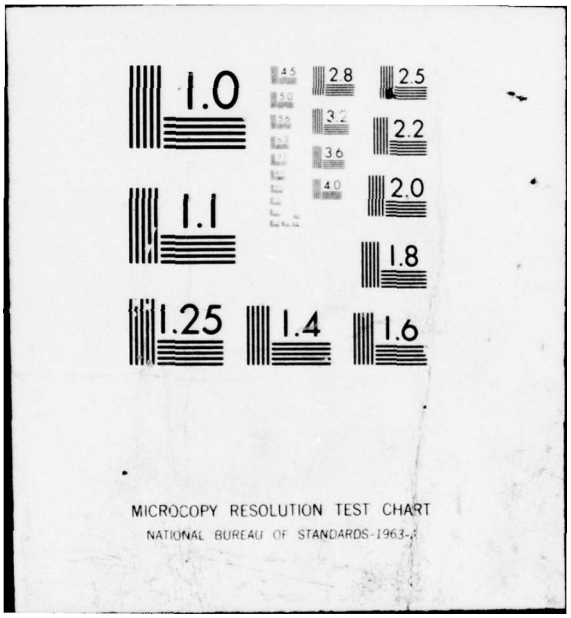
AD-A051 705 ARINC RESEARCH CORP ANNAPOLIS MD F/G 13/10
DEVELOPMENT OF GUIDELINES IN SUPPORT OF SHIP'S FORCE OVERHAUL M--ETC(U)
AUG 75 N J SCARLETT N00140-74-D-0090-0011
UNCLASSIFIED 1231-01-1-1441 NL

| OF |
AD
A051 705

END
DATE
FILMED
4-78
DDC


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
6.3
7.1
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Mgr ITSP

(12)

DEVELOPMENT OF GUIDELINES IN SUPPORT OF SHIP'S FORCE OVERHAUL MANAGEMENT SYSTEMS FOR NAVY DESTROYERS

August 1975

Prepared for

PERA(CRUDES)
PHILADELPHIA NAVAL SHIPYARD
Philadelphia, Pennsylvania

Under Contract N00140-74-D-0090-0011

Publication 1231-01-1-1441

ARINC RESEARCH CORPORATION

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: 1231-01-1-1441	2. GOVT ACCESSION NO.
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle): DEVELOPMENT OF GUIDELINES IN SUPPORT OF SHIP'S FORCE OVERHAUL MANAGEMENT SYSTEMS FOR NAVY DESTROYERS	5. TYPE OF REPORT & PERIOD COVERED
	6. PERFORMING ORG. REPORT NUMBER: 1231-01-1-1441
7. AUTHOR(s): Neil J. Scarlett	8. CONTRACT OR GRANT NUMBER(s): N00140-74-D-0090-0011
9. PERFORMING ORGANIZATION NAME AND ADDRESS: ARINC Research Corp., 2551 Riva Road, Annapolis, Maryland 21401	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS: PERA (CRUDES), PHILADELPHIA NAVAL SHIPYARD, Philadelphia, Pennsylvania	12. REPORT DATE: August 1975
	13. NUMBER OF PAGES: 18
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office): PERA (CRUDES), PHILADELPHIA NAVAL SHIPYARD, Philadelphia, Pennsylvania	15. SECURITY CLASS. (of this report): UNCLASSIFIED
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

UNCLASSIFIED/UNLIMITED

(12) 21 pp.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Various tasks conducted by ARINC Research relating to the development of guidelines in support of Ship's Force Overhaul Management Systems for Navy destroyers are described. Documents prepared and delivered under the study are referenced, and appropriate conclusions and recommendations are presented.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

400 247

LB

DEVELOPMENT OF GUIDELINES IN SUPPORT OF SHIP'S FORCE OVERHAUL MANAGEMENT SYSTEMS FOR NAVY DESTROYERS

August 1975

Prepared for

PERA(CRUDES)
PHILADELPHIA NAVAL SHIPYARD
Philadelphia, Pennsylvania

Under Contract N00140-74-D-0090-0011

Prepared by

N.J. Scarlett

ARINC RESEARCH CORPORATION

FLEET SUPPORT OFFICE
3565 Kenyon Street, Suite 7
San Diego, CA 92110

CORPORATE HEADQUARTERS
2551 Riva Road
Annapolis, MD 21401

Publication 1231-01-1-1441

Prepared under Contract N00140-74-D-0090-0011,
which grants to the U.S. Government a license to
use any material in this publication for govern-
ment purposes.

ABSTRACT

Various tasks conducted by ARINC Research relating to the development of guidelines in support of Ship's Force Overhaul Management Systems for Navy destroyers are described. Documents prepared and delivered under the the study are referenced, and appropriate conclusions and recommendations are presented.

CONTENTS

1
INTRODUCTION

This report summarizes the efforts performed by ARINC Research Corporation under Delivery Order 011 to Contract N00140-74-D-0090. The delivery order called for the following tasks:

a. Task 1 – Acquire and analyze Ship's Force Overhaul Management System (SFOMS) data summaries;

b. Task 2 – Determine the adequacy of the acquired data;

c. Task 3 – From the analysis of the summarized data, develop basic ship's force jobs, key operations, and man-hour estimates for work items typically included in ship's force work packages;

d. Task 4 – Provide guidelines for identifying long-lead-time material to support ship's force work;

e. Task 5 – Acquire data and develop guidelines for better definition of nonindustrial man-hour distribution and determination of industrial man-hours available, and

f. Task 6 – Develop procedures for use of SFOMS data in overhaul management.

Response of Hawaii, Inc. was subcontracted to provide support for Tasks 1 through 3.

Efforts performed, results achieved, and deliveries made under the delivery order are described in Section 2; conclusions and recommendations from these tasks are presented in Section 3.

2
SUMMARY OF TASK RESULTS

2.1 TASK 1 – ACQUIRE DATA

Under Task 1, SFOMS data were acquired for 48 destroyers of the Atlantic and Pacific Fleets. The data consisted of SFOMS status reports issued weekly during the ship overhaul periods (see Figure 1). The data for East Coast ships were provided by PERA(CRUDES), and the West Coast Ships by Response of Hawaii.

There were no delivery requirements under Task 1.

2.2 TASK 2 – DETERMINE ADEQUACY OF DATA

The objective of Task 2 was to analyze the data acquired under Task 1 to determine if the data base was sufficient to proceed with the remaining tasks. It was concluded that the data base was adequate for that purpose.

2.3 TASK 3 – DEVELOP BASIC SHIP'S FORCE JOB GUIDELINES

The objective of Task 3 was to develop, from the summarized data, a set of basic tasks to be performed by ship's force in implementing SFOMS. Ship's force job planning guidelines were developed in the interrelated forms described below.

2.3.1 Ship Type Models

Data generated in prior West Coast overhauls supported by Response of Hawaii were used as a baseline for generating SFOMS standard models for ship types DD, DDG, CG, FF, and FFG.

The format of these models is shown in Figure 2. The models were delivered under separate cover.

2.3.2 Guidelines for Scoping and Planning Ship's Force Work

The models described in Section 2.3.1, together with a sampling of the SFOMS data for East Coast ships, were used as a basis for development of a catalog of ship's

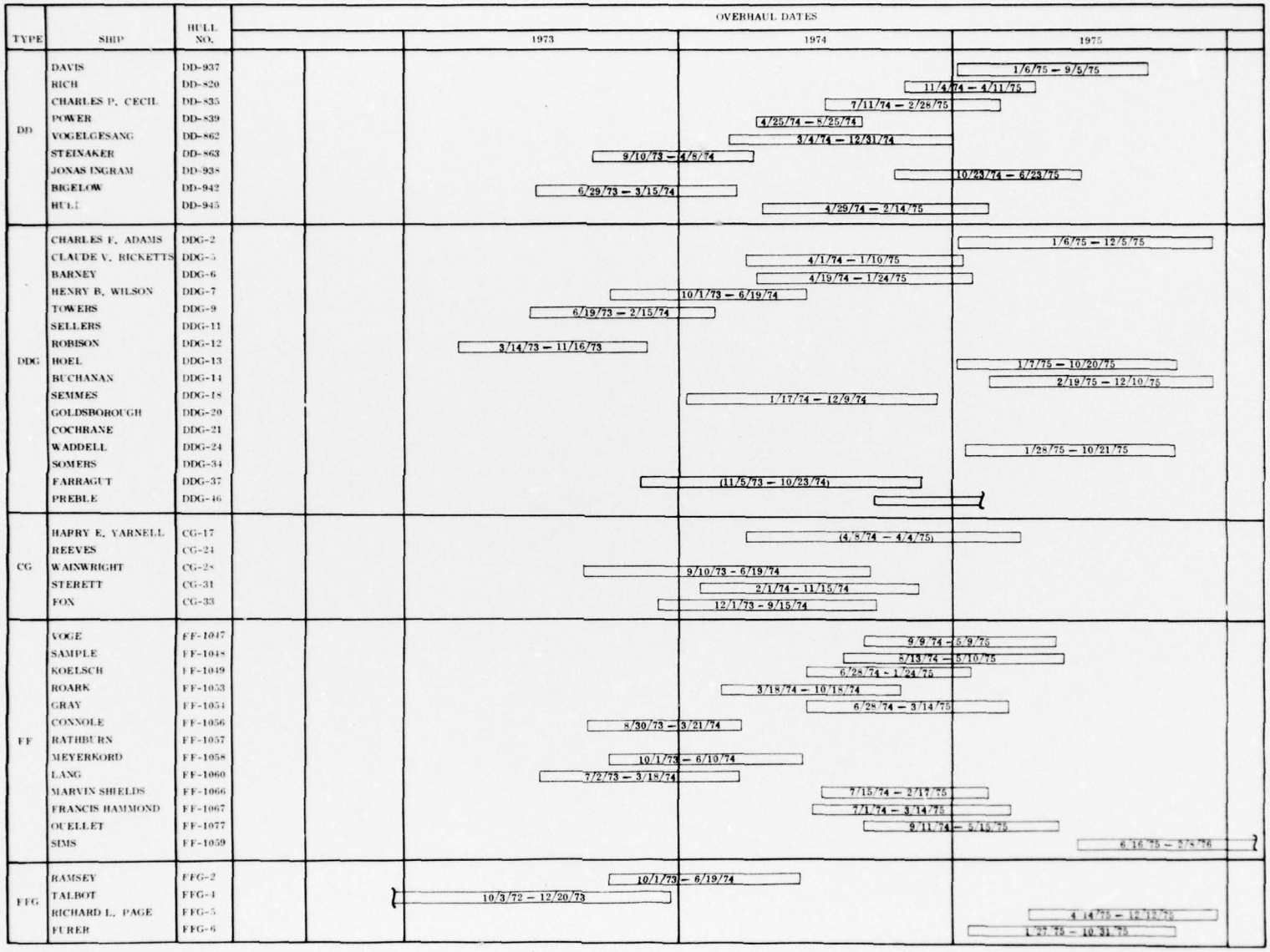


Figure 1. Ships Included in SFOMS Data Base

SFOMS STANDARDS (DE) **ALL JOBS - W/O MAT**
JOB SCHEDULE AND STATUS REPORT FOR WC EA04

THIS REPORT DATE MAY 21, 1975

WC-JSN	K O	TITLE VARIANCE	AWC	SCHEDULED START	SCHEDULED COMPL	MANHOURS EST	MANHOURS EXP	MANHOURS REM	DATE COMPL
EA04-4105		DSL GEN EXH MANIFS							
	A	RPL GSKTS	EA04	FEB 1	FEB28	42	0	0	
		LAST UPDATE THIS JSN WEEK ENDING MAY 2							
EA04-4106		#1B DSL GEN							
	A	OVHL	EA04	MAY 5	JUL21	315	0	0	
		LAST UPDATE THIS JSN WEEK ENDING MAY 2							
EA04-4107		DSL SW PUMP							
	A	RMV/RPR/INSTL/TEST	EA04	JAN16	MAY26	45	0	0	
		LAST UPDATE THIS JSN WEEK ENDING MAY 2							
EA04-4701		#1 SONAR CIRC PMP							
	A	RMV/RPR	EA04	MAR18	APR 1	7	0	0	
	B	INSTL/TEST	EA04	APR21	MAY12	41	0	0	
		LAST UPDATE THIS JSN WEEK ENDING MAY 2							
EA04-4702		#2 SONAR CIRC PMP							
	A	RMV/RPR/PRSV	EA04	MAR13	MAR25	41	0	0	
	B	INSTL/TEST	EA04	MAY21	AUG29	108	0	0	
		LAST UPDATE THIS JSN WEEK ENDING MAY 2							
EA04-4703		#1 AIRCOND C/W PMP							
	A	RMV/RPR	EA04	JAN15	MAR10	30	0	0	
	B	INSTL/TEST	EA04	MAY 1	MAY 1	6	0	0	
		LAST UPDATE THIS JSN WEEK ENDING MAY 2							

Figure 2. Sample of Standards Model

force jobs. The resultant document, entitled Guidelines for Scoping and Planning Ship's Force (publication W5-1231-TN01), was submitted under separate cover. That document presents a series of SFOMS "Planning Guidelines" sheets (see Figure 3), with a separate sheet provided for each job. The guideline sheets are grouped into appendixes, one for each work center category, as identified in Table 1. The information fields included in the guideline sheets are discussed individually below.

a. Item No. (block 1) – Contains a file number uniquely identifying each item in the appendix. This number is coded to identify the Work Breakdown Structure (WBS) designation and a sequence number within the WBS identification.

b. Title (block 2) – Contains both a long and short title for the item. The long title is a full description of the item, without abbreviations. The short title uses standard abbreviations and is included as an aid in compiling SFOMS input data sheets, where space constraints normally prevail.

c. WBS (block 3) – Contains the WBS number that best classifies the item, as defined from NAVSHIPS 0900-039-9010.

d. EIC (block 4) – Contains the Equipment Identification Code (EIC) that best categorizes the item, as defined in the EIC Master Index.

e. Originating Work Center (block 5) – Identifies the first two letters of the work center that is normally the originating one for the item. (It should be noted that work center designations vary from ship to ship.)

f. Recurrency (block 6) – Identifies the frequency with which the item occurs within destroyer ROH work packages. "Low" indicates that the item is only seldom required as part of a ship's work package. "Medium" indicates that there is reasonable chance of occurrence. "High" indicates a great probability that the item will occur during a ship's ROH. The estimates of frequency as contained in this block are based on a review of prior ROHs for a sampling of destroyers of all types.

g. Applicable Ship Type (block 7) – Identifies the ship type(s) to which the item is known to apply, on the basis of experience.

SFOMS PLANNING GUIDELINES

1. ITEM NO.	2. TITLE Long: Short:	3. WBS	4. EIC
		5. ORIG. WK CNTR	6. RECURRENCY

7. APPLICABLE SHIP TYPE: DD_____ DDG_____ CG_____ FF_____ FFG_____

8. KEY OP	9. MANPOWER GUIDELINES				10. SCHEDULE GUIDELINES		
	ACCOMPL WORK CENTER	ESTIMATED MANHOURS			CALENDAR TIME (WEEKS)	WHEN START	WHEN COMPLETE
		AVG.	LOWER LIMIT	UPPER LIMIT			

11. MATERIAL GUIDELINES

12. REMARKS

Figure 3. SFOMS Planning Guidelines

TABLE 1. SUMMARY OF WORK CENTER ORGANIZATIONS INCLUDED IN SFOMS SCOPING MANUAL

Appendix	Work Center Category	Typical Work Center Designations	
		Pacific Fleet	Atlantic Fleet
A	Fireroom	EB01, EB02, EB14	EB01, EB02, EB14
B	Auxiliaries Division	EA01, ER01	ER04
C	Repair Division	ER01, ER04	ER01
D	Electrical Division	EE01, EE05	ER02
E	Engineroom	EM01, EM02	EM01, EM02
F	Radiomen	OC01	CC01, OC01
G	Electronics	OE01, OE02	OE01, OE21
H	Radarmen	OI01, OI02	OI01, OI02
I	Navigation	ON01, NN01	ON01, NN01
J	Signalmen	OS01	OS01
K	Supply	SS01, *etc.*	SS01, *etc.*
L	Deck	WA01, WD01, *etc.*	WD01, WD21
M	Gunnery	WF01, WG01	WG01, WH21, etc.
N	Missiles	WM01, WS01	WM03, WS01, WS03

h. Key OP (block 8) – The suggested key operations that best describe the job, for purposes of SFOMS management.

i. Manpower Guidelines (block 9) – Identifies:

1) Accomplishing Work Center – The one that would normally accomplish the key operation. This work center will usually, though not necessarily always, be the same as the one identified in block 5.

2) Average Estimated Manhours – The best available estimate of the manpower required to perform the key operation. In most cases this is based on a review of similar types of jobs accomplished in

past ROHs. In certain cases, however, the quantity shown is basically an engineering estimate, without benefit of historical data.

3) Lower Limit Estimated Manhours – The least time considered likely to be required for accomplishing the key operation. The value shown is the lowest value observed from a sampling of SFOMS data.

4) Upper Limit Estimated Manhours – The longest time considered likely to be required for accomplishing the key operation. The estimate shown is the highest value observed from a sampling of SFOMS data.

j. Schedule Guidelines (block 10). Include:

1) Calendar time – Weeks need to accomplish the key operation, based on a review of similar jobs for prior ROHs.

2) When Start – ROH quarter during which the key operation was started in one or more of the prior ROHs sampled.

3) When Complete – Where appropriate, the milestone or key event by which time key operation should be completed (e.g., "prior to LOE").

k. Material Guidelines (block 11) – Contains general statements regarding material identification/ordering requirements applicable to the item.

l. Remarks (block 12) – Contains general statements, summarized tables of estimating factors, etc., as considered appropriate to the planning of each individual item. In cases where the quantity of supplemental guidance is voluminous, a supplement sheet is used.

2.4 TASK 4 – DEVELOP MATERIAL GUIDELINES

The objective of this task was to derive material guidelines for the set of ship's force jobs defined in Task 3. This output appears in a manual, Guidelines for Material Management in Support of Ship's Force Work (publication W5-1231-TN02), prepared and submitted under separate cover. The manual contains background information concerning material management duties of ship's force personnel prior to and during ROH. The role of SFOMS in material management is stressed. The manual addresses the following key tasks accomplished by ship's force during ROH planning:

a. Determining the material required for ship's force work.

b. Ordering the material.

c. Preparing SFOMS data input sheets for the material.

The manual contains an appendix that tabulates, by work center, material-ordering guidance appropriate to each applicable job defined in Task 3. The tables in the appendix are not intended as an exhaustive listing of materials that must be ordered, but rather a summary of material requirements and suggested sources of ordering data based on previous ROH experiences for destroyers.

2.5 TASK 5 – DEVELOP IMPROVED GUIDELINES FOR MANPOWER BUDGET PREPARATION

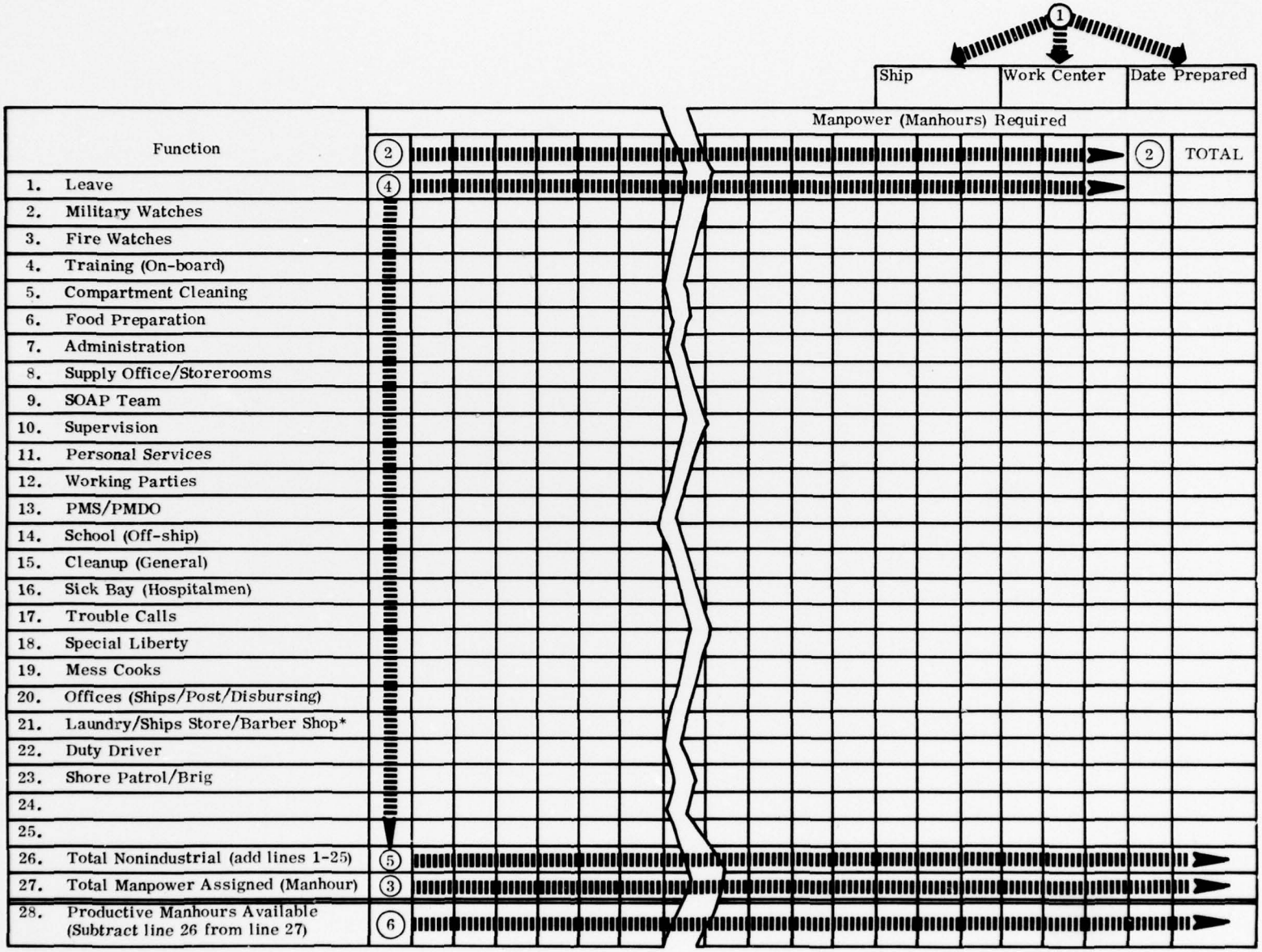
The objective of Task 5 was to acquire and summarize supplemental data to support better definition of the nonindustrial portion (i.e., leave, training, etc.) of ROH management. The task was accomplished through review, summary, and analysis of historical SFOMS data for East Coast ships. The guidelines were consolidated in a manual, Guidelines for Estimating Ship's Force Non-Industrial Manpower Requirements During ROH (publication W5-1231-TN03), which was submitted under separate cover. This manual outlines a procedure for estimating and computing nonindustrial requirements by completing the planning sheet shown in Figure 4. The procedure comprises the six steps described below. The circled numbers (e.g., ①) in Figure 4 identify the specific blocks of information associated with each step.

a. Step 1 – Fill in ship name and hull number, work center, and date.

b. Step 2 – Identify each week (e.g., February 1, February 8, etc.), starting with the first and ending with the last week of the ROH.

c. Step 3 – Compute and record in line 27 the number of man-hours assigned for each week of the ROH. This is determined by multiplying the number of men assigned to the work center by the number of normal working hours in that week (i.e., exclusive of holidays). For example, if there are 10 men assigned to a work center, four work days in the week, and seven work hours per day, the number of man-hours available is 280. Appendix G of the manual identifies the normal number of workdays for each calendar week through 1980.

d. Step 4 – Estimate the number of man-hours required for each non-industrial function. This quantity is based on the percentage of total



*Ships Servicemen functions.

Figure 4. Nonindustrial Work Planning Sheet

manpower expected to be assigned for each function during each week. The guidelines contained in Appendixes A through E of the manual provide assistance in formulating these estimates. Figure 5 illustrates the format of these guidelines.

e. Step 5 – Add the man-hours computed for lines 1 through 25, and enter the total nonindustrial manpower requirements in line 26.

f. Step 6 – Subtract line 26 from line 27 to determine the number of productive manhours available during each week of the ROH.

In addition to the procedure and appendixes described above, the manual contains application guidance pertaining to each of the nonindustrial functions listed in Figure 5.

2.6 TASK 6 – DEVELOP IMPROVED INSTRUCTIONS FOR UTILIZING SFOMS IN OVERHAUL MANAGEMENT

The objectives of Task 6 were to develop improved guidance for using SFOMS outputs in the management of ship overhaul, and for updating SFOMS guidance on a dynamic basis. Results of this task appear in the manual, Guidelines for Utilizing SFOMS Data During ROH Implementation (publication W5-1231-TN04), which was submitted under separate cover.

The manual presents guidelines for using SFOMS output data for both routine and specialized applications. Examples of routine applications are workload forecasting, performance measurement, and production control. Special applications that can be supported by SFOMS, although usually on an optional basis, include tender work and nonindustrial activities such as personnel leave and training.

SFOMS ESTIMATING GUIDELINES FOR
NONINDUSTRIAL FUNCTIONS

Type(s) of Ship _____ Work Center(s) _____

Function	Percentage (%) of Assigned Manpower		
	Average	Lower	Upper
1. Leave			
2. Military Watches			
3. Fire Watches			
4. Training (On-board)			
5. Compartment Cleaning			
6. Food Preparation			
7. Administration			
8. Supply Office/Storerooms			
9. SOAP Team			
10. Supervision			
11. Personal Services			
12. Working Parties			
13. PMS/PMDO			
14. School (Off-ship)			
15. Cleanup (General)			
16. Sick Bay (Hospitalmen)			
17. Trouble Calls			
18. Special Liberty			
19. Mess Cooks			
20. Offices (Ships/Post/Disbursing)			
21. Laundry/Ships Store/Barber Shop*			
22. Duty Driver			
23. Shore Patrol/Brig			
24.			
25.			
TOTAL			

Remarks:

*Ships Servicemen functions.

Figure 5. SFOMS Estimating Guidelines for Nonindustrial Functions

3
CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations relate to the implementation of the guidelines and procedures submitted under the delivery order.

3.1 AUTOMATION OF NONINDUSTRIAL WORK PLANNING SHEETS

PERA(CRUDES) has noted that the statistical guidance resulting from Task 5 can be programmed so that planning sheets can be generated using ADP techniques. That Navy activity has also suggested that manpower estimates be initially generated using basic data, such as number of personnel assigned each work center; and formatted in a manner that will accommodate changes or refinements by ship's force based on command policy or other unique considerations. ARINC Research concurs in this approach, and offers the following related suggestions:

a. The specific set of nonindustrial functions upon which the Task 5 guidelines are based should be reviewed to ensure that they include all such functions considered significant. Any resulting changes to the listing of functions should be established prior to programming.

b. The statistical averages should be reviewed by the appropriate TYCOMs to ensure that they are consistent with future management objectives.

3.2 JOB GUIDELINES

The job guidelines developed under Task 3 are presented in two different but compatible formats:

a. By ship type (ship type models)

b. By work center (catalog of jobs)

The former format has the advantage that it is easily revised and updated. Additional advantages are that the models are particularly useful as tools for scheduling specific overhauls for specific ships. The limitation of this format is that the data is uniquely constructed to each type of ship, and hence does not accommodate a

carryover of historical experience from type to type. An additional limitation is that the format is unique to one particular SFOMS application.

The latter format has the advantage of a broader data base and increases the degree of standardization for the key data elements of SFOMS. In addition, the latter format allows inclusion of additional planning guidance (e.g., WBS, EIC, plain or abbreviated language, identification of jobs, material guidelines, and other subjective guidance as may be appropriate to each job). This approach enables a broadened statistical data base and permits the carryover of historical data from one ship type to another.

It is recommended that the catalog of jobs be updated on an annual basis in its present format.

3.3 UPDATING JOB GUIDELINES

The guidelines produced under Task 3 basically reflect existing practices relative to scoping and estimating of jobs. In this regard it is noted that, for the most part, jobs have been limited in the past to the definition of a single key operation. The effectiveness of this practice is debatable. Consequently it is recommended that the key operations defined in the Task 3 guidelines be validated in consideration of the management objectives underlying SFOMS. The guideline sheets can be refined, (i.e., consolidated or further broken out) if desired in consideration of those objectives.

3.4 AUTOMATING JOB GUIDELINES

The reduction of the burden on ship's force in establishing SFOMS data inputs is a significant objective. Consistent with this objective, it is recommended that use of guidelines to generate initial/baseline output reports, rather than through manual generation of input sheets (in much the same manner as was discussed relative to non-industrial planning) be considered. In the interim it is recommended that the catalog of items and the statistical base for the estimates be expanded through the annual update program recommended in Section 3.2.