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Final Report:

PEB/LOE PREPARATION ASSISTANCE PROGRAM
for
USS FRANCIS HAMMOND (DE-1067)
and
USS MARVIN SHIELDS (DE-1066)

June 1975

Prepared for

PERA(CRUDES)
PHILADELPHIA NAVAL SHIPYARD
Philadelphia, Pennsylvania

Under Contract N00140-74-D-0090-0004

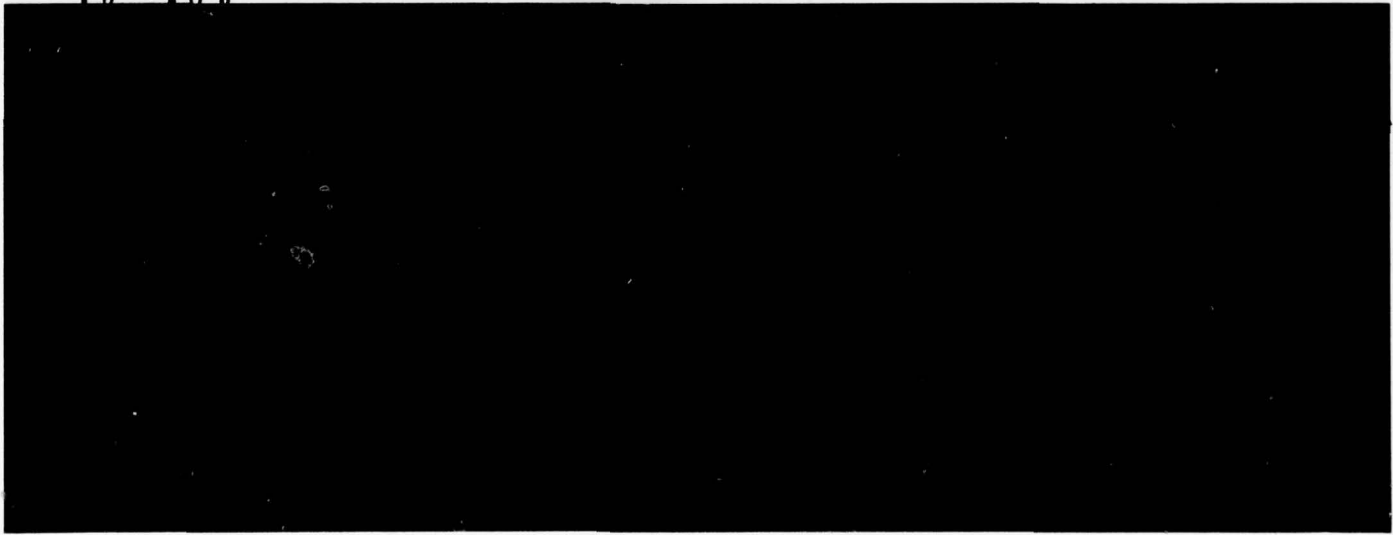
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ABSTRACT

Results of the initial implementation of the PERA(CRUDES) PEB/LOE Preparation Assistance Program are discussed. The effectiveness of that program in assisting DE-type ships in preparing for LOE is assessed; general conclusions on LOE preparation are presented; and recommendations are offered concerning the continuing implementation of the program. Also discussed is the implementation of an automated SFOMS on both ships.

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ABBREVIATIONS

CO	- Commanding Officer
COSAL	- Consolidated Ship's Allowance List
CSMP	- Current Ship's Maintenance Project
ECCM	- Engineering Casualty Control Manual
EDORM	- Engineering Department Organization and Regulations Manual
EO	- Engineer Officer
EOOW	- Engineering Officer of the Watch
LOE	- Light-Off Examination
PEB	- 1200 psi Propulsion Examining Board
PERA(CRUDES)	- Planning and Engineering for Repairs and Alterations (Cruisers and Destroyers)
Plan and Outlines	- <u>DE-Type Management Plan and Program Outlines for Use in PEB/LOE Preparation, July 1974</u>
POAM	- Plan of Action and Milestones
POT&I	- Preoverhaul Tests and Inspections
PQS	- Personnel Qualification Standards
ROH	- Regular Overhaul
SARP	- Ship Alteration and Repair Package
SF	- Ship's Force
SFOMS	- Ship's Force Overhaul Management System
SORM	- Ship's Organization and Regulations Manual
SY	- Shipyard
WC	- Work Center

SUMMARY

The PERA(CRUDES) PEB/LOE Preparation Assistance Program was initiated by ARINC Research Corporation on two ships: USS HAMMOND (DE-1067) and USS SHIELDS (DE-1066).

The Corporation assisted personnel of these ships in their initial use of the new PERA(CRUDES) guidance document, DE-Type Management Plan and Program Outlines for Use in PEB/LOE Preparation; and provided guidance where requested in the LOE preparation process.

Response of Hawaii, Inc., was tasked as a subcontractor to provide an automated SFOMS on both ships.

An objective of the study was to evaluate the effectiveness of the PEB/LOE Preparation Assistance Program. A baseline program for making such evaluations was established, and data pertaining to the LOE preparation efforts of HAMMOND and SHIELDS were compared against that baseline. While initial indications are that the assistance program has proven effective, the smallness of the sample size necessitates that such a conclusion be considered preliminary at this time. The data will become more meaningful as more ships complete the program, which will be introduced aboard seven other ships in other task orders under this contract.

Also unclear at the present is the optimum scope of the Preparation Assistance Program. The commanding officers of HAMMOND and SHIELDS requested that the program be expanded to provide more active participation of PERA personnel in the LOE-preparation process - that is, to actually conduct some preparation tasks. A less costly alternative is to reduce the scope of the assistance program to provide information and services only at the beginning of a ship's LOE preparation effort. The additional preparation assistance activities will permit this matter to be addressed more fully.

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INTRODUCTION

A program developed by PERA(CRUDES) to assist selected DE-class ships in their preparation for PEB/LOE was conducted by ARINC Research Corporation under Contract N00140-74-D-0090. Objectives of this PEB/LOE Preparation Assistance Program were to:

- a. Introduce aboard the selected ships the guidance document, DE Type Management Plan and Program Outlines for Use in PEB/LOE Preparation (hereafter referred to as "Plan and Outlines"); explain its use; evaluate its effectiveness as a LOE-preparation guidance document; and recommend any desirable changes to its content.
- b. Assist ship's force in assessing its starting position in major areas of LOE preparation; and aid the ship in establishing planning milestones for its LOE.
- c. Provide further assistance where requested or recommended. In particular:
 - 1) Review the ship's POT&I report, SFOMS work package, CSMP, SARP, and any other documents requested by the ship for its LOE preparations, for any missing items that would be relevant to the LOE.
 - 2) Suggest administrative documents and methods used by other ships that have successfully prepared for LOE.
 - 3) Monitor the ship's progress in meeting its established milestones, for purposes of evaluating the practicality of the milestones recommended in the Plan and Outlines.
 - 4) Assist ship's force in utilizing and implementing SFOMS.
- d. Evaluate the effectiveness of the PEB/LOE Preparation Assistance Program.

The ships selected by PERA(CRUDES) for PEB/LOE assistance under this task order were USS FRANCIS HAMMOND (DE-1067) and USS MARVIN SHIELDS (DE-1066).

This assistance was provided by ARINC Research in the form of 10 separate tasks, as discussed in Section 2. Conclusions from the study are presented in Section 3, and recommendations in Section 4. Specific areas of PEB/LOE preparation assistance provided HAMMOND and SHIELDS are briefly noted in Appendixes A and B, respectively. Suggested improvements to the Plan and Outlines document are listed in Appendix C. Data supporting the conclusions of this study are presented in Appendix D.

Included in the task order was a directive to implement an automated SFOMS aboard both ships. This task was subcontracted to Response of Hawaii, Inc. Results and recommendations regarding SFOMS are included in this report where applicable.

TASK ACTIVITIES

To aid in the implementation and evaluation of the new PEB/LOE concepts discussed in Section 1, ARINC Research conducted a set of 10 tasks. These tasks, discussed below in the order in which they are defined in the contract statement of work, do not represent a sequence of activities. The diverse assistance provided under this contract necessitated that the first nine tasks be performed in the sequence most helpful to ship's force and PERA(CRUDES) at any given time. The final task (10) provides for the documentation of the overall assistance program in terms of its value in helping USS HAMMOND and USS SHIELDS prepare for PEB/LOE.

2.1 TASK 1: ASSIST SF IN REVIEW OF SARP FOR LOE ITEMS

ARINC Research reviewed all PEB/LOE reports of COMNAVSURFPAC ships for the period 1 January-31 July 1974 to determine which LOE discrepancies occurred most commonly among the ships. These discrepancies were listed, and the listings were then used in reviewing the Ship Alteration and Repair Package (SARP) for HAMMOND and SHIELDS. Any commonly occurring discrepancy not observed in the SARPs was called to the attention of ship's force. Also during the review of the SARPs, those work items noted as being deferred for forces afloat accomplishment were listed for use in later review of the SFOMS data reports (Task 3). After providing the ship with a list of common discrepancies, the ARINC Research representative returned about a month later to discuss their status.

2.2 TASK 2: ASSIST SF IN ESTABLISHING SPECIFIC MILESTONES FOR ACCOMPLISHMENT OF PLAN AND OUTLINES

ARINC Research met with ship personnel to introduce the Plan and Outlines, review the ship's position in all areas of preparation for LOE, and help in establishing milestones for LOE preparation.

USS HAMMOND was visited on 26-27 March 1974 (ROH was scheduled to begin on 1 July). The major LOE-preparation problems recognized were difficulties in PQS implementation and the lack of administrative publications (ship's organizational

manual, SORM, EDORM, ECCM, etc.). HAMMOND had taken positive steps in establishing a POAM. ARINC Research reviewed that document and offered recommendations for its improvement.

USS SHIELDS was visited on 17-18 April 1974 (scheduled ROH start was 15 July). The major problem noted was that the SORM and EDORM were inadequate, and correcting them would probably require the major portion of LOE preparation time in the administrative area. A POAM had been prepared before the ARINC Research visit, but that plan was too general and it was decided (on ARINC Research's recommendation) to utilize the "Plan" portion of the Plan and Outlines. Final establishment of LOE milestones was deferred until the arrival of the new CO and EO in late June.

2.3 TASK 3: REVIEW SFOMS DATA ENTRY FORMS FOR LOE ITEMS, COMPLETENESS, AND CORRECTNESS

Examination of the SFOMS data forms for completeness and correctness of data entry was conducted by Response of Hawaii, Inc. ARINC Research decided not to review the SFOMS data entry forms for LOE items, but to wait until the ship's force work package had been smoothed out. This allowed time for all work plans by ship's force to be included in the work package, and for detection of any problems associated with work package organization.

The SFOMS "All Jobs" printouts were reviewed for LOE items, and notation was made of all jobs reassigned for forces afloat accomplishment and not included in the work package. Any problem (data omissions, etc.) were noted and reported to the ships. A later check with the ships was made to assess their progress in correcting these discrepancies.

2.4 TASK 4: INSTRUCT SF IN IMPLEMENTATION AND UTILIZATION OF SFOMS

Ship's officers were briefed on the uses of SFOMS in work package preparation, scheduling, and on uses of the SFOMS printouts as management tools. The SFOMS officer, his team, and work center supervisors were instructed in preparation of the SFOMS data forms and smoothing of the work load.

2.5 TASK 5: INSTRUCT SF IN DATA ENTRY OF SFOMS INFORMATION

Ship's force, including the SFOMS team and work center supervisors, was provided in-depth training on manpower budgeting, workload estimating and refinement, and use of the SFOMS data entry forms.

2.6 TASK 6: PROVIDE WEEKLY SFOMS REPORTS

Weekly SFOMS reports were provided the ships (through Response of Hawaii) from approximately two weeks before the start of overhaul until its completion. Late authorization to commence the SFOMS activity meant that the final adjustments to the work package were not made until one week before the ROH start, and therefore the weekly reports were still changing up to the beginning of ROH due to work package readjustments.

For HAMMOND, the last update of the SFOMS work package was made on 7 March, with the ROH ending on 14 March. For SHIELDS, the last SFOMS update was 31 January, with ROH ending on 17 February.

2.7 TASK 7: PROVIDE ASSISTANCE TO SF IN LOE PREPARATION

Continuing discourse with ship officers was maintained concerning LOE-preparation methods and documents that had proven effective on other ships, and to answer any questions raised. Actual conduct of the LOE was witnessed, and the personnel involved were interviewed to gain information for refining the LOE preparation process.

The LOE was conducted for SHIELDS on 2 December and for HAMMOND on 18 December 1974. Both were evaluated as satisfactory. Appendix A summarizes the assistance rendered to HAMMOND, and Appendix B the help given to SHIELDS.

2.8 TASK 8: MONITOR PROGRESS IN MEETING LOE PREPARATION MILESTONES

Problems in LOE scheduling and timeliness were noted throughout the preparation period and brought to the attention of cognizant ship's force personnel.

2.9 TASK 9: MAKE REVISIONS TO THE PLAN AND OUTLINES

Throughout the LOE preparation phase aboard HAMMOND and SHIELDS, experiences in applying the Plan and Outlines were noted, as were areas of potential

improvement to that document. Recommendations for minor changes to the Plan and Outlines were submitted directly to the PERA(CRUDES) project engineer as each came to light. A final interview with each CO provided additional recommendations for improvement.

2.10 TASK 10: ESTABLISH BASELINE FOR EVALUATION OF THE ASSISTANCE PROGRAM; COMPARE HAMMOND AND SHIELDS TO BASELINE

The baseline for evaluation of the LOE Preparation Assistance Program was established and the comparison of results aboard HAMMOND and SHIELDS submitted to PERA(CRUDES) as an interim evaluation report* that discussed the PEB/LOE Assistance Program in numerical terms. Significant portions of that report are included herein as Appendix D.

*ARINC Research Corporation, Interim Report: PEB/LOE Preparation Assistance Program for USS FRANCIS HAMMOND (DE-1067) and USS MARVIN SHIELDS (DE-1066), Publication W5-1224-TN01, June 1975.

RESULTS AND CONCLUSIONS

The interim report prepared under this study described the method by which ARINC Research Corporation collected and evaluated data that would indicate the effectiveness of the PEB/LOE Preparation Assistance Program. The portion of the interim report describing the data collection and reduction effort is reproduced in Appendix D. Conclusions drawn from the effectiveness study are presented in Section 3.1. Other observations and conclusions from the overall assistance program are presented in Section 3.2.

3.1 EFFECTIVENESS OF PEB/LOE ASSISTANCE PROGRAM

3.1.1 Assistance Program vs. Baseline Ships

The effectiveness of the PEB/LOE Preparation Assistance Program was evaluated in terms of how well HAMMOND and SHIELDS had prepared for LOE, versus how well two baseline (unassisted) ships had prepared for that examination. The baseline ships for the study were USS MEYERKORD (DE-1058) and USS ROARK (DE-1053).

For assistance-program ships, the average number of both PEB-identified material discrepancies and personnel failing PEB examinations was more than 10% lower than the baseline-ship averages. A conclusion based on these facts is that PEB/LOE assistance-program ships should be expected to perform better in those two categories. In the LOE administrative-preparation area however, with only a 2% difference, no conclusion can be drawn.

The great increase in ship's force productive manhours of program over baseline could be attributed simply to a larger work package, but the following factors might enter as well:

- a. Ensurance that all jobs were entered into SFOMS
- b. More attention to entering manpower expended
- c. Better training in the use of SFOMS
- d. Increased emphasis on propulsion space work, with augmentation of the work force from other work centers.

It cannot be concluded from these data that the Plan and Outlines and PEB/LOE assistance program have materially improved the LOE preparation performance by the ships. With this small sample, the only reasonable conclusion is that the data indicate improved results, but more data must become available to indicate development of firm supporting trends.

Two or more single-screw ships and five twin-screwed ships are scheduled for further implementation of the Plan and Outlines and assistance program. The data from these ships will be added to the data presented here to provide the larger base required and perhaps show the trends desired. This will be discussed in future reports on those tasks.

3.1.2 USS FRANCIS HAMMOND

In the three areas of LOE preparation (Appendix D, Table 3, items 1, 2, 3), HAMMOND had 31% fewer material discrepancies but expended 39% more dollars per discrepancy and 141% more ship's force manhours in the propulsion space work centers than the average baseline ship.

The apparent conclusion is that increased expenditures of money and ship's force manpower will result in fewer material discrepancies. However, the question of cost effectiveness arises, and the crossover point between expenditure (money and manpower) and return (fewer discrepancies) is not apparent here.

3.1.3 USS MARVIN SHIELDS

For SHIELDS, the noteworthy data are the material and administrative discrepancies, which were 8% and 26% higher, respectively, than for the average baseline ship; and the ship's force manpower expended in the propulsion-space work centers - 66% higher than the average baseline value.

SHIELDS completed the ROH 12 days ahead of schedule. The early completion is attributable in part to the goal of the CO to be ready for LOE on the date originally scheduled and not requesting any delays. The shipyard cooperated in achieving this goal. It is possible that the LOE-identified discrepancies would have been fewer had the LOE been deferred.

A review of the PEB/LOE report for SHIELDS indicates that PMS cards were closely inspected, with 21 more discrepancies noted in this area than the baseline average. Apparently, there was insufficient attention to detail in the PMS program preparation.

The most significant item of data for SHIELDS is the dollars spent per discrepancy, which is only 22% of that of the average baseline ship. A prime reason is that the policy of the shipyard ship superintendent was that all rework of previously accomplished jobs found necessary during mock-LOE and PEB/LOE be charged to the particular job rather than to a "LOE discrepancy correction" account.

3.2 GENERAL COMMENTS

The following general conclusions were drawn from this study:

- a. Regardless of the type of data selected for LOE-preparation comparison purposes, the performance in PEB/LOE will reflect the ship's:
 - 1) Continuing effort to maintain a state of material, administrative, and training readiness (i. e. , base readiness state on entering the ROH)
 - 2) Management ability, particularly when resources are severely limited
 - 3) General readiness to apply a positive attitude in complying with new requirements, using new programs designed to assist in the preparation effort, and offering ideas to improve those programs.
- b. Pass/fail is an inadequate criterion for evaluation of the effectiveness of the LOE program since a single significant safety discrepancy may cause failure of the LOE. For example, three ships in the past six months failed their LOE because of leakage of the duplex strainer plug valve in the fuel oil service system.
- c. Extension of an ROH is a post-LOE factor, and would only be significant if a ship failed its LOE and time were required to correct discrepancies in order to pass a re-examination. The question of extending the ROH of a ship that passed its LOE to correct minor discrepancies has not been entertained.
- d. The Plans and Outlines document can be improved in a number of ways, as noted in Appendix C.

- e. The intrinsic usefulness of the Plan and Outlines in helping a ship prepare for PEB/LOE will ultimately be determined from how effectively it is applied by ship personnel. It is of interest to note that two contrasting views on the document's usefulness were evidenced by the commanding officers of HAMMOND and SHIELDS. On HAMMOND, the Plan and Outlines document was not used after establishment of the LOE milestones. The CO maintained that the Plan and Outlines had been introduced to the ship too late to be of significant assistance. On SHIELDS, the Plan and Outlines was applied extensively throughout the entire LOE preparation period. The CO used it as his agenda for biweekly meetings to establish the ship's position in the LOE preparation schedule, which was maintained and used (together with the Plan and Outlines) as a management tool throughout the LOE preparation period.
- f. Two diverse opinions regarding the use of SFOMS were encountered. The CO of HAMMOND considered SFOMS most useful in the initial manpower budgeting and management decisions, and less useful during the progress of the overhaul. The CO of SHIELDS, on the other hand, felt that SFOMS was a valuable aid to the management of the work package throughout the ROH.

4 RECOMMENDATIONS

ARINC Research recommends that the PEB/LOE Preparation Assistance Program be continued for those ships that have not been subjected to the Propulsion Examination Board, but that careful attention be given to the optimum scope of such a program. Three alternatives are possible:

- a. Continue the assistance program at its present level
- b. Expand the program to provide more active assistance to the ships in PEB/LOE preparation (i.e., direct-help rather than consulting services)
- c. Limit the program to a short period, perhaps two weeks, at the beginning of LOE preparations.

The expanded program was suggested by the commanding officers of HAMMOND and SHIELDS. Their view was that the assistance program should: 1) provide all administrative publications needed to meet higher command requirements, and 2) correct discrepancies found in the ship's programs and publications prior to LOE. In brief, such a program would be directed toward direct assistance rather than guidance.

A more limited approach to LOE preparation assistance, designed to provide the ships with an initial briefing and limited follow-up, is not recommended since it is even further from the level of assistance deemed necessary by the COs.

A preferred recommendation is that the assistance program be continued at its present level. An investigation should be made of the possibility of providing one-time assistance at the type commander level, such as updating administrative manuals and preparing and promulgating a comprehensive training program that could then be made available to all ships.

It is recommended that the automated SFOMS be maintained as a management tool throughout ROH.

A final recommendation from this study is that the Plan and Outlines document be modified to incorporate the additions and changes listed in Appendix D.

APPENDIX A

PEB/LOE ASSISTANCE TO USS HAMMOND

During the PEB/LOE Preparation Assistance Program, ARINC Research provided the following assistance to USS FRANCIS HAMMOND (DE-1067), in addition to those areas discussed previously in this report.

1. Reviewed ship's safety instruction; prepared list of questions and comments and discussed them with EO.
2. Reviewed EDORM and provided list of comments and questions.
3. Made out SFOMS data entry forms for Plan and Outlines tasks, and suggested milestone dates. Provided list of these dates to the ship for review and entered into SFOMS under a dummy work center.
4. Reviewed ECCM for LOE items and proper organization. Provided list of comments, questions, and recommendations.
5. Prepared large chart of tasks and milestones for use by ship in tracking preparation progress.
6. Reviewed ship-generated LOE milestone dates for consistency and achievability.
7. Reviewed SFOMS work center EB01 in detail for EO.
8. Reviewed EOOW training plans and suggested improvements.
9. Reviewed ship's LOE preparations and suggested milestone dates.
10. Secured copies of messages regarding policies on changing of deck plates, valve wheels, and ladders from aluminum to steel, and delivered these messages to ship.
11. Reviewed engineering training outlines and provided list of questions, comments, and recommendations. Discussed listed items with EO.
12. Provided results of interviews with PEB Capt. Leedom regarding current PEB policies.

APPENDIX B

PEB/LOE ASSISTANCE TO USS SHIELDS

During the PEB/LOE Preparation Assistance Program, ARINC Research provided the following assistance to USS MARVIN SHIELDS (DE-1066), in addition to those areas discussed previously in this report.

1. Made out SFOMS data entry forms for Plan and Outlines tasks and suggested milestone dates. Provided list of these dates to the ship for review and entry into SFOMS under a dummy work center.
2. Reviewed ECCM for LOE items and organization. Provided EO with list of questions, comments, and recommendations.
3. Produced and provided large chart of tasks and milestones for use by ship.
4. Reviewed ship-generated LOE milestone dates for consistency and achievability.
5. Conducted in-depth review of Engineering Department SFOMS package for items other than LOE problems.
6. Delivered copy of HAMMOND EDORM with questions and comments to EO to use as sample in preparing his own EDORM.
7. Reviewed LOE preparations and updated Plan and Outlines chart with milestones.
8. Updated SFOMS dummy work center LOE-1 to agree with new Plan and Outlines milestones.
9. Provided results of interviews with PEB Capt. Leedom regarding current PEB policies.
10. Secured copies of messages regarding policies on changing of deck plates, valve wheels, and ladders from aluminum to steel; and delivered these messages to ship.
11. Reviewed Engineering Department standing orders and made up sample set from those produced by USS WHIPPLE. Discussed with EO.

APPENDIX C

RECOMMENDED CHANGES TO PLAN AND OUTLINES

The following recommendations are offered for improvement of the DE-Type Management Plan and Program Outlines for Use in PEB/LOE Preparation, July 1974. Indicated where applicable is the task number of the Plan and Outlines to which the recommendation applies.

1. Modify references to reflect the administrative change to the COMNAVSURFPAC organization, and to include the many new publications and policy instructions issued by COMNAVSURFPAC.
2. Eliminate references to a division commander, which are no longer applicable.
3. Include a warning not to underestimate the typing burden in administrative preparation. (Task A-1)
4. Include sufficient instructions for ship's force that they can conduct their own review of publications, i. e., what problems they should look for in their administrative documents. Stress the fact that particular ship-generated addenda to basic publications must be correctly placed, e. g., details of electrician duties should be in the EDORM instead of the SORM since the latter is an all-hands publication. (Task A-1)
5. Suggest the desirability of appointing a Printing Officer to take care of follow-up on form publication printing requirements and delivery. (Task A-1)
6. Include a recommendation that the EOCC manual be validated in the LOE preparation period. (Task A-3)
7. Delete the outlines for the SORM and EDORM, since each of these publications has been issued as a standard. (Task A-4)
8. Add references and instructions for establishing a fire doctrine for major engineering spaces. (Task A-5)
9. Change the task on electrical safety to include general safety. (Task A-6)
10. Include a recommendation to denote with red markings the problems noted in logs and operating records during LOE preparation. These marked logs and records can then be used for training purposes, to show where errors occurred. (Task A-9)
11. Remove indications that logs and records should show standard operating temperatures and pressures; only high and low limits are required. (Task A-9)

12. Stress the need for CO/XO involvement in indoctrination and gaining concurrence with new policies. Include a recommendation that Plan of the Day notes be written on LOE preparation status. Include a recommendation that the CO verbally address different divisions each week to keep personnel motivated for LOE preparation. Indicate that CO's personal involvement will be an assistance to the continuing effort of the department heads. (Task A-12)
13. Stress the importance of continuing contact with the shipyard personnel in getting selected records updated. Expand the description of installation of the updated 3M package to place emphasis on the installation of new equipment and cards. (Task A-14)
14. Add a description of the post-LOE POAM requirements, and an outline of the contents of that chart. (Task A-16)
15. Revise and combine training tasks T-1, T-2, T-3, and T-4. The preparation phase in these tasks is much simpler and can be stated more concisely than presently indicated in the Plan and Outlines. Several steps that can be combined for clarity are: 1) identify the billets for both auxiliary and underway watch bills; 2) match people to billets; 3) start a watch-station qualification program; 4) specify what each man needs for interim and final qualification (disregard rate structure); and 5) establish the watch stations for which personnel are to be trained, and assign PQS items.
16. Include a caution that PQS organization and implementation can be a bigger problem than expected - do not underestimate the amount of work involved. (Task T-1)
17. Eliminate reference to the Ship's Manning Document; form 1080 is more valuable in assessing personnel gains and losses. (Task T-3)
18. Change the task regarding training aids to indicate that none are available to forces afloat. Any use of training aids will be at shore facilities. (Task T-7)
19. Include cautions regarding space security instructions, which should cover what the Security Patrol is to look for and what action he should take. (Task T-12)
20. Include references to Mobile Training Team advisories, which are now being published. (Task T-13)
21. Expand the phrase "Identify all valves" to a requirement for making a list of valves and submitting it to PMS for preparation of an equipment guide list (EGL). (Task M-1)
22. Instruct that a tickler list rather than individual cards be maintained for gages. (Task M-2)
23. Add a caution that all unused damage control equipment should be locked up to prevent pilferage, which has been a major problem. (Task M-5)

24. Stress the fact that the shipyard performs no maintenance on equipment that is out of commission but not removed from the ship or scheduled for shipyard repair. (Task M-11)
25. Add a reminder to requisition the LOE kit list early, since these are high usage items. (Task M-14)
26. Add "Locked Open", "Locked Closed", and "High Voltage" signs to the LOE kit list. (Task M-14)
27. Add packing glands and body bonnet studs of various sizes to the list of the LOE kit. (Task M-14)
28. Stress that updating the CSMP on departure from the shipyard represents a considerable effort. (Task M-21)
29. Change the timing of post-ROH CSMP and COSAL updates to run from C-1 to C+1. Information is generally not available much earlier than that, and time is not available for updating during those last weeks during the ROH. (Tasks M-21, -22)

APPENDIX D

APPROACH TO EVALUATING EFFECTIVENESS OF PEB/LOE PREPARATION ASSISTANCE PROGRAM

(Excerpts from ARINC Research Publication W5-1224-TN01, Interim Report:
PEB/LOE Preparation Assistance Program – Interim Evaluation Report for USS
FRANCIS HAMMOND (DE-1067) and USS MARVIN SHIELDS (DE-1066), June 1975)

DATA COMPILATION

2.1 DATA CRITERIA AND TYPES

The data elements chosen for evaluation of the effectiveness of the PEB/LOE Preparation Assistance Program are those that are:

- a. Available through presently established data collection systems
- b. Usable in their available form without further manipulation
- c. Considered most likely to reflect the general value of the Plan and Outlines and the assistance program
- d. Expected to be available for all ships participating in this study
- e. Least affected by other aspects of the ROH effort.

It is felt that these criteria could be met by the information given in the ships':

1) PEB 1200 PSI LOE Report letter, 2) Shipyard Departure Report letter, and 3) SFOMS manpower summary. From those sources, the following specific data elements were obtained:

- a. Number of discrepancies noted by the PEB in the material preparation area
- b. Number of discrepancies noted by the PEB in the administrative preparation area
- c. Number of men failing any of the PEB-administered examinations (written tests, EOOW seminars, and oral interviews with enlisted watchstanders)
- d. Number of men participating in any of the PEB-administered examinations
- e. Total dollars spent by the shipyard on jobs titled specifically for LOE preparation and/or discrepancy correction
- f. Ship's force production manhours spent in propulsion-plant work centers

- g. Number of days the ship's availability was extended beyond or terminated before the originally planned ROH completion date
- h. PEB final evaluation of the ship's LOE.

The means by which these data are applied to evaluate LOE preparation effectiveness will be discussed in Section 3. The extent to which the data elements could be isolated to LOE-preparation evaluation from other ship-related activities is discussed below.

2.2 DATA ELEMENT CONSIDERATIONS

The PEB/LOE report includes separate listings of discrepancies submitted by the ship and noted by the PEB during the LOE. Only the latter list was considered in this study, since the PEB makes particular efforts toward consistency in its examinations from ship to ship. The ship-generated discrepancy lists are considered more prone to reflect variances in personal viewpoints, work initiative, etc.

The PEB discrepancy lists and examination results provide indicators of the LOE preparation effort in three major areas - administration, material, and training. The number of administrative discrepancies is a factor almost wholly within the ship's control, and is thus a good LOE-preparation indicator. Dollars spent by the shipyard in LOE preparation and/or discrepancy correction will provide some measure of the shipyard effort to assist material preparation (either pre- or post-LOE).

Ship's force production manhours* expended in the propulsion space centers (EA04, EB01, EB14, and EM01) provide the best isolation of ship's force LOE-preparation effort in the material area. In those centers, almost no administrative effort is accounted for and training is included in the overhead figures. It is recognized that a compilation of manhours expended on LOE-significant jobs would provide better data; however, all ships have not indicated these jobs or used consistent criteria for this designation.

The length of either an extension or early completion of a scheduled ROH date should be examined for possible indications of LOE preparation effectiveness; however, there is probably no clear correlation. While delays in ROH completion might, for example, be attributable to insufficient PEB/LOE preparation, it should be

*A SFOMS term for actual manhours expended by ship's force in conducting its planned work during ROH.

remembered that the PEB/LOE is merely a means of discovering problems that should be corrected even if there were no such program.

The final evaluation of the PEB regarding the ship's performance in the LOE is the resultant test of the ship and shipyard preparation effort.

2.3 DATA ELEMENT SUMMARY

In terms of the data elements just discussed, the PEB/LOE results for MEYERKORD and ROARK are summarized in Table 1. Because of the small sample size and wide dispersion of data points, the data elements have been averaged for the two ships.

The PEB/LOE data from FRANCIS HAMMOND and MARVIN SHIELDS are given in Table 2. As with the baseline ships, the data elements have been averaged.

TABLE 1. BASELINE SHIP PEB/LOE DATA

	MEYERKORD (DE-1058)	ROARK (DE-1053)	Combined	Average
PEB discrepancies, material	281	271	552	276
PEB discrepancies, administrative	123	102	225	113
Number taking examinations	96	70	166	83
Number failing examinations	39	23	62	31
Cost of shipyard LOE preparation/discrepancy correction, dollars	94,876	80,551	175,427	87,714
Productive manhours, ship's force propulsion space w.c.	11,103	17,965	29,068	14,534
ROH extension, days	34	27	61	31
Passed/failed LOE	Failed	Passed	1 Passed 1 Failed	NA

TABLE 2. PROGRAM SHIP PEB/LOE DATA

	HAMMOND (DE-1067)	SHIELDS (DE-1066)	Combined	Average
PEB discrepancies, material	190	299	489	245
PEB discrepancies, administrative	88	142	230	115
Number taking examinations	71	80	151	76
Number failing examinations	23	27	50	25
Cost of shipyard LOE preparation/discrepancy correction, dollars	83,775	20,483	104,258	52,129
Productive manhours, ship's force propulsion space w.c.	34,982	24,096	59,078	29,539
ROH extension, days	0	-12	-12	-6
Passed/failed LOE	Passed	Passed	2 Passed	NA

3 FINDINGS OF STUDY

The data elements defined and quantified in Section 2 are evaluated in this section as to their indication of the effectiveness of the PEB/LOE Material Assistance Program.

3.1 DATA ELEMENT INTERPRETATION

The data compiled for the ships of this study can be interpreted to denote the following:

- a. Data trends, rather than absolute values, will be the measure of the overall usefulness of the Plans and Outlines and the PEB/LOE Preparation Assistance Program.
- b. The number of PEB-identified discrepancies is a measure of the effectiveness of a ship's preparation for LOE.
- c. The percentage of men failing the PEB oral and written examinations measures a ship's effectiveness in the training area.
- d. The ratio of dollars spent by the shipyard in LOE preparation and/or discrepancy correction to the number of PEB material discrepancies is a measure of the cost effectiveness of the ship's preparation effort in the material area.
- e. Ship's force production manhours in the propulsion space work center is a measure of a ship's manpower utilization in material preparation.
- f. The number of days an ROH is extended (or shortened) may be a reflection of the planning estimate of the difficulty involved in LOE preparation.
- g. A "pass" or "fail" PEB evaluation is a reflection of the overall LOE preparation effort.

3.2 DATA EVALUATION

Table 3 presents the data elements, individually and mathematically treated as appropriate, chosen for comparison of PEB/LOE preparedness of the four ships. The key entries in that table, relative to the objectives of this study, are presented in the final column – the ratio of data averages for the program and baseline ships. Since the data elements of Table 3 are negative indicators (i. e., the lower the better), the program-to-baseline ratios reflect the same characteristic – the lower the percentage, the more effective the performance of the program ships.

The data of Table 3 will now be discussed, both from an overall viewpoint and relative to each of the ships participating in the PEB/LOE Preparation Assistance Program.

TABLE 3. SIGNIFICANT COMPARISONS OF PEB/LOE DATA

	Individual Ships								Ratio, Pgm to Baseline
	Baseline		Program		Combined Ships		Average Ship		
	MEYERKORD	ROARK	HAMMOND	SHIELDS	Baseline	Program	Baseline	Program	
1. PEB discrepancies, material	281	271	190	299	552	489	276	245	89
2. PEB discrepancies, administrative	123	102	88	142	225	230	113	115	102
3. Percentage failing examinations	41	33	32	34	37	33	37	33	89
4. Cost ratio, SY LOE preparation/ discrepancy correction to material discrepancies	338	297	441	69	318	213	318	213	67
5. Productive manhours, Ship's Force Propulsion Space Work Center	11,103	17,965	34,982	24,096	29,068	59,078	14,534	29,539	203
6. ROH extension, days	34	27	0	-12	61	-12	31	-6	NA
7. Passed/failed LOE	Failed	Passed	Passed	Passed	1 passed 1 failed	2 passed	NA	NA	NA