SEAOPS manual: Navy hovercraft operations

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RÉSUMÉ

Dès le début de l'étude sur un engin de débarquement à sustentation aérodynamique (LCAC), il avait été déterminé que la préparation du manuel d'exploitation correspondant nécessitait une approche unique. Bien que le LCAC soit un bâtiment de surface, la conception de base s'est inspirée des techniques utilisées pour les avions. C'est pourquoi ce manuel s'articule autour des procédures éprouvées, tirées des manuels correspondants utilisés en aéronavale et dans le cas des navires de surface.

Axé sur les besoins de l'équipage, le manuel SEAOPS (Safe Engineering and Operations) se veut un guide complet de toutes les procédures requises : vérifications avant et après chaque mission avec le choix d'une rotation rapide ou d'une vérification approfondie; montée en puissance et vice versa; mise en marche et arrêt du groupe auxiliaire de bord et du moteur principal. Trois listes distinctes sont prévues pour vérifier le lancement du groupe auxiliaire à partir soit de la batterie d'accumulateurs, soit d'une source extérieure. D'autres listes sont également prévues concernant les départs vers et depuis une base terrestre ou un navire de débarquement. Enfin, les opérations courantes, exception faite des manoeuvres tactiques, y sont expliquées en détail.

Le manuel d'exploitation donne une courte description de l'engin, décrit les procédures à suivre en cas d'urgence ou d'avarie, explique les manoeuvres de base pour la manutention des marchandises et fournit des renseignements utiles à l'équipage. Les procédures à suivre en cas d'avarie se sont inspirées de celles utilisées à bord des navires de guerre et leur présentation suit le même format que celui des documents similaires se trouvant à bord de ces derniers.

Le SEAOPS constitue un document dynamique à évolution rapide et structurée. Il comporte une version abrégée du manuel proprement dit, un manuel d'information sur l'engin, un manuel d'exploitation pour la desserte d'un navire de débarquement et un manuel explicatif des manoeuvres de manutention. On y trouve également les conditions devant être respectées pour la certification des membres de l'équipage. Des procédures ont été prévues pour tenir compte rapidement d'un changement quelconque, soit dans l'exploitation de l'engin, soit dans sa fabrication.

Devenu LE MANUEL du LCAC par excellence, ce document ouvre la voie aux opérations navales sur aéroglisseurs.

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ABSTRACT

Early in the development of the Navy Landing Craft Air Cushion (LCAC) it was determined that a unique approach for the craft operations manual was required. While the LCAC is a surface ship, much of the basic design came from aviation technology. From the beginning the Safe Engineering and Operations (SEAOPS) concept used proven, procedural elements drawn from both Naval Aviation and surface ship experience.

Crew oriented, the existing SEAOPS Manual provides all of the operational guidance required to operate the LCAC. This includes craft pre and post mission checks with provision for a quick turnaround, or thorough mission check. Power up and down, APU start and shutdown, and main engine start and shutdown checklists are provided. There are separate APU checklists for battery and external power. Additional checklists address craft departure from and return to a base or a well deck ship. Common operations short of tactical maneuvers also are set forth in detail.

The manual briefly describes the craft, provides emergency and casualty control procedures, outlines basic cargo handling requirements, and provides a chapter with crew usable performance data. The casualty procedures were developed following the procedures of the surface naval warfare community and use formats and diagrams that are similar to those the crews have used aboard ship.

The SEAOPS is a dynamic document that is evolving into a family of publications. This will include a streamlined version of the existing manual, a Craft System (information) Manual, a well deck LCAC Operations Manual for all well deck ships and a Cargo Handling Procedure document. Included in the basic manual will be provisions for certifying LCAC crew members. Procedures are in place for rapid response (change) when required as operational issues arise or craft configuration changes.

The SEAOPS has become THE LCAC manual and an important aspect of the introduction of Hovercraft for Naval operations.

SEAOPS MANUAL:
NAVY HOVERCRAFT OPERATIONS

by
David C. Braa and Donald E. Rayner

The title of this paper tells it all. The Navy had this new craft, an ACV called the LCAC, short for Landing Craft, Air Cushion, and needed the basic documentation required to operate the craft. Employment tactics for the LCAC was another and separate consideration. What was desired were the procedures for operating the craft in all anticipated conditions, both geographic and climactic. The result was the SEAOPS LCAC manual which has been well accepted by the Fleet. The manual in turn has become a key element in the recently established SEAOPS Program that is sponsored by the Chief of Naval Operations.

What is SEAOPS? The acronym stands for Safe Engineering and Operations. The concept for the program adds standardization to safety and operations. This ensures that all Navy LCAC operators perform a given function in the same manner.

SEAOPS approach evolved from two existing Navy programs. One of these, EOSS, Engineering Operational Sequencing System, is used in all surface ships today for starting and shutting down equipment and for equipment casualty control procedures. The other, NATOPS, Naval Air Training and Operational Procedures Standardization, addresses each type of Navy aircraft in a separate series of volumes with similar information. Neither of these programs fit the anticipated documentation requirements for LCAC exactly.

In the initial planning it had been determined that LCAC would require (1) an EOSS; (2) a Craft Operator's Manual; and (3) Craft Operational Checklists. In the preparation of the technical manual planning papers for these documents,
it was quickly apparent to both the craft builder and the Navy that a single publication could include all of the desired information. After negotiation, a single SEAOPS craft manual was approved. The manual format, as finally agreed, was patterned on the NATOPS aircraft manuals. However, the terminology, checklist format, and schematic symbols came from EOSS, as items familiar to surface sailors.

The Cold Check/Hot Check validation procedures of EOSS were adapted for use with SEAOPS, as well. A Cold Check includes system tracing using the SEAOPS schematics and a no-power walk through for all operating and casualty procedures, including the pre- and post mission checklists. Cold Check is scheduled to precede Builders

Trials. After the craft is delivered to the Navy, the Hot Check is conducted. The Hot Check includes a repeat system check and an underway period, where a Navy crew demonstrates that the SEAOPS procedures will operate the particular craft. Casualty procedural checks during the Hot Check are walk through type exercises.

As the outline for the SEAOPS craft manual took shape, the content of the manual expanded. The crew for LCAC consists of a Craftmaster, an Engineer/ Assistant Operator, a Navigator, a Loadmaster, and a Deck Engineer. Following the single document approach, the content was designed to include more than the procedures for starting and stopping the craft. Crew actions for all anticipated craft operations were determined to be required. Thus, procedures for the craft mission, cargo handling; routine records and reports; and emergency situations were included. Major topics are listed in Table 1. Throughout the development of the manual the uniqueness of this first Navy ACV document was a major consideration. Hovercraft terms such as plow-in and hump required definition before being addressed in the operational context. Very basic ACV maneuvering techniques had to be incorporated. Finally, the specific actions for each of the five member crew had to be addressed for all casualty and operational procedures.

From the beginning the SEAOPS manual concept included a pocketbook for each crewmember, which was to contain excerpts from the craft manual. This book, called the SEAOPS OCP, Operational and Casualty Procedures, contains all of the LCAC operational, casualty, premission, postmission and emergency procedures. For each item, the OCP mirrors SEAOPS and details responsible crewmember action. Particularly for casualties, the small crew size resulted in negotiated assignments and multi-disciplined responsibility.

The SEAOPS drafts were prepared by the craft builder and reviewed for preliminary approval by committee. This review group consisted of representatives from the Naval Sea Systems Command (PMS377), the Naval Sea Systems Engineering Station, Assault Craft Unit FIVE, (the first LCAC command) and the builder (Textron Marine Systems). The review process is diagramed in Figure 1. The development effort was an interactive process, and the feedback loop was well exercised. The SEAOPS and SEAOPS OCP were prepared over approximately 18 months and coincided with the fabrication and trials of LCAC 1. Since the initial manual was developed, there have been three major revisions, and change three to the latest revision is in process at the present time.

TABLE 1
SEAOPS SUBJECT CONTENT

- LCAC Characteristics
- LCAC System Descriptions
- Control Station Illustrations and Explanation
- LCAC System Technical Manual Listing
- Basic Craft Operating Procedures
- Communications and Navigation Equipment Procedures
- Operational Checklist
  - Power-up
  - APU Start (Power Available)
  - Main Engine Start
  - Departure
  - Return
  - Main Engine Shutdown
  - APU Shutdown (Power Available)
  - Power Down
  - APU Start (Battery)
  - APU Shutdown (Battery)
  - Cold Weather APU Start (Power Available)
  - Cold Weather Main Engine Start
- Determination
  - Cold Weather Main Engine Shutdown
  - Cold Weather APU Shutdown (Power Available)
  - Cold Weather APU Start (Battery)
  - Cold Weather APU Shutdown (Battery)
  - Well Deck Departure (Ship)
  - Mission Departure (Ship)
- Fuel Handling
- Operations
  - Heavy Weather
  - Cold Weather
- Reduced Visibility
  - Radar Operation
  - Maneuvering
  - Operations Overland
- Operations (Cont.)
  - Operations Over Water
  - Well Deck
  - Mooring
  - Anchoring
  - Docking Block
- Casualty Procedures
  - Main Engine
  - APU
  - Propulsion System
  - Engineering Fires
  - Underway Waterwash
  - Radar
  - Communications
  - AMS
  - Purging
- Emergency
  - Fire
  - Collision
  - Abandon Ship
  - Man Overboard
  - Jettison Cargo
- Cargo Handling
- Load Characteristics
- Weight and Balance
- Shoring and Dunnage
- Offloading
  - Land
  - Sea
  - Ship
- Mission Planning
- Performance Data
- Logs, Forms and Records
- Mission Kit Procedures
  - Cold Weather Kit
  - Troop Commander Kit
- Premission Checklist
- Postmission Checklist
- Thrumission Checklist (Quick turn around)
- AMS Description
- Armament
- Glossary

LCAC
SEAOPS MANUAL DEVELOPMENT
(1984 - 1986)

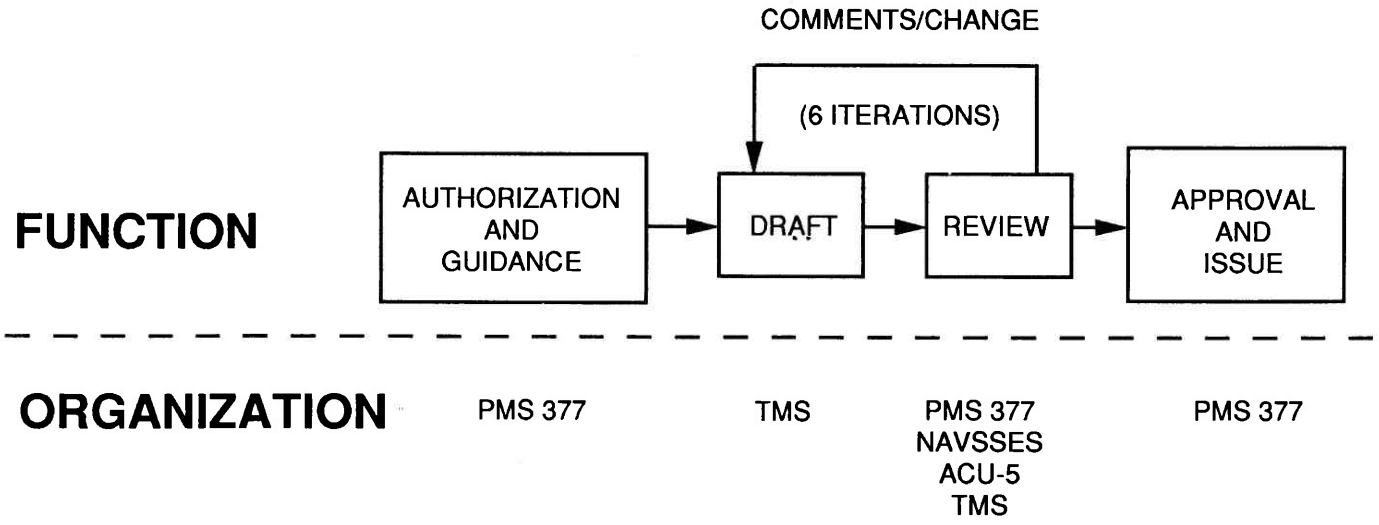

Figure 1. SEAOPS Development Cycle

For a dynamic document such as the SEAOPS craft manual, a responsive change process is important. The goals for SEAOPS change are timely response to emergency requirements; delivery of a modified manual with the craft, when new craft design changes have occurred; and delivery of SEAOPS changes at the same time as modifications are made to existing craft. Normally, changes are made using replacement pages. Procedures exist however, for disseminating pen and ink changes by electronic means.

In the SEAOPS manual development, once the content was agreed, there were three major areas of challenge. First, as alluded to earlier, some of the SEAOPS content became explanation, e.g. ACV operational characteristics, before procedures could be addressed. The manual as written contains several sections of material that were included only because the information was just not available in any other Navy publication. Second, establishing and maintaining an effective liaison with the design engineering team on a new craft is always a continuing effort. For SEAOPS, the situation was exacerbated by the unique aspects of the manual, but an in-house manual support team evolved, once requirements were identified. Third, obtaining information on changes to craft configuration or design became a consideration in the final stages of manual preparation. This subject is related to the second item, but it is a separate concern. A mechanism to insure that late changes get from the engineers to the manual preparers should be put in place early in the planning for this type of effort.

Another area of information coordination potentially could have affected SEAOPS development. Specifically, when testing a craft such as the LCAC, the test engineers often think in terms of craft characteristics as defined in a contract. In many cases the required characteristic is a required performance minimum not a craft limitation. One example was craft speed in sea state 3, where the contract requirement was stated as a limitation until wiser council prevailed. This subject area points up the manual makers requirement for empirical data as opposed to the calculated estimate. It also highlights the requirement for a planned test program to obtain the basic operational characteristic information early in a program of this sort.

One last area of interest in a SEAOPS type manual are the perceived requirements for operational characteristics, whether calculated or from test. The engineer wants as much information as is available on a wide range of subjects. His interest is legitimate, since he deals in finite units in order to resolve an engineering problem, whether damage control or horsepower required. The operator is at the other extreme. He believes that all that is necessary by way of performance data are tables which provide

engine settings, stopping distances and turning radii. In SEAOPS the result was a compromise with basic operator requirements and some engineer's data. The question is really still open, and in the future SEAOPS may contain only that information required to operate the craft. The more detailed material may find a home in the Craft Information Book, a craft systems description.

This year SEAOPS became a formal program sponsored by the Chief of Naval Operations with goals similar to those of the NATOPS program. As the scope broadens, the number of volumes in the SEAOPS series increases. Crew training, qualification and annual requalification will be the subject of Volume II of the series. Content is provided in Table 2. Safety and standardized procedures for both Fleets are the objectives of this document. The third volume will address Well Deck Ship Operations. Both the initial LCAC deployment and the NATOPS experience have demonstrated the requirement for this type of publication. Whereas the craft manual concentrates on LCAC crew action, the well deck ship volume will contain ship crew actions to support LCAC and the ship/craft interface for the five different types of well deck ships in the Navy. One result of this manual will be a reduction in content in the existing craft SEAOPS manual, since ship interface was one of the areas where procedures were included as not provided any place else. A rough outline is provided in Table 3.

Two more documents are candidates for inclusion in the series. One is a Loadmaster's Handbook prepared in two parts. Part 1 is detailed guidance for loading and securing cargo on the LCAC. Part 2 is an illustrated pocketbook containing specific vehicle and serial load characteristics, including LCAC tie-down requirements. The other document is a Basic ACV Manual, which examines the generic ACV in theory, craft features, operations, handling and applications in lay terms. Both of these publications fill gaps in Navy technical documentation and are in the review draft stage.

As part of the larger SEAOPS program, the concept of a SEAOPS Model Monitor is under review. The individual in this position would manage the SEAOPS program with the assistance of a small staff. His functions would include the manual change and review process and training evaluation to an as yet unspecified degree. A qualified LCAC Craftmaster appears to be desireable

TABLE 2
SEAOPS VOL. II, TRAINING
CONTENT

Purpose and Goals
Crew Duties
Training Requirements
  By crew position
Training Plan
Training Organization
Individual Qualification
Requirements
Crew (Team) Requirements
Waiver Procedure
Simulator Use
Qualification Authority
Cancellation of Qualifications
Individual Refresher Training Program
Refresher Training Course Content
Crew Refresher Training
Unit SEAOPS Training Evaluation
Crew Training Standards
Reports and Record Entries

for the position. However, this consideration and program management are in the initial discussion phase by the Navy life cycle managers.

In summary, the SEAOPS craft manual is a unique operating manual designed for the Navy ACV, the LCAC. Development of the manual required (1) a careful determination of content requirements; (2) close coordination between the design engineers and the technical writers; and (3) continuing review by the operators and Navy management. The craft manual is a living document and must be kept current in a timely manner. The operating manual has become part of an operating program, sponsored by the highest Navy command level. Additional, required volumes are in preparation and will be available to the Fleets in FY89. Expanded program management is being examined at the present. The bottom line - SEAOPS is being used to operate the Navy LCAC as planned and has served to bring ACV operations to the attention of the larger Navy community.

TABLE 3
SEAOPS, VOL. III, WELL DECK SHIP
CONTENT

Craft Description
- LCAC Characteristics
- Communications
- Dry Well Operations
- Wet Well Operations
- Foreign Object Damage (FOD)
- Heat, Fumes, and Noise

Safety Responsibilities
- Well Deck Ship
- LCAC Detachment
- Maneuvering
- Embarkation
- Ship Responsibilities
- ACU Responsibilities

Operations
- Responsibilities
- Pre-launch Procedures
- Post-recovery Procedures
- Fueling
- Cargo Handling
- Launch Procedures
- Recovery Procedures
- Alongside Operations
- Craft Assembly Area

Well Deck Support
- Electrical Power
- LCAC Tie-down
- Supply Procedures
- Maintenance
- Water wash
- Crane services
- Waste oil disposed
- Docking Procedures
- Sanitary Considerations

Ship Features (by class)
- LHA
- LHD
- LPD
- LSD 41
- LSD 36