience with ZOG, several users independently indicated that by starting from their own top frame, it was easier to use ZOG, and they could now structure the subnets their own way without having to develop a generic subnet first. This top frame change, implemented by the Management Department, clearly had a beneficial effect on ZOG system usage.

The information in this section was derived, in part, from a listing of subnets created by an evaluation team member reviewing the existing subnets on the system during the third visit. Only those subnets with substantive information were included in the list. Consequently, the list excludes those subnets that consist only of an empty frame or were deleted before the list was made. System software problems experienced at the time the list was made may have eliminated some other subnets. Accordingly, the list of subnets may be viewed as a conservative list representing the minimum number of subnets. Some of these subnets were mentioned by the users during the interviews and others were described on the questionnaires.

(1) IMDO (Aviation Intermediate Maintenance Department). Planning nets were developed during the cruise in the following areas: generic plans for convening monthly maintenance meetings, department head plans, officer leave schedules, specific monthly meetings, generic plan for port visit schedules, officer turnover schedule, required reports (monthly, quarterly, semiannually, and annually), and a 6-month plan for port visits.

(2) DEV (ZOG Development Group). Planning nets were created during the cruise in the following areas: conduct approach for conventional replenishment (CONREP) of supplies, Management Department personnel leave schedule, department

periodic tasks, generic plan for conducting specific department evolutions, and an overall ZOG system tracking net. This functional usage does not reflect any ZOG system software development, only plans for functional activities regarding the ship or ZOG system management.

(3) ENGO (Engineering Department). Planning nets were created during the cruise in the following areas: development of an operational readiness system evaluation (ORSE) preparation checklist, 6-month leave schedules for Engineering and Reactor Departments, drydocking checkoff list, standard operating instructions for fire-main management, ORSE correction tracking plans, personal task and plan lists, department organization during scheduled period of restricted availability, a checklist summary of training readiness evaluation of significant discrepancies, and an extensive damage control assistant task list.

(4) MGTO (Management Department). Planning nets were created during the cruise in the following areas: plans for the CO, conduct of a change of command ceremony, department 6-month personnel leave schedule, department specific responsibility task net, ZOG project reviews, respond to man overboard at sea situations, department head task plans and time-line plans, overall technology project task net, and planning for Wang system implementation. Also on this machine was a subnet plan for the ship's urinalysis program developed by the ship's Human Resource Officer.

(5) HMED (Medical Department). Planning nets were created during the cruise in the following areas: Medical Officer personal specific tasks, port visit schedules, report lists and due dates, providing medical services, department preparations for deployment, Medical Division Officer plans, and 6-day plans for the department.

(6) NAVO (Navigation Department). Planning nets were created during the cruise in the following areas: generic plans for performing ship evolutions, ship planning and plan implementation, instilling morale, operating the ship, and fighting the ship (SORM generic plans). Also on this machine, which is located on the ship's bridge, are subnets regarding ship emergencies. Examples of emergencies covered include loss of a generator, loss of feedline to the reactor, and loss of rudder control.

(7) PERS (Personnel Department). Planning nets were created during the cruise in the following areas: department personnel leave schedules, department head plans, and evaluating/maintaining the ship's performance (SORM generic plan).

(8) REAC (Reactor Department). Planning nets were created during the cruise in the following areas: preparing for the ORSE, department head plans, support for the Nuclear Propulsion Examining Board visit, and scheduling training resources.

(9) TRNG (Chaplain and Training Department). Planning nets were created during the cruise in the following areas: conduct of civic action support, provide command religious program, 6-week plan for command religious program, provide area Easter service, Memorial Day interfaith service, memorial service, Senior Chaplain's plans, and department personnel leave schedule.

(10) WEPS (Weapons Department). Planning nets were created during the cruise in the following areas: maintenance and operation of the weapons elevator system, (generic and specific nets), understanding the weapons department and resources, department reports, and Explosive Ordinance Department organization and turnover schedule.

(11) WELV (Weapons Elevator Maintenance). Generic planning nets were created during the cruise in the area of weapons elevator operation and maintenance. Also on this machine was a net developed by the Chaplain that included prefatory textual material for each chapter of the Bible.

(12) YYXO (Executive Officer). Planning nets were created during the cruise in the following areas: Abidjan port visit schedule, generic and specific plans for hosting visits of distinguished visitors, CARL VINSON visit to Pusan, CARL VINSON visit to Sasebo, XO's plans, XO's turnover schedules, and organization of a division officer ZOG task group. The purpose of the task group was to develop and expand generic and specific task planning subnets from the department level to the division level in the form of a Division Officer's Handbook. These planning nets were taking the initial form of leave, transfer, and training schedules while the division representatives gained familiarity with the ZOG system.

(13) OXOW (Strike Operations Department). Planning nets were created during the cruise in the area of the ship's general plans (SORM generic net).

In a subsequent section, available summary data are presented regarding how many subnets were accessed during specific time periods.

c. Planning subnet development. Analyses of the subnet listings determined there were 108 unique, functional, and substantive subnets created during the cruise and existing at the end of the deployment. These 108 subnets do not include nets existing at the beginning of the cruise. Of the total, 95 or 88 percent were classified as primarily supporting planning. Of the remainder, 6 percent supported training and 7 percent were documents or ZOG system bulletin boards.

The chronological rate of planning subnet creation was determined by cross-checking the end of deployment subnet listings against at-sea lists of subnet creation data. The subnet creation data for each deployment month are displayed in Table 4.

Table 4

Subnet Creation for the Planning Function
by Deployment Month

Month	Subnet	Percent
March	16	17
April	4	4
May	3	3
June	3	3
July	12	13
August	32	34
September	13	14
October	12	12
Total	95	100

There was a high level of planning subnet creation at the beginning of the deployment after implementation of the distributed data base software version of ZOG. Fewer subnets were created during April through June. During August, after an improved software version was released to the machines, planning subnet creation again rose to a high of 34 percent of all planning subnets. The decrease in subnet creation during the last 2 months is not surprising in view of the increased operational tempo of the ship during that time and the increased frequency of port visits when the crew departed the ship.

Numbers of subnets alone are not the single criterion by which the quality of planning net creation should be judged. Another criterion is the importance to the ship of the subnet plans. Examples of extremely useful ZOG-developed plans include task plans for entering and leaving ports, preparations for the ORSE, conduct of CONREP, port visit schedules, and providing the command religious program. Some of the plans that were developed continue to support ship functions beyond the 1983 cruise. Planning subnets were created to support functional activities during the stand-down period that followed the cruise and even when the ship goes into drydock in the future. While these subnets were beneficial to the ship, there were also personal plan subnets that supported the routine activities of a number of ZOG users.

d. Future ZOG efforts in support of planning. While most of the ZOG development group efforts since the end of the deployment have been directed at improving the software, there has been renewed planning activity throughout the user group since the cruise ended. Out of 22 unique subnets created from November through January 1984, 14 or 63 percent have been in the area of shipboard functional planning. Of the remaining eight subnets, one supported ZOG system planning, two supported ZOG training, one was a mailbox subnet, and four were documents or ship related data such as a parts list. By using the ZOG agents, revised plans for getting under way, entering port, and departmental schedules also have been generated for departments that were using ZOG at the end of the cruise. Recent improved system operation should result in additional ZOG users.

3.3.1.2 SORM. The SORM is a required ship's document containing all general operating procedures. Most SORMs are created by members of the commissioning crew updating and tailoring to their ship materials available from SORMs of a similar vessel. By having a SORM within an automated management system, the latest directives can be immediately distributed and available to all crewmembers. Instantiating the SORM was thought to be a useful demonstration of ZOG capabilities. By invoking a ZOG agent, the appropriate data from the SORM would result in a specific plan for a particular ship's evolution.

a. Intended use for the ZOG-generated SORM. The intended use of the ZOG-generated SORM was to facilitate access, creation, and revision of an accurate SORM document. Additionally, by having the SORM updated on the ZOG system, hard copies of the SORM could be easily generated by means of the Scribe document printing program on the system. The SORM could provide a central organizing authority for other subnets and their development or revision.

b. Actual use of ZOG in support of the SORM. At the beginning of the cruise, most of the subnets contributing to the SORM had already been created. Effort during the cruise was expended modifying and expanding the SORM nets already created, except for the creation of five new subnets during March and April 1983. System problems that limited access to data on remote machines caused users to monopolize other machines that had the SORM subnets. They were on only four machines (OXOW, NAVO, PERS, and INPUTB).

While hard copies of the SORM could be printed, there were problems caused by an extremely slow PERQ implementation of Scribe, the formatted document print program used at CMU on their VAX computer. The prolonged print time required by the Scribe program limited the extent of document printing on CARL VINSON. The ZOG development group attempted to make Scribe software corrections but they determined that fundamental limitations existed with the current PERQ version of the Scribe program. Figure 7 shows one page of a generic SORM plan.

Appendix F includes the entire "Fight the Ship SORM" summary and the summary for the "Underway Replenishment of Supplies" portion of the SORM.

c. SORM subnet development. Although the majority of SORM subnet creation occurred prior to the deployment, there was frequent access to and modification of the nets. The nets themselves were frequently quite large. The 40 unique SORM subnets ranged from 1 frame to 1234 frames and totaled 6484 frames. The average subnet consisted of 162 different frames. Appendix G lists the subnets, number of frames, and machine locations for all SORM subnets. Some SORM subnets were duplicated on other machines. This duplication of subnets was done to ensure that those machines would have access to the net even if the primary machine was down or system problems prevented access to that machine.

3.3.1.3 Weapons Elevator Maintenance Training. CARL VINSON's eight weapons elevators played an extremely valuable role in the ship's accomplishment of its mission. In addition to being used for moving weapons and ammunition, the elevators were used daily to relocate various ship stores. The elevators are a critical component of the total weapon platform. Consequently, maintaining the elevators is very important. Elevator maintenance training was an equally important ship function even during the precommissioning period. It was at this time that a part of the ZOG technology project came to bear on this ship activity.

a. Intended use of ZOG to support elevator training and maintenance. The overall project objective was to develop a ZOG-controlled and video disk-displayed elevator maintenance training manual. The Naval Sea Systems Command assisted ONR in funding this application. During ship construction, detailed video tapes were made of the operation maintenance of the weapons elevators. Some sequences show portions of the weapons elevators covered up by later construction. The video tapes incorporated color, motion, and sound along with close-ups and long shots to show the entire elevator under operating conditions. The video was then put on a video disk format, and a ZOG subnet was made to control the video display and presentation of associated textual material. The entire system represented a high technology maintenance manual. The manual was to be studied by referring to ZOG frames of textual information and looking at a television monitor to observe the video display. The result is rapid and random access to information and demonstration sequences contained in the on-line Weapons Elevator Maintenance Training Manual. Personnel in CARL VINSON's Elevator Maintenance and Operation Divisions were to proceed through the instructional programs using the operation or maintenance instruction as necessary.

b. Actual use in support of elevator maintenance training. The software necessary for interfacing ZOG and the video disk was developed prior to deployment. This software, however, was undergoing continuing debugging effort throughout the cruise because of a combination of software and equipment problems. The elevator maintenance manual portion of the ZOG data base was developed and implemented by the G-3 Division of the ship's Weapons Department. These personnel modified and expanded the manual

1 Fight the Ship

ACCOMPLISHER: *Commanding Officer*

1. Determine requirements for fighting the ship (assess threats and offensive strikes) (see p. 1, line 1)
2. Communicate requirements for fighting the ship (see p. 1, line 8)
3. Respond to requirements for fighting the ship (respond to threats and strike offensively) (see p. 2, line 4)

[11] **Determine requirements for fighting the ship (assess threats and offensive strikes)** 1
ACCOMPLISHER: *Commanding Officer/Command Authority*

1. Determine the requirements to defend the ship (no offensive strike) (see p. 1, line 2)
2. Determine the requirements to strike offensively (see p. 1, line 7)

[111] **Determine the requirements to defend the ship (no offensive strike)** 2
ACCOMPLISHER: *Commanding Officer/Command Authority*

[1111] **Determine requirements to defend the ship by setting General Quarters** 3
ACCOMPLISHER: *Commanding Officer/Command Authority*

[1112] **Determine requirements to defend the ship with missiles and guns** 4
ACCOMPLISHER: *Tactical Action Officer*

[1113] **Determine requirements to defend the ship with airborne air assets** 5
ACCOMPLISHER: *Tactical Action Officer*

[1114] **Determine requirements to defend the ship with alert air assets** 6
ACCOMPLISHER: *Commanding Officer/Command Authority*

[112] **Determine the requirements to strike offensively** 7
ACCOMPLISHER: *Commanding Officer/Command Authority*

[12] **Communicate requirements for fighting the ship** 8
ACCOMPLISHER: *Commanding Officer/Command Authority*

1. Communicate requirements to defend the ship by setting General Quarters (see p. 1, line 9)
2. Communicate requirements to defend the ship with missiles and guns (see p. 1, line 12)
3. Communicate requirements to defend the ship with airborne air assets (see p. 1, line 13)
4. Communicate requirements to defend the ship with alert assets (see p. 1, line 14)
5. Communicate requirements to strike offensively (see p. 2, line 1)

[121] **Communicate requirements to defend the ship by setting General Quarters** 9
ACCOMPLISHER: *Commanding Officer/Command Authority*

[1211] **Recommend setting General Quarters to the Commanding Officer/Command Authority** 10
ACCOMPLISHER: *Tactical Action Officer*

[1212] **Communicate order to OOD to set General Quarters** 11
ACCOMPLISHER: *Commanding Officer/Command Authority*

[1225] **Communicate requirements to defend the ship with missiles and guns** 12
ACCOMPLISHER: *Tactical Action Officer*

[1226] **Communicate requirements to defend the ship with airborne air assets** 13
ACCOMPLISHER: *Tactical Action Officer*

[1227] **Communicate requirements to defend the ship with alert assets** 14
ACCOMPLISHER: *Commanding Officer/Command Authority*

[1228] **Communicate requirements to defend the ship with alert assets to Commanding Officer/Command Authority** 15
ACCOMPLISHER: *Tactical Action Officer*

[1241] **Direct OOD to call away the launch of alert aircraft on All Stations of 1MC** 16
ACCOMPLISHER: *Commanding Officer/Command Authority*

[1242] **Communicate requirements to defend the ship with alert assets to Strike Operations Officer** 17
ACCOMPLISHER: *Commanding Officer/Command Authority*

Figure 7. Generic SORM plan document: Fight the ship.

data base throughout the cruise to provide comprehensive coverage of the eight elevators on CARL VINSON.

The data base itself consists of three sections: understand, operate, and evaluate/maintain the elevators. The understand section describes the location, function, and operation of elevator components. The operate section describes and demonstrates elevator operating procedures. The evaluate and maintain section provides instruction and demonstration of maintenance procedures, operating specifications, and electrical troubleshooting. The data base for the manual was maintained on the hard disk storage of several PERQs, all accessible by the PERQ located in the weapons elevator maintenance workshop area. This ZOG-maintained manual is the most complete manual for these elevators in existence.

Expansion of the ZOG-generated elevator manual during the cruise has taken the manual data base beyond the capabilities of the existing video disk displays. Consequently, substantial portions of the data base, developed during the cruise, regarding elevator troubleshooting and repair and maintenance are without related video sequences.

Use of the system during the cruise was generally oriented toward providing familiarization of Weapons Department enlisted personnel with the full range of elevator operating procedures. By the end of the cruise there was a small group of users who were responsible for the manual data base development and for assisting the other department personnel with using the weapons elevator manual system. This group of key users of the system included the Division Leading Chief Petty Officer, three rated petty officers, and two seamen. This group was needed to assist users unfamiliar with the system because of frequent problems experienced by the weapons elevator workstation, including the ZOG/video disk system. The training required by these new users included participation in the ZOG training classes conducted by the Management Department, completion of the ZOG tutorial, and some individualized ZOG instruction provided by the Management Department.

The problems the manual development group experienced were of both a hardware and software nature. The hardware problems involved the malfunctioning of PERQ circuit boards and the cathode ray tubes (CRT) displays. The laser video disk player also experienced hardware malfunctions, apparently caused by the continuous movement and vibration of the ship. All three players in the Weapons Department experienced missalignment of the laser causing incorrect video frame retrieval and frame slippage. Also, the interface between the ZOG and the POS malfunctioned. Despite frequent system problems, almost all 250 enlisted personnel involved with weapons elevator operation had the opportunity to familiarize themselves with operating procedures via this automated technical manual.

c. Maintenance manual subnet development. The subnets that support the Weapons Elevator Maintenance Training Manual are located on three machines. Of the 68 subnets distributed, 26 reside on the WELV PERQ, 17 on the WEPS machine, and 25 on the Supply Department (SUPO) machine. There were 5343 frames on the WELV machine and 4061 on SUPO at the time of the final evaluation team visit. While most of the subnets were created prior to the cruise, at least 12 elevator maintenance subnets were created late in the cruise. Development of these subnets during the last third of the cruise coincided with the release of an improved ZOG software version. One advantage of maintaining an on-line technical manual is realized whenever changes or updates are needed. This is especially true for complex equipment, such as the weapons elevator. This capability is evident because the ship itself has the only current version of the

technical manual for weapons elevators. A contractor responsible for the installation of the elevators for NIMITZ class carriers had depended on CARL VINSON to provide technical information from their version of the manual maintained on the ZOG system.

d. Future plans for the Elevator Maintenance Manuals. Current ship plans for the Weapons Elevator Maintenance Manual system are to continue with development of the data base in maintenance training. Additionally, the ship wants to acquire a printer to be located at the PERQ dedicated to the Elevator Manual. The availability of a printer at the PERQ would permit the local printing of troubleshooting and maintenance checklists for distribution to personnel performing elevator maintenance tasks, thereby extending ZOG's functional support. The addition of local printers for this function and for other functions was a recommendation made by the evaluation team during the first ship visit. A full set of these evaluation team recommendations made during the first two ship visits are included in Appendix H. These recommendations were made, in large part, to assist the CARL VINSON ZOG group with their development efforts.

3.3.2 Unexpected ZOG-supported Functional Applications

Because of the adaptability of the ZOG system, a variety of unexpected functional applications were developed by CARL VINSON personnel to support management responsibilities, ship's requirements, and the individual's personal needs. This section presents data regarding uses of the ZOG system that were not projected during the original conceptualization of the project.

3.3.2.1 Training. Developers projected during the ZOG planning phase that the system would support CARL VINSON training with the Weapons Elevator Maintenance Training Manual project. Further, they planned that the ZOG system would support its own training, although this training was not as well developed at the time of the deployment as the elevator maintenance training. Indeed, both of these forms of training were supported by the ZOG system. For weapons elevator maintenance, there were two specific ZOG nets created to assist in on-board repair of the elevator system and preoperational checkout prior to repair. These nets consisted of 421 and 86 frames respectively.

With respect to the ZOG system, the Management Department developed on-line training, conducted group classes, and provided individual tutoring. The on-line training consisted of an introduction to PASCAL programming (May 1983), implementation of an on-line ZOG Pocket Guide (August 1983), and development of an electronic troubleshooting net for PERQ preliminary maintenance to aid users. Other on-line ZOG training subnets that existed prior to the cruise were modified by Management Department personnel. Specifically, the ZOG Management User's Guide and the PERQ/ZOG User's Guide were aperiodically updated.

From the user questionnaires and during interviews, additional ZOG training materials were requested frequently, such as hard copies of ZOG training documents for both the beginning user and the experienced user. In part, this desire for additional training documents may have been due to the user's experience with the system during frequent system malfunctioning. When ZOG use difficulties were noted, the Management Department would try to solve the problem by providing individual tutoring for the user. For some users, however, having to wait to locate the proper personnel before getting assistance may have decreased their desire for seeking help. When the electronic mail system was implemented, it provided a more effective method for the user to solicit ZOG help.

The remaining examples of training support are in the form of subnets developed as "planning" nets to aid in the scheduling of training. The Engineering Department maintained a roster of qualified damage control training team members and a plan of action for 1984 refresher training. The Reactor Department has a subnet for scheduling the department training room.

An important form of support of ZOG training began during the latter portion of the cruise when the XO developed a net for organizing a Division Officer Task Group. This task group was designed to teach division representatives the ZOG system and to develop nets to support their respective divisions' leave and training schedules. During the second evaluation visit, the task group met for the second time.

3.3.2.2 Electronic Mail. Soon after the first evaluation visit, late July 1983, the ZOG management group implemented an electronic mailbox system. Initially, this system enabled users to easily send "mail" messages to individual users having unique logon names. After some software revision, the mailbox system was improved to the extent that the CO elected to have departmental messages directed to him on the ZOG system. During the second evaluation visit, the mailbox system was mentioned repeatedly by users as a significant system enhancement that aided both inexperienced and sophisticated users.

In addition to implementing the mailbox system, the management group implemented a "gripemail" subnet and allowed users to send messages concerned with the status of the ZOG system directly to ZOG management. Also, a "bulletin board" subnet was implemented that allowed users to generate one message that would go to all users on the system.

The evaluation team noticed, during the second ship visit, a significant increase in system utilization. This increase in system use was caused both by the improved operating characteristics of revised ZOG software implemented after the first visit and by the additional communication provided by electronic mail.

3.3.2.3 Personnel Turnover Procedures. One characteristic of military life is the frequent replacement of personnel. This turnover of personnel can be very disruptive to ship effectiveness when the individual's job involves complex tasking and extensive planning. The turnover in the Navy usually occurs quite rapidly with little overlapping duty time that would enable a new crewmember to learn a job from his predecessor. During the cruise, several of the ZOG users developed subnets structured to facilitate the turnover to their successor. For example, the XO and two department heads had turnover subnets that were used soon after the deployment ended. The head of the Weapons Department reported that without the ZOG nets he would not have had information about the ongoing status of his department's plans because he and his predecessor had only 1 day of overlapping duty. To ensure smooth personnel changes, the ship should require development of turnover subnets introduced during initial participation in ZOG training.

The turnover of the Assistant Strike Operations Officer during the cruise is a good case in point. The new officer had only a short overlapping period with the officer being relieved. Also, the new officer had almost no computer experience of any kind prior to coming to CARL VINSON. Yet the duties of the Assistant Strike Operations Officer now included preparing the ship's daily schedule, the Green Sheets, on the ZOG system. While no turnover nets had been developed for the incoming officer, the Management Department provided ZOG training, and the new officer, with concerted effort, was able to assume quickly that major responsibility. The individual reported that it took him

about 2 weeks of intensive ZOG experience to become comfortable with his tasks. Preparation of the Green Sheet required a level of ZOG skill beyond that necessary for creation of ZOG subnets. It required ability to modify frames and subnets and to use ZOG agents. For this position, development of a turnover net would be extremely effective in future situations. By the end of the cruise, the XO was informally encouraging system users to develop turnover nets. These turnover nets represent a clear example of one way the ZOG system contributes to personnel readiness.

3.3.2.4 Weapons of the United States. One of the most unusual and unexpected subnets created during the entire cruise was one of the most interesting, most widely used, and very informative nets developed to date. Independently, one of the enlisted personnel assigned to the Management Department for ZOG maintenance support developed subnet displaying information about military weapon systems of the United States. Essentially, the subnet was developed by creating displays of detailed information extracted from Jane's Fighting Ships. The top frame of this net listed the type of weapon platforms, ships and aircraft, and types of actual weapons/armament. All information was unclassified because it is in the public domain. In the net, each class of platform was listed including types of ships and aircraft. For each type of vessel or aircraft, detailed information was provided. This information included details about ships and aircraft, including size, performance, construction, weapons suites, and personnel requirements. The subnet creator was able to enter a third to a half of the information contained in the book during the cruise. This subnet became extremely well used and not merely by curious individuals. The subnet was frequently accessed by officers on the bridge and flag officers to learn about the capabilities of various ships operating with the CARL VINSON battle group. The extension of this subnet to include tactical information about unfriendly ships operating in the area is of considerable tactical importance.

For this weapons subnet, a large frame was used that covered the entire display area of the PERQ monitor. The large frame capacity was originally implemented for the AIRPLAN system. Selections, options, and pads were placed not in conventional frame locations, but where the subject matter dictated their natural placement because of frequency, size, or importance of the information. The result was that users perceived the system as providing them with more flexibility.

3.3.2.5 Medical Publications and Clinical Screening. One active user of ZOG was the head of the Medical Department, the Senior Medical Officer. He developed a medical publications subnet which contained more than 700 frames. This subnet listed all publications that were required or used in the Medical Department. The Medical Officer was the only ZOG user who had access to a local printer that could produce a hard copy of ZOG-generated information. The evaluation team noted the significant benefit of the printer to the Medical Department.

The Medical Officer began organizing material into a subnet idea, but this was not created because of lack of time and his departure from CARL VINSON. This idea focused on developing a subnet for structuring the procedures involved in screening sick personnel. The subnet would be used by subordinate personnel to guide their conduct of certain medical tests and procedures prior to the sick individual seeing the physician. The subnet could be generated as a hard copy document, distributed to the "small boy" ships that accompany a carrier, and used by their medical personnel who typically do not include a physician. After the diagnostic procedures were completed and corpsmen determined that the individual required the presence of a physician, then either patient or physician was transferred. This procedure for screening potential patients could save medical personnel time and helicopter operating/maintenance costs. Unfortunately, the Medical Officer had to depart ship's company prior to developing this subnet.

3.3.2.6 Personal Use. A number of users employed the ZOG system for development of small subnets that supported their personal plans or information. These subnets contained the kinds of personal information that are typical for computer system users, such as lists of property, details of education/career plans, and plans for immediate day-to-day activities. Because the subnets for the majority of users did not use system user protection features, anybody could peruse the information. Thus, the system was not used for sensitive personal information.

3.3.2.7 ZOG Use in Conduct of the Evaluation. During the deployment, the ZOG system supported the evaluation; ZOG management used the system to plan activities/meetings that were part of the evaluation visits. The management group developed a subnet to track the implementation of the recommendations the evaluation team had provided at the end of the first ship evaluation visit. A sample of this subnet is presented in Figure 8; note that each entry has a percentage estimate of completion. This subnet was found to be the best example of using the evaluation function of the ZOG system.

The evaluation team used the system to track receipt of information and events, meetings, or observations that were to occur prior to departing the ship. During the third visit, the system was used by the evaluation team to generate a unique subnet that listed representative frames from substantive subnets in the ZOG data base. At the end of the cruise, the Management Department used the system to generate end-of-cruise reports. All of these system uses would have been predicted by the ZOG system developers as natural applications of the automated management system.

3.3.3 The Integration of ZOG with the AIRPLAN Expert System

The Defense Advanced Research Projects Agency has sponsored a project to design an expert computer system that assists air operations officers with the decision making that is part of carrier-based aircraft launch and recovery procedures. This section describes this system, called AIRPLAN, and its integration with the ZOG system.

3.3.3.1 Background. Development of AIRPLAN was done at CMU with ZOG software serving as the interface between the AIRPLAN data processing and the system output to air operations personnel. The actual expert system that is the central component of AIRPLAN was developed using the OPS-7 programming language. In 1982 it was decided that AIRPLAN would be implemented on PERQ machines and would be integrated with the CARL VINSON ZOG system. In early 1983, prior to the deployment, AIRPLAN was installed on five of the ship's PERQs for tryout during the cruise.

The AIRPLAN system enables input of the relevant information, processes it according to a set of decision rules developed by experts, and provides the resulting information that will aid the officers in their decision making. Some of the AIRPLAN rules simply generate the implications of new information. Other rules recognize impending problems and develop a solution analysis. For example, AIRPLAN can analyze the fuel states of all waiting aircraft and can generate a new order for landing that will accommodate the fuel states of all the aircraft, taking into account such factors as the amount of available fuel, rate of fuel consumption, and the proximity to a tanker with fuel.

Because the status of aircraft is critical to many organizations on a carrier, the Air Operations Officers can be further burdened by queries from other personnel during flight operations. The network of PERQs inherent in the ZOG system provided a

Task - Accomplisher - Frameid	Jul83	Aug83	Sep83	Oct83	Nov83	Dec83
ZOG/VINSON Evaluation Recommendations - MANAGEMENT DEPARTMENT - 66% - ZOGEval1	20				30	
Hardware - 37% - ZOGEval2	20				30	
Install Glare Shields on Displays - ONR (will send) - ZOGEval3	20		30			
Install Vibration Dampening Material - PERQ Division - 50% - ZOGEval4	20-15					
Realign Floor Units to Improve Floppy Access - PERQ Division - 100% - ZOGEval5	20-10					
Additional Local Printers - VINSON/ONR - ZOGEval6	20				30	
Software - 62% - ZOGEval7	20		30			
System Malfunction Problems - VINSON/CMU/DTNRDC - 75% - ZOGEval8	20-10					
MailBox Communication System - MANAGEMENT DEPARTMENT R&D - 90% - ZOGEval9	20-30					
Develop Subnets across Departments - All VINSON DEPARTMENTS - 50% - ZOGEval10	20		30			
Delete Guest Sign On - MANAGEMENT DEPARTMENT R&D - 25% - ZOGEval11	20-10					
Subnet for PERQ Identification/Location - MANAGEMENT DEPARTMENT R&D - 100% - ZOGEval12	20-10					
gent for Recording Subnet Size - MANAGEMENT DEPARTMENT R&D - 100% - ZOGEval13	20					
nt for Plan Timing Conflicts - GEval14	20		30			
ntenance/Supply - 100% - ZOGEval15	20-10					
ly Backup Procedures - PERQ Division - 0% - ZOGEval16	20					

Figure 8. ZOG CARL VINSON evaluation recommendations.

natural opportunity for distributing the AIRPLAN information. Consequently, the ZOG AIRPLAN output could be distributed wherever the ZOG system existed.

For the ZOG system, this posed the issue of whether ZOG could successfully operate simultaneously with the operation of AIRPLAN. The evaluation team was extremely concerned about the ability of the two systems to operate independently without interfering with each other. The structure of the AIRPLAN system required five PERQs: two for data input, two for data output in the Air Operations Office, and one machine to manage the four input and output machines and actually perform the AIRPLAN processing of the data. All the other PERQs on the ZOG system also had access to the AIRPLAN output. Figure 9 depicts the AIRPLAN system configuration and indicates the organizations and officers who typically had access to the AIRPLAN data from either the Air Operations Office PERQs or from ZOG machines located at other places on the ship.

3.3.3.2 Functional Support of AIRPLAN. AIRPLAN's function is to assist the Air Operations Officers by providing information about the flight status of aircraft operating from the carrier. The officers monitor the launch and recovery of aircraft and must decide on recovery strategies for aircraft that have completed their mission. Currently, Air Operations Officers monitor all of the pertinent, and some irrelevant, information provided by multiple greaseboards, telephones, loudspeakers, and representatives from aircraft squadrons. The most common decision problems concern inadequate fuel supply of returning planes. Fuel problems arise, for example, when a pilot is unable to land on his first attempt, or a recovery is delayed because of a "fouled" landing deck. The three basic strategies to assist a low fuel state aircraft are (a) give the aircraft immediate landing priority, (b) provide fuel via an airborne tanker, or (c) divert the aircraft to a landing field within range of existing aircraft fuel supply. The decision made about the aircraft with insufficient fuel may, in turn, adversely affect the condition of other planes.

The AIRPLAN system was operating during virtually all of the flight operations. Input of the data was typically performed by one of the ZOG development group officers or a representative from one of the squadrons. The AIRPLAN system was subject to some of the same system interrupts and crashes as the balance of the ZOG system. Output from the system was readily available not only to the Air Operations Officers but also to the officers on the bridge and the flag offices. In fact, having the AIRPLAN output available to the bridge and the flag offices transmitted flight status information to those locations so rapidly that many telephone calls became unnecessary and were eliminated. This decrease in message traffic resulted in the Air Operations Officers processing and handling less information.

As part of the experimental development of AIRPLAN, a variety of flight operation scenarios were created. These scenarios permitted the exercising of the AIRPLAN system without requiring actual aircraft to fly. Figure 10 presents a representative AIRPLAN display during a recovery procedure.

Information contained on the recovery display is as follows:

TRAPPED/TO GO: the number of aircraft that have already landed/the number of aircraft remaining to be recovered.

ESTIMATED RAMP: expected time of the first aircraft landing.

S/N: the aircraft side number.

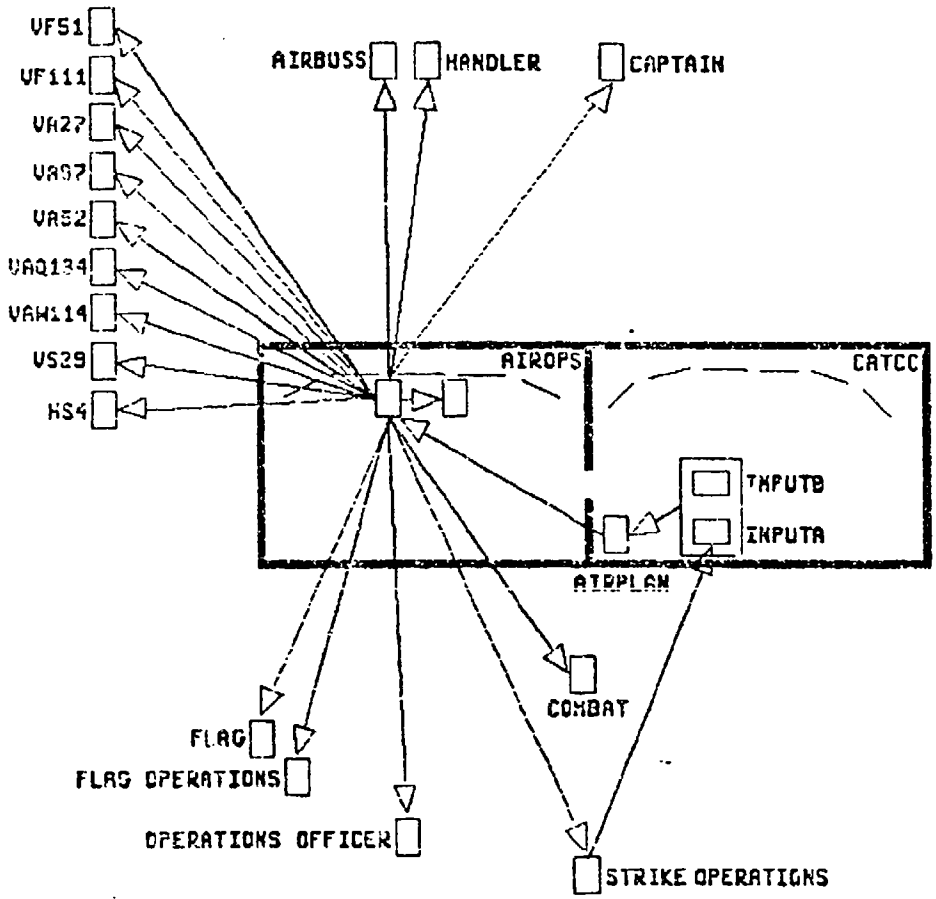


Figure 9. The AIRPLAN System.

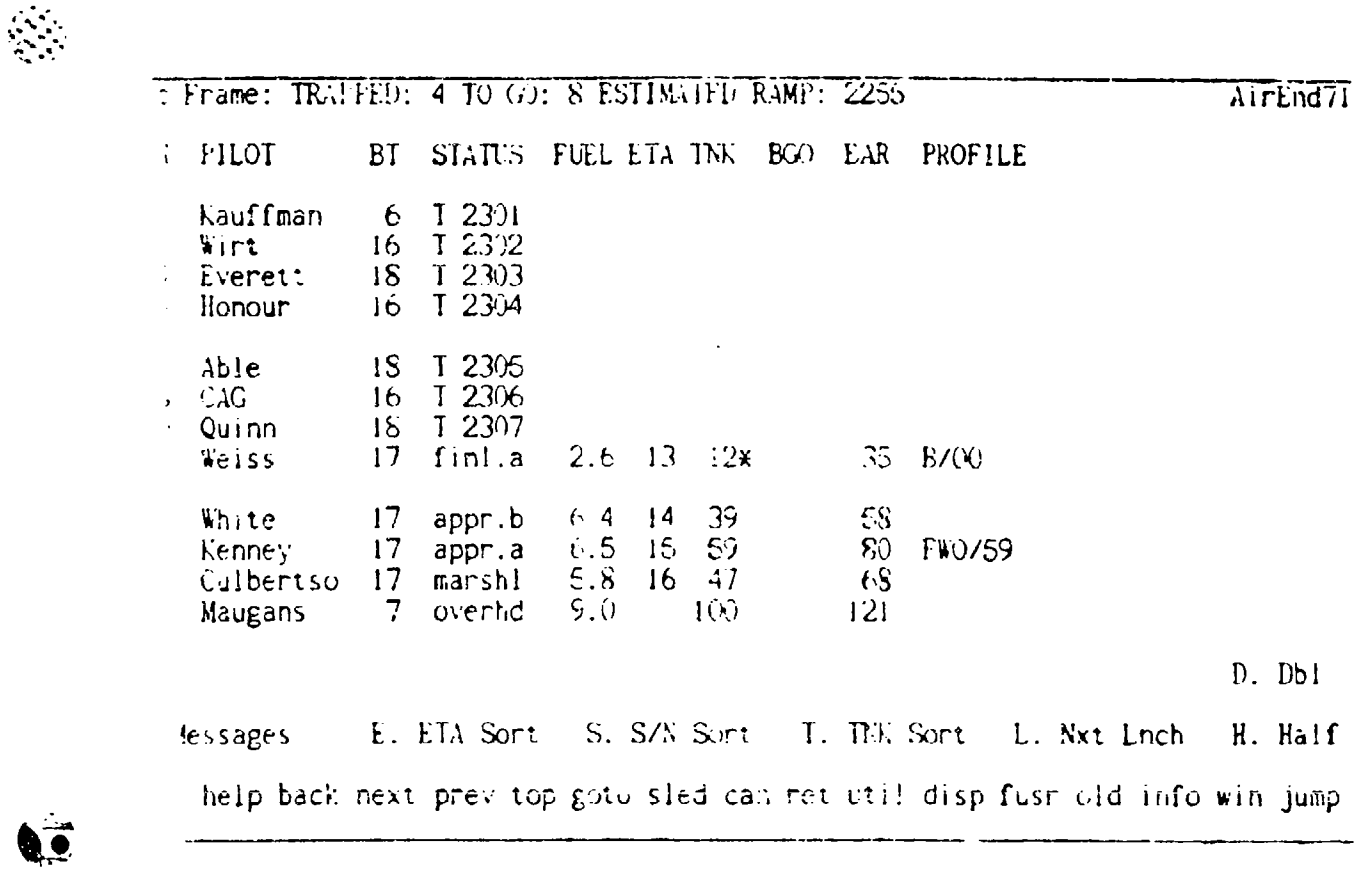


Figure 10. Display of AIRPLAN system aircraft recovery information.

PILOT: the pilot's name.

BT: the button, or frequency, the aircraft radios are tuned to. AIRPLAN automatically changes the displayed frequency as the aircraft moves through the various flight stages.

STATUS: the status of the aircraft. Options are marshl, appr.a, final.a, appr.b, final.b, tchgo, bolter, foulwo, techwo, tower, overhead, or spin. When the aircraft lands (is "trapped") a "T" followed by the actual time of landing appears.

FUEL: the actual or estimated fuel state of the aircraft. While in the marshal flight state, the fuel status is updated by the AIRPLAN expert system every 5 minutes; when the aircraft commences approach, the fuel state is updated automatically every minute.

ETA: the particular aircraft's expected time of arrival. The number is decremented automatically every minute.

TNK: the number of minutes before the aircraft must be fueled by a tanker. This is estimated by the expert system. When the aircraft is within 10 minutes of needing to be fueled, the estimate is starred-*.

BGO: the number of minutes before the aircraft should be barricaded.

BAR: The number of minutes before the aircraft should be barricaded. Essentially, this estimates the remaining possible flight time.

PROFILE: a summary of each pass an aircraft has made. If an aircraft has not been trapped, the display will indicate what and when the aircraft did. For example, a bolter (landing attempt without catching the arresting wire) at time 45 is displayed as "B/45."

Figure 11 presents the AIRPLAN display of recovery statistics that are available. Information on this display is self-explanatory. All of this information is available to users from any of the ZOG system machines.

The ship's daily flight schedule is entered into the ZOG system as an on-line net from the Strike Operations Office. This net provides AIRPLAN with the data for generating its various displays and permits the expert system to manipulate the data during a flight event. The flight schedule net itself can be used to quickly determine future events. Using ZOG, changes in the flight schedule can be rapidly distributed to all shipboard commands. Figure 12 presents an example of an AIRPLAN flight schedule.

In addition to the flight information, AIRPLAN has several aircraft emergency procedures subnets. By the end of the cruise, these emergency nets had been completed for the A-6E, EA-6B, KA-6D, and F-14A aircraft.

Figure 13 presents a sample display from the emergency procedure net for the EA-6B aircraft. During air operations, the procedures are available to Air Operations Officers and squadron representatives either from AIRPLAN or from NATOPS manuals.

As with all ZOG subnets, frames in the AIRPLAN emergency procedures nets are readily accessible by making single keystroke keyboard inputs. In Figure 13, the top level frame for EA-6B procedures is contained in the top window, and the number two option--ELECTRICAL--has been called up and is displayed in the lower window.

3.3.3.3 Future Expansion of AIRPLAN. Future plans for AIRPLAN include further development of the rule-based expert system and expansion of the emergency procedures. Expansion of the rule-based, decision making component of the system will include simulating tanking problems, predicting effects of events upon launch and recovery times, and allowing for the specification of aircraft type dependent alerts.

Because the present evaluation effort did not access the AIRPLAN system, no explicit data were collected regarding this functional extension of ZOG. However, the ZOG system was able to function with AIRPLAN. The AIRPLAN output became very important to ship management in a number of areas. As a result, there were extensive modifications made to ZOG software to increase the reliability of AIRPLAN. There was no question that the AIRPLAN system improved information handling within the ship's air operations/command structure.

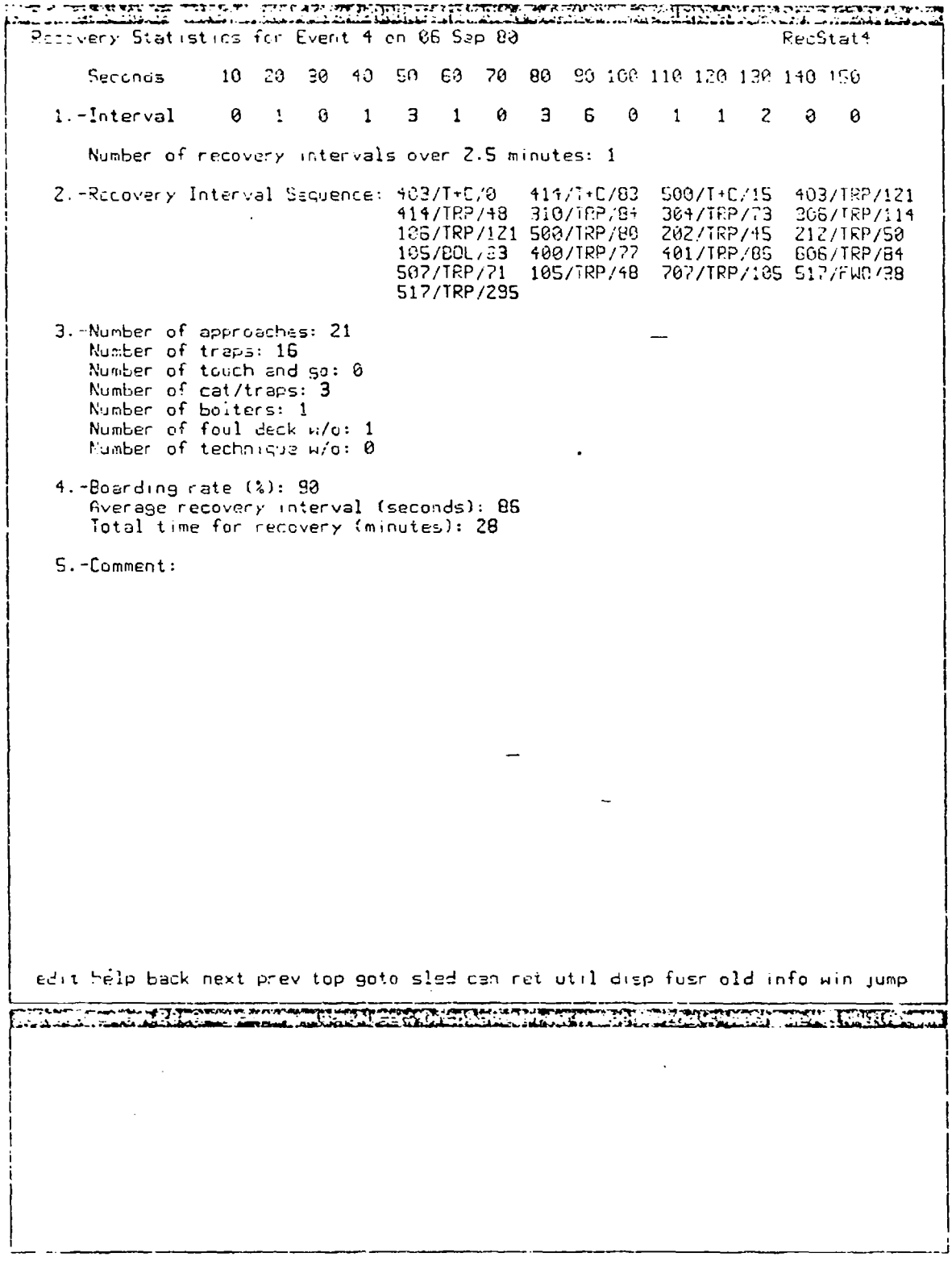


Figure 11. AIRPLAN recovery statistics.

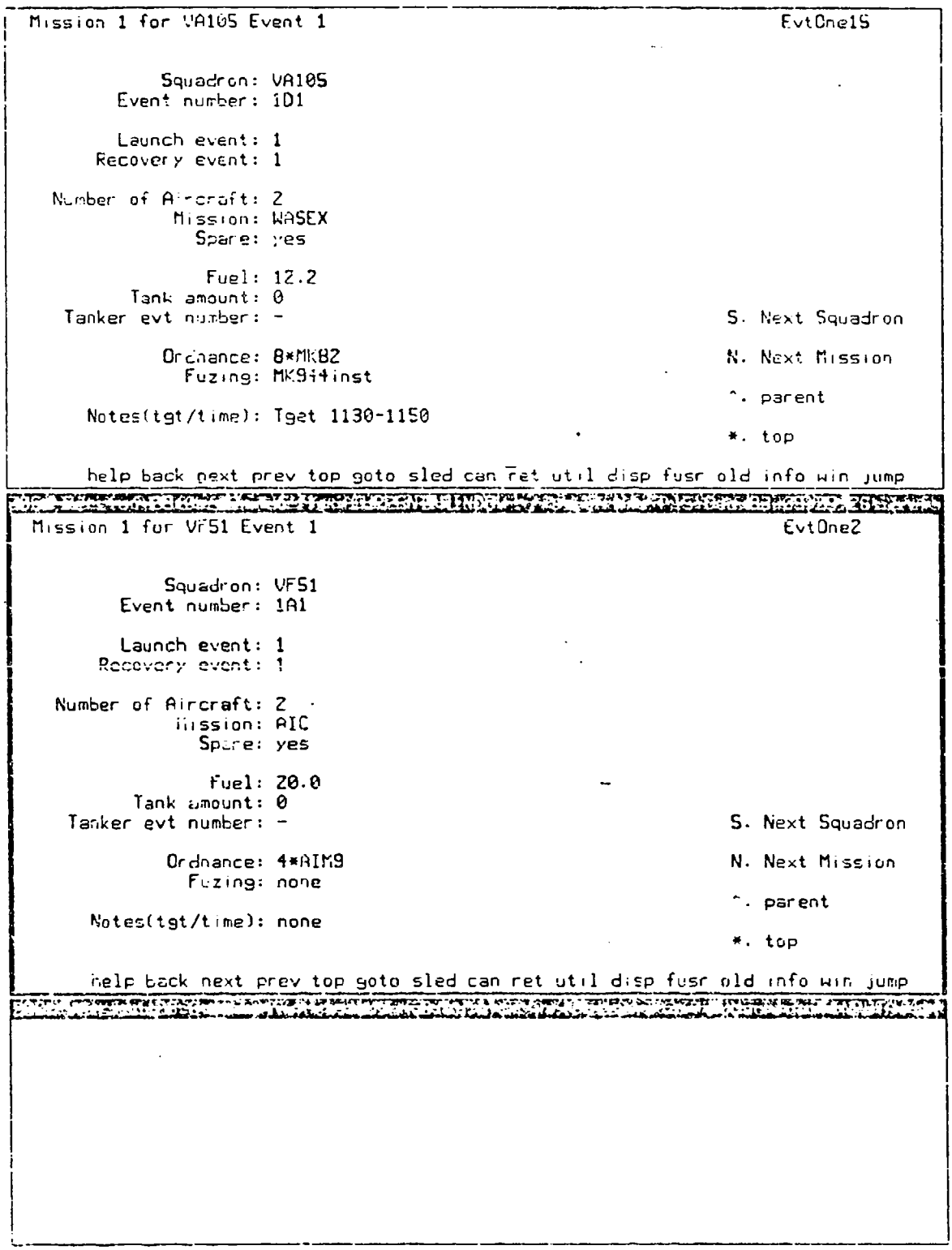


Figure 12. AIRPLAN on-line flight schedule.

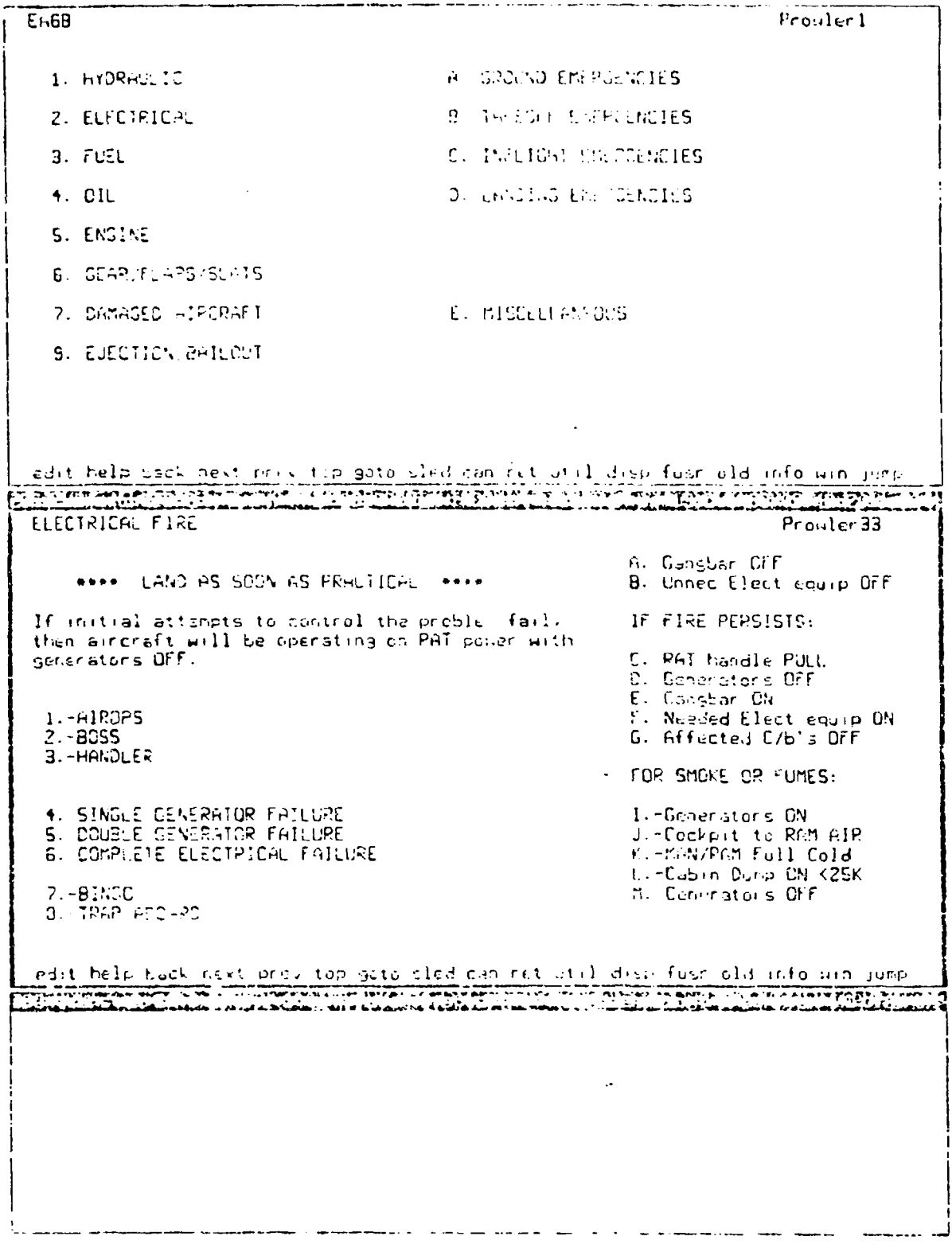


Figure 13. Sample AIRPLAN emergency procedure display for EA-6B.

3.3.4 Relationship of System Growth to System Development

Change in the size of the ZOG system was greatly influenced by changes in the ZOG system software. This system growth was evident in the size of the ZOG data base and the number of users and ship departments actively using ZOG.

3.3.4.1 Increase in Data Base. During the deployment, the ZOG data base expanded as a result of increased functional application of the system and expansion of the ZOG software itself. The number of functional ZOG subnets that were created during each month of the deployment for each ZOG machine are presented in Table 5.

The bottom line of Table 5 reveals the chronological growth of subnets in the data base. In March, after the distributed version of ZOG had been implemented on the PERQs, there was a significant increase in subnet development. As the system experienced substantial hardware and software problems from April through July, a low rate of subnet creation was not surprising. In late July, an improved version of the ZOG software was released to the ship's PERQs. Concomitant with the new software was a significant increase in subnet development. During August alone, 36 or one-third of the total number of subnets created during the cruise were developed. Lower rates of subnet development during September and October were probably not due to any software changes, but rather to the greater operational tempo of the ship and the increased time spent on port visits.

During the second evaluation visit, users mentioned the possibility of running out of data base storage space. A check of the available partition space by machine indicated that the storage space concern may be a valid issue given the CARL VINSON's approach to functional data base development, particularly concerning the SORM. Certainly, storage space was a concern of the shipboard management personnel in the allocation of subnets in the distributed data base. Table 6 lists the partition free space, in number of blocks for each machine, available on February 1984.

According to Table 6, the machine with the largest existing ZOG data base was the SUPO PERQ; hence, it had the smallest amount of available memory. The AIROPS machine, though, supports AIRPLAN and is not truly a part of the ZOG data base, but correspondingly, reflects the largest amount of available memory.

Early CARL VINSON activity in developing SORM subnets has resulted in considerable use of storage for that purpose. The data base managers make proper allocation of the data base to provide sufficient storage for all machines. A future concern of ZOG managers could be how much machine storage to allocate for what subnet, i.e., what functional applications have storage priority.

3.3.4.2 System Use and Development Activities. While system usage could increase over time, it is also a function of system development. At the time of the first evaluation visit, the ZOG system had 19 users who were functionally employing the system, including the four officers in the ZOG management group. During this first visit, extreme system software problems involving both the operating systems of ZOG and the PERQ machine became of paramount concern to all involved. As a result, a major effort was undertaken by the CMU developers to generate a software system that would eliminate the severe problems. After the ZOG software was revised, the evaluation team observed a significant increase in the number of users and the extent of use. During the second visit, the evaluation team interacted with 30 primary users.

Table 5

Number of Functional Subnets During 1983 Deployment

Name	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	After Cruise 11/83-/84
IMDO	1			2	2		1	3	9	6
ZZCO									0	1
DEV	1		1		1	3	3	1	10	3
ENGO						5	3	1	9	3
MGTO		1	1	1	7	8	1	2	21	3
HMED	1		1	1		7		1	11	
NAVO	7								7	
OPSO	Data were not available									
PERS	1		1					1	3	
REAC	1				1			2	4	
OXOW		1				1		2	2	
SUPO									0	
TRNG	1	1				4	3		9	1
AIR									0	1
WEPS					1	5	1		7	
WELV					1	1		4	6	2
YYXO	3	1				3	1	2	10	
Total	16	4	4	4	13	36	14	17	108	22

Note. Data obtained from February 1984 listing of existing substantive subnets. Data do not reflect management program development.

Table 6

ZOG Net Partition Free Space for All PERQs

PERQ Machine	Free Space Remaining
AIROPS	23354
AIROUTPUT	21284
CAG	PG School
CANONA	3871
CAT	NO ZOG
COMM	DOWN
DEV	10712
ENGO	13135
HMED	10846
IMDO	11081
INPUTA	10790
INPUTB	NO ZOG
MGTO	3617
NAVO	11023
OPSO	14927
OXOW	14002
PERS	19506
REAC	15041
SPARE	DOWN
SUPO	1797
TRNG	19284
VAIR	23147
WEPS	9280
WELV	6757
XADM	12829
YYXO	13853
ZZCO	9765

During the second visit, certain departments greatly increased their system usage and their number of users. Particularly evident was the greater use by the ENGO, REAC, and Aircraft Intermediate Maintenance Department (AIMD) and the initiation of use by the XO's division officers task group. Greater use across the system was seen through a higher frequency of interaction between departments and with the Management Department.

In summary, the number of users, departments, and the extent of their use of ZOG had increased significantly as a consequence of the implementation of the improved software. Further improvement of the software to totally remove system interruptions would have resulted in even greater system utilization.

3.4 System Maintainability

The topic of ZOG system maintainability will be presented in terms of ZOG/PERQ maintenance, the requirement for spare parts, and machine and software reliability. While reliability and maintainability are extremely crucial to a system implemented in the operational Navy environment, they are also critical to developing systems. The importance of a developing system stems from the need for reliability to ensure that the system has an adequate opportunity to mature in a healthy working environment. If either the hardware or the software are not functioning properly, it is difficult to accurately assess the functioning of the other system components. The necessity to implement the ZOG system, despite not having a fully functioning and debugged system, may have made it difficult for CARL VINSON users to judge the system's ultimate utility. Regardless, the level of system functioning must be documented during this evaluation period to ensure that any future prototype systems avoid some of the problems experienced by the ZOG/PERQ system.

3.4.1 ZOG/PERQ Maintenance

3.4.1.1 Maintenance Management Structure. Maintenance of the ZOG/PERQ system was managed by the Management Department. Within the department, personnel in the PERQ Division were charged with responding to trouble calls. Maintenance personnel in the PERQ Division consisted of an AK2 and five unrated DPs. Software repairs were the responsibility of the PERQ Division.

The actual repair of equipment was officially a responsibility of the Electronic Material Officer (EMO). The EMO had two second class data systems technicians (DSs) and three third class DSs to maintain the PERQs. All of the PERQ maintenance personnel under the EMO and some of the PERQ Division personnel had completed a 2-week PERQ maintenance course conducted by PERQ Systems before the cruise. This training should be repeated about every 18 months to ensure that the current staff of PERQ maintenance personnel are properly trained. The maintenance personnel believed the 2-week course was not long enough to provide adequate maintenance support for the PERQs.

3.4.1.2 Corrective Maintenance Procedures. Because of the shortage of trained personnel, corrective maintenance of equipment was a shared activity between EMO

technicians, PERQ Division personnel, and, on occasion, the AIMD Officer. The formal CARL VINSON procedures for unscheduled maintenance calls are as follows:

a. Receive the trouble call and log it in the PERQ log.

b. Notify one of the PERQ Division personnel.

c. The person notified will respond to the call and determine if the trouble is software or hardware.

d. If the trouble is a software problem then fix it or contact the PERQ Division Officer and relay the problem.

e. If the trouble is a hardware problem, contact the EMO's electrical casualty control.

f. If the EMO cannot solve the problem, make a request to the AIMD Officer for assistance.

g. If no one can repair the equipment, prepare the part for shipment back to PERQ Systems, Inc. for repair or prepare necessary purchase orders.

The actual equipment repair responsibilties of the PERQ Division personnel were limited and included the following:

a. Removal of the cover panels for inspection and cleaning.

b. Removal of whole assemblies such as the keyboard or the CRT, etc.

c. Connecting and disconnecting cables from the back of the PERQ.

d. Locking the disk for transporting the PERQ.

e. Supervising the transporting of the PERQ to a different location.

f. Removal and replacement of circuit boards.

g. Maintaining the PERQ maintenance log book.

Corrective maintenance of ZOG and PERQ software was the responsibility of the PERQ and Special Projects Divisions of the Management Department. As a practical matter, software maintenance was a shared activity between all those in the Management Department that had the programming ability. The enlisted PERQ personnel would frequently respond to a ZOG trouble call and be able to resolve the problem by interacting with the user. The problem would have been an operator error. Because the hardware and software were so unreliable, resolution of the problem usually required at least an initial contact with the PERQ Division personnel. As some users became more sophisticated and knowledgeable about the system, they would refer software problems directly to the ZOG group personnel most skilled in that software area. The inability to eliminate some of the continuing software problems involving the interface between the ZOG and POS kept the

ZOG group personnel so inordinately involved with software fixes they did not have adequate time for other system needs, such as user training.

3.4.1.3 Preventive Maintenance Procedures. In an effort to preempt corrective maintenance, the AK2 in the PERQ Division developed a set of preventive maintenance procedures now performed on the PERQs periodically. Other members of the ZOG management group indicated that conducting preventive maintenance procedures had undoubtedly prevented several equipment malfunctions. Performance of the preventive maintenance required approximately 1 hour per machine about once a month. These preventive maintenance procedures are included as Appendix I.

3.4.2 PERQ Spare Parts

The original allocation of PERQ machines to the CARL VINSON was based on the assumption that 2 of the 28 machines would be used for spare parts. Actually allocation of the machines to the various departments resulted in only one machine being formally dedicated as a spare machine to be located in the EMO's workshop. The intent was to have the spare serve as a working component of the ZOG system and, thereby, include the EMO's maintenance office as an active part of the ZOG system network. The high frequency of PERQ malfunctions resulted in the spare machine being stripped of parts for prolonged periods of time to keep other machines operating. Two other machines on the system that had relatively low use also were stripped for parts for machines in more ZOG active departments. The two stripped machines were the CAG and COMM PERQs.

Although CARL VINSON had departed the United States with a small supply of parts, a substantial number of replacement components had been ordered in the form of a Replacement Stock List (RSL). The contract for the RSL was let in May 1983, and the $92,000 in parts arrived on the carrier in late August 1983. Installation of the RSL parts on the machines caused an immediate improvement in the operating status of the system. The parts that frequently needed replacement were display boards, Ethernet boards, memory boards, and power supplies. Additional discussion of the defective components is presented in the following section. Table 7 lists, as examples, the spare parts required for March through May 1983.

3.4.3 PERQ/ZOG System Reliability

Reliability of any computer system is a combined function of the reliability of the hardware and software components. Ideally, evaluation of a software system, such as ZOG, could be done with a highly reliable computer so that the system's effectiveness could be attributed solely to the software. In the case of this evaluation of ZOG, however, it was operating on a machine that was not functioning well. To further cloud the issue, problems involving the interaction between the ZOG software and the PERQ software made it even more difficult to attribute system problems to ZOG or the POS. This section will describe, to the extent possible, the system reliability problems in terms of hardware malfunctions and software deficiencies and their relationship with PERQ computer problems.

3.4.3.1 Hardware Malfunctions

Table 8 presents a list of the machines and their downtimes in months and days. Machines for which the downtime is indicated as pending in the table were down at

Table 7

PERQ Spare Parts for March Through May 1983

Nomenclature	Part Number	Repair Price ($)	Comments
Canon Ethernet board	100266-00	862.00	
Display monitor board	100005-00	456.00	No display
Memory board	100048-00	700.00	
Ethernet board	100225-00	260.00	
Total for 12 weeks		2273.00	
Non-REI PERQ parts from 1 April to present			
10 board	100043-00	547.00	Trashes disks
10 board	100043-00	547.00	No floppy access
10 board	100043-00	547.00	No boot when hot
CPU board 4K	100004-00	715.00	ODS stops at 231
MEM board	100048-00	700.00	Horz. lines in display
MEM board	100048-00	700.00	Memory parity errors
Power supply	840100-01	190.00	No ODS or display
Actuator PCB board	26041-3	?	ODS stops at 14
Monitor board	270007	456.00	No display
Fly back transformer	922014-0044A-A	?	Frys fuses
Fly back transformer	922014-0044A-A	?	No display
Bit pad puck	1902-00	50.00	Broken wire in scope
Bit pad puck	1902-00	50.00	No buttons work
Ethernet board	100225-00	260.00	No Ethernet communications
Ethernet board	100225-00	260.00	Sends CRC errors
Ethernet pig tails	100075-00	26.00	No Ethernet communications
Tap box	2010E	?	Tap threads striped
Canon Ethernet board	100226-00	862.00	CRC errors
Canon Ethernet board	100226-00	862.00	CRC errors. Netserver time requests works but cannot print remote files.
Total for 12 weeks		9056.00	

Table 8

Electronic Maintenance JSN Accountability Log
15 March - 30 October 1983

Machine Identification	Downtime		Fault
PERQ CPU	4 mos.	11 days	Replace IC chips (4285 on memory board)
PERQ CAG		11 days	Bad Ethernet board
PERG CAG		18 days	Bad Ethernet board
PERQ PERS		2 days	Bad hard disk drive
PERQ HMED		1 day	Replaced power supply
PERQ HMED		1 day	Monitor dims out during 1/0 ops - replaced power supply
PERQ TRNG		1 day	Bad keyboard
PERQ HMED		1 day	Replaced disk belt
PERQ AIROP	1 mo.	9 days	Bad motherboard (connection to bit pad)
PERQ BRIDGE		1 day	Bad Ethernet board
PERQ (Unknown)	Pending		Bad memory board and I/O board
PERQ (Unknown)	Pending		Bad pad, Ethernet board, power supply
PERQ 750		1 day	Mouse - 3 broken wires
PERQ Spare		1 day	Mouse, one broken ground wire
PERQ Chaplain		1 day	Bad I/O board
PERQ XADM		1 day	Bad bit pad
PERQ DEV		1 day	Bad keyboard
PERQ Canon B	Pending		Bad Ethernet board and Ethernet transmitter
PERQ AIMD		6 days	Bad power supply, motherboard
PERQ DEV		? days	Bad I/O PCB, CPU PCB, power supply Ethernet PCB, and monitor
PERQ MGT		2 days	Bad monitor
PERQ COMM	Pending		Bad power supply, monitor, I/O PCB, memory PCB
PERQ ENGO		2 days	Bad memory PCB
PERQ MGT		2 days	Bad floppy drive
PERQ Spare	Pending		Bad I/O memory, CPU Ethernet PCB's card cage, power supply, monitor
PERQ VAIR	3 mos.	21 days	Bad Ethernet PCB
PERQ WELV		2 days	Bad monitor
PERQ XADM		1 day	Bad power supply and monitor
PERQ INPUTA		1 day	Bad monitor (motherboard)
PERQ WELVA	2 mos.	14 days	Bit pad and mouse defective
PERQ AIROP		1 day	Bad I/O board
PERQ Canon A		2 days	Bad memory board
PERQ XADM		4 days	Software correction
PERQ WELV		2 days	Hard disk, power supply
PERQ XADM	Pending		Bad monitor
PERQ AIROP		1 day	Bad monitor
PERQ WELV		1 day	Replaced I/O board
PERQ AIMD	Pending		Replaced display monitor
PERQ XADM	Pending		Replace monitor
PERQ SUPO	1 mo.	2 days	Replace monitor
PERQ ZZCO	1 mo.	9 days	Replace monitor

the time these data were collected. In some cases, while a component of the PERQ machine was inoperative other parts may be operating. For example, while a display may not be working for a machine, that machine can still be turned on and its resident data base can be accessed by other machines.

Machine downtime accounted for 14 percent of the total time the ZOG system could have been available to CARL VINSON personnel. Some machines were kept down because they were cannibalized to keep other machines operative. The lack of spare parts on the ship and the difficulty of obtaining replacement parts contributed to the extended machine downtime. A management decision determined which machines would be operationally maintained.

Table 8 indicates the high frequency malfunctions on the PERQ machines were the Ethernet boards, power supplies, memory boards, and monitors (displays). Early in the cruise the PERQs were connected to ship's power without benefit of the voltage surge suppression devices. Operation of the computers without these devices could have caused the malfunctions in the power supplies and, possibly, other problems.

Another explanation for frequent failures could be that the operating environment of an aircraft carrier is more severe than that of a normal land-based office. Specifically, machines in the compartments of CARL VINSON were subjected to more vibration and heat than computers experience in a normal office. The shipboard environment probably requires some degree of ruggedization of commercial equipment, but not to the extent of requiring military standardized devices. The ZOG management group did attempt to minimize environmental problems by supporting certain machines on shock absorbing mounts and relocating a few machines to spaces with more even temperatures. The evaluation team had two PERQs, the more recent Model II, which experienced similar problems despite the fact that the machines were located in a controlled laboratory space.

The management group used the ZOG system itself to monitor the status of all PERQ machines. A sample of a frame from the PERQ status subnet is presented as Figure 14.

For the reasons cited, the PERQ machines installed on board CARL VINSON malfunctioned at a rate sufficient to interfere with use of the ZOG system. The malfunctioning of the equipment was not, however, the most critical deficiency of the ZOG/CARL VINSON system.

3.4.3.2 ZOG/PERQ Software Deficiencies

The most serious deficiencies affecting the operation of the ZOG system were system software limitations. The ZOG software version, using a distributed data base through the POS, experienced frequent and continuous problems throughout the cruise. These problems, detected as unexplained system interrupts that stopped system processing, were reduced somewhat during the cruise with new ZOG software versions, but the software revisions were temporary fixes to get around some fundamental incompatibilities between the ZOG and POS.

During the first evaluation team visit, team members observed users working with the ZOG system. During virtually all of these observations the system crashed either for a hardware or software reason. Since the equipment would come back up in about 2 minutes, the majority of these malfunctions were assumed to be due to software problems, although it is not possible to ascribe this problem to only one software program.

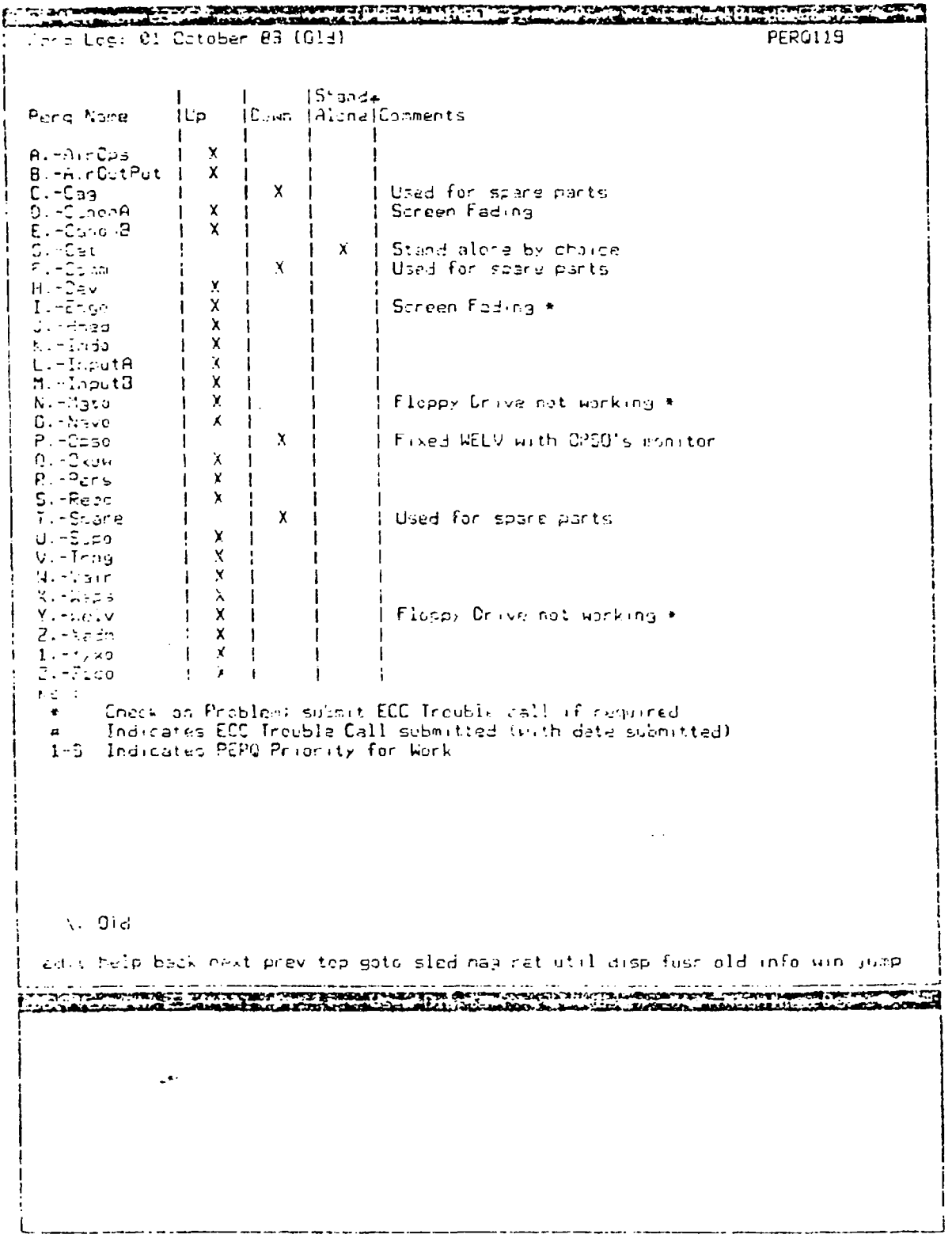


Figure 14. ZOG operational status.

During both ship visits during the cruise, reliability logs were attached to all machines with instructions for the users to login and logout and to log any difficulties they had with the system. Many of the users did not complete the reliability log, because it was an awkward and unusual procedure for them. However, all log sheets returned indicated some system problem, usually Ethernet interrupts or unexplained crashes out of ZOG.

3.5 PERQ Machine Data Description of ZOG System Use

Data regarding the use of the ZOG system were collected from the PERQ machines throughout the course of the deployment. As described before, the data were transferred to floppy disks, sent to CMU for preprocessing, and sent to NAVPERSRAND-CEN for final processing and analysis. This section describes the data obtained, how the ZOG system was used during the entire cruise, and system use during selected time periods.

3.5.1 Available ZOG/PERQ System Data

For a number of reasons system data were not collected, or were not usable for analysis, for certain machines. For some periods during the cruise, a breakdown of a PERQ machine or a malfunction of the operating system prevented data from being recorded or collected. In other cases, operational commitments preempted the data collection. One limitation of the system is that if data are not collected and the statistics files are filled, any added data are lost. Evaluators could not determine the reason for any particular loss of data, but they assumed that the data losses did not differentially bias the general results of the evaluation.

By design, data were not collected from the five machines that supported the AIRPLAN system. This was to make sure that AIRPLAN software would operate as efficiently as possible. Accordingly, those five machines were not included in any of the analyses. With regard to the remaining machines on the system, the statistical data collection did pose an added burden on the ZOG operating system. The ZOG statistics program was not activated until the distributed data base software version was implemented in mid-March, so the machine data covers the period from 15 March until 29 October 1983.

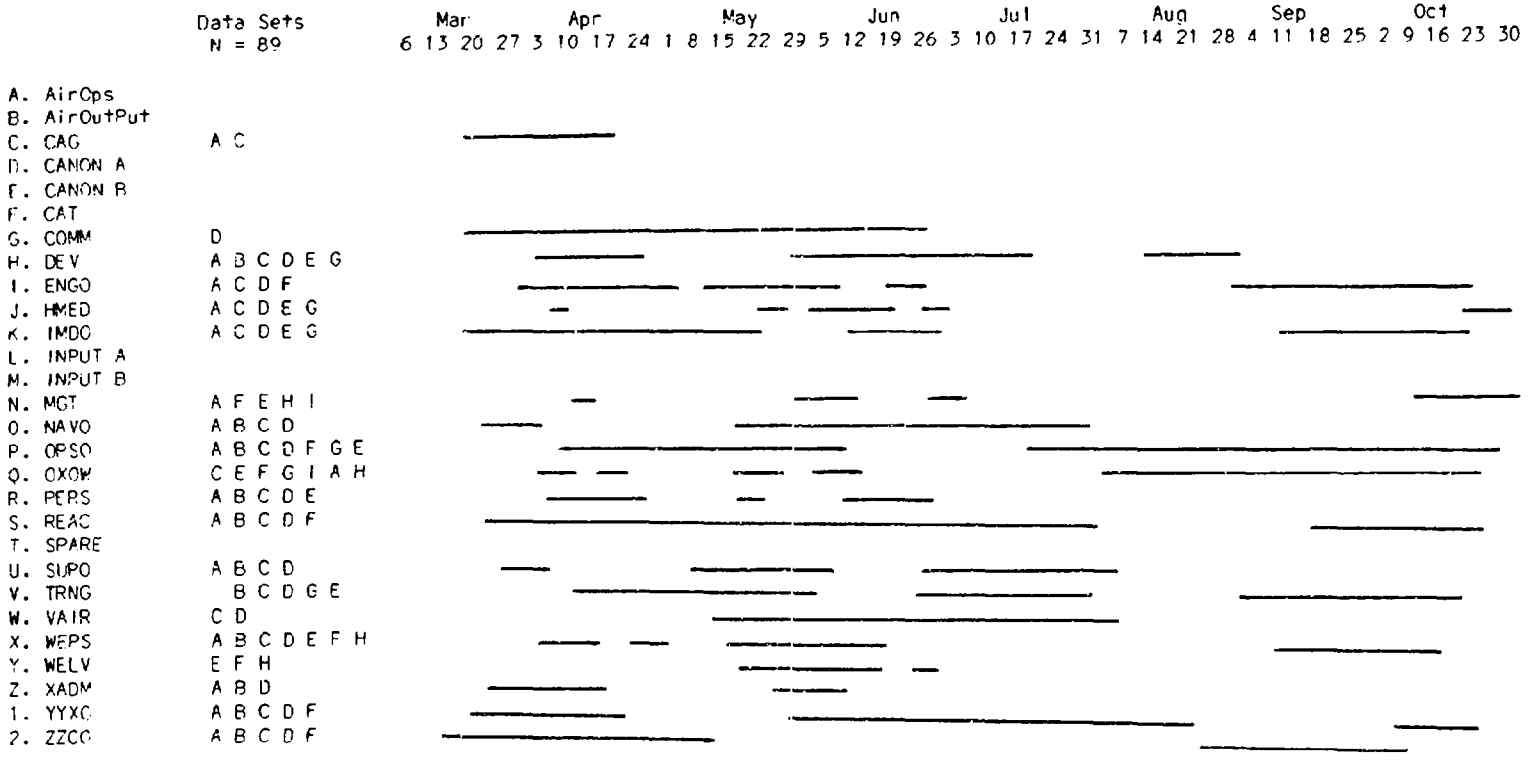
Data received at NAVPERSRANDCEN included 89 sets of user statistics collected from 20 of 27 ZOG machines on board CARL VINSON.

Table 9 presents the data blocks received at NAVPERSRANDCEN for each of the machines throughout the cruise and also significant periods when individual machines were not functioning.

Table 9 shows large gaps in machine usage caused by failure to collect the data and hardware and software failure. Software deficiencies also account for some system unavailability for selected PERQs, but are not reported on Table 9. Breakdowns of the CAG, COMM, and spare machines account for a major lack of data. Total machine downtime amounted to 14 percent of the total available time, based on 24-hour days. If available machine data time intervals are added to periods of machine downtime and divided by total time, the resulting proportion of time accounted for is 56 percent. Another source of missing data are software problems that resulted in "uncaught exceptions." An uncaught exception removes a user from the ZOG system software or

Table 9

PERQ Machine Usage During Evaluation Period



N=20 MACHINES REPORTED

operating system and erases user statistics collected up to the time of the exception. For other than the machine downtime and the uncaught exceptions, the evaluation team received no other information that would account for the frequent and long gaps in available data. Planned analyses had to be modified and some discarded because of the relatively small and intermittent amounts of data that were available.

3.5.2 System Use During the Entire Cruise

At NAVPERSRANDCEN, a ZOG data analysis agent was applied to the total machine-system data set covering the entire deployment period. This section describes the findings regarding overall system use.

Table 10 presents the total time all ZOG users spent in each of four system activity categories. These categories represent the user (a) browsing through the ZOG subnet information, (b) creating or modifying ZOG frames using the ZED editor, (c) creating or modifying frames using the ZOG SLED, and (d) the time the system was sitting idle with no user activity discernible to the machine. (After 20 minutes of no keystroke entry while in ZOG, 10 minutes in ZED, or 5 minutes in SLED, the machine registers an idle period and writes a blank statistics frame.)

Table 10

Total ZOG System Activity

Activity	Time (hours)
ZOG	309.6
ZED	87.9
SLED	15.8
Idle	2964.3

Table 10 shows the majority of the active ZOG time was spent in referring to existing subnet information. Also, the table indicates that the ZED editor, which is normally used to create complete ZOG frames, was used five times as much as the SLED editor. This finding is to be expected because the SLED editor permits rapid insertion or modification of information and would be expected to be used for shorter periods of time.

The same information is included in Table 11, but it is presented separately for each machine. Additionally, this table presents the number of frames accessed during each activity, the mean time spent at a frame for that activity, and the relative percentages for each machine.

For all three ZOG activity categories, the IMDO machine in the AIMD yielded the highest percentage of time of all the machines. The WEPS and the ENGO machines recorded the second highest percentages of use in the ZOG system and the ZED editor categories. Tied for highest percentage of time in SLED with the IMDO machine was the HMED machine. In the ZOG activity category, the NAVO (the bridge) and the WEPS machines had essentially the same, the third highest percentage of time. The finding of

Table 11

ZOG System Activity by Machine

FUNCTION/ MACHINE	ZOG % ZOG Time	ZOG Frames	ZOG Total Time Hrmin	ZOG $\bar{X}$ Time Secs.	ZOG Frames >CO	ZOG Time >CO Hrmin	ZED % ZED Time	ZED Frames	ZED Total Time Hrmin	ZED $\bar{X}$ Time Secs.	ZED Frames >CO	ZED Time >CO Hrmin	SLED % SLED Time	SLED Frames	SLED Total Time Hrmin	SLED $\bar{X}$ Time Secs.	SLED Frames >CO	SLED Time >CO Hrmin	SLED Stroke Errors %
COMMAND																			
ZZCO	1	787	2:00	9.17	9	77:16	1	5	0:04	52.60	0	0	0	1	0	13.00	0	0	30.10
NAVO	7	6109	21:39	12.77	343	474:13	6	361	5:62	50.22	5	9:40	1	15	0:06	24.2	0	0	16.53
ADMINISTRATION																			
YYXO	3	1602	8:53	18.50	66	346:46	4	233	3:16	48.54	5	2:03	1	25	0:18	43.56	1	1:02	7.49
XADM	1	203	0:17	5.76	8	13:39		0	0	0	0	0		2	0:01	32.00	0	0	38.37
PERS	1	168	0:18	6.48	4	48:41		0	0	0	0	0	0	2	0	19.50	0	0	14.59
TRGN	6	4249	18:50	17.74	108	321:24	7	418	6:25	56.52	8	9:18	15	214	2:25	40.60	1	0:11	5.54
HMED	4	2712	12:12	16.2	59	30:15	3	417	3:04	26.49	9	2:51	19	218	3:07	51.67	1	0:18	1.03
COMMUNICATIONS																			
COMM	1	71	0:12	10.70	1	0:32	1	2	0:01	30.50	0	0		2	0:01	30.5	0	0	5.68
OPERATIONS																			
OXOW	8	8276	24:37	10.71	130	118:00	8	1053	7:37	30.43	1	0:32	7	139	1:01	27.38	1	0:11	3.54
OPSO	2	1366	5:27	14.64	122	118:19	1	67	0:56	48.02	1	0:10	1	5	0.09	53.50	4	1:19	15.72
VAIR	2	2026	6:10	10.96	85	149.44	1	28	0:23	50.36	0	0	1	4	0:02	37.25	0	0	13.74
CAG	1	569	1:31	7.70	20	32.12	1	8	0:17	127.75	0	0	0	1	0	39.0	0	0	15.5
WEAPONS																			
WEPS	7	8740	27:50	11.47	81	15:50	12	602	10.07	60.54	7	1:37	3	57	0:50	53.26	0	0	11.22
WELV	5	4535	16:24	13.03	34	25:45	5	285	4.07	52.09	9	2:25	1	4	0:03	59.00	0	0	12.05
LOG/SUPPLY																			
SUPO	5	8186	14:48	12.24	152	308.04	4	126	3:32	107.31	4	7:15	9	5	1:45	101.94	0	0	31.61
IMDO	13	10056	39:23	14.10	178	239:53	9	808	8:19	37.12	13	4:51	19	368	3:04	30.08	1	0:30	2.50
ENGINEERING																			
ENGO	8	6966	26:27	13.17	111	182:14	9	556	8:21	54.07	5	3:35	9	185	1:37	31.64	0	0	10.75
REAC	5	3569	16:45	16.90	88	230:15	6	294	5:41	69.63	2	0:47	7	98	1:13	45.04	0	0	10.98
PERQ/MGT																			
MGT	4	3581	12:42	12.78	101	167.25	6	211	5:16	90.10	8	2:51	1	14	0:05	24.29	0	0	17.13
DEV	16	20056	51:30	13.00	341	287:00	16	1190	14:49	37.83	18	3:38	7	88	1.11	47.13	4	1:19	13.37
OVERALL N=20	100	93,827	309:36	13.06	2151	3862:23	100	7417	87:52	51.39	110	56·00	100	1569	15:49	41.51	14	5:20	14.01

the greatest relative amount of use on the IMDO, HMED, ENGO, and WEPS machines is consistent with the interview and questionnaire data regarding functional use of the system.

An additional finding also consistent with user reported activity is that regarding the number of frames accessed in ZOG. Again, the IMDO, WEPS, ENGO, and NAVO machines reported the highest numbers of frames accessed. Data for the OXOW machine indicate that users had a high rate of ZOG use. This would be expected because the Assistant OXOW had to generate the Green Sheet daily ship's schedule.

3.5.3 System Use During Selected Time Periods

The total data base of statistics obtained from the ZOG system comprises nine different sets, A through I. Each set includes all available data for the 20 machines for basically different periods. While some of the periods for the data sets overlap, for any machine the data are unique from one data set to another. Consequently, each data set represents a unique batch of data from one set to the next, and the sets represent mutually exclusive sets of information. Across data sets, however, there are differing numbers of machines and numbers of days represented in the data. Table 12 presents the total statistical data base collapsed over the 20 machines for each data set in terms of the numbers of frames and subnets that were accessed, and the number of subnets that were deleted.

Because of the varying numbers of machines and days involved in each data set, comparisons across these chronological sets of information are difficult to make. To equate these data, the data set was divided by the number of machine-days represented in the data set. The number of machine-days was determined by adding together the number of days each machine contributed data to that set. Then, the data in Table 13 were divided by the number of machine-days to get a logically equivalent basis for comparing the data across data sets.

The data now reveal some consistent and understandable trends. For the first data set A, collected soon after the system was installed, the data reflect the usage of a small and new computer system. After users became experienced and system problems were resolved, the level of usage increased gradually. After the revised system software was installed and debugged in August, there was a significant increase in usage. The machine data reported only a part of the subnets created (see Table 5) that were verified by the evaluation team on the CARL VINSON PERQs. The data sets at NAVPERSRAND-CEN that were obtained from the machines represent about 40 percent possible system uptime. This can be seen from the column in Table 11 indicating the decreasing number of machines and machine-days included in each set. As would be expected from previous data, the PERQs used most were the IMDO, ENGO, and REAC machines.

In another attempt to make chronological comparisons, three discrete 30-day periods were selected to make cross-period comparisons. Three periods were chosen that seemed to maximize the availability of data. The periods selected for analysis were 6 April to 5 May, 21 May to 20 June, and 16 September to 15 October 1983. A summary analysis was performed on these data and the results are presented in Table 14. The data are mutually exclusive across the periods. When this report was prepared, the analysis for the second period had not been completed; hence, those data are missing from the table. Again, there are different numbers of machines and intervals providing data.

Table 12

System Frame and Subnet Activity Chronological Data Set

Activity	Time Period A 3/15-4/17	B 4/03-5/23	C 4/09-6/12	D 3/23-8/24	E 5/15-6/29	F 6/03-10/24	G 8/02-10/24	H 9/11-10/24	I 10/11-10/24
ZOG frames accessed	10771	6081	10134	24120	16883	9054	15327	6052	2933
ZED frames accessed	829	98	733	839	1172	859	987	674	262
LED frames accessed	139	28	90	258	255	313	403	53	29
S/Ns created	115	2	2	14	5	9	4	2	1
deleted	2		-2	1					
S/N accessed	533	69	941	1604	2302	2014	3095	941	493
Number of machines contributing data	17	12	16	16	10	9	6	3	2
Number of machine-days	299	128	308	414	233	182	196	64	19

Table 13

System Frame and Subnet Activity per Machine-day for Chronological Data Sets

Activity	A	B	C	D	E	F	G	H	I
ZOG frames accessed	47.0	47.5	32.9	58.3	72.5	49.7	78.2	94.6	154.3
ZED frames accessed	3.6	0.8	2.4	2.0	5.0	4.7	5.0	10.5	13.8
SLED frames accessed	0.61	0.22	0.29	0.62	1.1	1.7	2.1	0.8	1.5
S/Ns accessed	2.33	0.02	3.1	3.9	9.9	11.1	15.8	14.7	25.93

Table 14

Summary System Statistics for Three Selected Periods

Period	Machine Days (MD)	ZOG		ZED		SLED		Total Agents Run	Total Subnets Accessed	Percent Stroke Errors
		Frames Per (MD)	Hrs. Per (MD)	Frames MD	Hrs. MD	Frames MD	Hrs MD			
06 Apr - 05 May	191	54.7	0.15	4.2	0.04	0.73	0.01	266	1647	10.49
21 May - 20 Jun	236	51.7	0.28	5.3	0.08	1.92	0.02	343	2896	14.71
16 Sep - 15 Oct	193	60.2	0.26	5.7	0.08	2.02	0.009	233	1894	5.05

To make comparisons meaningful, selected variables are divided by the number of machine-days for each group. Comparing periods 1 and 3 reveals a small but consistent increase in use in every category. This increase in use is accompanied by a decrease in the percentage of keyboard error strokes, from 10.5 percent down to 5.1 percent. An error stroke is not a legitimate command for the ZOG system, and the PERQ sounds a buzz to indicate an improper keystroke. This finding suggests that as the users become more active with ZOG they also increase their accuracy to select the proper command. While not a surprising finding, it reflects that ZOG exerts a form of learner control beneficial to system effectiveness.

3.5.4 Use of ZOG Agents

ZOG agents are programs, maintained as subnets of ZOG, that can be invoked by ZOG command to automatically operate on a specified portion of the data base. All agents are maintained on each PERQ as a set of local unique subnets. Implementation of an agent involves expanding or modifying the local subnets for all machines. As mentioned before, the ZOG management group maintained their DEV machine with the most recent software for debugging purposes. After debugging system updates and agents, they were released to all shipboard machines. A list of all the agents subnets common to all machines is included in Appendix J.

Initially, many users were thought to be able to develop and run system agents. However, the skill level required of agent developers exceeded that of the average ZOG user who was not able to create agents. The computer had to be programmed to use the PASCAL language to write agent programs. At best, most users were able to invoke agents created and debugged by others. Agent writing on board CARL VINSON was almost exclusively the province of the ZOG management group. One notable exception was the AIMD head, who used the IMDO machine.

Throughout the cruise, agent creation was a combined effort by the CARL VINSON ZOG development group both on the ship and at CMU. Agents were classified as either system utility agents to facilitate direct dealings with the system or simply as agents that would be applied to the data base. Specific agents that were developed during the very early part of the cruise included the following:

a. DoListFrames: produces hard copy of all frame titles in a subnet.

b. DoIAmWho: allows users to use another PERQ's local nets.

c. DoWho: provides the Ethernet address of any machine.

d. DoHiPrint: used to monitor changes in the data base.

e. FoFont: changes text, options, and local pads to any specified font.

f. ZMagnify: changes text, options, and local pads to a preset font.

g. AgDir: lists subnets for an individual PERQ, or for all PERQs, with the option of listing only changed subnets since a specified time.

h. AfVBH: outputs PERQ subnets in VAX zbh format to allow use on a VAX computer.

For the two 30-day periods discussed in the preceding paragraphs, the number of agents run per machine-day was computed. During the first period, there were 266 agents run during the period at the rate of 1.4 agents run per machine-day. During the last period, there were 233 agents run at the rate of 1.2 agents run per machine-day. System problems interfered greatly with the running of agents and may have contributed to the low rate of agents run.

3.6 ZOG User Interface Issues

3.6.1 Human Factors Aspects of General ZOG System Characteristics

One of the most important areas of consideration in evaluating the acceptability of an interactive computer system like ZOG is how well users can interface with the system. In addition to the question of whether the system is capable of supporting an individual user in the performance of his job, the user must be able to easily interact with the system. This is especially true for personnel of a Navy ship like the CARL VINSON, whose crewmembers are expected to discharge their responsibilities reliably and on time. System benefits must exceed the costs incurred in system development, system maintenance, personnel training and familiarization, and individual effort required to use the system. The evaluation team directed much of its attention to the latter factor.

Very briefly, consideration about the ease of using the system involves assessment of the ease of learning to use the system. Thus, if the procedures for manipulating hardware devices are complex or physically difficult, if the syntax of the dialogue between system and user is awkward, or if the form of information going in or coming out of the system is incompatible with the user's perception of it, the system suffers from a human factors problem which needs to be solved.

The developers of ZOG designed the system to eliminate the need for users to be trained programmers or data base managers to use the system effectively. The embedding of information within menu frames and the maintenance of very rapid system response time contributes to the ease with which the ZOG system can be used. The user is essentially guided through the system by a hierarchy of menu displays on the screen. The utility of this approach is dependent on the willingness or ability of the user to read frame after frame of material until the desired information is obtained.

3.6.1.1 Interface with the ZOG Data Base. An important feature of the ZOG system is that the user does not need to know about formal data base structures before storing or retrieving information in the system. By simply selecting one or more options, the user can reach any point within the data base. Any frames in the data base can be linked or unlinked without regard for the pathways between them. Additionally, the user can easily establish simultaneous links between any frame of information to similar or associated frames throughout the data base. This capability relaxes many constraints imposed by conventional data base systems which have a predetermined inflexible structure. Entries into and queries of conventional data bases require that either the user or some available query routines know that structure.

3.6.1.2 Interface with the System Characteristics. The characteristics of the ZOG interface are heavily dependent upon implementation of ZOG on particular host hardware. Hence, the merits of ZOG cannot be judged completely separate from the total ZOG/PERQ system. The purpose of this evaluation is not to assess ZOG per se, but to determine the viability of using ZOG-like capabilities "as it is implemented" in an operational environment rather than in a laboratory experiment. Based upon the findings

herein, decisions may be made as to which of the ZOG-like features will be used in any follow-on system and what the hardware specifications must be to adequately implement these features to their best advantage. Therefore, the evaluation attempts to (a) determine the relative merits of ZOG interface concepts as they apply in an operational setting and (b) assess the success of the implementation of those concepts on the existing PERQ hardware.

The major interface features of the ZOG system are (a) a consistent frame structure for storing and displaying information, (b) menu selection for moving among frames or to invoke external agents (programs), (c) rapid system response to users' selections, (d) on-line editing tools for creating and modifying frames, and (e) on-line documentation. The ZOG/PERQ system also included a "mouse" input device to provide the user with a pointing capability and "windowing" to permit the user to have split screen with separate information fields on the display. Graphics was an intended capability, but was not implemented on the CARL VINSON system during the evaluation.

The menu-driven approach of ZOG was a success as far as the inexperienced user was concerned. The mechanics of operating the ZOG system beyond the logon posed no problems to any of the users who were simply operating the system to browse through the data base or an on-line tutorial. There was little need for new users to learn commands or syntax because every action alternative was spelled out as a menu option. Hence, even new users were capable of performing the steps necessary to access any information in the data base. Unfortunately, without periodic and extensive browsing, users were seldom aware of all the categories of information in the data base. One user could be completely unaware of an applications subnet which a shipmate had developed despite the fact that elements of the subnet had direct bearing on his own responsibilities. This being the case, much of the power to link frames was given up because users did not know about these possible linkage points. Because information is stored within frames and is not used as reference pointers, a quick global search cannot be conducted to locate elements of the data base relevant to a particular topic unless a particular search agent is developed and invoked. Everything must be reached by hierarchical search, direct access to specify frames by identification number, or by local pad referral (which, as discussed here, is not fully exploited). Attempts were made to remedy the situation with announcements about new subnets and agents at periodic users' group meetings. The electronic mail capability of the ZOG/PERQ system was also used to bring users' attention to new areas or changes in the system. These steps are necessary and beneficial, but they tend to focus on new developments and changes and do not address a large portion of the data base already in place. Despite these mechanisms for increasing user interaction, new and experienced users were still on their own to form an overall picture of the contents of the networked data base.

A revised table of contents or index which the user (or current nonuser) can scan for possible assistance to perform his job or to further develop subnets would have been useful.

3.6.2 The SORM as a Data Base Organizing Factor

The SORM was originally intended to be used as an organizing factor in the development of ZOG subnets. As such it would serve as a table of contents, provided that the user was able to identify the section of the SORM which addressed the item of his interest. However, as pointed out earlier in the report, even though the SORM was developed far beyond the level typically found on ships, it was not developed to the detailed level that was anticipated. Individual users were anticipated to further develop

the SORM by instantiating their responsibilities down to the most meaningful molecular level possible. If that were done, the SORM would reflect, under ideal conditions, not only the major functional responsibilities of the various departments aboard, but also the precise interrelationships and procedures as practiced aboard the CARL VINSON. The SORM could have been prescriptive to the point of being a job aid; two things hampered this.

The first limiting factor was time. Ship's personnel have primary responsibilities at sea which consume an enormous part of any 24-hour period. Most, if not all, personal time can be taken up by the performance of their jobs, let alone developing subnets on computers about them. Thus, ZOG/PERQ development by users was most often done during any free time left and required a minimum degree of personal dedication.

The second factor which limited SORM development was the difficulty any user would have in instantiating their job as a subnet. The problem is very much like the problem of developing a knowledge base for expert systems. In expert systems, a knowledge engineer works directly with individuals to explicate aspects of their jobs, the problem situations which are encountered, and the manner in which the decisions are made. On the CARL VINSON the user was left alone to determine how to instantiate his job within the framework of the ZOG/PERQ system, using some partially completed SORM subnets as guidelines. This, understandably, proved to be an inadequate approach. Users who attempted to do this complained of many false starts, finding later that headings and subheadings they created earlier were inappropriate. One of the biggest problems the users had was how to choose meaningful and consistent levels of division. Users were constantly concerned that their subnet structure was not uniform with the rest of the system data base. As a result, many users started over and eventually became too frustrated to go much further. Although it was possible for the users to modify what they had completed rather than start over, most users did not feel familiar enough with the editor, ZED, and other ZOG features to do so

The question of "depth and breadth" is a problem for all hierarchical data base systems. When the data base is to be created and populated by discretionary users, such as on the CARL VINSON, firm guidance and assistance is mandatory. However, once the initial net for individuals can finally be established, maintenance and extension are much more simple. As was reported earlier, a few users persisted and succeeded in completing subnets to provide their reliefs with an enormous amount of "corporate knowledge" about their position and responsibilities. Despite the difficulty ...ed to others who worked without apparent success in establishing subnets, there were ...pected benefits. Some personnel reported that in the process of analyzing their resp...bilities for this project they realized many areas of their jobs which could be improved by a simple modification of procedures or reassignment of responsibilities to eliminate needless redundancies which they had uncovered. They also reported a better understanding of the working relationship that must occur between departments for the ship to function as a single team. Thus, there may be positive effects attributable to the ZOG/PERQ project which are not in evidence anywhere in the data base.

3.6.3 User Perceptions and Attitudes Regarding the ZOG System

During the shipboard interviews, users were questioned regarding their feelings towards the ZOG system. The evaluation team clearly believed there was a possibility for responses to the questions to be biased in favor of the system because of command interest in the project. During the second ship visit, an anonymous attitude questionnaire

was administered to the system users who attended the ZOG users meeting to allow users to express their true feelings. The users knew that after completing the questionnaire they were to return it directly to an evaluation team member. This procedure ensured the anonymity of the questionnaires and increased their validity. The questionnaire items were structured so a positive response toward the ZOG system would occur equally by indicating agreement and disagreement with the different statements to control for response bias.

Table 15 presents the questionnaire statements and the responses from the 17 users who completed it. The group of users completing this questionnaire was composed mostly of the primary system users.

The general attitude towards the system is seen in the responses to items a and e. Of the total respondents, 88 percent agreed or strongly agreed with the statement that they feel a real sense of accomplishment when they do a task on ZOG, and 100 percent disagreed with the statement that they could see no benefit to the ship from using the ZOG system. Responses to item k are in the same direction. Eighty-eight percent disagreed with the statement that ZOG is a good idea, but they will be glad to get away from using it. These responses all suggest a strong positive regard for the system in general.

More sensitive questions deal with how the respondents feel about using the system. In item b, 83 percent of the users agreed with the statement that doing a job-related task on ZOG saves time, after the initial ZOG frames are made. Similarly in item c, 88 percent disagreed with the statement that creating the ZOG frames is so hard and time-consuming that they prefer to do a task away from the system. Both of these results are strongly supportive of the system. Item d is more practical and probably reflects the user's true pragmatic belief about the system. For item d, 59 percent agreed or strongly agreed to the statement that they are now using the system to help plan their own personal activities; 29 percent indicated they were not using the system for personal planning.

How the users feel about system reliability was also questioned. For item f, 70 percent disagreed with the statement that the ZOG/PERQ malfunctions are so frequent they cannot use the system productively. There were three users (17 percent of those answering the questionnaire) who did agree with that statement. Most of the users felt that the revised system software had improved ZOG's reliability. This is seen in the 58 percent agreement with the item g statement, while 24 percent at least disagreed about improved system reliability. There is a prevailing opinion, though, that the PERQ computers are not sufficiently reliable. This finding is seen in the responses to item j, in which 65 percent of the users disagreed with the statement that the computers are sufficiently reliable as installed on CARL VINSON. There were 30 percent of the users who indicated, by their responses to item j, the perception that the computers were sufficiently reliable.

In item h, 87 percent of the users indicated they agreed with the statement that the ZOG management group gave them all the help they needed in keeping the system up. The user feelings are not as positive regarding help developing new applications. For item i, 76 percent indicated that they agreed with the statement that the management group gives them all the help they need developing new applications.

The responses for the final item also are indicative of a positive general attitude toward the system. For item l, 88 percent of the users indicated they agreed

Table 15

ZOG Technology Evaluation Anonymous Questionnaire (N = 17)

Rate the degree to which you agree or disagree with the following statements:

		Strongly Agree (%)	Agree (%)	Disagree (%)	Strongly Disagree (%)	No Opinion (%)
a.	I feel a sense of real accomplishment when I do a task on ZOG	23	65	12		
b.	Doing a job-related task on ZOG saves me time, after the initial ZOG frames are made	30	53	12		5
c.	Creating the ZOG frames is so hard and time-consuming that I prefer to do a task away from the ZOG computer		12	41	47	
d.	I am now using the ZOG system to help plan my own personal schedule of activities	35	24	24	5	12
e.	I see no benefit to the ship by using the ZOG system			47	53	
f.	ZOG/PERQ malfunctions are so frequent that I can't use the system productively	5	12	65	5	12
g.	Since the ZOG software was changed in early August, ZOG is much more reliable	5	53	12	12	18
h.	The ZOG management group gives me all the help I need in keeping the system "up"	31	56			13
i.	The ZOG management group gives me all the help I need in developing new applications for ZOG	35	41	5		18
j.	The PERQ computers are now sufficiently reliable as they are installed on CARL VINSON		30	53	12	5
k.	I think ZOG is a good idea, but I will be glad to get away from using it		12	30	53	5
l.	I would like to take ZOG with me to use in my next job	70	18			12

Write any comments (positive or negative) that you have about the ZOG system on the back of this questionnaire. Turn completed form into the NAVPERSRANDCEN interviewer only. This information will not be provided to ship management; you cannot be identified.

with the statement that they would like to take ZOG with them to their next job. Responses to all items indicate a strong positive attitude towards the system and a perception that it helps users do their job.

3.6.4 Ergonomics Assessment of the PERQ/CARL VINSON Workstation

To determine the extent to which human user factors have been satisfactorily embedded into the PERQ/CARL VINSON workstations, an ergonomic assessment was conducted on the workstation environment and the PERQ workstation itself. This section describes the findings from these two human factors assessments.

3.6.4.1 Adequacy of the Workstation Environment. During the first ship visit, evaluation team members assessed the ergonomic characteristics of 10 of the PERQ/CARL VINSON workspaces that represented the range of the environmental factors the ZOG system encountered on the ship. The 10 factors that were assessed were drawn from an ergonomic checklist for video display terminals and workplaces that was designed by Cakir, Hart, and Stewart (1980). Table 16 presents the results from the environmental assessment.

Table 16

PERQ Workstation Ergonomics Assessment Data

Work Station Location _____ _____

(To be completed by observer)

Rate the following ZOG/PERQ workstation features:

	(N = 10 Workstations)	Extremely Unsatis-factory	Unsatis-factory	Satis-factory	Extremely Satis-factory
1.	Convenience of workstation	-	1	8	1
2.	Amount of workspace around terminal	-	2	6	2
3.	Table height	-	-	10	-
4.	Chair adjustability	-	5	4	1
5.	Keyboard adjustability	-	1	9	-
6.	Illumination level	-	1	9	-
7.	Illumination adjustability	-	7	3	-
8.	Freedom from glare	-	4	6	-
9.	Surrounding workstation temperature	-	-	10	-
10.	Surrounding workstation noise level	-	1	8	1

Almost all of the environmental factors were rated satisfactory for the majority of the workspaces. In general, the PERQs were located in office-like compartments that had the normal range of heat and light for a Navy ship. The three factors that received more than one unsatisfactory rating were the adjustability of illumination, chair adjustability, and freedom from glare. The PERQ machines had been installed with standard Navy ship-issue tables, chairs, and lighting conditions. The factor of excessive glare on the PERQ screens was considered to be resolvable by installation of glare shields on the PERQs. This was recommended as a solution in the evaluation team recommendations.

Unsatisfactory ratings on this checklist did not necessarily result in lack of system use. For example, the workspace with the largest number (4) of unsatisfactory ratings, the AIMD workspace, also was one of the most regularly used machines. The AIMD space was typical because it was the department head's office, and the machine had been placed on a table convenient to the department head's chair. Desks and tables were small and there was little room to add another computer. Finding space for the sizable hard disk storage cabinet was the most difficult installation problem. A limitation of the typical installation was that access to the machine by users, other than the department head, was very difficult. Of all the workspaces on the ship, only about 20 percent of them permitted ready access to the PERQ by other than the designated user. The problem with this approach to computer installations is that if the designated user is not using the system and other users do not have access to the machine, it is effectively no longer a part of the system.

Vibration from the ship's engines and aircraft affected the operation of the computer. Although vibration was not a problem for the user, its negative effect on the computer certainly interfered with user/system operation.

3.6.4.2 Adequacy of PERQ Workstation Equipment. An assessment of the PERQ computer was performed at NAVPERSRANDCEN using Model I PERQs procured for different projects but similarly equipped. The assessment of the PERQ workstation also used the ergonomic checklist developed by Cakir et al. (1980). The results of this assessment are presented in the following paragraphs.

For the typical kinds of ZOG user tasks, such as viewing/creating ZOG frames, agent writing, file transfer, data manipulation, and telecommunications, the display screen has more than an ample number of available character spaces and has adequate display memory. The memory is accessed by page scrolling which is under keyboard control. The character set is adequate and may be interchangeably displayed as black-on-white or white-on-black background. Characters are 4 millimeters (mm) in height (at least 3 mm is recommended), and character width is 80 percent of uppercase height (70-80% is the acceptable range). The space between characters is 20 percent of character height, which is the minimum acceptable. Row spacing is considerably more than the recommended 100-150 percent of character height.

The PERQ displays both upper- and lowercase characters with lowercase descenders projecting below the base line of each line of text. There is a very clear distinction between the characters X and K, O and Q, T and Y, S and 5, I and L, U and V, and l and 1. There is however, little difference between the lower case "l" and the numeral "1," which may be a potential source of confusion. The distinction between the letter "O" and the Number "0" via a slashed 0 is very clear for purposes of the standard alphabet. The basic character set is upright (as contrasted with slanted) and cursive

characters for italics are not available. The provided cursor is clearly distinguishable from other symbols on the display. Recently, multiple fonts, which can be defined by the user, have been implemented within screen and frame displays.

The display screen is adjustable in the vertical axes to obtain variable screen angles. The screen is fixed in the horizontal axis. The upper edge of the screen is set at or below eye height, based on normal chair and table heights. The displayed character images are stable, and screen illumination is adequate with an overall luminance adjustment at the rear of the machine. Although character and background luminance are not individually adjustable, the contrast between character and background is good.

One of the highly desired characteristics of the PERQ is its divided window capability that allows the user to switch between two horizontally divided sections of the screen, with a third smaller section on the bottom that presents results of user inputs. Switching between windows is accomplished by a single key stroke. The window activated to receive user commands is labeled "current window" and is highlighted with a white wide-band border. The user's active window remains displayed until it is displaced by switching back to another window. The split screen feature permits users to track their preceding actions while executing another task and having a record of actions accumulating at the bottom of the screen.

The keyboard is detached from the display screen and is electronically connected to the display via a cable of adequate length. The keyboard is of sufficient weight to minimize unintentional movement. The thickness of the keyboard from the base to the home row of keys exceeds the recommended range limit of 30 mm. The side view profile of the keyboard is a combined stepped and dished configuration. The two bottom rows are stepped and the three upper rows are dished. The key arrangement, along with an angle of 30 degrees, makes a generally comfortable keyboard. The surface of the keyboard has a mat finish with an acceptable level of reflectance. The keyboard does not have an excess of deep space for resting the palms of the hand. Key travel is between a recommended 0.8 mm and 4.8 mm, and the square key tops measure 13 mm, again, within the acceptable range of 12 to 15 mm for accommodating most fingers. The center spacing between adjacent keys is within acceptable limits--18 mm. Key legends are resistant to wear and abrasion because they are molded into the key tops. Key tops on machines located on board CARL VINSON showed no sign of excessive wear. Key top surfaces are concave to improve finger entry accuracy and specular reflections are kept to a minimum. Depression of each key is accompanied by an audible click and the keys have a low failure rate. The keyboard lacks a tactile spike on the "J" key, for example, for the right hand in the home position, so there is a tendency for the right hand to drift too far to the right when touch typing.

The layout of the alpha keys corresponds to the conventional electronic keyboard. Alphanumeric keys are gray and are not differentiated from the few special function keys by color coding. Commands for which unintentional operation may have serious consequences require a two-key operation, for example, Control-C to quit and Control-Shift-C to leave ZOG and return to POS.

Pointing of the cursor and activation of some system commands are accomplished by means of bit pad and a four-button puck (mouse). The bit pat, 15.5 by 15.5 inches, was excessively large for use in a crowded ship environment, but operated without trouble. The more recent PERQ Model II is available with a tablet, 8.25 by 10.75 inches, which is a size more easily accommodated in typical work settings. The bit pads on board CARL VINSON were reported to be cumbersome for most workspaces. In fact, at some

PERQs the pad was positioned in back of the PERQ monitor to get it out of the way. The PERQ computer would not operate without the bit pad and puck plugged in. The smaller tablet and mouse of the PERQ II would be a better peripheral device for shipboard installations. Additionally, there should be available an interconnecting plug that would permit system operation without having the bit pad or mouse connected. ZOG users were evenly divided regarding their preference for input by means of the keyboard or the mouse.

ZOG makes use of the PERQ flashing indicators, such as animated bumble bees, serial dots, and highlighting to indicate system modes: ZOG, ZED, SLED, que/standby, and current window. The noise level created by the PERQ disk drives exceeds a recommended 5 decibels increase over the ambient noise level in the typical office.

While voltage supply fluctuations have not been a problem with PERQs at NAVPERSRANDCEN, they did prove to be a source of equipment malfunction on board CARL VINSON. Provision of in-line voltage regulators with shipboard PERQs eliminated the malfunctions induced by line voltage surge. The PERQ does not have a hardware alarm system of either an audible or visual nature to signal a malfunction. There is, however, software generated feedback to indicate when memory storage file space is exceeded, but not when system problems cause the system display to go blank.

The PERQ workstation emits sufficient heat when operating so that two machines in a relatively small closed room will significantly raise room temperatures. Heat and noise transmission of the PERQ Model I does impact on the shipboard environmental conditions for users. Modifications in the newer model II PERQ machine have reduced both the temperature and noise emitted by the machine when compared to the Model I on board CARL VINSON. In summary, the PERQ more than meets the minimum human factors requirements for satisfactory user interaction.

3.6.5 User Interface Characteristics of the ZOG System

This section describes the evaluation team's findings on a number of issues that affect the quality of the ZOG/user interface. These user requirements are discussed in terms of the user's ease of use.

a. Logon and logoff delay. After turning on a terminal, it may take 2 minutes for the machine to warm up and for the user to get logged on to the ZOG system. Logon to ZOG when the PERQ is in POS, while considerably shorter (approximately 30 to 60 seconds), is sufficiently long to alter the behavior of the users. This longer delay makes users stay logged on the system rather than exit and logon at a later time. Similarly, when a user logged off the system there was a delay of approximately 30 seconds while the machine statistics were written out to the statistics file. This delay also contributed to individuals not logging on or off the system.

For evaluation purposes, this approach to different users logging on and off the system effectively eliminated the differentiation of users on the same machine. Future versions of ZOG should strive to reduce the time it takes to get the user into and out of the ZOG environment irrespective of any statistics collection program. While the delays were of sufficient inconvenience to the evaluation team, this criticism is by no means a major system concern.

b. Guest logon. As with many general purpose computer systems, ZOG was programmed to permit any person to enter the system using a guest logon. With that logon, however, individuals could not modify subnets to prevent unintentional damage to the subnets. What was enabled was the ability to browse through the ZOG data base and complete on-line ZOG training. Use of the guest logon absolutely eliminated the ability to distinguish one user from another in the machine usage data collected for this evaluation. When this concern was expressed to the ZOG management group, they made efforts to ensure that everyone used their own unique logon. However, the difficulty and time spent logging off and on the system caused people to use the machine with whatever logon was currently registered. The logon behavior displayed by the CARL VINSON users is understandable in terms of individuals who are trying to maximize the effectiveness of their time. Naturally, the system developers would like the detailed user information. A proper balance between experimental and developmental needs and operational constraints should be made in applying logon or logoff protocols in future developmental systems implemented in the fleet.

c. Automatic logoff. For a period of time during the middle of the cruise, a software feature was implemented onto ZOG wherein a machine not receiving a keystroke entry for 20 minutes would have the user exited from ZOG and the statistics would be recorded. This feature was implemented by the ZOG management group to induce users to aid in the evaluation by performing proper logon and logoff procedures. The problem arose because there was a software deficiency that would result in a user not being permitted to log back on if they had been automatically logged off. In the event of being logged off, a user would have to reboot the system and, perhaps, even then they could not get back on the system for a period of time. This became of sufficient concern to the CARL VINSON users that the automatic logoff feature was turned off after about 2 weeks.

d. System response time. The ZOG system bases its functionality on a very rapid response to the entire data base. Although the original system design goal of .25 was not met, the actual response time of the system, usually .5 to 1.5 seconds, was well within the range of what users would expect for a menu selection system. The longer response times occurred when the requested frame was resident on a remote PERQ and the Ethernet system was involved. Even the increase of response time from .5 to 1.5 seconds is of sufficient concern to have the ZOG data base manager attempt to allocate subnets on machines where they would normally be used. CARL VINSON users were very satisfied with the system's response time throughout the cruise. Certainly the ZOG system achieved its goal of providing rapid response to a large hierarchically structured data base.

e. Browsing through nets. While browsing through hierarchically structured subnets on ZOG is easy for an inexperienced user, there were a number of CARL VINSON users who would get lost in the data base. The relatively new user would have particular difficulty getting to a specific frame if they did not know the frame identification number. Given the difficulty of working to a specific frame and faced with a complex SORM subnet, users would tend to limit their excursions into new sections of the data base. Several users expressed the desire for a hard copy graphic representation of the data base hierarchy in order to help them understand the subnets.

f. Unique top frame. During the cruise, the ZOG software was changed so when users logged on they were presented with their own unique top frame. This change enabled users to be in subnets of major concern to them immediately and without a search through the data base. This change contributed greatly to increased system use. The evaluation team believes that this change represents a pragmatic approach to dealing with the difficulty experienced by new users in moving through the data base.

g. Limits on data base size. In the beginning it was believed that the capacity of the system could easily handle any expected system growth for a substantial time. However, the manner in which the data base had to be distributed and the need for redundant distribution of the data base caused second thoughts. The system began to show noticeable effects from the need to constantly swap large amounts of information around the Ethernet. Delays in system response time, while still in the acceptable range, were beginning to get longer as more information and more users were added to the system. As long as the storage capacity remained fixed, delays could be expected to increase dramatically as more experienced users were added to the system.

h. Use as a word processing system. The ZOG system was not developed as a word processing system. It does have the ZED and SLED editors, and it could produce hard copy documents through a printing program called Scribe. Unfortunately, Scribe on the PERQ Model I was extremely slow and was not functional to generate documents. While the ZOG frame charts can be easily produced, a management system should incorporate conventional word processing capabilities. Future versions of ZOG should have good word processing capabilities and should have a good software interface with a printer.

i. Document printing. The document printing program, Scribe, on the PERQ implementation of ZOG was not at all adequate for generating hard copy documents during the cruise. Future versions of ZOG should have much better interfaces with a printing program. Inexpensive printers should be located at selected ZOG stations to enable those users to generate quickly copies of work task lists to be distributed to subordinates. Additional printers would extend functionality without greatly increasing system cost. At one ZOG machine, the user had an Apple computer and an inexpensive printer to generate exactly the kind of work lists just described. Unfortunately, the user had to manually enter information from ZOG to the Apple to generate the lists, thereby duplicating his effort.

j. Documentation. Many of the ZOG users expressed the need for more ZOG training documents. This need was felt by inexperienced and by sophisticated users, although the need was for different levels of documents. One of the complaints that was expressed by users was that the documentation that did exist was out of date. Documentation for the experienced ZOG system manager was also insufficient and out of date. In the ZOG management office, however, the evaluation team found the following documents dated 5 August 1983:

(1) ZOG Agent User's Guide

(2) ZOG Primer

(3) ZOG Glossary--Alphabetic Index

(4) PERQ/ZOG User's Guide

In the management department document files the following system documents were also found:

(1) System Utilities

(2) Agents/AIRPLAN

(3) User Guides

(4) Message Reports

(5) Font Guides

(6) Three Rivers Computer Corporation/PERQ Service Guide

(7) Editor/Netserver

(8) PERQ Software Reference Manual

(9) Scribe Distribution

(10) Canon Printer Driver

(11) Three Rivers Computer Corporation/PERQ Schematics Manual

k. The ZOG editors. ZOG has two editors which are available to users: ZED and SLED. The ZED is the more complete of the two and is the one intended for use in building and modifying frames of information. It has a large repertoire of commands to insert, delete, and replace characters. It also permits the user to access the areas of the frame which define the menu actions. Because the PERQ hardware lacked special function keys which could be dedicated to the editing function, a command system assigned principally to the QWERTY keyboard was used. Mastering the use of ZED and its command structure is no more difficult than for most other common text editors. Nonetheless, it is a skill soon lost if not used frequently. Many of the users found ZED complex as compared to the word processing capability of the Wang VS100, which has dedicated word processing function keys. Most of the difficulty in learning ZED was related to the training schedule and documentation. Users typically got their training before they were exposed to ZED and were in a position to employ it. By the time they were competent with ZOG and were ready to create frames, they had forgotten many of the particulars of ZED. The document describing ZED, though useful as a training manual, was not particularly helpful when the users relied on it as a reference manual. The users could not easily extract what they needed to use ZED. A list of the ZED commands is contained in Appendix K.

The second editor, SLED, was significantly easier to use, but could be used only to fill in the blank slots of frames already created by ZED. All users found SLED to be extremely convenient. SLED worked especially well when used in conjunction with the mouse to selectively indicate which blanks were to be acted upon. Where a significant amount of data entry was required and the tempo of operations was rapid, as in AIRPLAN, the process was greatly facilitated by the use of SLED and its options which permitted the selection of predetermined default states or toggling between "yes and no" responses by the user.

l. The mouse. The PERQ mouse is an input device which permits the user to control the display cursor directly with his hands. The mouse is a puck-like object that, in the case of the PERQ hardware, is used in conjunction with a magnetic board (bit pad) which senses the location of the mouse on the board. When the mouse is moved on the board, the cursor moves correspondingly on the screen. The mouse could be used to position the cursor by its absolute location on the board (upper left board corresponding to upper left on the screen) or by a series of cumulative motions of the mouse (moving the

cursor downward caused the cursor to move downward from wherever it was on the screen). Users could select options from ZOG frames by manipulating the mouse to move the cursor to the option displayed on the screen. To make it easier for the user to know just when the cursor had been positioned properly on any option, the ZOG/PERQ display could be made to highlight the selected option. To activate the selection, the user needed only to depress a button located on the mouse itself. Thus it is, in fact, possible for many of the user interactions to occur without using the keyboard itself.

In practice, the use of the mouse with its bit pad met with mixed success. As mentioned in the previous section, the mouse was most useful in an application such as AIRPLAN where the slot editor SLED was used heavily to input information into specific blanks on the display. However, most users interviewed in the evaluation did not use the mouse very much. The major complaint was the amount of space occupied by the bit pad. On a ship, space is a premium. Since the individuals would most likely be working from written notes and documents, there was little working space left at the workstation. Because the use of the bit pad was a convenience more than a necessity, many of the users simply stood the device on end, tucked it out of the way behind the display unit, and left it there.

The users appreciated the ease by which the cursor location could be controlled by the mouse, but thought that an alternative which required less space would be much better. Most people thought that a "trackball" device would be the most preferred because of the familiarity most Navy personnel have with Navy Tactical Data System consoles.

m. The tutorial. The ZOG tutorial served as the major training device for several users. Typically, an experienced user would briefly discuss with a new or potential user the overall structure of the ZOG/PERQ system and its menu approach. The experienced user would set up the system so the new user would be positioned at the top of the tutorial subnet. Other than becoming more familiar with the layout the keyboard and the meaning of the more unusual symbols, the new user would typically have no trouble whatsoever in going through the on-line tutorial. Some users would periodically depress the wrong key by accident and be propelled a frame forward or backward unexpectedly. On occasion, users would declare themselves lost at this point and would seek assistance. However, early in the tutorial the user is taught how to move back rapidly until a familiar frame is reached. Adventuresome users would explore options that require them to do a little more to recover. The developers of the tutorial tried to limit the ways a new user could get himself into an intractable position. Over a period of time, almost all the traps into which the new user might fall should be eliminated.

The content of the tutorial is very complete and employs many of the techniques which have been found to make embedded training systems successful. The most important aspect is the use of the system itself to teach new users. By using the very same system to train users, a degree of confidence and familiarity is established in the user which is not possible otherwise. Most users found themselves going back to the tutorial from time to time as a refresher or to learn more about some aspect of the system which they had not yet experienced.

3.7 Postdeployment ZOG System Changes

Since CARL VINSON completed its deployment 29 October 1983, there have been a number of changes in the management and operation of the ZOG system. Although the activities of the system since the end of deployment were not within the original

scope of this report, readers may be interested to know the current state of the ZOG system. This section describes the changes that have taken place in recent months in the software, system management, and maintenance.

3.7.1 System Software

ZOG development group efforts since the end of deployment have focused on improving the robustness of the system with software changes. Shipboard ZOG developers have worked in coordination with the CMU personnel to develop and implement a number of new ZOG utility agents. These agents improved the ability to manipulate and access the data base and improved the printing capability through enhanced text production.

3.7.2 System Management

Since the end of the cruise, the CARL VINSON Management Department has been reorganized to reflect the current state of computer systems aboard the ship. The department has been designated the Management Information Systems (MIS) Department and still has three divisions. The R&D Division has the responsibility for the ZOG/PERQ system and special projects that are components of the larger Technology Transfer Project. The Shipboard Nontactical ADP Program (SNAP) Division is responsible for the newly implemented SNAP computer system that supports the ship's supply function. The Administrative Support Division is responsible for the Wang computer system, word processing, and administrative support.

Although personnel within the MIS Department have changed, the ship is continuing to support the ZOG system with personnel, maintenance, and parts supply. One of the four officers managing the ZOG system during the cruise is still with the MIS Department at this time. ZOG user meetings have been held with the focus on informing users of system changes and enhancements.

3.7.3 System Maintenance

All the defective parts sent to PERQ Systems, Inc. for repair have been returned to CARL VINSON. Because of the delay in getting replacement parts under the previous agreement, a contract was let in December 1983 with PERQ Systems Inc. that will ensure immediate transport and rapid repair of PERQ components. The company cancelled a maintenance course scheduled for February 1984 for CARL VINSON personnel; the course was conducted in July 1984. The cancellation of the course and the loss from CARL VINSON of three of the PERQ-trained maintenance personnel have posed some maintenance problems for the PERQ/ZOG system. The improved access to replacement parts, because of the recent contract, is keeping the system operating despite less available shipboard maintenance capability. This maintenance strategy, of course, is placing a greater reliance on the exchange of components rather than on equipment repair.

4.0 CONCLUSIONS

The ZOG Technology Demonstration Project meets its program goal of expediting the transition of technology from basic to applied research status by implementation aboard an operating carrier.

4.1 ZOG Technology Demonstration Project Objective

The development of the ZOG project and its implementation on CARL VINSON represents a notable research milestone in the acceleration of transition of research from a basic to applied research status. While the system experienced problems during the deployment test, the results of the test were returned to the developers and assisted them in making system revisions that improved operational utility.

CONCLUSION: The ZOG Technology Demonstration Project met its program goal of expediting the transition of technology from basic to applied research status by implementation aboard an operating carrier.

4.2 Planned Functional Support

4.2.1 Management Planning

The ZOG system support of CARL VINSON management was notably effective for planning. Hardware and software problems experienced by this developmental system did interfere with development of functional applications. As the system matured and achieved increasing reliability, users developed increasing numbers of planning applications. These applications affected ship operations during the deployment and will continue to support ship operations throughout its postdeployment period and into future deployments.

CONCLUSION: The ZOG system implemented on CARL VINSON provided significant functional support to shipboard management despite experiencing an initial high rate of hardware and software failures.

4.2.2 SORM

Certain subnets in the SORM data base represent extremely useful management support; use of the other SORM subnets was minimal. The requirement to access the ZOG system from the SORM net proved awkward and constraining to the users and did not justify the SORM being the organizing structure of data bases for similar ZOG-like systems.

CONCLUSION: The SORM was not suitable as an organizing element for all ZOG functional applications as was originally conceived. Some SORM subnets provided extremely beneficial task plans in support of the performance of major ship evolutions.

4.2.3 Weapons Elevator Maintenance Training Manual

The Weapons Elevator Maintenance Training Manual represents an excellent application of the video disk technology in conjunction with the ZOG system. In combination they provided a training format to the CARL VINSON not presently available to most maintenance personnel. Software and hardware problems prevented the ZOG system and video disk from obtaining maximal effectiveness. This application of the system could be directed towards other shipboard maintenance and training tasks.

CONCLUSION: The ZOG system player was an excellent mechanism for development of a high technology Weapons Elevator Maintenance Training Manual that allowed immediate on-line incorporation of system changes. Application of this training technology was limited due to deficiencies in the data base, the interface between the ZOG system and the video disk player, and the reliability of the video disk player itself.

4.2.4 Weapons Elevator Maintenance Training

Two major ZOG nets were created during the deployment in support of WELV training. Shipboard personnel reported that almost all personnel associated with the weapons elevators experienced the video disk displayed training to familiarize them with elevator operation. Data base and electromechanical deficiencies were observed by the evaluation team to be extremely limiting in the real usage of the system for training purposes.

CONCLUSION: The ZOG system and the integrated video disk player provided an ideal technology for presenting WELV training.

4.2.5 Additional Training Applications

Other training applications of the ZOG system focused on scheduling of personnel and resources for training purposes. Development of additional training applications in the future will require the involvement of shipboard management personnel directly concerned with training. The training applications on the system could be numerous but will need management support in addition to the actual development of instructional material.

CONCLUSION: The ZOG system supported training management.

4.3 System Extensibility

4.3.1 AIRPLAN

AIRPLAN is a prototype "expert" computer system designed to provide rapid information to Air Operations Officers during flight operations. The AIRPLAN system was integrated with the ZOG system and provided the AIRPLAN output information to all ZOG workstations. This information was used by all command level management personnel to keep current on situations during air operations. During the cruise, ZOG subnets were developed that enhanced AIRPLAN's effectiveness by providing aircraft emergency information to system users. Although not within the technical scope of this evaluation, the effectiveness of AIRPLAN warranted its inclusion in this section.

CONCLUSION: The AIRPLAN extension of ZOG represented an important new functional application that provided on-line information about carrier air operations throughout the ship.

4.3.2 Additional ZOG Applications

During the cruise, the ZOG system experienced increasing growth in functional applications. These applications ranged from routine personal plans and lists to development of a small information data base describing details of weapons systems of the United States Armed Forces. A number of applications involved development of task plans that could be used by managers or their subordinates. Additional use of ZOG by general ship's company was limited, in part, by not having printers available at selected ZOG workstations. In general, all these additional applications resulted in increased information sharing and improved communication among CARL VINSON personnel.

CONCLUSION: The ZOG system supported an increasing number and variety of ship functions as the system matured and users became more familiar with ZOG.

4.4 System Use and Characteristics

4.4.1 General System Acceptance

During the ship visits, the evaluation team noted an increase in user acceptance of the ZOG system as it became more reliable. There was not only an increased use of the system by individual users, but also an increase in the number of active, primary users. Interview and questionnaire data indicated that the majority of the users believed that the system was contributing to the performance of their job duties.

CONCLUSION: CARL VINSON users accepted and used the ZOG system increasingly during the deployment to perform their duties. As the system became more reliable, users became more active in applying the system to support their job tasks and believed that the system was aiding them in performing their job.

4.4.2 ZOG System Usage Rate

Use of the ZOG system increased over time. Early in the deployment, system use was much lower than was expected. The evaluation team was able to determine several causes for infrequent use. The principal reason was the lack of enough available applications which individuals could use immediately. Secondly, initial system unreliability contributed to the frustration and lack of confidence of new users. Lack of available time to learn and use the system effectively prevented many potential users from working more with the system. Additionally, training and documentation were believed to be insufficient to support new users in a shipboard environment.

CONCLUSION: ZOG system usage rate increased during the deployment as more applications and subnets were added.

4.4.3 The ZOG Menu Selection Characteristic

The ZOG system users were able to use the menu selection characteristic of the system regardless of their level of experience. The selection options of the ZOG system were easily learned and provided ample guidance for even a naive user. Users employed the menu selection techniques with little concern for constraints in maneuvering through the data base.

CONCLUSION: The menu selection characteristic of ZOG was readily accepted by system users and, generally, gave ready access to the entire data base.

4.4.4 The ZOG Rapid Response Characteristic

The rapid response to keyboard input was one of the best features of the system. The response time range of .5 to 1.5 seconds was well within an acceptable range for system users. Future ZOG versions should strive to maintain this feature, because it clearly makes system use efficient and satisfying to the user.

CONCLUSION: The goal of providing the user with a system capable of rapid response was met by the ZOG/PERQ system. Response times of .5 to 1.5 seconds were well within the range of suitability for beginning and expert users alike.

4.4.5 The ZOG Hierarchical Data Base

User comprehension of the ZOGnet structure is necessary for accurate maneuvering through the data base. Inexperienced users occasionally got lost while browsing through the subnets. Shipboard changes in the software system enabled users to enter the data base at their own top frame, thereby improving the ability of interacting with ZOGnet structure. Experienced users had no difficulty interacting with the data base.

CONCLUSION: The large-network, hierarchically structured ZOG data base was generally acceptable to system users. Customizing entry points into the data base greatly facilitated user interaction with the system.

4.5 ZOG Training

4.5.1 User Computer Skill Requirement

The initial computer skill level of CARL VINSON users varied from absolute rank beginner to expert with master of science degrees in computer science or operations research. Most of the users had had minimal familiarity with a microcomputer, either through personal ownership or in their Navy career. The effect of prior knowledge of computers seemed related to the level of attained skill with ZOG during the cruise. This may have been due to more experienced individuals being able to work around system problems that would deter an inexperienced user. System managers in the Management Department had PASCAL computer programming abilities and needed them in the course of providing system support.

CONCLUSION: ZOG did not require the user to have any background or experience in computers for a majority of the system's use. Prior experience, however, was beneficial in using some of ZOG's more sophisticated features. ZOG system managers must be experienced and expert in using and programming computers.

4.5.2 ZOG System Training

ZOG system user training, provided by the Management Department, involved individual and group instruction throughout the cruise. User training provided by the ZOG system included on-line tutorial and on-line documents. The same documents were available to users in a hard copy format. Because of the relatively rapid change in ZOG software, most of the on-line and hard copy training materials were not current. Efforts to maintain the ZOG system interfered with the ability of the Management Department to provide user training. Both beginning and skilled users expressed the desire for more training. Additional training should have been directed specifically at target populations, for example, at beginners or at experienced level individuals.

CONCLUSION: The ZOG training provided CARL VINSON users during deployment was adequate, but was not updated sufficiently to make optimum use of evolving system capabilities.

4.6 System Reliability and Maintenance

4.6.1 Hardware Reliability

The ZOG technology demonstration project hardware system, comprised of PERQ computers, Ethernet networking cables and connectors, and Canon printers, experienced severe and frequent malfunctions. While some commercial off-the-shelf equipment will work quite well on a Navy ship without special ruggedization, the continual vibrations and sometimes high temperatures in a ship will cause some equipment to fail. Some of the hardware malfunctions were caused by the extreme conditions placed on the equipment because of their placement of the ship. For example, the malfunctioning power supplies were most likely caused by excessive surge of line voltage, because the frequency of power supply malfunctions decreased after line voltage surge suppressors were installed. Still, the PERQs experienced frequent malfunctions of memory boards, displays, disk drives, and cabling and Ethernet connectors. The hardware system was not sufficiently reliable for use in an operational setting.

CONCLUSION: The hardware suite used for the CARL VINSON ZOG system was not sufficiently reliable for sustained operational use aboard an aircraft carrier.

4.6.2 Hardware Maintenance

Because of the high rate of PERQ hardware failure, maintenance of the computers became a significant factor while the ship was on deployment. The ship did not have an adequate spare parts supply at the beginning of the cruise and it was quickly depleted. A contract to procure a sizable number of spare parts was not completed until after the cruise began. When the parts shipment arrived, most of the computers were able to be brought back on line. Technicians on CARL VINSON had to complete a 2-week course in PERQ maintenance to be reasonably competent in their maintenance tasks.

CONCLUSION: Hardware problems necessitated a commitment of ship's maintenance technicians beyond what was reasonably expected, thereby placing an unanticipated burden on the technicians and the spare parts supply.

4.6.3 Software Reliability

ZOG system software, written in PASCAL, employed a distributed data base and was implemented on board CARL VINSON at the beginning of the deployment. The ZOG software experienced extensive problems, in part because of a negative interaction with the POS. This was a developing system and not a prototype ready for operational implementation. The software did work well enough that the users were able to take advantage of all system capabilities, particularly during the end of the deployment. While development of the distributed data base software was a notable accomplishment, this being the first instance of it occurring on an operating Navy ship, software and equipment problems resulted in a significant limitation in access to the data base. System problems caused by Ethernet interrupts also contributed to diminished user capability and satisfaction.

CONCLUSION: The ZOG system was clearly capable of providing beneficial support to shipboard management, although the software must be improved and stabilized before being implemented on other ship management systems.

4.7 The Technology Test-bed Concept

The CARL VINSON has been serving as the test-bed host for several technology development projects. The ZOG system served as a management tool to monitor and guide all the projects. CARL VINSON command and personnel have been extremely supportive of the development efforts throughout the project's life. Association of the Navy personnel with the civilian experts who develop the systems seems to have resulted in the development of systems that are better suited to operational needs. Additionally, the Navy personnel have profited technically through this association with the technology project personnel, thereby bringing into the operational Navy an expertise that is not commonly found.

CONCLUSION: The technology test-bed concept aboard CARL VINSON resulted in the development of systems better suited to operational Navy requirements and led to improved technical skills of the operational Navy personnel associated with the projects.

5.0 RECOMMENDATIONS

The following recommendations are based on the evaluative information gathered during shipboard visits and onsite observations. These recommendations are directed towards both the operational Navy fleet and the Navy research community.

5.1 The ZOG system merits immediate transition to advanced development as an automated management system in support of shipboard planning, management, training, and evaluation applications.

5.2 The technology test-bed concept should continue to be supported aboard CARL VINSON, and other selected platforms, to ensure maximum benefit from applied technological developments and to provide an efficient alternative to the procurement process permitting iterative system development within the context of research.

5.3 The research community should consider developing future versions of a ZOG-like system using the Department of Defense language, ADA, to take full advantage of its transportability and its capacity for supporting concurrent processing.

5.4 The Weapons Elevator Maintenance Training Manual project should be transitioned to advanced development so additional instructional sequences can be developed, interface deficiencies can be eliminated, and the maintenance training portion of the project can be further developed to provide a broader maintenance application.

5.5 Future installations of ZOG system prototypes should have a substantial set of general applications in place so new and potential users can perceive immediate benefits from the system.

5.6 The ZOG system should be interfaced with other shipboard computer systems to ensure maximum effectiveness of all systems.

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APPENDIX A

ZOG TECHNOLOGY EVALUATION FORMS

ZOG TECHNOLOGY EVALUATION ANONYMOUS QUESTIONNAIRE

Rate the degree to which you agree or disagree with the following statements:

	Strongly Agree	Agree	Disagree	Strongly Disagree	No Opinion
a. I feel a sense of real accomplishment when I do a task on ZOG.					
b. Doing a job-related task on ZOG saves me time, after the initial ZOG frames are made.					
c. Creating the ZOG frames is so hard and time consuming that I prefer to do a task away from the ZOG computer.					
d. I am now using the ZOG system to help plan my own personal schedule of activities.					
e. I see no benefit to the ship by using the ZOG system.					
f. ZOG/PERQ malfunctions are so frequent that I can't use the system productively.					
g. Since the ZOG software was changed in early August, ZOG is much more reliable.					
h. The ZOG management group gives me all the help I need in keeping the system "up."					
i. The ZOG management group gives me all the help I need in developing new applications for ZOG.					
j. The PERQ computers are now sufficiently reliable as they are installed on VINSON.					
k. I think ZOG is a good idea, but I will be glad to get away from using it.					
l. I would like to take ZOG with me to use in my next job.					

Write any comments (positive or negative) that you have about the ZOG system on the back of this questionnaire. Turn completed form into the NPRDC interviewer only. This information will not be provided to ship management; you cannot be identified.

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NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER
SAN DIEGO, CALIFORNIA 92152

[illegible] 1983

Day_____

ZOG SYSTEM USE DATA: OBSERVER FORM

(To be used during observation of system use.)

1. Observer:_____

2. Time logged on_____ or observation begins:_____

3. Time end:_____

4. Individual observed:_____

5. Work Station location:_____

6. Purpose(s) of ZOG session, as expressed by user at beginning of session:

_____

_____

7. ZOG system capabilities used: _____

   a. Review ZOG net for information._____

   b. Use ZED to enter information._____

      Describe:_____

_____

_____

_____

   c. _____

_____

_____

_____

_____

8. ZOG capability use as determined by observer._____

_____

_____

_____

9. Approximate system response time (seconds) from keystroke to beginning of display of next frame._____

10. Approximate system response time (seconds) from keystroke to complete display of next frame _____

11. Check facility of use with ZOG system:

_____ Extremely capable

_____ Capable

_____ A few difficulties using ZOG

_____ Major difficulties using ZOG

12. How long (weeks) does User indicate they have used ZOG?_____

13. Describe difficulties, if any, that User has with system. If none, check here.

_____

_____

_____

14. Describe ship functional use of ZOG. (Planning, evaluation, training, sending/receiving information, examination/updating of SDRM, etc.)

_____

_____

_____

_____

15. Other observations:

3

NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER
SAN DIEGO, CALIFORNIA 92152

Sept 1983
Day_____

ZOG/PERQ USER INTERVIEW FORM

You are requested to complete this interview/questionnaire as part of an evaluation of the ZOG/PERQ system. Although some of you may be new to the ZOG/PERQ system, try and answer all of the questions. The information that you provide will be summarized with information from all other users and will not include individual names. Accordingly, please answer frankly and completely. It is only through your assistance that the system can be improved to meet your needs in a better way. Identifying information is needed so that we may contact you at a later date, after you have had more experience with the ZOG/PERQ system. The obtained information will not be placed in your records and will not be used to evaluate you in any way.

Full Name:_____ Rate/Rank:_____

Division:_____ Job Assignment:_____

Time in this Position (Months):_____

1. Indicate the extent of your experience with any type of computers:

   No previous experience. _____

   I occasionally worked on someone's personal computer. _____

   List any programming languages you have used. None. _____

   _____ _____

   _____ _____

2. Are you currently using the ZOG system? Yes ☐ No ☐

3. How many hours did you work on the ZOG/PERQ system yesterday? _____

4. How long have you worked with the ZOG system? No. of weeks _____

5. What other shipboard computers do you now use ?

_____

6. Check the type(s) of training you received on ZOG.

____ None

____ On-line tutorial

____ User's Guide

____ Help from another user

____ Other (Specify) _____

7. Do you need more training or practice at this time to feel comfortable using the ZOG system? Yes ___ No ___

If yes, specify the areas in which you feel you need more instruction. (For, example: need help in using ZED, creating a frame, using the SLED editor, etc...) _____

_____

_____

_____

8. Describe how you think ZOG training might be improved._____

_____

_____

_____

9. Rate how easy you think ZOG is to learn:

Extremely easy ___ Easy ___ Difficult ____ Extremely Difficult ___

10. Rate how comfortable you are using the ZOG system.

___ Extremely comfortable using ZOG at any time.
___ Fairly comfortable using ZOG. I know I can make it do what I want.
___ Mild discomfort using ZOG. I am not sure what to do to get it to work.
___ Extreme discomfort with ZOG. I don't like to use it.

11. Check (✓) the following tasks for which you have ever used ZOG. Also indicate the frequency (per week) of those tasks that you now regularly perform using ZOG.

Have Used At Any Time	No. of Times Per Week Now Use ZOG	Task
_____	_____	Initial familiarization with ship's procedures/ regulations. Describe how ZOG is used:
		_____
		_____
		_____
_____	_____	Initial training in the use of ship's procedures. Describe.
		_____
		_____
		_____
_____	_____	Reference and resolution on performance of ship's procedures. Describe.
		_____
		_____
		_____
_____	_____	Determine what actions to take concerning ship's procedures. Describe.
		_____
		_____
		_____

Have Used At Any Time	No. of Times Per Week Now Use ZOG	Task
_____	_____	Update shipboard instructional/procedural directives. Describe.
		_____
		_____
		_____
_____	_____	Planning long-term activities. Describe.
		_____
		_____
		_____
_____	_____	Planning the week's activities. Describe.
		_____
		_____
		_____
_____	_____	Planning specific operations. Describe.
		_____
		_____
		_____
_____	_____	Guidance in carrying out specific operations. Describe.
		_____
		_____
		_____

Have Used At Any Time	No. of Times Per Week Now Use ZOG	Task
_____	_____	Verify that operations have been completed. Describe.
_____	_____	Evaluate performance on specific operations/tasks. Describe.
_____	_____	Initial familiarization with the weapons elevators. Describe.
_____	_____	Initial training in the maintenance of weapons elevators. Describe.
_____	_____	Reference and resolution of maintenance procedures for the weapons elevators. Describe.

Have Used at Any Time	No. of Times Per Week Now Use ZOG	Task
_____	_____	Performing corrective and preventive maintenance on the weapons elevators. Describe.
_____	_____	Update of weapons elevator maintenance procedures. Describe.
_____	_____	Training in any other area. (List each area and describe how ZOG is used.)
_____	_____	Manage any aspect of training. Describe.
_____	_____	Send work related messages to individuals or offices. Describe.

Have Used at Any Time	No. of Times Per Week Now Use ZOG	Task
_____	_____	Receive work related messages from others. Describe. _____ _____ _____
_____	_____	Evaluate individual work performance. Describe. _____ _____ _____
_____	_____	Other task. Describe. _____ _____ _____
_____	_____	Other task. Describe. _____ _____ _____
_____	_____	Other task. Describe. _____ _____ _____

12. How frequently do you use the SORM on ZOG? (Times per week) _____
How frequently do you use the hard copy of SORM? (Times per week) _____

13. Have you used the ZED editor? Yes ___ No ___

If yes, how many times did you use ZED during the past week? _____

14. Rate how easy you think ZED is to use:

Extremely easy ___ Easy ____ Difficult ____ Extremely Difficult ____

15. Have you used the slot editor-SLED? Yes ___ No ___

If yes, how many times did you use SLED during the past week? ____

16. Rate how easy you think SLED is to use:

Extremely easy ___ Easy ____ Difficult _ _ Extremely Difficult ____

17. Which editor do you use the most frequently? ZED ____ SLED ____

Why? _____

_____

18. When you use your preferred editor do you have to relearn how to make it work? Yes ____, sometimes I have to get some help.

No ____, I use the editor without any restudy.

19. When you use the least preferred editor, do you have to relearn how to make it work? Yes____, Sometimes I have to get some help.

No_____, I use the editor without any restudy.

20. Why do you prefer the _____ editor? _____

_____

_____

21. Compared to the first of the deployment, or whenever you first started using ZOG during the deployment, are you now using ZOG:

A lot more frequently ___ More frequently ____ About the same ____

A little less frequently ____ A lot less frequently ____

22. For what general purposes do you now use ZOG? _____

_____

_____

_____

23. Since using ZOG, have you changed the way you perform certain tasks? Describe. _____

_____

_____

_____

24. Does the use of ZOG require you to spend more [ ], less [ ], or, about the same [ ] amount of time to perform a given task. Describe.

_____

_____

_____

25. In your experience, how frequently has the malfunctioning of the ZOG/PERQ system interferred with the performance of your job during the last two months?

- [ ] Never
- [ ] Infrequently, about once per month
- [ ] About 1 a month
- [ ] Almost everyday

26. Describe how the ZOG system has helped you perform your job.

_____

_____

_____

_____

27. Describe how the ZOG system has hindered your job performance.

_____

_____

_____

_____

28. Indicate the number of times that you performed the following ZOG activities YESTERDAY, AND DURING THE PAST WEEK.

	Yesterday	Past week
a. Browsed through the ZOGnets.		
b. Created a ZOG frame.		
c. Modified a ZOG frame.		
d. Used the ZED editor.		
e. Used the SLED editor.		
f. Used ZOG to make a list of tasks or things.		
g. Used SCRIBE to print out a document.		
h. Using ZOG, commented on someone else's frames.		
i. Used the ZOG find utility to locate frames.		
j. Worked on creating a ZOG subnet, but used paper and pencil and didn't enter anything. in the computer at the time.		
k. Monitored AIRPLAN displays.		
l. Referred to the SORM on ZOG.		
m. Used ZOG to manage the work schedules of my subordinates.		
n. Used ZOG to manage my own work schedule.		
o. Used ZOG to check on the activities of my colleagues.		
p. Used the "Help" feature of ZOG to understand how to make ZOG function.		
q. Used the mouse and tablet to move through ZOG.		

29. To improve the ZOG system on VINSON, we need more support from:

The C.O. ____ X.O. ____ ZOG management ____ ZOG/PERQ maintenance ____

Our own subordinates____ ZOG developers ____ PERQ manufacturer ____

Other (specify) _____

3

NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER
SAN DIEGO, CALIFORNIA 92152

JULY 1982

Day_____

ZOG/PERQ USER INTERVIEW FORM

You are requested to complete this interview/questionnaire as part of an evaluation of the ZOG/PERQ system. Although some of you may be new to the ZOG/PERQ system, try and answer all of the questions. The information that you provide will be summarized with information from all other users and will not include individual names. Accordingly, please answer frankly and completely. It is only through your assistance that the system can be improved to meet your needs in a better way. Identifying information is needed so that we may contact you at a later date, after you have had more experience with the ZOG/PERQ system. The obtained information will not be placed in your records and will not be used to evaluate you in any way.

Full Name:_____ Rate/Rank:_____

Division:_____ Job Assignment:_____

Time in this Position (Months):_____

1. Indicate the extent of your experience with any type of computers:

   No previous experience. _____

   I occasionally worked on someone's personal computer. _____

   List any programming languages you have used. None. _____

   _____

   _____

2. Are you currently using the ZOG system? Yes ☐ No ☐

3. How long have you worked with the ZOG system? No. of weeks. _____

   How many hours per day do you now use OG? _____

4. What other shipboard computers do you use?

   _____

   _____

5. Check (✓) the type(s) of training you received on ZOG.

   _____ None

   _____ On-line Tutorial

   _____ User's Guide

   _____ Tutoring from Another User

   _____ Other (Specify) _____

6. Was your training long enough? Yes ☐ No ☐

7. Were the training objectives clear to you? Yes ☐ No ☐

8. Was the emphasis of your training right for you? Yes ☐ No ☐

9. Do you need more training/practice at this time to feel comfortable using the ZOG system? Yes ☐ No ☐

10. Describe how you think ZOG training might be improved. (List areas you think need improvement.)

    _____

    _____

    _____

    _____

11. Rate how easy you think ZOG is to learn:

    Extremely easy ☐ Easy ☐ Difficult ☐ Extremely Difficult ☐

12. Check (✓) the following tasks for which you have used the ZOG/PERQ system. Also indicate the frequency (per week) of those tasks that you now regularly perform using ZOG.

Have Used At Any Time	No. of Times Per Week Now Use ZOG	Task
_____	_____	Initial <u>familiarization</u> with ship's procedures/ regulations. Describe how ZOG is used:
		_____
		_____
		_____
_____	_____	Initial <u>training</u> in the use of ship's procedures. Describe.
		_____
		_____
		_____
_____	_____	Reference and resolution on <u>performance</u> of ship's procedures. Describe.
		_____
		_____
		_____
_____	_____	Determine what actions to take concerning ship's procedures. Describe.
		_____
		_____
		_____

Have Used At Any Time	No. of Times Per Week Now Use ZOG	Task
_____	_____	Update shipboard instructional/procedural directives. Describe.
		_____
		_____
		_____
_____	_____	Planning long-term activities. Describe.
		_____
		_____
		_____
_____	_____	Planning the week's activities. Describe.
		_____
		_____
		_____
_____	_____	Planning specific operations. Describe.
		_____
		_____
		_____
_____	_____	Guidance in carrying out specific operations. Describe.
		_____
		_____
		_____

Have Used At Any Time	No. of Times Per Week Now Use ZOG	Task
_____	_____	Verify that operations have been completed. Describe.
_____	_____	Evaluate performance on specific operations/tasks. Describe.
_____	_____	Initial familiarization with the weapons elevators. Describe.
_____	_____	Initial training in the maintenance of weapons elevators. Describe.
_____	_____	Reference and resolution of maintenance procedures for the weapons elevators. Describe.

Have Used at Any Time	No. of Times Per Week Now Use ZOG	Task
_____	_____	Performing corrective and preventive maintenance on the weapons elevators. Describe.
		_____
		_____
		_____
_____	_____	Update of weapons elevator maintenance procedures. Describe.
		_____
		_____
		_____
_____	_____	Training in any other area. (List each area and describe how ZOG is used.)
		_____
		_____
		_____
_____	_____	Manage any aspect of training. Describe.
		_____
		_____
		_____
_____	_____	Send work related messages to individuals or offices. Describe.
		_____
		_____
		_____

Have Used at Any Time	No. of Times Per Week Now Use ZOG	Task
_____	_____	Receive work related messages from others. Describe.
_____	_____	Evaluate individual work performance Describe.
_____	_____	Other task. Describe.
_____	_____	Other task. Describe.
_____	_____	Other task. Describe.

13. How frequently do you now use the SORM? (Times/Week) _____

Indicate the relative percentage of times you use the on-line or hard copy SORM. (The numbers should total 100%.)

%_____Hard copy

%_____On-line

Total % = 100%

14. Have you used ZED? Yes /_/ No /_/

If you have used ZED, answer the following questions.

How many times per week do you now use ZED? _____

For what purpose do you use ZED?_____

_____

_____

_____

What capabilities of ZED do you find most difficult to use? _____

_____

_____

_____

Rate how easy you think ZED is to use:

Extremely Easy /_/ Easy /_/ Difficult /_/ Extremely Difficult /_/

15. Compared to the first month that you used ZOG, are you now using ZOG:

A lot more frequently /_/ More frequently /_/ About the same /_/

A little less /_/ A lot less frequently /_/

16. For what general purposes do you now use ZOG? _____

_____

_____

_____

17. Since using ZOG, have you changed the way you perform certain tasks? Describe. _____

_____

_____

_____

18. Does the use of ZOG require you to spend more /_/, less /_/, or, about the same /_/ amount of time to perform a given task. Describe.

_____

_____

_____

19. In your experience, how frequently has the malfunctioning of the ZOG/PERQ system interferred with the performance of your job?

/_/ Never
/_/ Infrequently, about once per month
/_/ About 1 a month
/_/ Almost everyday

20. Indicate, from your own personal experience, the relative percent of time that the ZOG system malfunctioned due to:

%_____ equipment (hardware) failure.

%_____ programming (software) failure.

Total % of times = 100

21. Describe how the ZOG system has helped you perform your job.

22. Describe how the ZOG system has hindered your job performance.

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NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER
SAN DIEGO, CALIFORNIA 92152

JULY 1983

Day_____

ZOG SYSTEM USE DATA: OBSERVER FORM

(To be used during observation of system use.)

1. Observer:_____

2. Time logged on_____ or observation begins:_____

3. Time end:_____

4. Individual observed:_____

5. Work Station location:_____

6. Purpose(s) of ZOG session, as expressed by user at beginning of session:

_____

_____

7. ZOG system capabilities used: _____

   a. Review ZOG net for information._____

   b. Use ZED to enter information._____

      Describe:_____

_____

_____

_____

   c. _____

_____

_____

_____

_____

8. ZOG capability use as determined by observer._____

_____

_____

_____

9. Approximate system response time (seconds) from keystroke to beginning of display of next frame._____

10. Approximate system response time (seconds) from keystroke to complete display of next frame._____

11. Check facility of use with ZOG system:

_____ Extremely capable

_____ Capable

_____ A few difficulties using ZOG

_____ Major difficulties using ZOG

12. How long (weeks) does User indicate they have used ZOG?_____

13. Describe difficulties, if any, that User has with system. If none, check here.

_____

_____

_____

14. Describe ship functional use of ZOG. (Planning, evaluation, training, sending/receiving information, examination/updating of SDRM, etc.)

_____

_____

_____

_____

15. Other observations:

10

NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER
SAN DIEGO, CALIFORNIA 92152

JULY 1983

PERQ WORKSTATION ERGONOMICS ASSESSMENT

Work Station Location: _____

(To be completed by Observer.)

Rate the following ZOG/PERQ workstation features:

	Extremely Unsatis-factory	Unsatis-factory	Satis-factory	Extremely Satis-factory
1. Convenience of workstation				
2. Amount of workspace around terminal				
3. Table height				
4. Chair adjustability				
5. Keyboard adjustability				
6. Illumination level				
7. Illumination adjustability				
8. Freedom from glare				
9. Surrounding workstation termperature				
10. Surrounding workstation noise level				

11. Ease of user relocation. _____

General Observations: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

5

NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER
SAN DIEGO, CALIFORNIA 92152

JULY 1983

Day_____

ZOG SYSTEM SUPPORT OF TRAINING

To be discussed with appropriate functional area supervisors.

A. ZOG Support of Weapons Elevator Maintenance Training:

(Individual Interviewed:_____)

1. Number of persons trained using ZOG supported training (including videodisc. _____

2. Range of rate of individuals trained. _____ to _____

3. Ratings of those trained._____

_____

4. Number of individuals onboard PQS qualified for elevator maintenance. _____

Number needing PQS qualification._____

5. Does ZOG subnet list individuals receiving elevator Training? Yes ☐ No ☐

If yes, what is subnet name. _____

_____

_____

_____

6. Discussion of status/history of Weapons Elevator Maintenance during current deployment. (Meet with Weapons Elevator Boss)

_____

_____

_____

_____

_____

B. ZOG Support of Other Training Areas:

(Individual Interviewed: _____)

1. What other task training areas are supported by ZOG?

2. Describe the support ZOG provides for each training area. (Include subnet name for each area.)

3. Describe difficulties in using ZOG to support training.

4. Describe benefits/assets of ZOG system to your training requirement.

NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER
SAN DIEGO, CALIFORNIA 92152

SEPT 1983

Day_____

ZOG/PERQ SYSTEM USE AND RELIABILITY LOG

Work Station Location:_____

(This log is to be completed EACH time you use the ZOG/PERQ system for this week.)

Time on System				Malfunction During Session	
On	Off	Name	Purpose of ZOG Session	Yes/No	Describe Problem Include Time System Down

INTERVIEWER'S COPY

3

NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER
SAN DIEGO, CALIFORNIA 92152

Sept 1983
Day_____

ZOG/PERQ USER INTERVIEW FORM

You are requested to complete this interview/questionnaire as part of an evaluation of the ZOG/PERQ system. Although some of you may be new to the ZOG/PERQ system, try and answer all of the questions. The information that you provide will be summarized with information from all other users and will not include individual names. Accordingly, please answer frankly and completely. It is only through your assistance that the system can be improved to meet your needs in a better way. Identifying information is needed so that we may contact you at a later date, after you have had more experience with the ZOG/PERQ system. The obtained information will not be placed in your records and will not be used to evaluate you in any way.

Full Name:_____ Rate/Rank:_____

Division:_____ Job Assignment:_____

Time in this Position (Months):_____

1. Indicate the extent of your experience with any type of computers:

   No previous experience. _____

   I occasionally worked on someone's personal computer. _____

   List any programming languages you have used. None. _____

   _____

   _____

2. Are you currently using the ZOG system? Yes ☐ No ☐

3. How many hours did you work on the ZOG/PERQ system yesterday? _____

4. How long have you worked with the ZOG system? No. of weeks _____

5. What other shipboard computers do you now use ?

_____

6. Check the type(s) of training you received on ZOG.

___ None

___ On-line tutorial

___ User's Guide

___ Help from another user

___ Other (Specify) _____

7. Do you need more training or practice at this time to feel comfortable using the ZOG system? Yes ___ No ___

If yes, specify the areas in which you feel you need more instruction. (For, example: need help in using ZED, creating a frame, using the SLED editor, etc...) _____

_____

_____

_____

8. Describe how you think ZOG training might be improved._____

_____

_____

_____

9. Rate how easy you think ZOG is to learn:

Extremely easy ___ Easy ___ Difficult ___ Extremely Difficult ___

10. Rate how comfortable you are using the ZOG system.

___ Extremely comfortable using ZOG at any time.
___ Fairly comfortable using ZOG. I know I can make it do what I want.
___ Mild discomfort using ZOG. I am not sure what to do to get it to work.
___ Extreme discomfort with ZOG. I don't like to use it.

11. Check (✓) the following tasks for which you have ever used ZOG. Also indicate the frequency (per week) of those tasks that you ow regularly perform using ZOG.

Have Used At Any Time	No. of Times Per Week Now Use ZOG	Task
_____	_____	Initial familiarization with ship's procedures/ regulations. Describe how ZOG is used:
		_____
		_____
		_____
_____	_____	Initial training in the use of ship's procedures. Describe.
		_____
		_____
		_____
_____	_____	Reference and resolution on performance of ship's procedures. Describe.
		_____
		_____
		_____
_____	_____	Determine what actions to take concerning ship's procedures. Describe.
		_____
		_____
		_____

Have Used At Any Time	No. of Times Per Week Now Use TOG	Task
_____	_____	Update shipboard instructional/procedural directives. Describe.
_____	_____	Planning long-term activities. Describe.
_____	_____	Planning the week's activities. Describe.
_____	_____	Planning specific operations. Describe.
_____	_____	Guidance in carrying out specific operations. Describe.

Have Used At Any Time	No. of Times Per Week Now Use ZOG	Task
_____	_____	Verify that operations have been completed. Describe.
		_____
		_____
		_____
_____	_____	Evaluate performance on specific operations/tasks. Describe.
		_____
		_____
		_____
_____	_____	Initial familiarization with the weapons elevators. Describe.
		_____
		_____
		_____
_____	_____	Initial training in the maintenance of weapons elevators. Describe.
		_____
		_____
		_____
_____	_____	Reference and resolution of maintenance procedures for the weapons elevators. Describe.
		_____
		_____
		_____

Have Used at Any Time	No. of Times Per Week Now Use ZOG	Task
_____	_____	Performing corrective and preventive maintenance on the weapons elevators. Describe.
_____	_____	Update of weapons elevator maintenance procedures. Describe.
_____	_____	Training in any other area. (List each area and describe how ZOG is used.)
_____	_____	Manage any aspect of training. Describe.
_____	_____	Send work related messages to individuals or offices. Describe.

Have Used at Any Time	No. of Times Per Week Now Use ZOE	Task
_____	_____	Receive work related messages from others. Describe.
_____	_____	Evaluate individual work performance. Describe.
_____	_____	Other task. Describe.
_____	_____	Other task. Describe.
_____	_____	Other task. Describe.

12. How frequently do you use the SORM on ZOG? (Times per week) _____
How frequently do you use the hard copy of SORM? (Times per week) _____

13. Have you used the ZED editor? Yes ___ No ___

If yes, how many times did you use ZED during the past week? _____

14. Rate how easy you think ZED is to use:

Extremely easy ___ Easy ____ Difficult ____ Extremely Difficult ____

15. Have you used the slot editor-SLED? Yes ___ No ___

If yes, how many times did you use SLED during the past week? ____

16. Rate how easy you think SLED is to use:

Extremely easy ___ Easy ____ Difficult ____ Extremely Difficult ____

17. Which editor do you use the most frequently? ZED ____ SLED ____

Why? _____

_____

18. When you use your preferred editor do you have to relearn how to make it work? Yes ____, sometimes I have to get some help.
No ____, I use the editor without any restudy.

19. When you use the least preferred editor, do you have to relearn how to make it work? Yes____, Sometimes I have to get some help.
No_____, I use the editor without any restudy.

20. Why do you prefer the _____ editor? _____

_____

_____

21. Compared to the first of the deployment, or whenever you first started using ZOG during the deployment, are you now using ZOG:

A lot more frequently ___ More frequently ____ About the same ____

A little less frequently ____ A lot less frequently ____

Are there any parts of your job for which the ZOG/PERQ system has become essential? Describe _____

22. For what general purposes do you now use ZOG?

23. Since using ZOG, have you changed the way you perform certain tasks? Describe.

24. Does the use of ZOG require you to spend more / /, less / /, or, about the same / / amount of time to perform a given task. Describe.

25. In your experience, how frequently has the malfunctioning of the ZOG/PLRQ system interferred with the performance of your job during the last two months?

/ / Never
/ / Infrequently, about once per month
/ / About 1 a month
/ / Almost everyday

26. Describe how the ZOG system has helped you perform your job.

27. Describe how the ZOG system has hindered your job performance.

28. Indicate the number of times that you performed the following ZOG activities YESTERDAY, AND DURING THE PAST WEEK.

	Yesterday	Past week
a. Browsed through the ZOGnets.		
b. Created a ZOG frame.		
c. Modified a ZOG frame.		
d. Used the ZED editor.		
e. Used the SLED editor.		
f. Used ZOG to make a list of tasks or things.		
g. Used SCRIBE to print out a document.		
h. Using ZOG, commented on someone else's frames.		
i. Used the ZOG find utility to locate frames.		
j. Worked on creating a ZOG subnet, but used paper and pencil and didn't enter anything in the computer at the time.		
k. Monitored AIRPLAN displays.		
l. Referred to the SORM on ZOG.		
m. Used ZOG to manage the work schedules of my subordinates.		
n. Used ZOG to manage my own work schedule.		
o. Used ZOG to check on the activities of my colleagues.		
p. Used the "Help" feature of ZOG to understand how to make ZOG function.		
q. Used the mouse and tablet to move through ZOG.		

29. To improve the ZOG system on VINSON, we need more support from:

The C.O. ____ X.O. ____ ZOG management ____ ZOG/PERQ maintenance ____

Our own subordinates____ ZOG developers ____ PERQ manufacturer ____

Other (specify) _____

APPENDIX B

DIRECTORY OF ZOG SOFTWARE AND NETWARE

Directory of ZOG Software and Netware

ZOG Dual-Document

25Mar83

USS CARL VINSON (CVN-70)

This document was created via the ZOG agent AgDoc
from the StarShip ZOGnet beginning at ZOG frame Directory!

This subnet contains a listing of all the ZOG software, both sytems and applications software, as well as the major "core" subnets for the ZOG system. The names of the maintainer(s) of each module and subnet are listed, so that this net will serve as a reference tool for finding out the person(s) to whom to direct bug reports and requests for updates.

In addition, the name of the author(s) of the subnet or module are included in square brackets ([]) after the module or subnet name. This is to point the maintainer to the "prime source" of information on the module.

1 ZOG Software

ZOG Software naturally breaks down into a number of categories. These are displayed below for ease of selection. Note: The person in charge of each software module is also responsible for maintaining and updating the documentation for that software, as well as its ZOG Code net.

1.1 System Software

1.1.1 Basic ZOG system

* UEI
* ZBack
* ZBHIO raz
* ZError
* ZInitExit
* ZInitOthers
* ZIO raz
* ZLogin rpl
* ZOG
* ZParse
* ZPoll
* ZSel raz
* ZTrace rpl
* ZUser raz
* ZOGVersion [dim] rpl
* ZVideo

1.1.2 "System Libraries"

1.1.2.A-BaseLib

1.1.2.B-FsString

1.1.2.C-NetDefs raz

1.1.2.D NetLib (Contains Subnet Libraries) meg

* NetHandl meg
* NetInsert meg
* NetMakeDel meg
* NetOption meg
* NetPerqCodes meg
* NetStack meg
* NetString meg

1.1.2.E-StatsDefs rpl

1.1.2.F-StatsLib rpl

1.1.3 Access to Actions, Agents and Shell Utilities

* ZAction [hrp]
* ZActUtils [hrp]
* ZAAction [hrp]
* ZBAction [hrp]
* ZDAction [hrp]
* ZEAction [hrp]
* ZFAction [raz] raz
* ZAgent [rpl] rpl
* ZXAAgent [rpl] rpl
* ZXBAgent [rpl] rpl
* ZShell [drs] rpl
* ZXShell [rpl] rpl

1.1.4 Statistics Processing

* StatsDefs
* StatsLib

* ZPollSnap
* ZPutStats
* ZSnapShot
* ZStats

1.1.5 Interface to PERQ Screen

* IncDisp [raz] raz
* ZCanvas [dlm] raz
* ZCanvUtils [raz] raz
* ZDisplay [dlm] raz
* ZUser [dlm] raz
* ZWind [dlm] raz

1.2 Netserver Software

* NetServ [ggr,dlm] meg
* ZAccessProcs [ggr,dlm] meg
* ZNet [ggr,dlm] meg
* ZNetProcs [ggr,dlm] meg
* ZNetServer [ggr,dlm] meg
* ZOGMSG [dlm] meg
* ZOGMSGDefs [dlm] meg
* ZOGNetServer [ggr,dlm] meg

1.3 Editor Software

1.3.A ZED

* ZCrFrame raz
* ZDspInc raz
* ZEDDefs raz
* ZEDFram raz

* ZEdit raz

* ZEdItem raz

* ZEDUtil raz

1.3.B SLED

* ZBrEd [pjl] rpl

* ZEnvEd [pjl] rpl

* ZEnvUtil [pjl] rpl

* ZSled [pjl] rpl

* ZSledUtil [pjl] rpl

1.4 Agent Software

1.4.1 ZOG Utilities

1.4.1.A-AgArchiv [raz] raz

1.4.1.B-AgCopy [mdf] rpl

1.4.1.C-AgDirectory [raz] raz

1.4.1.D AgFind [raz] raz

1.4.1.E-AgIndex [raz] raz

1.4.1.F-AgOld [mdf] rpl

1.4.1.G-AgPar [psf] rpl

1.4.1.H-AgPost [mdf]

1.4.1.I-AgRestore [raz] raz

1.4.1.J-AgSubnet [mdf]

1.4.1.K-AgSwap [mdf]

1.4.1.L-AgTest rpl

1.4.2 Dual-document

* AgPic [mdf] rpl

* AgDoc [mdf]

1.4.3 Programming Environment

1.4.3.A AgCode [rma] rpl

1.4.3.B-AgOps rpl

1.4.4 Planning and Evaluation

1.4.4.A AgAdjDt [rpl] rpl

1.4.4.B-AgInst [psf] rpl

1.4.4.C-AgInTask [psf] rpl

1.4.4.D-AgTPlan [mdf] rpl

1.4.4.E-AgUpTask [psf] rpl

1.4.4.F-AgZPlan [mdf] rpl

1.5 Agent Libraries

1.5.A-ArchLib [raz] raz

1.5.B-EnvLib [mdf] rpl

1.5.C-FramLib [mdf] raz

1.5.D-FormLib [mdf] raz

1.5.E PlanLib [psf,mdf] rpl

1.5.F-SelLib [mdf] raz

1.5.G-StackLib [raz] raz

1.6 Utilities

* Exercise rpl

* MakeStub rpl

* Utility rpl

1.7 Airplan

* AirCom [psf] meg

* AirDefs [psf] meg

* AirLib [psf] meg

* AirOutput [psf] meg
* ApPagePac [psf] meg
* ApTestOut [psf] meg
* ApFlOver [psf]
* ApLOver [psf]
* ApOpsFile [psf]
* ApPlover [psf]
* ApROver [psf]
* ZXAirPlan [rpl]

2 ZOG Netware

ZOG Netware also falls into several categories.

2.1 "Core" Subnets

* ZOG
* Help cgg
* GPADS
* Schema cgg
* Slots mdf

2.2 User Guides

These subnets contain the various users and programmers guides for parts of the ZOG system. Note that the individual agent writers are responsible for the writing and maintaining of their agent's user's guides. Local Pad !A points to the agents frame with a list of responsible parties.

2.2.1-Agent Writer's Guide [cgg] cgg

2.2.2-Management Applications User Guide (MUG) [mdf] cgg

2.2.3-Pocket Guide [mdf] cgg

2.2.4-Primer [cgg] cgg

2.2.5-ZOG Agents Guide (ZAG) (top level) [psf] cgg

2.2.6 ZOG Maintainer's Guide [dlm] rpl,cgg

2.2.7-ZOG User's Guide (ZUG) [eay,rma] cgg

3 Index by Maintainer

* Rob Acksyn
* Paul Fischbeck
* Mark Frost
* Mike Goodside
* Peter Lieu
* Ron Lupish
* Don McCracken
* Hal Powell
* Russ Shoop
* Bob Zimmermann

Directory of ZOG Software and Netware

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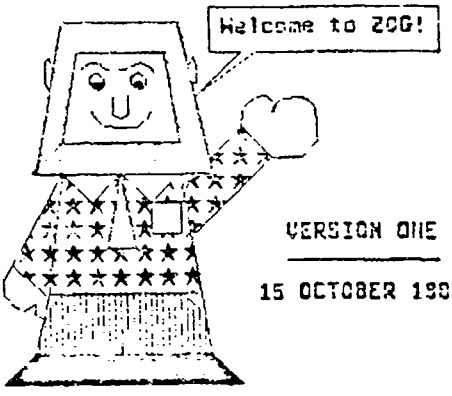
Directory of ZOG Software and Netware

APPENDIX C

THE ZOG POCKET GUIDE

THE ZOG



VERSION ONE

15 OCTOBER 1983

POCKET GUIDE

In a Pocket Guide is designed for all users onboard the VINSON. The guide will hopefully provide a ready reference to both the beginner as well as the expert ZOGGER. If there is some item that you would like to see added, just let the Management Department know. New versions of this guide will be released as changes come in.

PERQ Locations

- AirOps ..... 7807 ... 03-170-1-C
- AirOutPut .... 7807 ... 03-170-1-C
- Cog ..... 7009 ... 03-84-12-L
- CanonA ..... 7494 ... 01-175-3-Q
- CanonB ..... 7009 ... 03-84-12-L
- Cat ..... 7985 ... 03-119-4-Q
- Coxe ..... 7265 ... 03-118-3-Q
- Cav ..... 7009 ... 03-84-12-L
- Engo ..... 7354 ... 2-196-0-Q
- Hood ..... 7633 ... 2-120-0-L
- Ixdo ..... 7453 ... 01-190-2-Q
- InputA ..... 7807 ... 03-170-1-C
- InputB ..... 7807 ... 03-170-1-C
- Mgto ..... 7915 ... 01-185-3-Q
- Move ..... 6222 ... 09-159-1-C
- Opeo ..... 7807 ... 03-138-0-C
- Oxow ..... 7191 ... 03-138-2-C
- Pers ..... 6412 ... 3-113-0-L
- Reoc ..... 7782 ... 2-181-1-L
- Spare ..... 7009 ... 03-84-12-L
- Supo ..... 7767 ... 2-119-1-Q
- Trng ..... 7949 ... 2-121-2-Q
- Weir ..... 7001 ... 010-160-1-C
- Woos ..... 7937 ... 2-204-1-Q
- Welv ..... 7829 ... 02-170-1-A
- Xoda ..... 7225 ... 03-170-1-C
- Yyxo ..... 6996 ... 2-180-2-L
- Zzco ..... 8026 ... 03-159-1-L

- CanonA is the primary printer
- CanonB is the secondary printer
- PGTD is the Master

When you arrive at your PERQ station, ZOG should already be running on the machine. ZOG will have a distinctive three window display. If it is not, then complete the following procedures:

If the PERQ is off, blank display:

- Turn the PERQ on. Push the power switch, located on the the front panel of base unit, to the right or ON position.
- You should hear the fans start and the display should light up.
- The computer takes about two minutes to boot after being turned on. If the display has not cleared in two minutes, try rebooting. This is done by pressing the reboot button located on the rear of the keyboard.
- Once the machine is booted, it should automatically get the correct date and time. However, there is a possibility that it will not. If it asks for a date and time, simply type them in using the exact format. If the date is correct but not the time, only the time need be entered.
- Once the machine has the date and time, it will automatically go into ZOG. This will take about a minute or two after the display has cleared.

If the PERQ is on, but not in ZOG:

- If the PERQ is on and running, but not in ZOG (a very rare occurrance), simply type "zog" followed by a carrige return. It should take about one or two minutes for the typical ZOG display to appear.

Once the three window ZOG display is on the PERQ, it is time to log-in.

- If "Please enter your name:" does not appear in the second ZOG window, then type a control "c". This is done by holding down the control key and typing a lower case "c". The control key is labeled "CTRL" and is located in the lower left-hand corner of the keyboard. This will log-off the previous user.
- Once "Please enter your name:" appears in the second window, simply type in your login followed by a carriage return. Your login should be the same as your FMS (federated management code). If you do not have one, use your departmental log-in.
- The prompt, "Password:", should appear. Simply type in your ZOG password followed by a return. If the system does not recognize either your log-in or your password it will ask you to try again. Reenter them just in case you made a typing error.
- If you are still unable to successfully log-in, use the departmental login and contact the Management Department (ext 7003) to get your log-in entered into the system.
- Once logged on the system should display your top frame in the upper window and your mail frame in the lower window. If the system is unable to find either one, a default frame will be used.

Global Pads appear at the bottom of every frame. They may be executed by either typing the first letter of the word or by selecting them with the mouse. When in the edit or sled mode, a different set of global pads will appear.

- edit ... run zed, the zog editor
- help ... display top frame of ZOG Users Guide
- back ... back-up one frame on path
- next ... display next option's selection frame
- prev ... display previous option's selection frame
- top .... display top frame of net
- goto ... display a specific frameid: system prompts for frameid
- sled ... run sled, the slot editor
- can .... remote screen dump to the Canon laser printer
- ret .... display backup stack
- util ... display index to all agents and utilities
- disc ... redisplay current frame
- fusr ... display full screen user display
- old .... save a copy of the current frame
- info ... display frame information: owners, who and when created, etc
- win .... move to other window, other window becomes the current window
- jump ... display current window in the other window

Even though there are over 50 different commands inside of the ZED, the ZOG editor, with only a handful of basic commands and the mouse it is possible to make any required alterations to a frame. To enter the editor, simply select the global pad "edit". This can be done through the keyboard by typing "e", or by using the mouse to select the field. Once in edit the global pads will change. The new global pads are the basic ones that you should be familiar with. Like all other global pads they may be activated by either typing the first character or selecting the field with the mouse.

- help ..... display a index help frame that will direct you to online information. Select the edit global pad at anytime to return to the edit mode on the frame you were editing when you selected "help".
- quit ..... quit the editor without saving your changes.
- exit ..... leave the editor, saving all your changes.
- insert .... allow you to insert characters . To exit the insert mode, hit the "INS" key, upper left corner of the keyboard or tap any mouse button.
- del ..... delete whatever character is underneath the cursor.
- xtend ..... put you in the insert mode at the end of whatever field the cursor is in.
- Just ..... justify the right hand margin of whatever field the cursor is in.
- Insitem ... allow you to add another item like the one the cursor is currently in: option or local pad.
- Delitem ... delete the entire item that the cursor is in: frame title, frame text, option, or local pad.
- X-AddOpt .. add another option in sequence. Hit "INS" twice to stop adding options.
- nxtfr .... link an option or local pad to a specific, already created frame.
- posit ..... allow you to move options, local pads, and frame text. Follow the prompts on the bottom line.
- Frmt ..... order the option selection characters, and evenly space the options.

* a: display action of selection
* b:
* c: change character: not change "n" characters
* d: delete character: ndt delete "n" characters
* e: exit zed
* f: find next occurrence of string
* g:
* h: display help for zed
* i: insert text
* j: justify or item
* kx: kill to "x": delete text to "x"
* l: position cursor to beginning of item
* mx: munch to "x": delete text to "x", insert new text
* n: modify next frame of selection
* o:
* p: modify position of item
* q: quit zed destroying all changes
* r: replace character: nrt replace "n" characters
* sx: search to "x": position cursor to next occurence of "x"
* t: transpose next two characters
* u:
* v: invert alphabetic case to end of word
* w: insert time stamp: (zog 2 Oct 83 21:22:00)
* x: extend text of item
* y: display expansion string of selection
* z: modify selection character of selection

* A: display frame action
* B:
* C: display frame comment
* D: delete item
* E: exit zed
* F: reformat options: number/letter sequentially and adjust spacing between options
* G: modify global pod frame
* H: display help for zed
* I: insert selection
* J: justify frame text
* K:
* L: position cursor to frame text
* M:
* N:
* O:
* P:
* Q: quit zed destroying all changes made
* R: replace item: delete and insert
* SX: search to selection character "X"
* T:
* U:
* V: convert option to local pod, or local pod to option
* W:
* X: extend selections: add option or local pod
* Y: display frame expansion string
* Z:
* ^: clear delete/kill buffer
*]: insert contents of delete/kill buffer
* >: move forward one word
* <: move backward one word
* _: (underbar) replace frame

Agents are computer programs that run inside of ZOG. These programs have been designed to make ZOG much more powerful. Agents are used to create the daily Green Sheet and the Getting Underway Checklist. Agents are simple to run. If any questions come up, an online guide is available for each agent. These guides can be found on the agent environment frame, under the "G. Guide" local pad.

- Selecting the Agent: All agents can be located by selecting the global pad "util". This will place the ZOGI frame in the other window. By selecting the first option, a menu showing the various types of agents will appear. Select the desired category. The next frame will list the actual agents. Select the desired agent. The environment frame will appear.

- The Environment Frame: Every agent needs to be given certain guidance before it can be run. You have to tell the agent where it should start, where it should go, and what it should do. A special frame, the environment frame, has been designed to do just that. All the information that an agent needs is on the environment frame.

- Filling in the Environment Frame: Environment frames are filled in using SLED, the slot editor. This is a special editor that is designed to be especially easy to use. To use SLED, select the global pad "sled" by either typing "s" or using the mouse. Next select the option on the environment frame you want to fill in. This can be done by either typing the selection character or selecting the option with the mouse. The editor will automatically place the cursor in the correct position and offer a prompt on the bottom line to help in filling in the slot. Sometimes the prompt will appear in the other window. In this case just select the desired answer. Once all the options have been filled in, type "e" to exit SLED.

- Executing the Agent: After you are done with SLED and have exited the editor, it is time to run the agent. Select the local pad "X. Execute". This can be done with either mouse or keyboard. The agent will let you know what it is doing by displaying information on the bottom line. It will let you know of any problems it has encountered and the frames it has looked at. When it has finished, "Done!" will appear on the bottom line.

Tasks & Plans

These are the agents that are used to create the various plans used around the ship like the daily Green Sheet.

- AgAdjDate ... modify start/due dates for specific task tree
- AgGenr ..... create a generic task tree from a specific task tree
- AgInst ..... create a specific task tree from a generic task tree
- AgInTask .... initializes a specific task tree
- AgTPlan ..... create a hardcopy plan from specific task tree
- AgUpTask .... updates status and effort fields for specific task tree
- AgZPlan ..... create a on-line plan from specific task tree

Hardcopy Output

These agents can be used to create hardcopy documentation of your on line ZOG frames.

- AgDoc ..... output depth-first document from tree of frames
- AgPic ..... output a picture format of a ZOG frame

ZOG Utilities

These agents do alot of the low level chores to make net building quicker and easier.

- AgCopy ..... copies a tree of frames
- AgFind ..... search for keywords or changes in ZOG subnets
- AgMkSecond .. ensure that the secondary copy of a net is complete
- AgPar ..... verifies the parent and top pads for a tree
- AgIndex ..... make an index of subnets
- AgArchive ... archive on to a floppy a series of frames
- AgRestore ... restore from a floppy a series of frames
- AgSwap ..... do a one-for-one replacement of a string

PERQ Utilities Page 10

Numerous PERQ utilities are available within ZOG itself. These can be found by selecting the global pad, "Util". This will display the ZOG1 frame in the other window. Now select the third option, "3. Use PERQ Utility". This will display a frame which lists all the utilities available. Select the one you want to use.

- directory .... display contents of current directory
- path ..... change current path (prompts)
- set ..... set search path list (prompts)
- mount ..... mount the floppy disk
- dismount .... dismount the floppy disk
- type ..... type file to the screen (prompts)
- print ..... print file on canon printer (prompts)
- rename ..... rename file(s) (prompts)
- copy ..... copy file(s) (prompts)
- delete ..... delete file(s) (prompts)

Key Frames Page 11

- AirIndex1 .... AirPlan frames.
- CVGlobal1 .... the SORM
- CVNSpaces1 ... Ship's Spaces net
- CVPlan1 ..... the Ship's Plans
- DBMS1 ..... Index of all subnets
- Mail1 ..... Index to all mailboxes
- ShipInfo1 .... Online Jane's Fighting Ships
- WpMan1 ..... Weapons Elevator frames
- ZOG1 ..... Agents and Utilities.

User Guides

- ZOG Agent Users Guide: How to use each ZOG agent (frame AgGuide1)
- ZOG Management Users Guide: How to do SORM planning (frame MUG1)
- ZOG Pocket Guide: This guide: a quick & dirty manual (frame NewPoc1)
- ZOG Primer: Short and simple introduction to ZOG (frame Primer1)
- ZOG Tutorial: How to learn about ZOG (frame Tutor1)
- ZOG Users Guide: How to use ZOG and ZEG: complete manual (frame ZUG1)

It is important to keep subnets from getting to big and unwielding. The max sub size of a subnet is 3000 frames. However, if you find yourself with nets approaching 1000 frames, it is probably time to start breaking it down into smaller subnets. Each subnet should have it own particular theme or idea. To create a subnet simply follow these procedures

- Go the "2001" frame: Select the "util" global pod with the mouse or type "U". This will put the 2001 frame in the other window.
- Select the "Create a new subnet" local pod: Select this local pod with the mouse or type "S" on the keboard.
- Answer the prompts and build a "0" frame: The system will ask a series of prompts. Enter the name of the subnet you want to create. If you desire any special capitalization, enter it now. Numeric characters are not permitted in a subnet name. It will prompt you for a "0" frame. For most use the default frame, 2000, will be appropriate. If you are doing a task tree, then instead of 2000, type in <machine name>task0. After answering all the prompts, the "0" frame of your new subnet should appear. You will be in the edit mode and at this time, make any additional changes your schema frame.
- Return to the "2001" frame: After the schema is exactly the way you want it, exit the editor and return to the 2001 frame by using the "util" global pod as before.
- Select the "Create a new frame" local pod: Create the first frame in your new net by selecting the local pod. "Create a new frame".
- Answer the prompts and build a first frame: The frame you want to create is "<subnet name>/1". You will want to use the subnet "0" frame as the frame to copy so just hit a carriage return when prompted. The first frame of your subnet will appear and you will be left in the edit mode ready to begin.

An electronic mail system has been added to 2GG. All primary users have their own mailboxes. Anyone can send mail, but only those with mailboxes can receive it. If you would like to have a mailbox call the Management Department (2009). In addition to the personal mailboxes, there is a BBoard mailbox for general announcements about the system, and a Gripe mailbox, where users can post their complaints and comments about the 2GG system.

How to send mail

- The "Mail1" frame: All mail is sent starting from frame Mail1. If you have your own mailbox, it should appear in the lower 2GG window when you log on. On all personal mail frames, the local pod. "Send Mail" points to frame Mail1. The Mail1 frame has an alphabetical index to all mailboxes. Mailboxes names are based upon Federated Management System (FMS) codes. Therefore all people with mailboxes working in the Reactor Department can be found under "R".
- Drafting a message: Select the mailbox you want. You will next be prompted to set frame protection. If you want your message to have limited access so that only you and the person you are sending it to can either read it or write on it, then type "y", else hit a carriage return.
- Completing the message: After a few seconds the message frame will appear. You will already be in the edit mode. Simply hit "x" to position the cursor and go into the input mode. All ZED commands apply. The first 20 characters of the subject lin. will be used as the message title.
- Transmitting the message: After you have finished composing the message, select "Transmit". This will place an option on the receiver's mailbox pointing to your message. It will automatically timestamp the option with you name and the date. You will be returned to the Mail1 frame.

How to delete mail

- Delete one message at a time: On your personal mail frame, select "Delete Mail". You will be prompted as to which option you would like deleted. The actual message frame will appear in the other window as verification. The progrm will repeat as often as you like. When done, the progrm will offer to reformat your mail frame.
- Delete all your messages: On your personal mail frame, select "Delete ALL Mail". This will delete every frame in your mail subnet. Do this only if there are NO messages that you wish to save. BE CAREFUL!!!

How to clear unattached frames (floaters) from a subnet

During the construction phase of a complicated tree, frames often get cut free from the main body after they become superceded. After the tree has been completed, the creator may want to erase all these floating frames. There is no direct way to do this. However, utilizing the copy agent, it can be done.

- Copy the good subnet to a dummy subnet: Select the "util" global pad to display the ZOG frame in the other window. Select the first option, "Use ZOG Agents". On the next frame select the fourth option, "Use ZOG Utilities". The copy agent is the second option. Fill the environment frame in so that the subnet that is to be cleaned is copied into a temporary or dummy subnet. This dummy subnet must already be created.

- Delete the good subnet: Once the copy agent has finished and you have verified that the entire tree has been safely copied, delete the original subnet by typing a control "d", followed by an "x", followed by a carriage return. It will next prompt for a subnet name. This will permanently delete all frames by the zero frame for a subnet. The subnet cannot be restored. BE CAREFUL!!!

- Copy the dummy subnet back to the good subnet: Simply use the copy agent again to copy the dummy tree back to the original subnet. Once this is finished delete the dummy subnet. It should be noted that any pointers from other frames in other subnets into specific frames in this subnet may not match anymore. The frames will most likely have new frame-ids.

How to Make a BigFrame

BigFrames are frames that take up both windows. Though they may seem to be extremely useful, they must not be used too freely. It is important not to have too much information on a frame. If feasible, several layers of regular sized frames should be employed.

Enter "BigFrame" in the frame expansion area

- While in edit type "I" to enter the frame expansion area. Capitalization is important.

- Type "i" to go into an insert mode.

- Type "BigFrame", capitalization is important.

- Hit the INS key to exit the input mode.

- Hit the INS key again to return to the normal frame.

Enter the BigFrame global pad set

- While in edit, type "G" to change the global pad set.

- The machine will prompt for an entry. Type "GPads4". This will attach to the frame the global pads that will appear in line 48 vice line 24.

Special problems

- Once you have made these two changes and want to see the frame in the expanded mode, you will have to exit the editor. The frame will still appear regular until you leave the frame and come back to the frame.

- The "parent" and "top" local pads will have to be moved.

How to Build SLED Frames

How to build Slot frames: See frame Slot1 for an index of already built slot frames. A slot frame has five options. These options are:

- Name ..... the name of the slot may be entered, however it is not required.
- Type: ..... one of the following types must be entered: PString, Toggle, Case, Boolean, Frameid, Subnet, Slot, Integer, Real, Character, Date, User, Time. When the user inputs a slot value, the editor will do error checking to insure that the entry agrees with this type field.
- Default ... this entry will appear inside "[]" after the prompt line. If the type is "Frameid" then a "/" will use the frameid from the other window. If the type is "Date" then a "." will use the current date.
- Prompt .... there are two types of prompts. If there is a menu frame from which the user should pick an slot value, link that frame directly from this option. Else enter a string that will aide the user in filling in the slot.
- Help ..... is not currently implemented.

How to connect Slot frames: Slot frames are not linked to options on the environment frame in the normal "next frame" manner. To build a slot frame, while in the normal, non-edit mode, hit the "INS" key followed by the selection character of the option you wish to have the hidden slot frame. The typical prompts for top down frame creation will appear. Answer them accordingly. Once the frame is created, the "-" character that follows the selection character of an unlinked frame will not disappear since the frame is linked only through the expansion area.

How change slot frames: To change the hidden link to a slot frame, go into the edit mode on environment frame. Select the slot whose link you wish to modify with either the mouse or "LF" key. Type "y" to enter the option expansion area. There should be a line "Frameid: <frameid>" in the expansion area. This <frameid> is the old link. Replace with the frameid of the new slot using ZED edit commands. Type "INS" to exit the option expansion area.

APPENDIX D

ZOG USERS GROUP NEWS LETTERS

ZOG Users Meeting ZOG Users Group-

16Jul83 1st Mtg. notes

1 Zog Users Group-

Periodic meetings are a great idea. During today's meeting, several good ideas were exchanged. In general, users want to continue to get together at regular intervals to discuss new ideas and problems.

2 Executive Officer-

We have spend a considerable amount of time building depth into the SORM. Now it is time to concentrate on the lateral construction of the nets, i.e., rather than working on the "Depth First" appraoch, it is time to fill in the top levels of the SORM and work on a "Top Down" design. He would like to see us institutionalize our planning schema using the "True ZOG users" and inspire the other department heads to get involved.

3 AIMD Officer-

Would like to be able to create plans for groups of accomplishers, i.e., he wants to be able to create a single plan that includes all his Division Officers' tasks.

Answer: LCDR Shoop - The capability to create multiple plans and plans sorted by accomplishers and multiple accomplishers will be available in Version 19.1 This includes the capability to create plans involving multiple accomplishers.

4 Senior Medical Officer-

Had trouble with creating documents from subnets. He finds it necessary to manually edit the document outside of ZOG and clean up the indentations. Also noted the "busy numbering" system at the beginning of each option.

Answer: LCDR Shoop - Pepper editor should not be necessary in creating nice

documents from subnets. This can be accomplished by using Scribe. Version 19.1 has features that itimize leaf nodes with an '*', thereby eliminating the numbers from the leaf nodes.

5 Senior Chaplain-

It is very frustrating to try and access other machine's subnets when they are down or not in ZOG. Also, the Perq seems to freeze while its inside ZOG. It sometimes requires actions from the Management Department to fix the problem.

Answer: LCDR Shoop - There exists a problem at a very low level in the software of the PERQ that causes our Ethernet/Memory swaping errors. There is a plan to try and get Three Rivers to help us solve that problem.

6 Strike Operations-

Would like to be able to create Green Sheets without having to manually edit out unrelated options, i.e., be able to include Department subnets in the plan but only those options related to the Green Sheet. Answer: LCDR Shoop - The present plan is to implement an agent that will sort by accomplishers, i.e., a plan created from all those frames whose ACCOMPLISHER: field includes a [GS]. This use of '[*]' is a standardized method of identifying accomplishers. Examples include: [ZZCO] [IMDO] [IXD*] where the '*' is a wild card. Version 19.1 will include this feature.

7 AIMD Officer/Executive Officer-

Would like plans to contain only one instance of a task if it occurs daily. I.E. Eight Oclock reports happen every day and Six day Plans are sometimes appear cluttered with six instances of it. He would like to see:

Task	Day1	Day2	Day3	Day4	Day5	Day6
8 O'Clock Reports	1800 -1900	1800 -1900	1800 -1900	1800 -1900	1800 -1900	1800 -1900

Answer: LCDR Shoop - This feature seems to be nice if you had only a small

number of tasks included in a Plan. But when you have many tasks on a single day, you may want them sorted by time, to be able to read properly, and find conflicts in schedules. Suggest the user make one or two day Plans, like the Green Sheet.

8 Note from the PERQ CZAR

Plans will be institutionalized here in the near future. The intent is to have the Data Base Administrator (me) and the Commanding Officer review the Evolutions for a given period and build the top level of the Ships Specific Task Net and using these new Planning agents to create all HOD's Plans from running this agent on that net. This means a cooperative effort from the Strike Operations Officer for the Green Sheet, as well as the HODs. It will ultimately take the detail of creating the Plans and make Management Department responsible for their creation and distribution. Whether they are on line plans linked to the Organizational Net, or hard copy plans distributed manually.

Table of Contents

Vol.I Issue 1

1. ZOG Enhancements

1.1 Electronic Mail

Electronic Mail is now availible on all PERQs! When you log in to ZOG with Version 20.1 you will observe that the bottom ZOG frame initially presented is your PERQ mail frame. The latest mail sent to you is immediately visible on your mail frame in the form of options. Older mail (i.e. more than 9 options) is pushed down and is available via the "Old Mail" Local Pad.

Additional Local Pads are available for: Sending Mail to other PERQs, Sending Mail to a general Bulletin Board (for all users), Sending mail to a special Gripe subnet (for user encountered ZOG problems) for MGIO Action, Reading the Bulletin board and Reading the Gripe subnet.

You can review the Guide documentation for Mail by selecting "M" below or by selecting the local pad "M" on your PERQ mail frame.

1.1.M Guide for Mail

1.2 Additional ZOG Actions

Some additional Extended ZOG Functions (ZOG Actions) are now available in ZOG.(See ZOG1, option 2 or goto ZOG7). All the old ZOG Actions remain unchanged. The following NEW Actions have been added:

Change Subnet Allows complete subnets to be read, write or UNprotected Protection:

Add Frame Owner: Allows the Frame Owner to add CO-Owners

Note: The "Write zbh" and "Read zbh" Actions have been added to this section and removed from the top frame, ZOG1.

1.3 Additional PERQ Utilities

Under ZOG Version 20.1 additional PERQ Utilities have been incorporated. (See ZOG1, option 3 or goto ZOG14). These utilities allow for simple file manipulation that is normally accomplished in the PERQ Shell. By including these utilities in ZOG the occasional necessity to leave ZOG for file manipulation in the Shell has been eliminated. Definitions of the new PERQ Utilities are listed below:

Directory: Displays the contents of the current PERQ file directory Path: Changes the Directory Path to a new path Type: Type a file from the current directory to the screen Mount: Mount a floppy disk as an additional PERQ file partition DisMount: Dismount a floppy disk from the PERQ file partition Rename: Rename a file in the current PERQ file directory Copy: Copy a file to a new file in the current PERQ file directory Delete: Delete

a file in the current PERQ file directory

Set Search and the Print function are the same as before

1.4 Automatic Log-Off Feature

The Automatic Log-Off Feature has been incorporated into ZOG Version 20.1. This new enhancement allows for unattended terminals to be automatically logged-off if the terminal has not been active in ZOG for two statistics gathering sessions (approximately 21 minutes). A good practice to get into is always logging out of ZOG when you have terminated a ZOGging session (control-"c"). By doing this the PERQ will remain in ZOG, but others will not have access to your subnets as they are required to log-in with their own ID and password.

2. AGENT News

2.1 Generic Subnet Creation (AgGenr)

AgGenr creates a generic subnet from a specific subnet. It is useful for preserving specific subnets in a form that allows the subnet to be reused at a later time with different dates and times. When you initially create a specific subnet utilize AgGenr to create a copy of the subnet in a generic form for storage and future use. When you desire to use the particular subnet for a different event all that is necessary is the instantiation of the generic subnet which creates a copy of the particular subnet in a specific form with dates and times that you have entered when executing AgInst.

Note that the generic subnet that is created by runnig AgGenr will reflect date and times in "T" + or - hours and minutes. "T" time normally is the target time that the event is to start or is due. Minus ("-") normally indicates events that occur prior to "T" time and Plus ("+") indicates events that occur after "T" time.

AgGenr is located with the ZOG Planning Agents.(ZOG1, option 1 then ZOG2, option 1 then ZOG3 option 7 "Create Generic Task Tree" or goto AgGenr2.)

2.2 Multiple Plans (AgTPlan)

Multiple Plans can now be produced from one execution of AgTPlan. All that is necessary is to ensure that the "ACCOMPLISHER:" slot on your subnet frames reflects the proper code(s) for a particular accomplisher(s). Normally the accomplisher codes will be the Federated Management Code(s) in brackets (i.e. [MGT01 [YYX01 etc.).

If multiple plans are desired simply goto frame "AgTPlan15" and create a list of accomlishers using the proper FMS codes. AgTPlan will then create plans for every accomplisher listed and place the plans in individual files. The file names have the convention:"CODEDate.Plan". (i.e. MGT012AugS3.Plan).

To print a particular plan use the ZOG Print Action with the file name. (Note: the file names will appear in the User Display).

The small amount of overhead involved in archiving critical files can pay off in a big way should the unexpected happen!

Note: The Management Department routinely Archives all subnets off each PERQ on a weekly basis and archives a change file for each machine daily (i.e. only changes to subnets are backedup daily). This allows reconstruction of files should a problem develop with the hard disk. Files are only maintained for a two week period and then must be reused. Although the Management Department backups are available, keeping your own backups is a good idea especially for critical frames or subnets.

AgReStore is located with the ZOG Utilities (ZOG1,option1 ZOG2,option4 then ZOG6,option6 "ReStore Archive...").

2.7 Make Secondary Backups (AgMkSecond)

This agent will create secondary backup frames for a subnet that has been designated to have a secondary. It is used to create secondary frames that have not been created during an editing session due to the unavailability of the secondary machine (i.e.,the secondary PERQ was not in ZOG). Utilize this agent to ensure all pertinent backups have been created.

AgMkSecond is located with the ZOG Utilities (ZOG1, option 1 then ZOG2, option 4 and then ZOG6, option 8 "Make Secondary Backups" or goto AgMkSecond2).

3. Software Issues

With the coming of ZOG Version 20.1 there also comes some PERQ Operating System modifications to fix some of the "system" problems we have been encountering. Specifically the "Frozen KeyBoard" and the "Interrupts during Swapping" problems have been resolved. What this means to the user is that system reliability has been improved and fewer system hang ups will be experienced.

4. Hardware Issues

The Management Department R&D section is presently working on a plan to "hard wire" all the PERQs to the "on" position. This will allow the PERQ to come back on immediately after a power failure etc. and reinitialize directly into ZOG.

The EMO is presently working on a modification to all Ethernet boards to eliminate the transmission of "Long Packets" (Long Messages sent PERQ to PERQ). This will reduce the collision of information on the Ethernet and make PERQ access more reliable.

5. ZOG Training

Assistence and training is always available on a personal basis from Management Department personnel. Please call 7009 for assistence or to make an appointment. Additionally the following ZOG training classes are scheduled for the Month of August: CLASS DATE/TIME LOCATION ZOG Beginners 10 AUG 83/08-0900 Conference Room 18 AUG 83/08-0900 conference Room

AgTPlan is located with the ZOG Planning Agents (ZOG1, option 1 then ZOG2, option 1 and then ZOG3, option1 "Create Hardcopy plan" or goto AgGenr2).

2.3 String Replacement (Agswap)

AgSwap will go through a tree of frames and replace all instances of one specified string with another.

This agent is located with the ZOG Utilites (ZOG1, option 1 then ZOG2, option 4 and then ZOG6, option 6 "Global String replacement within tree of frames" or goto AgSwap2).

2.4 Find a String (AgFind)

Although it is easy to move around in ZOG's subnets trying to find a particular frame or set of framess is often very time-consuming. To make this task easier, AgFind was developed. AgFind automatically searches through any subnet to locate a specific set of frames of interest to you.

Sometimes, you might want to look for all frames dealing with a specific area of interest, such as frames concerned with using the ZOG editor, ZED. Or, more commonly, you might wish to scan through all frames in particular subnet which have been modified since the last time you looked through that subnet. Maybe, you are particularly interested only in those frames modified by a particular person. AgFind is the tool which enables you to perform these searches through the net.

AgFind is located with the ZOG Utility Agents (ZOG1, option1 then ZOG2, option 4 then ZOG6, option 1 "Search frames; find recent changes" or goto AgFind2).

ve Subnets to Offline Storage (AgArchive)

gent will copy subnets from any PERQ onto a floppy disk on your PERQ. It will also allow you to re-read those subnets which have been placed onto a floppy back into ZOG.

Thus, frames which are valuable may be stored out of harm's way; frames which have been accidently destroyed may be retrieved; and frames which you no longer want to have on your disk need not be permanently deleted.

AgArchive is located with the ZOG Utility Agents (ZOG1, option 1 then ZOG2, option 4 then ZOG6, option 5 "Archive Frames to floppy disk" or goto AgArchive2).

2.6 Restore Archive Frames from floppy disk

AgRestore performs the reverse of AgArchive; It reloads archived frames or subnets from the floppy disk to the hard disk. This allows the user to restore frames or subnets that have been mistakenly damaged or destroyed. It should be noted that you can't restore frames or subnets that haven't been archived! In other words it is good practice to store backup copies of critical frames or subnets offline (i.e. Archive the files to a floppy).

ZOG Advanced 13 AUG 83/08-1000 Conference Room 20 AUG 83/08-1000 Conference Room

6. ZOG Customer Service

The Management Department has established a ZOG Customer Service Center. The ZCSC will be responsible for ensuring the ZOG users receive fast efficient service concerning trouble/problem calls and user assistance requests.

To assist the ZCSC in resolving the problems that arise concerning the PERQ and/or ZOG a ZOG Service Request (ZSR) and ZSR Tracking System has been implemented by the Management Department. This will allow for the formal tracking of not only problems, but of requests for system enhancements.

For assistance in any area concerning ZOG or the PERQ minicomputer system, please call J-7009.

7. ZOGs Corner

Welcome to ZOGs Corner! For each issue of the ZOG Users Group News I will add some comments, pointers or just general tid bits of information that all good ZOGGERs should know. This issue I present a few pointers on how to trouble shoot your PERQ if things aren't working right.

If you are in ZOG, enjoying a good work out with the subnets and the system freezes on you (i.e., the cursor will not respond to the mouse and the global pads do not function) don't curse and go looking for a big hammer to fix the PERQ. Simply reboot the system by pressing the small button on the back of the PERQ. After about a minute (or so) the PERQ will reinitialize and ask you to login. Enter your ID and password (each followed by a carriage return) You will then see a prompt cursor. Just type "zog" and a carriage return. ZOG will now reinitialize (about 20 seconds) and you are all set to go! Wasn't that easy?

I should note at this point that we have implemented some changes to the PERQ Operating System sent by CMU and 3RCC and thus will experience fewer system freezes and consequently improved system reliability!

7.> More Info

How about mouse problems? No... Cheese is not the answer nor is throwing the poor little critter on the floor and giving it a close up view of the underside of your shoe! Instead I would suggest you check all the plugs on the bit pad (3 total- 1 in front and 2 in back) for a snug fit. If this does not solve the problem then try the bit pad reset button on the right side of the bit pad. This reinitalizes the pad.

Should your troubles persist after all this ...Well its still not time to punt the mouse or resolve to using the bit pad as a base for the coffee mess. Just try rebooting the system as I described in the previous frame. Often just reinitalizes ("booting" as they say in the computer world) cures this kind of problem (i.e the PERQ starts over with a clean slate).

If all this fails then its time for a coffee break! BUT first call for Customer Service from the local ZOG/PERQ Troubleshooters (Management Dept.) at 7009. By the time you are done with your coffee we will have your mouse sitting up and doing tricks (That is if your mouse doesn't require major surgery!)

Table of Contents

ZOG USERS GROUP NEWS

28Sep83 (Mtg early in Sept.

Vol.I Issue 2

1. ZOG Enhancements

1.1 New Login I.D.s

The new version of ZOG soon to be released (version 22.0) will allow the user to Login using his FMS (Federated Management System) Code as his user I.D. By utilizing the appropriate FMS code to login (and individual password), the user will be able to observe his mail frame in the bottom ZOG window and his Top Frame in the top window upon initial entry into ZOG (See ZOGNews Enhancements 2 and 3). This means that no matter which PERQ a user logs in at he will always observe the same initial frames when entering ZOG (in-other words, the user will not be dependent on a particular PERQ for display of the initial ZOG frames).

Note: Only FMS codes will have this unique capability. Using the old login I.D.s will result in the default frames of "CVglobal1" and "EBoard1".

1.2 Electronic Mail Improvement

New enhancements to the ZOG Mail system will allow the user to delete mail from his mail frame when it is no longer required (Select "G" below for details) and access the user's mail from any PERQ by simply logging in with his designated FMS code and password. (See ZOGNews Enhancements 1)

1.2.G Agent Mail Guide

1.3 Department "Top Frame"

The new login format will initially display the user's mail frame in the bottom window of ZOG and in the top window of ZOG will be the user's "Top Frame." The user's top frame has been reserved for the user's index. The index should be utilized for quick access to frequently used nets, current projects etc. Organization in this fashion allows the user to enter the zognet data base and locate pertinent subnets in the most expeditious manner.

1.4 Standardization of Responsibility Nets

The Top Frame structure for Ship's Plans has been adjusted and a standard convention established for Department (or individual) Responsibility Task Nets. The Root Frame of a Department's (or individual's) Plans is identified by the frameid: ####Plan1 (where #### is replaced with the FMS Code).

The root frame (####Plan1) will include two options. The first option provides a link to the Department's Specific Task Net and should be linked to frame "####Task1"."####Task1" can be formated as desired, but it is recommened that it include options (links) to Specific Tasks and Personal Tasks (####Pers) (See "Formats1" for an example) or options for Periodic Tasks, Unique Tasks and Personal Tasks (See "MGTOPlan1" for this example). The former structure was the original ZOG format and will allow those with

the structure in place to conform to the standard. The latter structure is recommended for those just implementing their Task Nets as it will allow distinction between recurring and unique (aperiodic) tasks.

Caution should be exercised when creating options on "####Task1" as options that link to nets outside the department task net will cause extraneous inserts in department plans. Recommend local pads for outside links.

1.4.> More

The second option on "####Plan1" should be linked to "####Plan2" (See "formats12" for an example of what ####Plan2 should resemble). The "####Plan2" frame is an index for the departmental "On-Line" Plans that have been created using the agent AgZPlan.

Note: When initially building your top structure it is recommended that you copy the frames from the "formats" or the "MGTO" subnet. Ensure that all links are disconnected after you copy a frame ("n" "-" in ZED). Then utilize AgSwap to replace "####" or "MGTO" with your appropriate FMS code.

2. AGENT News

2.1 Green Sheet Agent

The Green Sheet Agent will allow a user to enter a Green Sheet item on the Strike Ops Green Sheet subnet. These items will then be reviewed by Strike Ops and printed on the daily CARL VINSON Green Sheet.

To utilize the Green Sheet agent the user simply has to select "u" or util from the global pad set. This action places the frame "ZOGI" in the opposite window that the cursor is in. On the ZOGI frame is the local pad "G" for "Submit Frame to Green Sheet". Selecting "G" will activate the Green Sheet agent and the user will be asked for a frame ID. Note: if the frame you are submitting to the green sheet is in the window with the cursor (i.e. you just built it or pathed down to it) then simply type "/" for frameid.

The Green Sheet agent will automatically break all links to the frame identified when it is copied to the Strike Ops subnet. Strike Ops is also added as an owner of the copied Green Sheet Frame.

Utilize the local pad on "####Plan1" , "#### GS" to link to the Strike Ops Green Sheet subnet for quick access to you Green Sheet items.

3. Software Issues

3.1 Selection of Nodes at Creation

The selection of primary and secondary nodes at the time of subnet creation was suggested as a system improvement at a recent ZOG Users meeting. The suggestion was a Good idea and has been passed to our support group at Mellon Institute. They are in the process of integrating this system modification into the ZOG code. We expect to see this enhancement in the

near future. Keep those Suggestions coming - only with good user participation can we put together a worth while system!

3.2 Frame Garbage Collection

This is another Good suggestion that was submitted at a recent ZOG User Group meeting. The ability to reclaim unlinked frames (i.e., frames deleted in the middle of a subnet) allows the user to efficiently utilize memory (in other words, unused frames that are floating in the zognet are "really deleted").

Unfortunately this is not an easy task to implement. To unlink a frame and return it to "free" memory requires that all links to that frame be identified (i.e. just because it is deleted from a particular subnet doesn't mean that it is just part of that subnet). The ability to identify ALL links to a particular frame requires that each frame have an "Accessor" list. An accessor list is not presently implememted in the ZOG data structure and to do so would require major surgery on ZOG.

This is not to say that Frame Garbage Collection will never be implemented, for it is really a necessity as ZOG grows, in order to efficiently utilize memory. It will just be a way down the road before this action can be adequately suppoted.

4. Hardware Issues

4.1 RSL has Arrived

The PERQ RSL has arrived (finally!). We now have the PERQ support parts that were ordered at the beginning of the year to supply onboard PERQ repair. Unfortunately our shortage of PERQ parts is so critical that even with the arrival of the RSL we are not going to be able to get all PERQs back on line. We are in the process of replenishing the RSL, but it is anticipated that critical parts will be not be available for some machines until we return to Alameda.

4.2 EMO Maintenance

As of approximately 15 Aug 83 the EMO assumed all responsiblity for the on board maintenance and repair of the PERQs. The Management department and the EMO have established procedures, PMS etc., to hopefully provide the best possible sevice to the users.

If you experience any kind of problem with ZOG or the PERQ minicomputer system (hardware or software) please contact the Management R3D Center at J-7009. We will record your trouble call in our tracking system and provide initial trouble shooting. If the problem turns out to be hardware related then the Management Department will contact the EMO for the appropriate assistance.

5. ZOG Training

ZOG Training for the weeks of 5 Sep 83 and 12 Sep 83 have been cancelled due to the Subic port call.

Personal assistance and or training can be scheduled by appointment during those weeks by contacting LCDR Anderson or LCDR Fischbeck at J-7009.

The zog User Group Meetings will be scheduled as required during those weeks. Watch the Bulletin Board (CBoardMail) for annoucements.

ZOG USERS GROUP NEWS

Rcvd: 31 Jan 89 from Anderson

190ct83 4th Mtg. News - mtg on or abt -

Vol.I Issue No.4 19 October 1983

1. ZOG Enhancements

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Note: Only FMS codes will have this unique capability. Using the old login I.D.s will result in the default frames of "CVglobal1" and "BBoard1".

Also, if you are a new user and login with your FMS code and it doesn't work then you need to contact MCTO (7009) so we can enter your code and create a mail and top frame. Only current users have had their FMS codes added to ZOG and have a mail and top frame available.

1.2 Electronic Mail Improvement

New enhancements to the ZOG Mail system will allow the user to delete mail from his mail frame when it is no longer required. The user has the option of deleting selected mail or completly clearing all mail from his mail box (Select "G" below for details).

Additionally a user can Send either read or write protected mail. When "Send Mail" has been selected ZOG will automatically ask if the mail to be sent should be protected and if so what type of protection. Note: A user can acccess his mail from any PERQ by simply logging in with his designated FMS code and password (See ZOGNews Enhancements 1).

※ Agent Mail Guide

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Caution should be exercised when creating options on "####Task1" as options that link to nets outside the department task net will cause extraneous inserts in department plans. Recommend local pads for outside links.

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2. AGENT News

2.1 Green Sheet Agent

The Green Sheet Agent will allow a user to enter a Green Sheet item on the Strike Ops Green Sheet subnet. These items will then be reviewed by Strike Ops and printed on the daily Carl Vinson Green Sheet.

To utilize the Green Sheet agent the user simply has to select "u" or util from the global pad set. This action places the frame "ZOG1" in the opposite window that the cursor is in. On the ZOG1 frame go to ZOG Agents, then Planning Agents and then select option 8, "Submit an item for the Green Sheet". The user will be asked for a frame ID. Note: if the frame you are submitting to the green sheet is in the opposite window then simply type "/" for frameid. The Green Sheet agent will automatically break all option links to the frame identified when it is copied to the Strike Ops subnet. Strike Ops is also added as an owner of the copied Green Sheet Frame.

Utilize the local pad on "####Plan1" , "#### GS" to link to the Strike Ops Green Sheet subnet for quick access to your Green Sheet items. Note: when the Green Sheet agent is executing it will identify the frame on the Strike Ops subnet in which your item is being placed.

3. ZOG Actions Added

3.1 Add Subnet Owner

Add an additional owner to a whole subnet is now available as a ZOG Action. To locate this action goto "ZOG1" or select the global pad "u". On ZOG1 select option 2, ZOG Actions. Then select option "Q" for "Add Subnet Owner". ZOG will then ask for the name of the subnet to add an owner to and will

ask for the new owner's ID. The new owner will then be added as an owner to all frames in the subnet identified.

3.2 Remove Subnet Owner

Remove an owner from a whole subnet is now available as a ZOG Action. To locate this action goto "ZOG1" or select the global pad "u". On ZOG1 select option 2, ZOG Actions. Then select option "B" for "Remove Subnet Owner". ZOG will then ask for the name of the subnet in which to remove an owner and will ask for the owner's ID. The identified owner will then be removed as an owner to all frames in the subnet identified.

4. PERQ Utilities Removed

Some PERQ Utilities have been removed from Version 23.0. The PERQ Utilities that are not available are: "D. Display contents of Current Directory" and "S. Set Search Path List." These are only temporary deletions and were implemented in version 23.0 due to some memory problems that we are experiencing when calling these PERQ Shell commands.

Essentially what is happening, is that when these PERQ commands are executed the overhead required in the ZOG memory segment is more that ZOG can handle and ZOG bombs due to a full memory error. The memory management involved in linking these PERQ utilities into ZOG is difficult and we have forwarded the problem to CMU for assistance in its resolution.

APPENDIX E

EXAMPLES OF SPECIFIC TASK PLANS

MGTO's InPort Task Net

Created 09Sep83 1423

MGTO LOO InPort Schedule

Task - Accomplisher - Frameid	12Sep 0000	0800	1600	13Sep 0000	0800	1600
LCDR Shoop: Leave - [MGTO] - MGTOInPort48						
LT Johnson: Reporting Aboard (Possibly!) - [MGTO] - MGTOInPort40						
DP3 Gerhart: Reproting Aboard - [MGTO] - MGTOInPort41						
SN Tarleton: Leave - [MGTO] - MGTOInPort47				0730		
LCDR Fischbeck: Leave - [MGTO] - MGTOInPort49	0700					
PMS: MGTO Monitor - [MGTO] - MGTOInPort38						
Work Package Identification: TBA - [MGTO] - MGTOInPort37						
Admin/Ops Shipboard 3M: (Flocar & Vandermolen) - [MGTO] - MGTOInPort74	0600					
General Damage Control: (Bolander, Morgan, Johnson) - [MGTO] - MGTOInPort75	0600					
Review Message Traffic - [MGTO] - MGTOInPort69	0645	0800				
Departmental Duty Officer Security: (Control Keys to All MGTO Spaces) - [MGTO] - MGTOInPort62	0700			0659		
Sign Yoke - [MGTO] - MGTOInPort65	0700-0715					
Working Hours - [MGTO] - MGTOInPort9	0700		1600			
Muster Report - [MGTO] - MGTOInPort67	0715					
3M Inspection - [MGTO] - MGTOInPort35		0800				
Departmental Duty Officer Meeting: Morning - [MGTO] - MGTOInPort34		~~0815-0830~~	0745-0800			
Shipboard Conference: (MGTO: Ensure Conference Room is Clean by 0900) - [MGTO] - MGTOInPort78		0900-1100				

Task - Accomplisher - Frameid	12Sep 0000	0800	1600	13Sep 0000	0800	1600
Departmental Duty Officer Inspect MGTO Spaces - [MGTO] - MGTOInPort50		1145-1200				
Liberty Call: OffGoing Duty Section - [MGTO] - MGTOInPort56		1200	[redacted]	0700		
Security Watch for Berthing - [MGTO] - MGTOInPort20			1600	0700		
Security Watch for Wang Room - [MGTO] - MGTOInPort21			1600	0700		
Security Watch for MGTO Spaces - [MGTO] - MGTOInPort22			1600	0700		
Trouble Calls: Call Forwarding to Wang Room J-7494 for duty hours - [MGTO] - MGTOInPort24			1600	0700		
Liberty Hours - [MGTO] - MGTOInPort8			1600	0700		
DFI Jackson: Leave - [MGTO] - MGTOInPort46			1600	[redacted]	[redacted]	[redacted]
DUTY SECTION: Clean Berthing - [MGTO] - MGTOInPort25			1700-1800			
DUTY SECTION: Clean Head - [MGTO] - MGTOInPort26			1700-1800			
DUTY SECTION: Clean Passageways - [MGTO] - MGTOInPort27			1700-1800			
Sign Yoke - [MGTO] - MGTOInPort66			1700-1715			
Parts Expected: Check Ranger Deck - [MGTO] - MGTOInPort32			1700	0600		
Departmental Duty Officer Inspect MGTO Spaces - [MGTO] - MGTOInPort51			1900-1915			
Print 8 O'Clock Reports - [MGTO] - MGTOInPort68			1900-1915			
Departmental Duty Officer Meeting: Evening - [MGTO] - MGTOInPort35			1930-1945			

Task - Accomplisher - Frameid	12Sep 0000	12Sep 0800	12Sep 1600	13Sep 0000	13Sep 0800	13Sep 1600
General Damage Control:(Turnipseed, Hermanns) - [MGTO] - MGTOInPort76				0600	[redacted]	[redacted]
Reveiw Message Traffic - [MGTO] - MGTOInPort69				0645	0800	
Departmental Duty Officer Security: (Control Keys to All MGTO Spaces) - [MGTO] - MGTOInPort62				0700	[redacted]	[redacted]
Sign Yoke - [MGTO] - MGTOInPort65				0700-0715		
Working Hours - [MGTO] - MGTOInPort9				0700	[redacted]	1600
Muster Report - [MGTO] - MGTOInPort67				0715		
E-4 Exam (Dicenzo,Kucera,Keen) - [MGTO] - MGTOInPort31				0730	1100	
Departmental Duty Officer Meeting: Morning - [MGTO] - MGTOInPort34					~~0915~~ 0830	~~0945~~ 0800
Shipboard Conference: (MGTO: Ensure Conference Room is Clean by 0900) - [MGTO] - MGTOInPort78					0900-1100	
Departmental Duty Officer Inspect MGTO Spaces - [MGTO] - MGTOInPort50					1145-1200	
Liberty Call: OffGoing Duty Section - [MGTO] - MGTOInPort56					1200	[redacted]
Security Watch for Berthing - [MGTO] - MGTOInPort20						1600
Security Watch for Wang Room - [MGTO] - MGTOInPort21						1600
Security Watch for MGTO Spaces - [MGTO] - MGTOInPort22						1600
Trouble Calls: Call Forwarding to Wang Room J-7494 for duty hours - [MGTO] - MGTOInPort24						1600
Liberty Hours - [MGTO] - MGTOInPort8						1600

Task - Accomplisher - Frameid	12Sep			13Sep		
	0000	0800	1600	0000	0800	1600
MGTO Softball Game: Subic - [MGTO] - MGTOInPort60						1600-1800
DUTY SECTION: Clean Berthing - [MGTO] - MGTOInPort25						1700-1800
DUTY SECTION: Clean Head - [MGTO] - MGTOInPort26						1700-1800
DUTY SECTION: Clean Passageways - [MGTO] - MGTOInPort27						1700-1800
Sign Yoke - [MGTO] - MGTOInPort66						1700-1715
Parts Expected: Check Hanger Deck - [MGTO] - MGTOInPort32						1700
Departmental Duty Officer Inspect MGTO Spaces - [MGTO] - MGTOInPort51						1900-1915
Print 8 O'Clock Reports - [MGTO] - MGTOInPort68						1900-1915
Departmental Duty Officer Meeting: Evening - [MGTO] - MGTOInPort35						1930-1945

Chaplains Plans

Task - Accomplisher - Frameid	010ct	020ct	030ct	040ct	050ct	060ct
Annual Chapel Fund Report to AIRPAC - YXCH - Chaplain Westling [YXCH] - CRP388	[redacted]					
Audit for the Third Quarter - SUPO - Supply Officer [YXCH] - CRP216	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Conduct daily meeting with RP staff - YXC3 - Senior RP [YXCH] - CRP228	0755-0805					
Attend ZOG-Users Meeting - YXCH - Chaplain Westling [YXCH] - CRP381	0800-1000					
Execute Film Program - YXC2 - Chaplain Todd [POD][YXCH] - CRP150	1400-1500					
Celebrate Vigil of Sunday Mass - YXC1-Chaplain Oddo [GS][POD][YXCH] - CRP23	1900-1930					
Evening Prayer from the Bridge - YXCH - Duty Chaplain [YXCH] - CRP352	2155					
Brotherhood Hour (Bible Study) - MS3 Balliet [POD][YXCH] - CRP142	2200-2330					
Conduct daily meeting with RP staff - YXC3 - Senior RP [YXCH] - CRP228		0755-0805				
Celebrate Sunday Mass - YXC1-Chaplain Oddo [GS][POD][YXCH] - CRP21		0900-0955				
Sunday Divine Worship (Protestant) - YXCH - Chaplain Westling, and YXC2-Chaplain Todd[GS][POD][YXCH] - CRP7		1000-1100				
Provide music at scheduled Chapel Services(Voices of Vinson) - OS3 K. Thomas [YXCH] - CRP136		1000-1100				
Provide Chaplains' Holy Helo visits and Divine Services. - YXCH - Chaplain Westling [YXCH] - CRP45		1200-1700				
Sunday Lay Service (L.D.S.) - AX1 Stewart [GS][POD][YXCH] - CRP28		1600-1730				
Prayer and Praise Service (Protestant) - YXC2-Chaplain Todd [GS][POD][YXCH] - CRP8		1930-2030				

Task - Accomplisher - Frameid	01Oct	02Oct	03Oct	04Oct	05Oct	06Oct
Evening Prayer from the Bridge - YXCH - Duty Chaplain [YXCH] - CRP352		2155				
Arrange for CO/XO opening welcome - YXCH - Chaplain Westling [YXCH] - CRP181			[redacted]			
Conduct daily meeting with RP staff - YXC3 - Senior RP [YXCH] - CRP228			0755-0805			
Fam & I Lecture on ship's chaplaincy services - YXC5 - Chap.Office Mngr [YXCH] - CRP239			0815-0845			
Morning Fellowship (Bible Study) - AOAN W. Baker [POD][YXCH] - CRP286			0830-0930			
Fam & I Lecture on ship's library services - YXC4 - Library Manager [YXCH] - CRP240			0845-0915			
Maintain accounts for Chap Fund - YXC5 - Chap.Office Mngr [YXCH] - CRP205			0900-1400			
Celebrate Daily Mass - YXC1-Chaplain Cedo [GS][POD][YXCH] - CRP22			1100-1130			
Protestant Noonday Worship - YXC2-Chaplain Todd [GS][POD][YXCH] - CRP10			1130-1200			
Navigators' Fellowship - Lt Christ [POD][YXCH] - CRP17			1900-2030			
Conduct rehearsals (Voices of Vinson) - OS3 K. Thomas [POD][YXCH] - CRP131			2100-2200			
Evening Prayer from the Bridge - YXCH - Duty Chaplain [YXCH] - CRP352			2155			
Free New Testament Displays - YXC3 - Senior RP [YXCH] - CRP282				[redacted]		
Order all other supplies as needed - YXC3 - Senior RP [YXC3] - CRP208				[redacted]	[redacted]	
Maintain supply log - YXC3 - Senior RP [YXCH] - CRP209				[redacted]	[redacted]	

Task - Accomplisher - Frameid	010ct	020ct	030ct	040ct	050ct	060ct
Conduct daily meeting with RP staff - YXC3 - Senior RP [YXCH] - CRP228				0755-0805		
Edit Captain's Family Phone Message - YXC4 - Library Manager [YXCH] - CRP354				0830-2200		
Submit to PAO "Chaplain's Chat" for the EAGLE - YXC1 - Chaplain Oddo [YXCH] - CRP295			--	0900	1600	
Celebrate Daily Mass - YXC1-Chaplain Oddo [GS][POD][YXCH] - CRP22				1100-1130		
Bible Fellowship (Protestant) - ASC Viladesau [POD][YXCH] - CRP15				1230-1300		
Set up materials for Seminar(s) - YXC3 - Senior RP & Facilitators [YXCH] - CRP180				1500-1900		
Conduct Curtain Studies - SN John B. Wright [POD][YXCH] - CRP359				1900-2000		
Execute Pre-Reunion Family Seminars on board - YXCH - Chaplain Westling [YXCH] - CRP100	--			1900-2230		
Church Leadership Seminar - YXC2 - Chaplain Todd [POD][YXCH] - CRP360				2000-2100		
Evening Prayer from the Bridge - YXCH - Duty Chaplain [YXCH] - CRP352				2155		
Brotherhood Hour (Bible Study) - MS3 Balliet [POD][YXCH] - CRP140				2200-2330		
Evaluate Seminars for Future Planning - YXCH - Chaplain Westling [YXCH] - CRP101				2300-2400		
Provide Certificates for attendees(Pre-Reunion Seminar) - YXCH5 - Chap.Office Mngr [YXCH] - CRP182					[redacted]	
Conduct daily meeting with RP staff - YXC3 - Senior RP [YXCH] - CRP228					0755-0805	
Morning Fellowship (Bible Study) - AO2 W. Baker [POD][YXCH] - CRP287					0830-0930	

Task - Accomplisher - Frameid	010ct	020ct	030ct	040ct	050ct	060ct
Celebrate Daily Mass - YXC1-Chaplain Oddo [GS][POD][YXCH] - CRP22					1100-1130	
Holy Communion (Protestant) - YXCH-Chaplain Westling [GS][POD] [YXCH] - CRP12					1130-1200	
Provide scheduled training of RPs based on syllabus. - YXC2 - Chaplain Todd [YXCH] - CRP224					1600-1700	
Monitor and supervise courses for advancement for RPs. - YXC2 - Chaplain Todd [YXCH] - CRP57					1600-1700	
L.D.S. "Home Meeting" - AX1 Stewart [GS][POD][YXCH] - CRP29					1700-1900	
Officers' Christian Fellowship - LT Maugans [POD][YXCH] - CRP18					1930-2100	
Conduct rehearsals (Voices of Vinson) - OS3 K. Thomas [POD][YXCH] - CRP132					2100-2200	
Evening Prayer from the Bridge - YXCH - Duty Chaplain [YXCH] - CRP352					2155	
Conduct daily meeting with RP staff - YXC3 - Senior RP [YXCH] - CRP228						0755-0805
Print Bulletin for Sunday Protestant service - YXC5 - Chap.Office Mngr [YXCH] - CRP219						0900-1600
Celebrate Daily Mass - YXC1-Chaplain Oddo [GS][POD][YXCH] - CRP22						1100-1130
Review Daily OpSums for Chaplains Availability & Requests for Holy Helo support - YXCH - Chaplain Westling [YXCH] - CRP346						1200-2200
Bible Fellowship (Protestant) - AEC Villadesau [POD][YXCH] - CRP16						1230-1300
Conduct Personal Development program in ship's brig - CRP229						1400-1530

Task - Accomplisher - Frameid	010ct	020ct	030ct	040ct	050ct	060ct
Rosary & Benediction of the Blessed Sacrament (Catholic) - YXC1-Chaplain Oddo [OS][POD][YXCH] - CRP297						1900-1955
Chaplain's Bible Seminar - YXC2-Chaplain Todd [POD][YXCH] - CRP358						2000-2145
Evening Prayer from the Bridge - YXCH - Duty Chaplain [YXCH] - CRP352						2155
Brotherhood Hour (Bible Study) - MS3 Balliet [POD][YXCH] - CRP141						2200-2330

Proposed Plan

Task - Accomplisher - FrameId	15Jul	16Jul	17Jul	18Jul	19Jul	20Jul
Breakfast - ONRRev21	0730-0830					
Management Department Brief - Management Officer - ONRRev7	0830-1600					
AirPlan - LCDR Fischbeck - ONRRev13	1000-1030					
MATNET - LCDR Shoop - ONRRev15	1030-1100					
Lunch - ONRRev11	1100-1300					
Technology Transfer Projects - Commanding Officer - ONRRev12	1300-1330					
ZOG Project Status - LCDR Shoop - ONRRev9	1330-1400					
Planning and Plan Implementation - LCDR Shoop - ONRRev10	1400-1430					
Weapons Elevator Manual - LCDR Anderson - ONRRev14	1430-1500					
Dinner - ONRRev23	1700-1800					
HOD Meeting- Introduction - ALL - ONRRev22	1830-1900					
Breakfast - ONRRev21		0730-0830				
Hardware Issues - LCDR Shoop - ONRRev18		0900-1100				
Lunch - ONRRev11		1100-1300				
True ZOG Users Meeting - Department Heads - ONRRev16 - See Note 1		1300-1500				
Dinner - ONRRev23		1700-1800				

Task - Accomplisher - Frameid	15Jul	16Jul	17Jul	18Jul	19Jul	20Jul
Individual Department Review - Department Heads - ONRRev17 - See Note 2			[redacted]	[redacted]	[redacted]	
Breakfast - ONRRev21			0730-0830			
Lunch - ONRRev11			1100-1300			
Dinner - ONRRev23			1700-1800			
Breakfast - ONRRev21				0730-0830		
Lunch - ONRRev11				1100-1300		
Vinson Project Demonstrations - Management Officer - ONRRev19				1300-1500		
Dinner - ONRRev23				1700-1800		
Breakfast - ONRRev21					0730-0830	
Evaluation and Conclusions - Project Team/Evaluation Team - ONRRev20					0900-1100	
Lunch - ONRRev11					1100-1300	
Dinner - ONRRev23					1700-1800	
Breakfast - ONRRev21						0730-0830
Lunch - ONRRev11						1100-1300
Dinner - ONRRev23						1700-1800

Notes

Meeting for the ZOG users group includes the following officers: Executive Officer, Senior Medical Officer, Senior Chaplin, Operations Officer, AIMD Officer, Strike Ops Officer, and Reactor Officer

APPENDIX F

ZOG-GENERATED SORM SUMMARIES

1 Fight the Ship

ACCOMPLISHER: *Commanding Officer*

1. Determine requirements for fighting the ship (assess threats and offensive strikes) (see p. 1, line 1)
2. Communicate requirements for fighting the ship (see p. 1, line 8)
3. Respond to requirements for fighting the ship (respond to threats and strike offensively) (see p. 2, line 4)

[1] Determine requirements for fighting the ship (assess threats and offensive strikes) 1
ACCOMPLISHER: *Commanding Officer/Command Authority*

1. Determine the requirements to defend the ship (no offensive strike) (see p. 1, line 2)
2. Determine the requirements to strike offensively (see p. 1, line 7)

[11] Determine the requirements to defend the ship (no offensive strike) 2
ACCOMPLISHER: *Commanding Officer/Command Authority*

[11.1] Determine requirements to defend the ship by setting General Quarters 3
ACCOMPLISHER: *Commanding Officer/Command Authority*

[111] Determine requirements to defend the ship with missiles and guns 4
ACCOMPLISHER: *Tactical Action Officer*

[112] Determine requirements to defend the ship with airborne air assets 5
ACCOMPLISHER: *Tactical Action Officer*

[113] Determine requirements to defend the ship with alert air assets 6
ACCOMPLISHER: *Commanding Officer/Command Authority*

[12] Determine the requirements to strike offensively 7
ACCOMPLISHER: *Commanding Officer/Command Authority*

[2] Communicate requirements for fighting the ship 8
ACCOMPLISHER: *Commanding Officer/Command Authority*

1. Communicate requirements to defend the ship by setting General Quarters (see p. 1, line 9)
2. Communicate requirements to defend the ship with missiles and guns (see p. 1, line 12)
3. Communicate requirements to defend the ship with airborne air assets (see p. 1, line 13)
4. Communicate requirements to defend the ship with alert assets (see p. 1, line 14)
5. Communicate requirements to strike offensively (see p. 2, line 1)

[21] Communicate requirements to defend the ship by setting General Quarters 9
ACCOMPLISHER: *Commanding Officer/Command Authority*

[211] Recommend setting General Quarters to the Commanding Officer/Command Authority 10
ACCOMPLISHER: *Tactical Action Officer*

[212] Communicate order to OOD to set General Quarters 11
ACCOMPLISHER: *Commanding Officer/Command Authority*

[22] Communicate requirements to defend the ship with missiles and guns 12
ACCOMPLISHER: *Tactical Action Officer*

[23] Communicate requirements to defend the ship with airborne air assets 13
ACCOMPLISHER: *Tactical Action Officer*

[24] Communicate requirements to defend the ship with alert assets 14
ACCOMPLISHER: *Commanding Officer/Command Authority*

[241] Communicate requirements to defend the ship with alert assets to Commanding Officer/Command Authority 15
ACCOMPLISHER: *Tactical Action Officer*

[242] Direct OOD to call away the launch of alert aircraft on All Stations of 1MC 16
ACCOMPLISHER: *Commanding Officer/Command Authority*

[243] Communicate requirements to defend the ship with alert assets to Strike Operations Officer 17
ACCOMPLISHER: *Commanding Officer/Command Authority*

[125] Communicate requirements to strike offensively. 1
ACCOMPLISHER: *Commanding Officer/Command Authority*

[126] Direct OOD to call away the Strike Warfare Board on All Stations of 1MC 2
ACCOMPLISHER: *Commanding Officer/Command Authority*

[127] Notify Operations Officer to convene the Strike Warfare Board to determine responses for the requirements to strike offensively 3
ACCOMPLISHER: *Commanding Officer/Command Authority*

[128] Respond to requirements for fighting the ship (respond to threats and strike offensively) 4
ACCOMPLISHER: *Commanding Officer/Command Authority*

1. Prioritize requirements (see p. 2, line 5)
2. Determine responses (see p. 2, line 8)
3. Direct (order) responses (see p. 3, line 16)
4. Execute responses (see p. 3, line 17)

[131] Prioritize requirements. 5
ACCOMPLISHER: *Commanding Officer/Command Authority*

[1311] Prioritize requirements for immediate responses 6
ACCOMPLISHER: *Tactical Action Officer*

[1312] Prioritize requirements for Strike Warfare Board responses 7
ACCOMPLISHER: *Commanding Officer/Command Authority*

[132] Determine responses. 8
ACCOMPLISHER: *Commanding Officer/Command Authority*

1. Determine responses for immediate requirements (see p. 2, line 9)
2. Determine responses for requirements provided to the Strike Warfare Board (see p. 2, line 19)

[1321] Determine responses for immediate requirements. 9
ACCOMPLISHER: *Tactical Action Officer*

1. Determine responses using Screaming Eagle TACPRO (see p. 2, line 10)
2. Determine responses using Standing Procedures/TACPROs (see p. 2, line 11)
3. Determine responses using modification of Standing Procedures/TACPROs (see p. 2, line 15)

[13211] Determine responses using Screaming Eagle TACPRO. 10
ACCOMPLISHER: *Tactical Action Officer*

[13212] Determine responses using Standing Procedures/TACPROs. 11
ACCOMPLISHER: *Tactical Action Officer*

[132121] Determine Assets available airborne and in alert 12
ACCOMPLISHER: *Tactical Action Officer*

[132122] Plan responses using Standing Procedures/TACPROs 13
ACCOMPLISHER: *Tactical Action Officer*

[132123] Determine new Air Plan (if required) 14
ACCOMPLISHER: *Strike Operations Officer*

[13213] Determine responses using modification of Standing Procedures/TACPROs. 15
ACCOMPLISHER: *Tactical Action Officer*

[132131] Determine Assets available airborne and in alert 16
ACCOMPLISHER: *Tactical Action Officer*

[132132] Plan responses using modification of Standing Procedures/TACPROs 17
ACCOMPLISHER: *Tactical Action Officer*

[132133] Determine new Air Plan (if required) 18
ACCOMPLISHER: *Strike Operations Officer*

[1322] Determine responses for requirements provided to the Strike Warfare Board 19
ACCOMPLISHER: *Strike Warfare Board*

1. Convene Strike Warfare Board (see p. 3, line 1)
2. Determine assets from Aircraft Handling Officer (see p. 3, line 4)
3. Decide if cancellation of next event sorties is justified (see p. 3, line 5)
4. Decide if recall of aircraft is justified (see p. 3, line 9)
5. Decide how many deck launched alert aircraft/tankers are needed if flex deck is required and deck will be locked while spotting and launching new mission aircraft (see p. 3, line 13)
6. Develop new Air Plan (see p. 3, line 14)
7. Provide options to Commanding Officer/Command Authority (see p. 3, line 15)

[13221] Convene Strike Warfare Board 1
ACCOMPLISHER: *Operations Officer*

[13221.1] Ensure OOD calls away the Strike Warfare Board on All Stations of 1MC as directed by the Commanding Officer/Command Authority 2
ACCOMPLISHER: *Operations Officer*

[13221.2] Meet with the Strike Warfare Board in Strike Operations Office 3
ACCOMPLISHER: *Operations Officer*

[13222] Determine assets from Aircraft Handling Officer 4
ACCOMPLISHER: *Strike Operations Officer*

[13223] Decide if cancellation of next event sorties is justified 5
ACCOMPLISHER: *Strike Warfare Board*

[13223.1] Determine if aircraft from next event are needed for new strike requirements 6
ACCOMPLISHER: *Strike Warfare Board*

[13223.2] Determine impact on later events 7
ACCOMPLISHER: *Strike Warfare Board*

[13223.3] Make cost/benefit judgement 8
ACCOMPLISHER: *Strike Warfare Board*

[13224] Decide if recall of aircraft is justified 9
ACCOMPLISHER: *Strike Warfare Board*

[13224.1] Determine if aircraft recall is needed for new strike requirements 10
ACCOMPLISHER: *Strike Warfare Board*

[13224.2] Determine impact on later events 11
ACCOMPLISHER: *Strike Warfare Board*

[13224.3] Make cost/benefit judgement 12
ACCOMPLISHER: *Strike Warfare Board*

[13225] Decide how many deck launched alert aircraft/tankers are needed if flex deck is required and deck will be locked while spotting and launching new mission aircraft 13
ACCOMPLISHER: *Strike Planning Board*

[13226] Develop new Air Plan 14
ACCOMPLISHER: *Strike Planning Board*

[13227] Provide options to Commanding Officer/Command Authority 15
ACCOMPLISHER: *Operations Officer*

[133] Direct (order) responses 16
ACCOMPLISHER: *Commanding Officer/Command Authority*

[134] Execute responses 17
ACCOMPLISHER: *Commanding Officer/C id Authority*

1. Execute Screaming Eagle respon e (s 1*)
2. E ecute response using existing Air 4, line 3)
3. Execute response using modified exi an (see p. 4, line 6)
4. Execute Response using Strike Warfa generated new Air Plan (see p. 4, line 20)

[134], E ecute Screaming Eagle response 18
ACCOMPLISHER: *Tactical Action Officer*

[13411] Order General Quarters (if required) 1
ACCOMPLISHER: *Commanding Officer/Command Authority*

[13412] Carry out Screeming Eagle TACPRO 2
ACCOMPLISHER: *Tactical Action Officer*

[1342] Execute response using existing Air Plan 3
ACCOMPLISHER: *Commanding Officer/Command Authorithy*

[13421] Order General Quarters (if required) 4
ACCOMPLISHER: *Commanding Officer/Command Authority*

[13422] Launch/direct aircraft already assigned to missions 5
ACCOMPLISHER: *Commanding Officer/Command Authority*

[1343] Execute response using modified existing Air Plan 6
ACCOMPLISHER: *Commanding Officer/Command Authority*

[13431] Order General Quarters (if required) 7
ACCOMPLISHER: *Commanding Officer/Command Authority*

[13432] Modify existing Air Plan 8
ACCOMPLISHER: *Strike Operations Officer*

[13433] Distribute modified existing Air Plan 9
ACCOMPLISHER: *Strike Operations Officer*
RULE: *Phone minor mods, otherwise deliver*

[13434] Distribute modified existing Air Plan to TAO 10
ACCOMPLISHER: *Strike Operations Officer*

[13434.2] Distribute modified existing Air Plan to FLAG 11
ACCOMPLISHER: *Strike Operations Officer*

[13434.3] Distribute modified existing Air Plan to CVIC 12
ACCOMPLISHER: *Strike Operations Officer*

[13434.4] Distribute modified existing Air Plan to Air Operationss 13
ACCOMPLISHER: *Strike Operations Officer*

[13434.5] Distribute modified existing Air Plan to Weapons 14
ACCOMPLISHER: *Strike Operations Officer*

[13434.6] Distribute modified existlig Air Plan to Pri Fly 15
ACCOMPLISHER: *Strike Operations Officer*

[13434.7] Distribute modified existing Air Plan to Squadrons 16
ACCOMPLISHER: *Strike Operations Officer*

[13434.8] Distribute modified existing Air Plan to Central Control 17
ACCOMPLISHER: *Strike Operations Officer*

[13434.9] Distribute modified existing Air Plan to Bridge 18
ACCOMPLISHER: *Strike Operations Officer*

[13434] Launch/direct aircraft assigned to modified Air Plan 19
ACCOMPLISHER: *Commanding Officer/Command Authority*

[1344] Execute Response using Strike Warfare Board generated new Air Plan 20
ACCOMPLISHER: *Commanding Officer/Command Authority*

1. Order General Quarters (if required) (see p. 4 line 21)
2. Distribute new Air Plan (see p. 5, line 1)
3. Station Mission Experts (see p. 5, line 11)
4. Launch aircraft (see p. 5, line 16)

[1345] Order General Quarters (if required). 21
ACCOMPLISHER: *Commanding Officer/Command Authority*

[13442] Distribute new Air Plan 1
ACCOMPLISHER: *Strike Operations Officer*

[13442.1] Distribute new Air Plan to TAO 2
ACCOMPLISHER: *Strike Operations Officer*

[13442.2] Distribute new Air Plan to FLAG 3
ACCOMPLISHER: *Strike Operations Officer*

[13442.3] Distribute new Air Plan to Air Operations 4
ACCOMPLISHER: *Strike Operations Officer*

[13442.4] Distribute new Air Plan to Weapons 5
ACCOMPLISHER: *Strike Operations Officer*

[13442.5] Distribute new Air Plan to Pri Fly 6
ACCOMPLISHER: *Strike Operations Officer*

[13442.6] Distribute new Air Plan to Squadrone 7
ACCOMPLISHER: *Strike Operations Officer*

[13442.7] Distribute new Air Plan to CVIC 8
ACCOMPLISHER: *Strike Operations Officer*

[13442.8] Distribute new Air Plan to Central Control 9
ACCOMPLISHER: *Strike Operations Officer*

[13442.9] Distribute new Air Plan to Bridge 10
ACCOMPLISHER: *Strike Operations Officer*

[13443] Station Mission Experts 11
ACCOMPLISHER: *Air Wing Commander*

[13443.1] Station Mission Expert in Pri Fly 12
ACCOMPLISHER: *Air Wing Commander*

[13443.2] Station Mission Expert in CDC 13
ACCOMPLISHER: *Air Wing Commander*

[13443.3] Station Mission Expert in Air Operations 14
ACCOMPLISHER: *Air Wing Commnader*

[13443.4] Station Mission Expert in CVIC (debrief) 15
ACCOMPLISHER: *Air Wing Commnader*

[13444] Launch aircraft 16
ACCOMPLISHER: *Commanding Officer/Command Authority*

[13444.1] Brief aircrews 17
ACCOMPLISHER: *Intelligence Officer*

[13444.2] Assign mission aircraft 18
ACCOMPLISHER: *Aircraft Handling Officer*

[13444.21] Communicate aircraft assignments to ready rooms from Flight Deck Control by squadron Maintenance Control 19
ACCOMPLISHER: *Squadron Maintenance Officer*

[13444.22] Communicate aircraft/aircrew assignments to Air Operations from Squadron Ready Rooms by sound powered phone 20
ACCOMPLISHER: *Squadron Duty Officers*

[13444.23] Communicate aircraft/aircrew assignments to Pri Fly from Squadron Ready Rooms by sound powered phone 21
ACCOMPLISHER: *Squadron Duty Officers*

[13444.24] Communicate aircraft assignments to CDC from Air Operations by sound powered phone 22
ACCOMPLISHER: *Air Operations Officer*

[13444.3] **Load weapons** 1
ACCOMPLISHER: *Weapons Officer*

[13444.4] **Start mission aircraft** 2
ACCOMPLISHER: *Air Officer*

[13444.5] **Catapult mission aircraft** 3
ACCOMPLISHER: *Air Officer*

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1 Underway Replenishment of Supplies

ACCOMPLISHER: *Commanding Officer*

1. Conventional Replenishment (CONREP) of Supplies (see p. UNREP3, line UNREP3A)
2. Vertical Replenishment (VERTREP) of Supplies (see p. UNREP15, line UNREP15A)
3. CONREP/VERTREP of Supplies (see p. UNREP27, line UNREP27A)

[11] Conventional Replenishment (CONREP) of Supplies 2
ACCOMPLISHER: *Commanding Officer*

1. Prepare for CONREP of Supplies (see p. UNREP4, line UNREP4A)
2. Conduct CONREP of Supplies (see p. UNREP5, line UNREP5A)
3. Perform Post CONREP operations (see p. UNREP207, line UNREP207A)

[111] Prepare for CONREP of Supplies 3
ACCOMPLISHER: *Commanding Officer*

[1111] Conduct planning meeting for CONREP of Supplies 4
ACCOMPLISHER: *Executive Officer*

[1112] Determine Ships requirements for CONREP of Supplies 5
ACCOMPLISHER: *Supply Officer*

[1113] Determine Rendezvous Position for CONREP of Supplies 6
ACCOMPLISHER: *Navigator*

[1114] Send Required Messages for CONREP of Supplies 7
ACCOMPLISHER: *Operations Officer*

[1115] Perform Operational check of equipment for CONREP of supplies 8
ACCOMPLISHER: *First Lieutenant*

[1116] Promulgate required notices for CONREP of Supplies 9
ACCOMPLISHER: *Officer of the DECK*

[112] Conduct CONREP of Supplies 10
ACCOMPLISHER: *Commanding Officer*

[1121] Complete CONREP Checklist 11
ACCOMPLISHER: *Officer of the Deck*

[11211] Perform the 'DAY' CONREP checklist 12
ACCOMPLISHER: *Officer of the Deck*

[11211.1] Establish UHF Communications with UNREP ship 13
[11211.2] Determine Romeo Corpen and speed 14
[11211.3] Make 1MC announcement for manning stations 15
[11211.4] Establish Bridge to Bridge Radio Communications 16
[11212] Perform the 'NIGHT' CONREP checklist 17
[1122] Maneuver the ship for CONREP of Supplies 18
ACCOMPLISHER:

[11221] Rendezvous for CONREP of Supplies 19
ACCOMPLISHER: *Navigator*

[11222] Conduct Approach for CONREP of Supplies 20
ACCOMPLISHER: *Conning Officer*

[11222.1] Maneuver CARL VINSON to a waiting station 2000 yds astern the delivery ship 21
ACCOMPLISHER: *Conning Officer*

[11222.2] IF CARL VINSON is in waiting station 2000 yds astern the delivery ship THEN make 1MC announcment 'THE INCINERATOR ROOM IS CLOSED. HOLD ALL TRASH ON STATION' 22
ACCOMPLISHER: *Officer of the Deck*

[11222.3] Check the course of delivery ship using the AUX CONN pelorus by sighting the mast in line with the stern on the delivery ship. At night sight the task lights in line with the stern light and record information on status board in AUX CONN 2
ACCOMPLISHER: *Navigator*

[11222.4] Verify ROMEO AT THE DIP to port on the delivery ship 3
ACCOMPLISHER: *Officer of the Deck*

[11223] Conn Alongside for CONREP of Supplies 4

[11223.1] Manuever CARL VINSON to a position 140 to 160 ft to the left of the delivery ship by altering ships heading in increments of 1/2 degree. Distance abeam is determined by sighting through to "rake" and noting the relative position of the "T-bar" against the actual waterline of the delivery ship. Determine distance abeam by noting the position of the "T-bar" relative to the colored pins on the "rake". The outer most pin is 180 ft. The distance between the pins is 20 ft. The bridge-to-bridge (B/B) phone/ distance line provides both a sound powered S/P phone circuit and a distance between ships visual indicating system. The B/B line has colored flags attached to it which are spaced 20 ft. apart. The colored flags correspond to the colored pins on the "rake". Example: The outer most pin on the "rake" is white and represents 180 ft of distance abeam. The B/B line flag is white with the number 180 painted on it. When the B/B line is being tended properly, the reference point for determining distance abeam using the B/B line flags, is the life raft "barrels" outboard of the starboard catwalk forward of elevator no. 1. Caution: Hull contour of the delivery/receiving ship and improper tending of the B/B line can cause a disparity in "rake" and B/B line distance abeam reading. At night a cluster of 3 chemical lights will be attached at the 60, 100, 140 and 180 ft flag markers. There will be 1 chemical light at all other flag markers 5
ACCOMPLISHER: *Conning Officer*

[11224] Conduct Normal Breakaway after CONREP of Supplies 6
ACCOMPLISHER: *Conning Officer*

[11224.1] IF all lines are clear between CARL VINSON and the delivery/receiving ship THEN order HAUL DOWN PREP 7
ACCOMPLISHER: *Officer of the Deck*

[11224.2] Notify Central Control "BREAK THE ALONGSIDE MANEUVERING COMBINATION. ANSWER THE ORDERED BELL ON ALL FOUR SHAFTS" 8
ACCOMPLISHER: *Navigator*

[11224.3] Verify with the Officer of the Deck that CARL VINSON is clear of surface contacts to port 9
ACCOMPLISHER: *Navigator*

[11224.4] Order new course to the left to clear the delivery ship using increments of 2 degrees. When CARL VINSON is 300 ft. to port of the delivery ship order new course to the left using increments of 5 degrees 10
ACCOMPLISHER: *Conning Officer*

[11225] Conduct Emergency Breakaway during CONREP of Supplies 11
ACCOMPLISHER: *Conning Officer*

[11225.1] Order Quartermaster to sound six short blasts with the ships whistles 12
ACCOMPLISHER: *Officer of the Deck*

[11225.2] Make 5MC announcement "ON CARL VINSON EMERGENCY BREAKAWAY, EMERGENCY BREAKAWAY, EMERGENCY BREAKAWAY ALL HANDS STAND CLEAR OF THE STARBOARD SIDE" 13
ACCOMPLISHER: *Navigator*

[11225.3] Notify all ships in the formation by bridge radio communications that CARL VINSON is executing an emergency breakaway 14
ACCOMPLISHER: *Officer of the Deck*

[11225.4] Order bridge replenishment stations sound powered phone talkers to pass the word to all stations "EMERGENCY BREAKAWAY, EMERGENCY BREAKAWAY, EMERGENCY BREAKAWAY" 2
ACCOMPLISHER: *Officer of the Deck*

[1123] Rig Required Stations for CONREP of Supplies 3
ACCOMPLISHER: *First Lieutenant*

[1124] Connect Required Ship to Ship Stations for CONREP of Supplies 4
ACCOMPLISHER: *First Lieutenant*

[1125] Operate Required Stations for CONREP of Supplies 5
ACCOMPLISHER: *Commanding Officer*

[11251] Transfer supplies from Ship to Ship 6
ACCOMPLISHER: *First Lieutenant*

[11252] Transfer supplies from CONREP station to Stowage 7
ACCOMPLISHER: *Supply Officer*

1. Planning - Determine physical lay out and Determine what is coming (see p. UNREP119, line UNREP119A)
2. Staging and transfer of stores (see p. UNREP120, line UNREP120A)

[11252.1] Planning - Determine physical lay out and Determine what is coming 8
ACCOMPLISHER: *[SUPO* Supply Officer *]*

[11252.11] Determine Transfer Points for moving supplies 9
ACCOMPLISHER: *[MAIR* [SUPO] *]*

[11252.12] Determine Segregation Points for holding supplies of unknown destination 10
ACCOMPLISHER: *[MAIR* [SUPO] *]*

[11252.13] Determine Staging Points for supplies 11
ACCOMPLISHER: *[MAIR* [SUPO] *]*

[11252.2] Staging and transfer of stores 12
ACCOMPLISHER: *[SUPO* Supply Officer *]*

1. Receive listing of stores to be received (see p. UNREP121, line UNREP121A)
2. Identify supplies as they arrive and determine which Staging Points they should go to. (see p. UNREP127, line UNREP127A)
3. Move supplies to Staging Point (see p. UNREP123, line UNREP123A)
4. Strike stores to storerooms (see p. UNREP135, line UNREP135A)
5. Inventory stores by matching STOW copy with ROB copy of initial listing. (see p. UNREP136, line UNREP136A)
6. Survey any losses and Post receipts (see p. UNREP137, line UNREP137A)
7. Verify UNREP evolution with spot checks (see p. UNREP138, line UNREP138A)

[11252.21] Receive listing of stores to be received 13
ACCOMPLISHER: *[SXO1* Assistant Supply Officer *]*

[11252.22] Identify supplies as they arrive and determine which Staging Points they should go to. 14
ACCOMPLISHER: *S2,S8,S6, and S8 Divisional representatives*

1. Handling of stores that go to storerooms (see p. UNREP122, line UNREP122A)
2. Handling of MSP and Flight Gear stores (see p. UNREP128, line UNREP128A)
3. Handling of DTO stores (see p. UNREP129, line UNREP129A)

[11252.221] Handling of stores that go to storerooms 15
ACCOMPLISHER: *S2, S8, S6, and S8 Division Representatives*

1. If known which storeroom THEN move stores (see p. UNREP141, line UNREP141A)
2. If not known which storeroom THEN segregate (see p. UNREP147, line UNREP147A)

[11252.2211] If known which storeroom THEN move stores 16
ACCOMPLISHER: *Forklift Operator*

[11252.22111] Move stores to transfer point 2
ACCOMPLISHER: *Forklift Operator*

[11252.22112] Move stores to staging point for that storeroom 3
ACCOMPLISHER: *Forklift Operator*

[11252.2212] IF not known which storeroom THEN segregate 4
ACCOMPLISHER: */SXO1* Assistant Supply Officer]

[11252.22121] Determine storeroom 5
ACCOMPLISHER: */SXO1* Assistant Supply Officer]

[11252.22121.1] Move to segregation point 6
ACCOMPLISHER: *Forklift Operator*

[11252.22121.2] Determine location from NIMS 7
ACCOMPLISHER: */SXO1* Assistant Supply Officer]

[11252.22122] Move to storeroom 8
ACCOMPLISHER: *Forklift Operator*

[11252.22122.1] Move stores to transfer point 9
ACCOMPLISHER: *Forklift Operator*

[11252.22122.2] Move stores to staging point for that storeroom 10
ACCOMPLISHER: *Forklift Operator*

[11252.222] Handling of MSP and Flight Gear stores 11
ACCOMPLISHER: */SXO6* S6 Division Officer]

[11252.2221] Transfer of supplies to S6 storerooms 12
ACCOMPLISHER: */SXO6* S6 Division Officer]

[11252.2222] Inventory of stores completing paperwork and forwarding to S1 13
ACCOMPLISHER: */SXO6* S6 Division Officer]

[11252.223] Handling of DTO stores 14
ACCOMPLISHER: *Divisional Representatives*

[11252.2231] Segregate stores by department 15
ACCOMPLISHER: *S2, S3, S6, and S8 Representatives*

[11252.2232] Notify department to strike stores 16
ACCOMPLISHER: *S8 Division Officer*

[11252.2233] Inventory and prepare paperwork for S1 17
ACCOMPLISHER: *Department Supply PO*

[11252.23] Move supplies to Staging Point 18
ACCOMPLISHER: *Forklift operators*

[11252.24] Strike stores to storerooms 19
ACCOMPLISHER: */SXO8* S8 Division Officer]

[11252.25] Inventory stores by matching STOW copy with RCR copy of Initial listing. 20
ACCOMPLISHER: */SXO6* S8 Division Officer]

[11252.26] Survey any losses and Post receipts. 21
ACCOMPLISHER: */SXO1* S1 Division Officer]

[11252.261] Survey any losses 22
ACCOMPLISHER: */SXO1* S1 Division Officer]

[11252.262] Post Receipts of supplies received 23
ACCOMPLISHER: */SXO1* S1 Division Officer]

[11252.27] Verify UNREP evolution with spot checks. 24
ACCOMPLISHER: */ZZCO* Commanding Officer]

[12221] Prepare vertrep drop zones 2
ACCOMPLISHER: *Aircraft Han. ing Officer*

[12223] Prepare hangar deck staging area 3
ACCOMPLISHER: *Hangr Deck Officer*

[1224] Operate Required stations for VERTREP of Supplies 4
ACCOMPLISHER:

[12241] Transfer supplies from VERTREP drop zone to elevator 5
ACCOMPLISHER: *[SUPO* Supply Officer]

[12242] Transfer supplies from elevator to stowage 6
ACCOMPLISHER: *Supply Officer*

1. Planning - Determine physical lay out and Determine what is coming (see p. UNREP175, line UNREP175A)
2. Staging and transfer of stores (see p. UNREP179, line UNREP179A)

[12242.1] Planning - Determine physical lay out and Determine what is coming 7
ACCOMPLISHER: *[SUPO* Supply Officer]

[12242.11] Determine Transfer Points for moving supplies 8
ACCOMPLISHER: *[VAIR* [SUPO]]

[12242.12] Determine Segregation Points for holding supplies of unknown destination 9
ACCOMPLISHER: *[VAIR* [SUPO]]

[12242.13] Determine Staging Points for supplies 10
ACCOMPLISHER: *[VAIR* [SUPO]]

[12242.2] Staging and transfer of stores 11
ACCOMPLISHER: *[SUPO* Supply Officer]

1. Receive listing of stores to be received (see p. UNREP180, line UNREP180A)
2. Identify supplies as they arrive and determine which Staging Points they should go to. (see p. UNREP181, line UNREP181A)
3. Move supplies to Staging Point (see p. UNREP200, line UNREP200A)
4. Strike stores to storerooms (see p. UNREP201, line UNREP201A)
5. Inventory stores by matching STOW copy with ROB copy of initial listing. (see p. UNREP202, line UNREP202A)
6. Survey any losses and Post receipts (see p. UNREP203, line UNREP203A)
7. Verify UNREP evolution with spot checks (see p. UNREP205, line UNREP206A)

[12242.21] Receive listing of stores to be received 12
ACCOMPLISHER: *[SXO1* Assistant Supply Officer]

[12242.22] Identify supplies as they arrive and determine which Staging Points they should go to. 13
ACCOMPLISHER: *S2,S8,S6, and S8 Divisional representatives*

1. Handling of stores that go to storerooms (see p. UNREP182, line UNREP182A)
2. Handling of MSP and Flight Gear stores (see p. UNREP193, line UNREP193A)
3. Handling of DTO stores (see p. UNREP195, line UNREP195A)

[12242.221] Handling of stores that go to storerooms. 14
ACCOMPLISHER: *S2, S8, S6, and S8 Division Representatives*

1. If known which storeroom THEN move stores (see p. UNREP183, line UNREP183A)
2. IF not known which storeroom THEN segregate (see p. UNREP186, line UNREP186A)

[12242.2211] If known which storeroom THEN move stores. 15
ACCOMPLISHER: *Forklift Operator*

[12242.22111] Move stores to transfer point 16
ACCOMPLISHER: *Forklift Operator*

[12242.22112] Move stores to staging point for that storeroom 17
ACCOMPLISHER: *Forklift Operator*

[12242.2212] IF not known which storeroom THEN segregate 2
ACCOMPLISHER: */SXO1* Assistant Supply Officer]

[12242.22121] **Determine storeroom** 3
ACCOMPLISHER: */SXO1* Assistant Supply Officer]

[12242.22121.1] **Move to segregation point** 4
ACCOMPLISHER: *Forklift Operator*

[12242.22121.2] **Determine location from NIMS** 5
ACCOMPLISHER: */SXO1* Assistant Supply Officer]

[12242.22122] **Move to storeroom** 6
ACCOMPLISHER: *Forklift Operator*

[12242.22122.1] **Move stores to transfer point** 7
ACCOMPLISHER: *Forklift Operator*

[12242.22122.2] **Move stores to staging point for that storeroom** 8
ACCOMPLISHER: *Forklift Operator*

[12242.222] Handling of MSP and Flight Gear stores 9
ACCOMPLISHER: */SXO6* S6 Division Officer]

[12242.2221] **Transfer of supplies to S6 storerooms** 10
ACCOMPLISHER: */SXO6* S6 Division Officer]

[12242.2222] **Inventory of stores completing paperwork and forwarding to S1** 11
ACCOMPLISHER: */SXO6* S6 Division Officer]

[12242.223] Handling of DTO stores 12
ACCOMPLISHER: *Divisional Representatives*

[12242.2231] **Segregate stores by department** 13
ACCOMPLISHER: *S2, S3, S6, and S8 Representatives*

[12242.2232] **Notify department to strike stores** 14
ACCOMPLISHER: *S8 Division Officer*

[12242.2233] **Inventory and prepare paperwork for S1** 15
ACCOMPLISHER: *Department Supply PO*

[12242.23] Move supplies to Staging Point 16
ACCOMPLISHER: *Forklift operators*

[12242.24] Stow stores in storerooms 17

[12242.25] Inventory stores by matching STOW copy with ROB copy of Initial Listing 18
ACCOMPLISHER: */SXO8* S8 Division Officer]

[12242.26] Survey any losses and Post receipts 19
ACCOMPLISHER: */SXO1* S1 Division Officer]

[12242.261] **Survey any losses** 20
ACCOMPLISHER: */SXO1* S1 Division Officer]

[12242.262] **Post Receipts of supplies received** 21
ACCOMPLISHER: */SXO1* S1 Division Officer]

[12242.27] Verify UNREP evolution with spot checks 22
ACCOMPLISHER: */ZZCO* Commanding Officer]

[1224[illegible] Secure from VERTREP of Supplies. 23
ACCOMPLISHER:

[1225] Secure from Flight Quarters 24
ACCOMPLISHER: *AIR Officer*

[1225] Transport Supplies from staging area to Stowage area 2
ACCOMPLISHER: *Supply Officer*

[123] Perform Post VERTREP operations 3
ACCOMPLISHER: [ZZCO Commanding Officer]

[13] CONREP/VERTREP of Supplies 4
ACCOMPLISHER: *Commanding Officer*

[131] Prepare for CONREP/VERTREP of Supplies 5
ACCOMPLISHER: *Commanding Officer*

[1311] Conduct planning meeting for CONREP/VERTREP of Supplies 6
[1312] Determine Ships requirements for CONREP/VERTREP of supplies 7
[1313] Determine Rendezvous Position for CONREP/VERTREP of Supplies 8
[1314] Send Required Messages for CONREP/VERTREP of Supplies 9
[1315] Perform Operational check of equipment for CONREP/VERTREP of Supplies 10
[1316] Promulgate required notices for CONREP/VERTREP of Supplies 11
[132] Conduct CONREP/VERTREP of Supplies 12
ACCOMPLISHER: [ZZCO Commasnding Officer]

[133] Perform Post CONREP/VERTREP operations 13
ACCOMPLISHER: [ZZCO Commanding Officer]

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APPENDIX G

LISTING OF SORM SUBNETS

here is the listing of SORM frames on the PERQS.

Subnet	Frames	Machine
Basic	85	OXOW
Billet	108	OXOW
Config	1	OXOW
Cvbill	56	OXOW
CVBillI	38	OXOW
CVBoard	86	OXOW
CVCom	104	PERS
Cvcompt	528	PERS
CvglobalI	60	PERS
CvInv	51	OXOW
Cvlayout	3	NAVO
CVMaint	44	PERS
CVNctD	53	NAVO
CVNNotes	5	NAVO
CVOps	4	NAVO
CVOrg	1234	OXOW
CVOrgA	251	OXOW
CVOrgI	219	OXOW
CVRule	38	NAVO
Cvpd	15	PERS
CVPub	72	INPUTB
CVPubI	35	INPUTB
CVRef	114	NAVO
CVThry	107	PERS
Fight	174	NAVO
General	141	OXOW
UnderConFig	2	NAVO
Cvpari	9	NAVO
Cvts	4	PERS

Cvrepair	5	NAVO
Over	40	PERS
Org	31	OXOW
CVPlan	198	OXOW
CVResp	2	OXOW
CVMgmt	29	NAVO
CVMorale	722	NAVO
CVPers	101	NAVO
CVSupp	365	NAVO
CVEvol	923	NAVO
Unrep	427	NAVO

APPENDIX H

EVALUATION TEAM RECOMMENDATIONS FROM CARL VINSON SHIP VISITS

ZOG/VINSON TECHNOLOGY DEMONSTRATION

EVALUATION RECOMMENDATIONS

19 MAY 1983

- INSTALL GLARE SHIELDS ON DISPLAYS (ONR WILL SEND)
- INSTALL VIBRATION DAMPENING MATERIAL TO EXTENT POSSIBLE ON ALL MACHINES AND FLOOR UNITS (IF SHIP CANNOT PROVIDE, ONR WILL SEND)
- EXAMINE WORK STATIONS FOR POSSIBLE REALIGNMENT OF FLOOR UNIT PROCESSOR TO IMPROVE ACCESSIBILITY OF FLOPPY DISC.
- AN EXCELLENT PROCEDURE FOR DAILY BACKUP HAS BEEN DEVELOPED, AND IS BEING FOLLOWED BY THE MANAGEMENT DEPARTMENT - SHOULD BE CONTINUED.
- EXCELLENT PMS PROCEDURES FOR THE PERQ MACHINES HAVE BEEN DEVELOPED, AND IMPLEMENTED BY THE MANAGEMENT DEPARTMENT - SHOULD BE CONTINUED.
- IMPLEMENT NAVY INTEGRATED LOGISTICS SUPPORT SYSTEM. THIS HAS BEEN IMPLEMENTED BY MANAGEMENT DEPARTMENT. RESOLVES MAJOR CONCERN OF PROJECT SPONSORS.
- MANAGEMENT DEPARTMENT NEEDS TO INSTITUTE MECHANISM TO ENABLE USER TO GET AGENTS WRITTEN FOR HIM.
- STRONGLY SUPPORT MANAGEMENT DEPARTMENT'S PRESENT EFFORT TO DEVELOP & IMPLEMENT A MAILBOX - ZOG USERS COMMUNICATION SYSTEM. ENCOURAGE IMPLEMENTATION ASAP. RECOMMEND ESTABLISHMENT OF SEPARATE MAILBOX FOR SYSTEM USER COMMENTS.
- RECOMMEND REGULAR ZOG USERS MEETINGS TO DISCUSS PROBLEMS, CHANGES, ETC. HAVE NEXT MEETING BEFORE NEXT ZOG VERSION IS INSTALLED.
- RECOMMEND USE OF SEVERAL, CHEAP, LOCAL PRINTERS TO FACILITATE DISPERSAL OF INFORMATION TO SUBORDINATES (AFTER 1 NOVEMBER 1983).
- EMPHASIZE DEVELOPMENT OF SUBNETS ACROSS ADDITIONAL DEPARTMENTS TO SOME MINIMUM LEVEL TO ACHIEVE REQUIRED DEPARTMENTAL LINKAGES.
- RECOMMEND THAT, FOLLOWING RESOLUTION OF THE SYSTEM MALFUNCTIONING PROBLEM, THE MANAGEMENT DEPARTMENT REDIRECT EFFORT TOWARD THE IMPROVEMENT OF INITIAL AND FOLLOWON USER TRAINING.
- RECOMMEND THE CREATION OF A GLOBAL STATUS FRAME REPORTING THE STATUS OF ALL PERQS. ACCOMPLISHED THIS WEEK.
- RECOMMEND DELETION OF THE GUEST SIGN ON TO MAKE A MORE ACCURATE RECORD OF USAGE.
- RECOMMEND A RENEWED EFFORT TO ENSURE THAT EACH USER LOGS ON AND OFF.
- RECOMMEND THAT WHEN STATUS FILES ARE LOST, AN ENTRY BE MADE BY THE MANAGEMENT DEPARTMENT NOTING DAY AND TIME OF LOST DATA SO THAT MISSING DATA CAN BE ACCOUNTED FOR.

- RECOMMEND THAT MANAGEMENT DEPARTMENT ADD A FIELD TO PARTS USAGE LOG TO INDICATE MACHINE I.D. NUMBER AND LOCATION.

- RECOMMEND THE RECREATION OF A SUBNET INDICATING LOCATION, COMPONENT NUMBER , AND PERQ MACHINE IDENTIFICATION.

- RECOMMEND THAT AN AGENT BE CREATED THAT WILL RECORD SUBNET SIZES. ACCOMPLISHED THIS WEEK.

- STRONGLY RECOMMEND THAT ALL EFFORTS BE EXPENDED TO RESOLVE SYSTEM MALFUNCTIONING PROBLEM. IF SOFTWARE PROBLEM RESOLUTION REQUIES OUTSIDE SUPPORT, DAVID TAYLOR WILL INSTITUTE A CONTRACT TO OBTAIN THE NECESSARY SUPPORT.

- RECOMMEND THAT THE MANAGEMENT DEPARTMENT MODIFY THE PLAN WRITING AGENT TO HIGHLIGHT TIMING @ONFLICTS.

- RECOMMEND THAT THE MANAGEMENT DEPARTMENT INSTITUTE PROCEDURE FOR REVIEWING NEWLY GENERATED FRAMES FOR FITNESS OF FRAME STYLE.

ZOG EVALUATION COMMENTS

01Oct83

* There has been a major increase in the number and depth of ship supporting ZOG subnets during the last 2 months. Notable subnet expansion is present across and within departments. For example, the Reactor Office, Engineering, AIMD, Personnel and Weapons Elevator departments have substantially expanded their subnets and number of users.

* The number of users has increased, along with their skill level.

* Increase in users and net expansion, in part, due to improved system software functioning. ZOG system and Airplan, while still containing problems, are operating more reliably than 2 months ago. David Taylor will relate to CMU the ship's concern for high priority software problems. Resolution of the logoff problem is a critical issue.

* ZOG management is functioning well and evidences increased interaction with the user. This is apparent to the Evaluation group and the ZOG users on board, for both the officer and enlisted contingents of the Management department.

* Management department staffing will become an issue by March 1984. The ship needs to consider means to replace staff. For longer range, the idea of obtaining staff members from Navy P. G. school, and having a ZOG development effort located at the P. G. school vice or in addition to CMU should be explored.

* The ZOG management group needs to increase interaction with Vinson personnel at CMU. David Taylor will explore means to increase communication with CMU located personnel.

* The ZOG management division needs to continue to expand interaction with users both individually and in groups. The development and implementation, by the Management department of the mailbox and individual user top frame have been significant contributions to improved ZOG system utilization.

* Suggest the Management department conduct 2 kinds of user meetings on an aperiodic basis: (1) A beginning users level of meeting that would present basic software changes and discuss issues with non-technical language, and (2) An intermediate/advanced user's meeting for higher level technical issues. (Anyone could attend any meeting.)

* To further aid the user, hard copy user guides should be developed/revised and distributed. These guides should be: (1) A basic simple guide for new users, (2) An intermediate guide listing editor and agent user commands, and (3) An advanced guide for sophisticated users. This documentation is vital to continuation of ZOG use.

* The Executive Officer's Division Officer ZOG meetings are excellent and are already impacting the involved divisions. These new users are developing relatively basic subnets, such as leave, transfer, and training schedules, that are serving department needs while teaching these division officers the operating procedures and capabilities of the ZOG system.

* For all types of users the management group should encourage and aid the development of turnover subnets for people scheduled to depart the Vinson.

* As system use increases, the allocation of Perqs and other equipment will become a crucial issue. The Management department needs to review present Perq allocation on the basis of current departmental needs. A specific recommendation is to relocate the Perq from the Supply department to a department having a greater need for it.

* An unused Diablo printer, presently in the Assistant Strike Officer office should be installed at a Perq location where it could be used. Possibilities include the Reactor Officer or Engineering.

* To aid in full terminal use, the ship should consider establishment of a Perq/Wang terminal room. This room, and the terminals, would be available to any user. ZOG management enlisted personnel could manage the room and serve as ZOG/Wang tutors. Additionally, the room could serve as a training location at specified times. Obviously, providing terminals for this space is a concern. This room would greatly facilitate access to terminals.

* Perq maitenance procedures under the EMO are good and the trouble-reporting system is working well. Excessive hardware malfunctions of Perq machines have drastically cut into spare parts supply. David Taylor will seek to advance release of parts funds to ZOG management.

* Perq maintainers will need the manufacturers 2 week training prior to the next cruise. Tentative desired schedule for the Perq systems hardware training, conducted onboard, is the Jan-Feb 1984 time period.

* The placement of an operating Perq in the EMO spaces would facilitate communication regarding trouble calls, EMO use of the ZOG system, and improved maintenance through greater operational familiarity.

* Because of immediate hardware problems, David Taylor will work to get Perq manufacturer technicians to the ship in Alameda asap.

APPENDIX I

PREVENTIVE MAINTENANCE SERVICE (PMS) ON THE PERQ COMPUTER SYSTEM

PMS ON THE PERQ COMPUTER SYSTEM

Tools Required: One medium size phillips head screwdriver
One large size flat head screwdriver
One paint brush
One vacuum cleaner

Personnel Required: One man. (Two if PERQ must be moved for convenience)

Time Required: One Man hour

Unplug all the cables from the rear of the perq. There should be five in all.
Remove the four front cover screws.
Remove the front cover.
Remove the four back cover screws.
Remove the back cover.
Remove the two left side cover screws.
Remove the left cover.
Remove the two right side cover screws.
Remove the right cover.
Remove the top cover.
Remove the two screws holding the card cage which are located above the hard disk, on the centerline.
Unplug the two cables leading from the IO board. Disconnect the cables from the holders on the side of the card cage. Wrap the top cable over the top of the perq, and wrap the bottom cable under the perq.
Unplug both the JA and JB connectors from the power supply, and place them under the perq.
Lift out the card cage by placing your left hand under the front of the power supply and your right hand under the back of the power supply. Lift the card cage straight up until it comes off track. Then move it straight out clear of the perq.
Place the card cage on top of the perq very carefully. The JA and JB connectors should be on top.
Remove the power supply by sliding the card cage so that the power supply is hanging over the edge. As you look down at the power supply there should be two screws on the oppsite side as the JA and JB connectors. One foward and one aft on the power supply. Remove these two screws and swing the power supply out from the card cage. Unclip the small clip and the bar clip and remove the power supply.
Clean the power supply with the paint brush and the vacuum cleaner.
Replace the power supply by connection the bar clip and then the small clip. Screw the two screws back into the power supply through the card cage, and place the card cage out of the way.
Unplug the two cables going to the disk drive, and the ribbon cable.
Remove the hard disk by removing the two bottom screws, one located fwd on the bottom of the hard disk and one located aft on the bottom of the hard disk. Then remove the top aft screw while holding the disk drive up. Hold the disk drive up by placing one hand under the top lip of the disk drive. Then slide the disk drive so that it rests on the bottom edge of the frame. Then remove the top front screw while holding on to the disk drive. Hold on to the disk drive by placing one hand under the heat exchanger. To completely remove the disk drive pick it up with one hand under the heat exchanger and one hand under the aft upper lip of the hard disk and swing it free of the perq.
Clean any dirt off the hard disk with the paint brush and vacuum cleaner.

Clean any dirt off whats left of the perq. Then turn the perq on its back. Clean any dirt off the inside bottom and outside bottom. When it is clean then begin to reassamble it.
Place the perq back on its feet.
Make sure that the ribbon cable running under the disk drive and the card cage is still in the right position.
Place the hard disk back into the disk drive slot, holding it the same way you took it off. Place the front top screw in first. Then the aft top screw. Then place the two bottom screws in. The order does not matter for the two bottom screws. Then reconnect the to cables and one ribbon cable to the hard disk.
Place the card cage back into the perq by sliding it in the oppsite way you took it out. Make sure that it rests on both the top and bottom tracks. Slide it all the way to the rear of the perq. Now connect the JA and JB connectors to the power supply. Place the ribbons back on the side of the card cage, and reconnect to the IO board.
Place the screws back into the card cage on the top above the hard disk.
Place the top cover on.
Place the side covers on and screw down.
Place the front cover on and screw down.
Place the rear cover on and screw down.
Plug all connectors into the back.
Turn the perq on and take it into ZOG.

APPENDIX J

LIST OF ALL ZOG AGENTS ON SYSTEM

Alphabetical list of unique subnets on Local, including all Agents

Table of Contents

<V Global
Help
Primer1

APPENDIX K

LIST OF THE ZED EDITOR COMMANDS

INSERT
a new selection: I
new text in front of the current character: i
a new option after the last option: X
new text at the end of the current item: x
a 'timestamp' at the current cursor location in the text: w or i...Ctrl-W
contents of the buffer at the current cursor location in the text: ^Y

DELETE the
current item: D
current character: d
text from the current character up to some character: k
contents of the buffer: #

REPLACE the
text from the current character up to some character: m
current character: c
current character: r
'next-frame' field for the current item: n
current item: R
global pad set: G
current character with its other case: v
selection character for the current selection: z

MOVE the CURSOR to the
any character: move mouse + click button
next character: <space>
previous character: Ctrl-H
next selection: LF
previous selection: INS
next occurance of a given character: s
selection with a given selection character: S
beginning of the text of the current item: l
beginning of the frame text: L
next occurance of a string: f
previous word: :
next word: ;

DISPLAY for EDITING the
frame action: A
selection action: a
frame comment: C
frame expansion string: Y
selection expansion string: y

MISC Commands
Display help for the editor in the other window: H or h
Exit the editor, saving the changes made: E or e
Exit the editor, without saving the changes made: Q or q
Reposition the current item: p
Reposition all the options as a group: P
Reformat the options: F
Justify the text for the current item: J
Justify the text for the current item, starting at the current character: j
Transpose the current character with the next character: t

A	edit the frame action
a	edit the action for the current selection
C	edit the frame comment
c	change the current character "5c" replaces the next five characters with the next five typed
D	delete the current item
d	delete the current character "3d" deletes the next 3 characters, "%d" deletes the remaining text
E or e	exit the editor, saving the changes made
F	reformat the options "0F" places 0 blank lines between the options (single spacing) "1F" or "F" places 1 blank line between options (double spacing)
f	find a string in the current item "f...INS" finds the next occurrence of the string specified
G	change the global pads frame for the frame
H or h	display help for the editor
I	insert a new selection
i	insert new text before the current character
J	justify the entire text for an item
j	justify the text for an item starting at the current character
k	delete text from the current character up to some char <k> "kt" deletes characters up to the next occurrence of "t"
L	move the ZED cursor to the frame text
l	move the ZED cursor to the first character of the current item
m	replace the text from the current item up to some char <k> "mb...INS" replaces the characters up to "b" with the input typed
n	change the next-frame for the current item
P	reposition all the items as a group
p	reposition the current item
Q or q	exit the editor without making any changes
R	replace the current item
r	replace the current character "4r...INS" replaces the next four characters with the input typed
S	move the ZED cursor to a selection with selection character "S4" moves the ZED cursor to selection "4"
s	move the ZED cursor to the next occurrence of character <k> "sw" moves the cursor to the next occurrence of "w"
	transpose the current and next characters
	invert the case of the current word
	insert a timestamp in front of the current character
X	extend the options "0X" inserts a new option after the last option with no separation "1X" or "X" extends the options with 1 blank line as separation
x	extend the text for the current item
Y	edit the expansion string for the whole frame
y	edit the expansion string for the current selection
z	change the selection character for the current selection
INS	move the ZED cursor to the previous selection
LF	move the ZED cursor to the next selection
Ctrl-H	move the ZED cursor to the previous character
<space>	move the ZED cursor to the next character
Ctrl-T	insert a timestamp while in the insert mode
S	suspend editing the frame and return to ZOG mode
^	insert the contents of the buffer in front of the current character
#	delete the contents of the buffer
;	move the ZED cursor to the next word
:	move the ZED cursor to the previous word
_	replace the frame with the contents of another frame

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