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Interim Report:

PEB/LOE PREPARATION ASSISTANCE PROGRAM

INTERIM EVALUATION REPORT 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

Publication W5-1224-TN01

FLEET SUPPORT PROGRAM

ARINC RESEARCH CORPORATION

3565 Kenyon St., Suite 7
San Diego, CA 92110

Interim Report:

PEB/LOE PREPARATION ASSISTANCE PROGRAM,

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ABBREVIATIONS

CO	– Commanding Officer
COSAL	– Consolidated Ship's Allowance List
CSMP	– Current Ship's Maintenance Project
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	– DE-Type Management Plan and Program Outlines for Use in PEB/LOE Preparation, July 1974
POAM	– Plan of Action and Milestones
POT&I	– Preoverhaul Tests and Inspections
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

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1
INTRODUCTION

The guidance document, DE-Type Management Plan and Program Outlines for Use in PEB/LOE Preparation, was prepared in July 1974 by PERA(CRUDES) with the assistance of ARINC Research Corporation. The Corporation's support was provided under Contract N00140-73-D-0074, Task Order 0016. A follow-on program to evaluate the effectiveness of that document in helping ships prepare for PEB/LOE was developed by PERA(CRUDES) and is being conducted by ARINC Research on selected DE-type ships. Steps being taken in this PEB/LOE Preparation Assistance Program, being conducted under Contract N00140-74-D-0090, Task Order 0004, are to:

a. Introduce the above-referenced document, hereafter referred to as "Plan and Outlines", aboard each ship; explain its use; and aid the ship in establishing preparation milestones for its LOE.

b. Assist ship's force in assessing its present (starting) position in major areas of LOE preparation.

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.

d. Generally evaluate the Plan and Outlines, observe the experiences of ship personnel in applying that guide, and recommend any desirable changes to the Plan and Outlines.

This interim report, prepared in accordance with Task 10 of the contract task order, is intended to:

a. Present the criteria that constitute a baseline for evaluating the effectiveness of the PEB/LOE Preparation Assistance Program

b. Present the data resulting from LOE preparation efforts of two DE-class ships selected by ARINC Research as a baseline group, and two designated by PERA(CRUDES) for the assistance program

c. Compare the data for the "baseline" and "program" ships, and

d. Evaluate the data and comparisons to determine the effectiveness of the assistance program.

The ships selected as the baseline group are USS MEYERKORD (DE-1058) and USS ROARK (DE-1053). The PEB/LOE preparation activities on these ships will be compared (through appropriate data elements) with the corresponding activities of the first two ships to participate in the assistance program – USS FRANCIS HAMMOND (DE-1067) and USS MARVIN SHIELDS (DE-1066).

2
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

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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.

3.2.1 Assistance Program vs. Baseline Ships

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.

TABLE 3. SIGNIFICANT COMPARISONS OF PEB/LOE DATA

	Individual Ships				Combined Ships		Average Ship		Ratio, Pgm to Baseline
	Baseline		Program						
	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

Two 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.

3.2.2 USS FRANCIS HAMMOND

In the three areas of LOE preparation (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.

3.2.3 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 being 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 might 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.

3.2.4 General Comments

In evaluating the usefulness of the data displayed, it must be recognized that, regardless of the type of data selected for comparative purposes, the performance in the PEB/LOE will reflect the ship's:

a. Continuing effort to maintain a state of material, administrative, and training readiness (i.e., base readiness state on entering the ROH)

b. Management ability, particularly when resources are severely limited

c. 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.

It should be noted that pass/fail is a poor 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.

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.

As stated previously, data from the other ships scheduled for participation in the PEB/LOE Preparation Assistance Program is needed to increase the statistical accuracy of the data on which these conclusions were based.

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