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Final Report:

PEB/LOE PREPARATION ASSISTANCE PROGRAM
FOR
USS OUELLET (FF-1077) AND USS SAMPLE (FF-1048)

July 1975

Prepared for
PERA(CRUDES)
PHILADELPHIA NAVAL SHIPYARD
Philadelphia, Pennsylvania
Under Contract N00140-74-D-0090-0008

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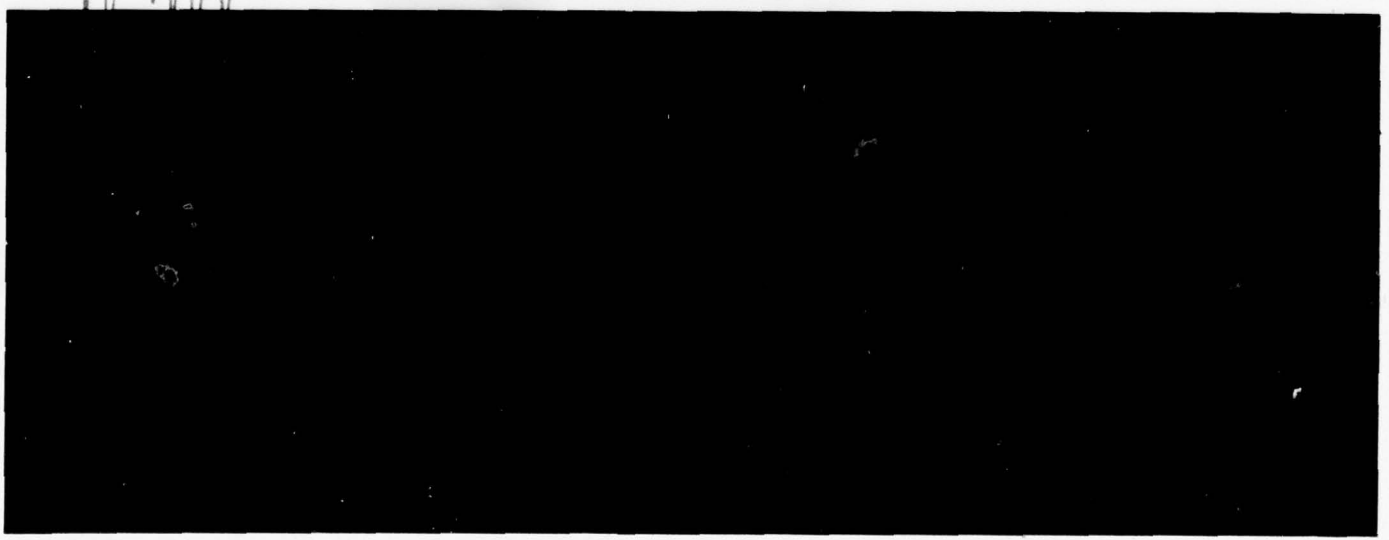
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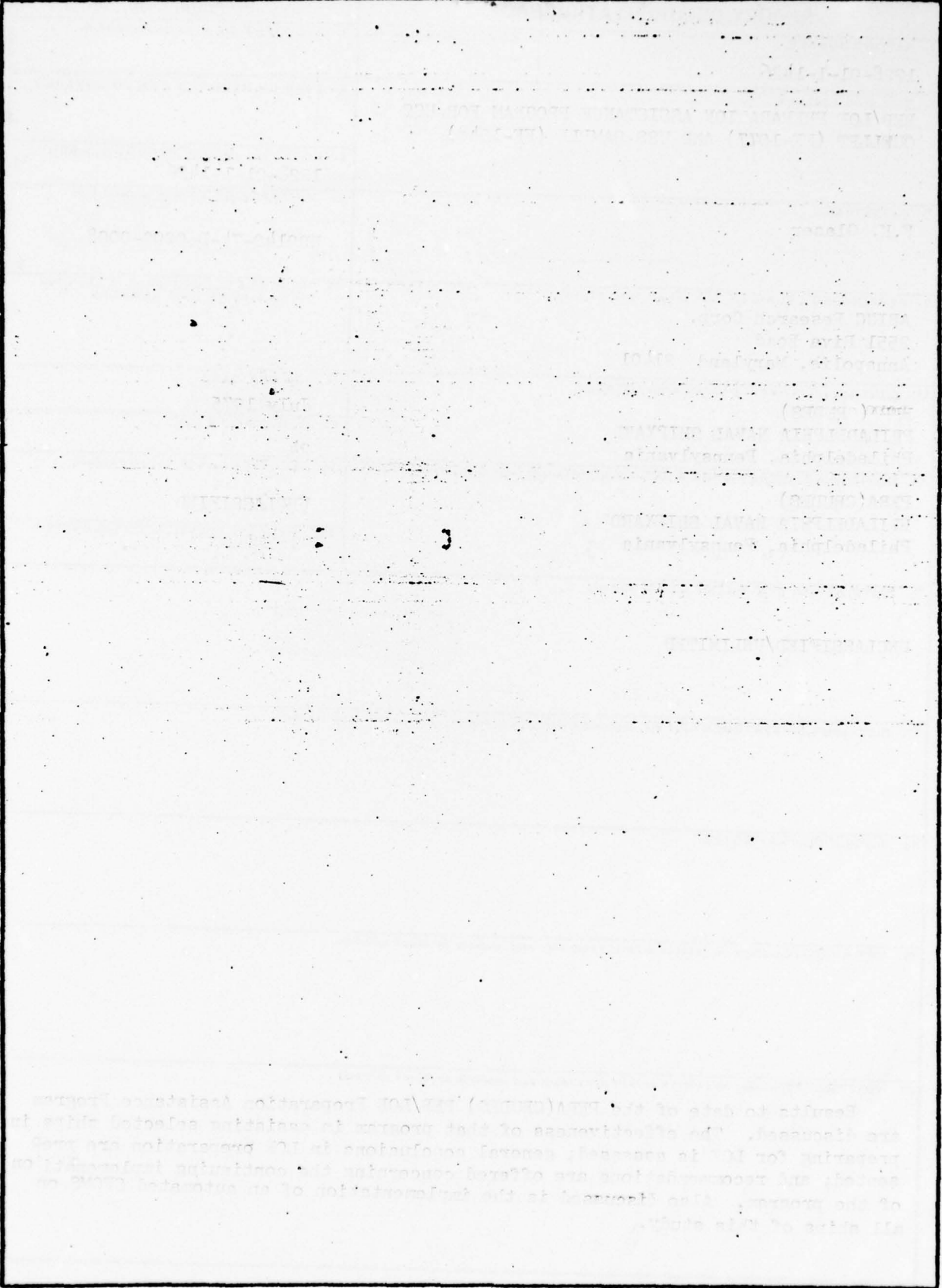
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ABSTRACT

Results to date of the PERA(CRUDES) PEB/LOE Preparation Assistance Program are discussed. The effectiveness of that program in assisting selected 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 all ships of this study.

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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
EDOM	- Engineering Department Organization 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
PMS	- Planned Maintenance System
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
XO	- Executive Officer

SUMMARY

The PERA(CRUDES) PEB/LOE Preparation Assistance Program was initiated by ARINC Research Corporation on USS FRANCIS HAMMOND (FF-1067) and USS MARVIN SHIELDS (FF-1066), and continued aboard USS OUELLET (FF-1077) and USS JAMBLE (FF-1048). While this report has been written to document the activities on the latter two ships, it is presented in the form of a cumulative discussion of all efforts conducted thus far in the assistance program.

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 all ships.

An objective of the study was to evaluate the effectiveness of the PEB/LOE Preparation Assistance Program. A baseline for making such evaluations was established, and data pertaining to the LOE preparation efforts of all four ships 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 five other ships in another task order under this contract.

The question of the optimum scope of the Preparation Assistance Program remains unresolved. The commanding officers of three of the program ships 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. Planned additional preparation assistance will permit this matter to be addressed more fully.

CONTENTS

ABSTRACT	iii
ABBREVIATIONS	v
SUMMARY	vii
1. INTRODUCTION	1
2. TASK ACTIVITIES	3
2.1 Task 1: Assist SF in Review of POT&I, CSMP, and SARP for LOE Items	3
2.2 Task 2: Assist SF in Establishing Specific Milestones for Accomplishment of Plan and Outlines	3
2.3 Task 3: Review SFOMS Data Entry Forms for LOE Items, Completeness, and Correctness	4
2.4 Task 4: Instruct SF in Implementation and Utilization of SFOMS	5
2.5 Task 5: Instruct SF in Data Entry of SFOMS Information	5
2.6 Task 6: Provide Weekly SFOMS Reports	5
2.7 Task 7: Provide Assistance to SF in LOE Preparation	6
2.8 Task 8: Monitor Progress in Meeting LOE Preparation Milestones	6
2.9 Task 9: Make Revisions to the Plan and Outlines	7
2.10 Task 10: Compare Program Ships to Baseline Established for Evaluation of Assistance Program	7
3. RESULTS AND CONCLUSIONS	9
3.1 Assistance Program vs. Baseline Ships	9
3.2 Individual Ships	11
3.3 General Comments	12
4. RECOMMENDATIONS	15
APPENDIX A: PEB/LOE Assistance Summary	A-1
APPENDIX B: Recommended Changes to Plan and Outlines	B-1
APPENDIX C: Approach to Evaluating Effectiveness of PEB/LOE Preparation Assistance Program	C-1

1
INTRODUCTION

A program developed by PERA (CRUDES) to assist selected FF-type ships in their preparation for PEB/LOE is being conducted by ARINC Research Corporation under Contract N00140-74-D-0090. Objectives of this PEB/LOE Preparation Assistance Program are 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.

*DE-type ships (escort) have been redesignated FF-type (frigate).

This study is being conducted incrementally under separate delivery orders of the contract. PEB/LOE assistance to USS FRANCIS HAMMOND (FF-1067) and USS MARVIN SHIELDS (FF-1066) was provided under Delivery Order 0004, and was reported on in ARINC Research publication 1224-01-1-1416, dated June 1975. The assistance program has been continued under Delivery Order 0008 for USS OUELLET (FF-1077) and USS SAMPLE (FF-1048). At the request of PERA (CRUDES), this report prepared under Delivery Order 0008 will be a cumulative discussion of all efforts performed to date in the PEB/LOE Preparation Assistance Program.

The assistance provided by ARINC Research has been 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 items of PEB/LOE preparation assistance not covered in the general discussion are noted in Appendix A. Suggested improvements to the Plan and Outlines document are listed in Appendix B. Data supporting the conclusions of this study are presented in Appendix C.

Included in both delivery orders was a directive to implement an automated SFOMS aboard each ship. 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, 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 the four ships prepare for PEB/LOE.

Unless otherwise stated, the task discussions pertain commonly to all ships assisted in this program.

2.1 TASK 1: ASSIST SF IN REVIEW OF POT&I,
CSMP, AND SARP FOR LOE ITEMS

ARINC Research reviewed all PEB/LOE reports of COMNAVSURFPAC ships for the period 1 January-31 December 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 ships' POT&I, CSMP, and SARP. Any commonly occurring discrepancy not covered in these publications 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 each ship with a list of questions and comments arising from these reviews, the ARINC Research representative returned about a month later to discuss their resolution.

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 modifying the Plan and Outlines to fit their particular circumstances in assigning responsibilities and establishing milestones for LOE preparation. A Gantt-type chart was developed to track LOE preparation status until the SFOMS was operational.

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

SHIELDS was visited on 17-18 April 1974 (scheduled ROH start was 15 July). The major problem noted was that the SORM and EDOM 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.

USS OUELLET was visited on 26-27 June 1974 (ROH was scheduled to begin on 11 September). The major LOE-preparation problems recognized were the need for updating the EDOM and the list of valves in the engineering spaces.

USS SAMPLE was visited on 31 July 1974 (scheduled ROH start was 13 August). Two major concerns were noted: the need for writing and validating a list of all valves in the engineering spaces, and ensuring that the ship was provided copies of equipment test procedures.

It was recommended to all ships that the Plan and Outlines tasks be entered into the SFOMS for management assistance in PEB/LOE preparation. However, only one of the four ships (SAMPLE) utilized this approach. Ship's force personnel of the other three ships favored the use of milestone charts.

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

For all ships, 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 planned for accomplishment 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 but 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 and 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 workload.

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 near its completion. For HAMMOND, SHIELDS, and SAMPLE, 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. Final SFOMS updates were as follows:

<u>Ship</u>	<u>ROH Completion</u>	<u>Last SFOMS Update</u>
HAMMOND	14 March 1975	7 March 1975
SHIELDS	31 January 1975	17 February 1975
OUELLET	15 May 1975	22 April 1975
SAMPLE	11 May 1975	15 April 1975

In addition to the above weekly reports, an initial one-time submission of the following SFOMS reports were made to the ships and PERA (CRUDES):

- a. Manpower summary
- b. "All Jobs" reports
- c. "All Material Items" reports (in work center-job sequence number, and material stub number).

These initial SFOMS reports were delivered to the ships, and potential management uses of each report type was discussed. Ship's force was then free to choose those report formats that best suited its needs.

2.7 TASK 7: PROVIDE ASSISTANCE TO SF IN LOE PREPARATION

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

<u>Ship</u>	<u>LOE Date</u>	<u>Evaluation</u>
HAMMOND	2 Dec 74	Satisfactory
SHIELDS	18 Dec 74	Satisfactory
OUELLET	17 Mar 74	Satisfactory
SAMPLE	2 Apr 74	Satisfactory

Appendix A summarizes specific items of LOE preparation assistance rendered by ARINC Research to the four ships.

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.

The status of Plan and Outlines key events, and of ship-personnel resource application, were continuously reviewed with recommendations made where applicable.

2.9 TASK 9: MAKE REVISIONS TO THE PLAN AND OUTLINES

Throughout the LOE preparation phase, 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: COMPARE PROGRAM SHIPS TO BASELINE ESTABLISHED FOR EVALUATION OF ASSISTANCE PROGRAM

The baseline for evaluation of the PEB/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 C.

*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 is reproduced in Appendix C. Conclusions drawn to date 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 ASSISTANCE PROGRAM VS. BASELINE SHIPS

The effectiveness of the PEB/LOE Preparation Assistance Program was evaluated in terms of how well HAMMOND, SHIELDS, OUELLET, and SAMPLE 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 (FF-1058) and USS ROARK (FF-1053). The comparative data for this evaluation are presented in Table 3-1 and discussed below.

For assistance-program ships, the average number of PEB-identified material and administrative discrepancies and personnel failing PEB examinations was from 19 to 31 percent lower than the baseline-ship averages (items 1 through 3, Table 3-1). A conclusion based on these facts is that PEB/LOE assistance-program ships should be expected to perform better in those three categories.

The cost ratio of shipyard LOE preparation/discrepancy corrections to material discrepancies was 4% higher in the assistance-program ships than baseline (item 4). For this small difference, no conclusion can be drawn.

Ship's force productive manhours were much greater for program than baseline ships (item 5). The difference could be attributed simply to a larger work package, but the following factors might enter as well:

- a. Ensurance that all jobs were entered in SFOMS
- b. More attention to entering manpower expended

TABLE 3-1. SIGNIFICANT COMPARISONS OF PEB/LOE DATA

Item	Individual Ships										Ratio, Program to Baseline	
	Baseline			Program				Combined Ships		Average Ship		
	MEYERKORD	ROARK	HAMMOND	SHIELDS	OUELLET	SAMPLE	Baseline	Program	Baseline	Program		
1. PEB discrepancies, material	281	271	190	299	126	144	552	759	276	190	69	
2. PEB discrepancies, administrative	123	102	88	142	46	67	225	343	113	86	76	
3. Percentage failing examinations	41 (39 of 96)	33 (23 of 70)	32 (23 of 71)	34 (27 of 80)	26 (11 of 43; Note 3)	26 (21 of 80)	37 (62 of 166)	30 (82 of 274)	37 (31 of 83)	30 (21 of 69)	81	
4. Cost of SY LOE preparation/discrepancy correction, dollars	94,876	80,551	83,775	20,483	61,422	(Note 1)	175,427	165,686	87,714	55,227	63	
5. Productive manhours, Ship's Force Propulsion Space Work Center	338	297	441	69	487	(Note 1)	318	332	318	332	81	
6. ROH extension, days	34	27	0	-12	0	0	29,068	59,078	14,534	29,539	203	
7. Passed/failed LOE	Failed	Passed	Passed	Passed	Passed	0	1 passed 1 failed	4 passed	NA	NA	NA	

NOTES: (1) Cost not identified.
 (2) Data not available at time of publication
 (3) Results of written examinations not included in PEB/LOE report.

- 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.

Ship's force productive manhours figures were not available for OUELLET and SAMPLE as of the publication of this report. When the data become available, a supplement will be published containing appropriate results and conclusions.

It cannot be concluded from these data that the Plan and Outlines and overall PEB/LOE assistance program have materially improved the LOE preparation efforts of the FF-type ships. With this small sample, the only reasonable conclusion is that the data suggest improved results, but more data must become available to indicate any firm supporting trends. Five more ships are scheduled for participation in the assistance program. The data from these ships will be added to that presented here to provide the larger base required, and perhaps show the desired trends. This will be discussed in future reports.

3.2 INDIVIDUAL SHIPS

3.2.1 USS FRANCIS HAMMOND

In the three areas of LOE preparation (Table 3-1, 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 expenditure 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.

3.2.2 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.

3.2.3 USS OUELLET

OUELLET had the fewest discrepancies and lowest examination-failure percentage of any of the ships evaluated. Alternatively, the highest number of dollars was spent per discrepancy of any of the ships (although not the highest total dollar amount). The conclusion to be drawn is the same as for the comparable situation noted for HAMMOND (Section 3.2.1).

3.2.4 USS SAMPLE

Although the data pertaining to SAMPLE are approximately the same as for OUELLET, the lack of shipyard LOE discrepancy cost data precludes examination of the cost effectiveness of the discrepancy correction effort.

3.3 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 eight 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 reexamination. The question of extending the ROH of a ship that passed its LOE to correct minor discrepancies has not been entertained.
- d. The Plan and Outlines document can be improved in a number of ways, as noted in Appendix B.

RECOMMENDATIONS

ARINC Research recommends that the PEB/LOE Preparation Assistance Program be continued for those ships that have not been examined by 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, SHIELDS, and OUELLET. 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.

The recommended course 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 ship overhaul.

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

APPENDIX A
PEB/LOE ASSISTANCE SUMMARY

	<u>Page</u>
A-1. USS FRANCIS HAMMOND (FF-1067)	A-3
A-2. USS MARVIN SHIELDS (FF-1066)	A-5
A-3. USS OUELLET (FF-1077)	A-7
A-4. USS SAMPLE (FF-1048)	A-9

APPENDIX A-1

PEB/LOE ASSISTANCE TO USS FRANCIS HAMMOND

During the PEB/LOE Preparation Assistance Program, ARINC Research provided the following assistance to USS FRANCIS HAMMOND (FF-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 EDOM 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 interview with PEB Capt. Leedom regarding current PEB policies.

APPENDIX A-2

PEB/LOE ASSISTANCE TO USS MARVIN SHIELDS

During the PEB/LOE Preparation Assistance Program, ARINC Research provided the following assistance to USS MARVIN SHIELDS (FF-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 EDOM with questions and comments to EO to use as sample in preparing his own EDOM.
7. Reviewed LOE preparations and updated Plan and Outlines chart with milestones.
8. Updated SFOMS dummy work center LOE1 to agree with new ship-generated milestones.
9. Provided results of interview 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 A-3
PEB/LOE ASSISTANCE TO USS OUELLET

During the PEB/LOE Preparation Assistance Program, ARINC Research provided the following assistance to USS OUELLET (FF-1077), in addition to those areas discussed previously in the report.

1. Provided results of interview with PEB Capt. Leedom regarding current policies.
2. Prepared suggested POAM for LOE preparation, delivered to ship for modification, provided final draft for use.
3. Reviewed SORM, EDOM, ECCM, and ship's PMS instruction for consistency and agreement with type commander policies. Provided lists of comments and questions.
4. Reviewed ship's SFOMS instructions. Discussed results of review with SFOMS Officer.
5. Reviewed ship's training instruction for LOE items and completeness. Discussed questions and comments with EO.
6. Prepared large chart of tasks and milestones for visual display and tracking of LOE progress by ship.
7. Prepared SFOMS input data sheets for LOE POAM for ship to review, modify, and enter.
8. Interviewed PEB member to answer questions raised by CO. Discussed answers with CO.
9. Reviewed Engineering Standing Orders. Prepared new standing orders by combining best features of those of OUELLET, REEVES, and RATHBURNE.
10. Reviewed WHIPPLE EDOM and compared with OUELLET's. Discussed suggested format and content with EO.
11. Discussed results of SHIELDS LOE with CO.
12. Delivered to Overhaul Manager a list of questions asked by PEB watchstanders on SHIELDS and HAMMOND.
13. Delivered copy of HAMMOND training outlines to EO.
14. Reviewed WHIPPLE environmental control instructions and made list of comments and questions. Delivered copy of instruction and comments to EO for possible use.

15. Reviewed HAMMOND post-LOE POAM and delivered copy to CO with suggestions.
16. Reviewed SHIELDS LOE report for EDOM discrepancies and delivered list to EO for correction of his own.
17. Conducted oral interviews of watchstanders in manner of PEB to assist EO to evaluate strengths/weaknesses of individuals.
18. Delivered advance copy of new Plan and Outlines Task A-16 to CO to enable timely use.
19. Delivered advance copy of new machinery test network to Overhaul Manager.
20. Prepared post-LOE POAM charts for EO use.

APPENDIX A-4

PEB/LOE ASSISTANCE TO USS SAMPLE

During the PEB/LOE Preparation Assistance Program, ARINC Research provided the following assistance to USS SAMPLE (FF-1048), in addition to those areas discussed previously in this report.

1. Delivered list of questions asked by PEB of watch standers on SHIELDS and HAMMOND.
2. Provided results of interview with PEB Capt. Leedom regarding current PEB policies.
3. Delivered copy of OUELLET SFOMS instructions to XO for possible use.
4. Reviewed SORM, EDOM, COMNAVSURFPAC Shipboard Training Manual, 1200 psi Management Manual, and ECCM for consistency and agreement with type commander policies. Provided list of comments and questions.
5. Reviewed, edited, and typed Engineering Night Orders.
6. Reviewed and edited ship's Repair Party Manual for consistency with other instructions and policy documents.
7. Delivered copy of HAMMOND training outlines to EO.
8. Reviewed various safety publications, made extracts, and delivered to EO for use in training.
9. Delivered copy of WHIPPLE environmental control instructions and comments to EO for possible use.
10. Delivered copy of HAMMOND post-LOE POAM to CO.
11. Prepared large chart of tasks and milestones for visual display and tracking of LOE progress by ship.
12. Discussed results of MARVIN SHIELDS LOE with CO and EO.
13. Reviewed ship-generated LOE milestones dates for consistency and achievability.

APPENDIX B
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 to 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 EDOM 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 EDOM, 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. (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. Suggest 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)
30. Include a caution that all equipment reinstalled at LOE is currently scheduled for PMS, and to ensure that all MRCs are held on board and are in place. (Task A-15)
31. Include note that the current charter of MTT is to provide inspection of administrative and training area for LOE readiness and to make recommendations; their assistance does not extend to corrective actions. (Task T-13)
32. Clarify misconception that the "PEB kit" is provided to the ship. This must be ordered by the ship. (Task M-14)
33. Expand the description of installation of the updated 3M package to place emphasis on the installation of new equipment and cards. (Task A-15)

APPENDIX C

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)

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.

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

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 Plan 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.