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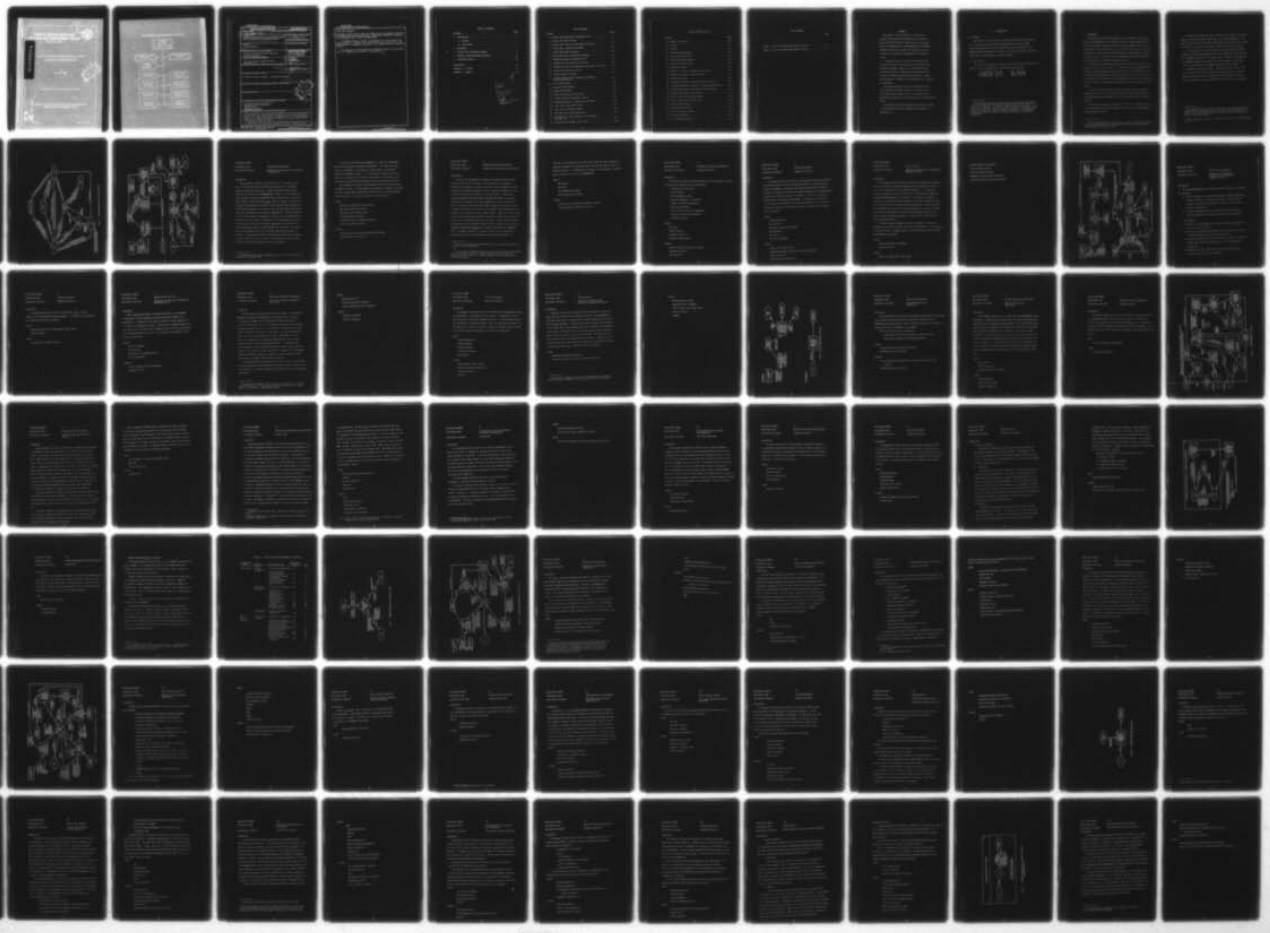

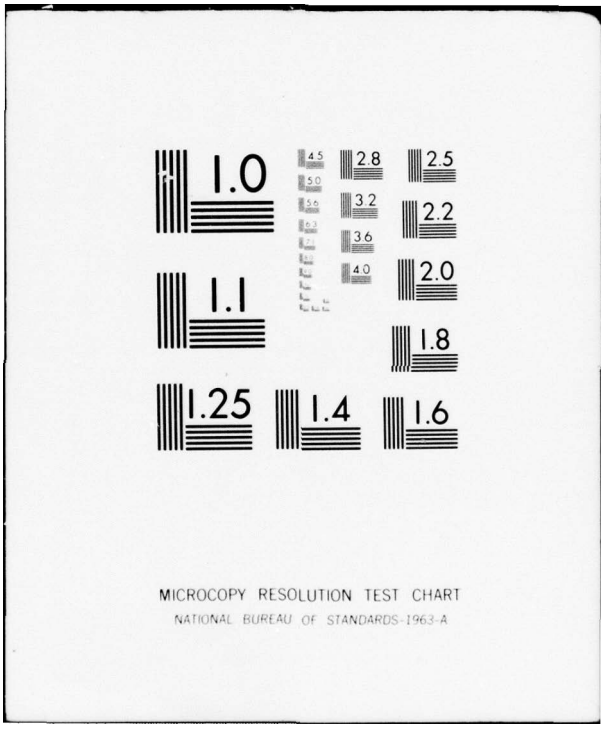
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DAVID W. TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER

Bethesda, Md. 20084

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TRIDENT SYSTEM/SURFACE SHIP MAINTENANCE PROCESS DESCRIPTION AND COMPARISON STUDY

by

Benjamin Siegel

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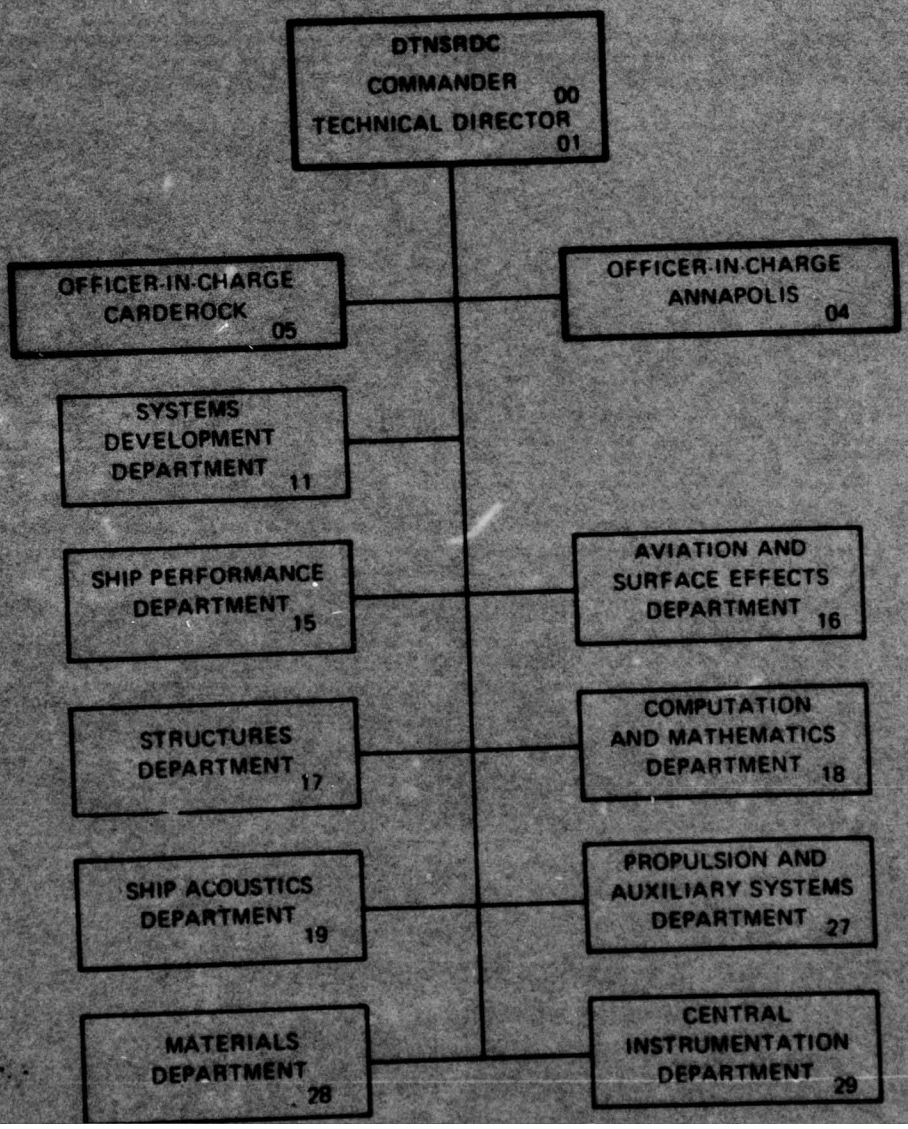

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The purpose of this study was to identify and describe the maintenance processes that are currently being performed by surface ships (destroyers/frigates) and those contemplated to be implemented by the TRIDENT Submarine System and to compare their salient situations, procedures, and method of handling data in these processes.

Information used as a basis for describing these maintenance processes was acquired from interviews with shipboard personnel, discussions with next page

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Ships Parts Control Center (SPCC) and NAVSEA codes, and documents pertaining to TRIDENT operations and maintenance. Formats were developed to summarize this information and to assist in comparisons.

The TRIDENT Submarine System is contemplated to be more automated and employ software to a greater extent than surface ships currently do in the implementation of maintenance processes at the organizational and intermediate levels.

The comparison of these maintenance processes is based on acquired data and is not judgmental with respect to preferability.

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ABSTRACT

The purpose of this study was to identify and describe the maintenance processes that are currently being performed by surface ships (destroyers/frigates) and those contemplated to be implemented by the TRIDENT Submarine System and to compare the salient situations, procedures, and methods of handling data in these processes.

Information used as a basis for describing these maintenance processes was acquired from interviews with shipboard personnel, discussions with Ships Parts Control Center (SPCC) and NAVSEA codes, and documents pertaining to TRIDENT operations and maintenance. Formats were developed to summarize this information and to assist in comparisons.

The TRIDENT Submarine System is contemplated to be more automated and employ software to a greater extent than surface ships currently do in the implementation of maintenance processes at the organizational and intermediate levels.

The comparison of these maintenance processes is based on acquired data and is not judgmental with respect to preferability.

1. INTRODUCTION

1.1 PURPOSE

The purpose of this study was to identify and describe the maintenance processes that are currently being performed by surface ships* (destroyers/frigates) and those contemplated to be implemented by the TRIDENT Submarine System and to compare the salient situations, procedures, and methods of handling data in these processes.

1.2 DATA SOURCES

The sources of the data that were used as the basis for describing the surface ship and TRIDENT System maintenance processes were:

USS McCANDLESS - (FF 1084)	SPCC - Code 884
USS PUGET SOUND - (AD 38)	SPCC - Code 880F
NAVSURFLANT HQ - (Code N45)	NAVSEA - PMS 396

*Although OPNAV Instruction 4790.4 series specifies the requirements of the 3M System, their applications may vary on individual ships to meet local situations. In addition, surface ships are required to report corrective maintenance actions on specific categories of equipment; submarines are required to report maintenance experience on all equipment. Scope of the study was limited to surface ships under the command of CINCLANTFLT.

2. PROCEDURES

Interviews were held with personnel from the Operations, Weapon and Engineering Departments of the USS McCandless and various groups (particularly the Analysis, Records and Reporting Section (ARRS)) aboard the USS PUGET SOUND. Data acquired from these interviews* were used as a basis for describing the maintenance processes performed by representative customer and tender ships. An interview with NAVSURFLANT HQ (Code N45) supplied a general description of depot maintenance procedures.

Discussions and reviews of data procedures and formats were held with Ships Parts Control Center (SPCC) - Codes 884 and 880, and NAVSEA-PMS 396. Documents (see Bibliography on page 96) describing the TRIDENT Class Submarines Maintenance Management System Requirements and concept of operation were acquired from SPCC - Code 884 and NAVSEA-PMS 396. This information was used as a basis for describing the maintenance processes discussed in this report.

The surface ship maintenance process descriptions were reviewed by NAVSURFLANT HQ (Code N45); the TRIDENT Submarine System maintenance process descriptions were reviewed by SPCC - Codes 880F and 884, and NAVSEA - PMS 396.

The salient situations, procedures, and methods of handling data for the current surface ships were compared with those for the contemplated TRIDENT Submarine System.

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*Due to the variations in ship types, locations, and operational situations, surface ships do not always implement maintenance instructions and procedures in identical manners.

A standardized format was used to describe each process. The format header includes the process index number, type, and performer(s). The body of the format is a narrative describing the actions that occur within the process. In addition, the process inputs and outputs are listed.

To facilitate the comparison between the surface ship and TRIDENT systems, the Maintenance Numbers (see format heading) were kept the same for comparable processes* in Sections 3 and 4. However, to distinguish the TRIDENT processes from those of the surface ships, a lower case letter "a" was added to the TRIDENT System maintenance numbers.

Appendix A includes a glossary. Appendix B includes some of the forms currently used (surface ships) and some expected to be used in implementing the maintenance (TRIDENT System)** processes. Documents from which pertinent data were obtained are listed in the Bibliography.

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*Variations between the current surface ship and contemplated TRIDENT System methods of implementation of maintenance processes resulted in deletion of some Maintenance Numbers and adjustments in the designated names of Maintenance Types.

**Descriptions of the types of information to be used in TRIDENT System formats.

3. SURFACE SHIP MAINTENANCE PROCESSES

This section contains descriptions of current surface ship maintenance processes. The processes are classified by organization level, category, and type of maintenance being performed. Table 1 is an index to the location of each process description.

Figure 1 offers an overview of the maintenance information flow among the major activities. Figures synthesizing these processes are located at the beginning of each category and should be used as a guide to the text. Figure 2, for example, diagrams the planned maintenance subsystem processes for surface ships. The numerical indicator in each rectangular process box in these figures refers to the maintenance number used in the corresponding process description.

TABLE 1 - LIST OF PROCESSES DESCRIBED IN SECTION 3

ORGANIZATIONAL LEVEL	CATEGORY	MAINTENANCE TYPE	MAINTENANCE NUMBER	PAGE
Ship's Force	Planned	Perform Data Acquisition	1	9
		Perform Planning and Scheduling	2	11
		Determine Performance Requirements	3	13
		Perform Maintenance	4	14
		Prepare Reports	5	15
	Corrective	Perform Data Acquisition	6	18
		Perform Failure Reporting	7	20
		Perform Problem Validation	8	21
		Assign Failure Priority	9	22
		Determine Performance Requirements	10	23
		Perform Maintenance	11	25
		Prepare Reports	12	26
	Inspections	Perform Data Acquisition	13	29
		Perform Planning and Scheduling	14	30
		Perform Unscheduled Inspection	15	31
IMA	Corrective/ Planned	Perform Data Acquisition	16	33
		Perform Initial TAV Planning	17	35
		Perform Data Preparation and Distribution	18	37
		Perform Other Initial Planning	19	39
		Perform Work Center Planning and Scheduling	20	41
		Determine Performance Requirements	21	42
		Perform Maintenance	22	43
		Prepare Reports	23	44
Depot	Corrective/ Planned	Perform Restricted Availability Planning and Scheduling	24	47
		Perform Maintenance and Prepare Reports	25	49

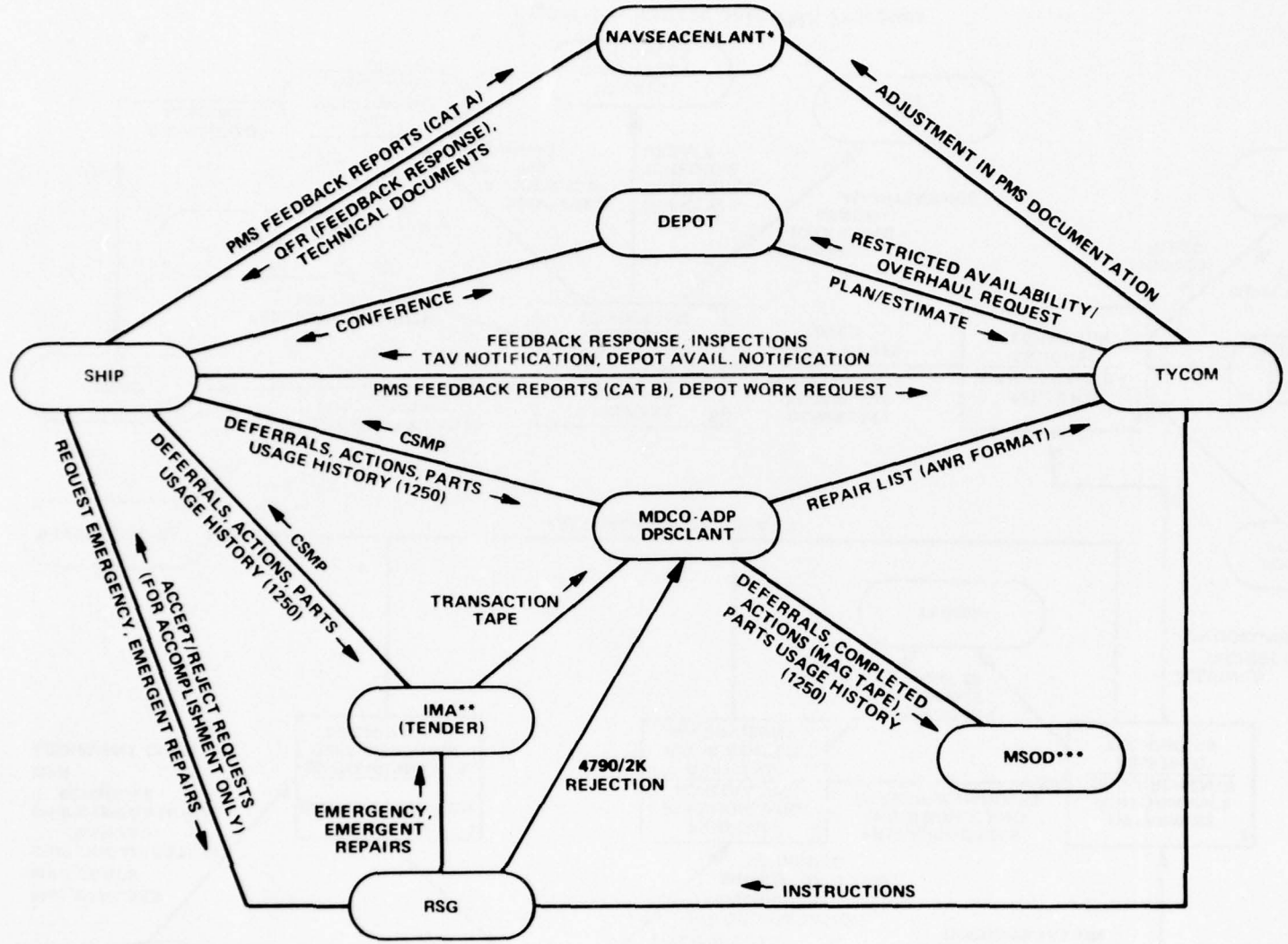

Figure 1 – Surface Ship Maintenance Information Flow

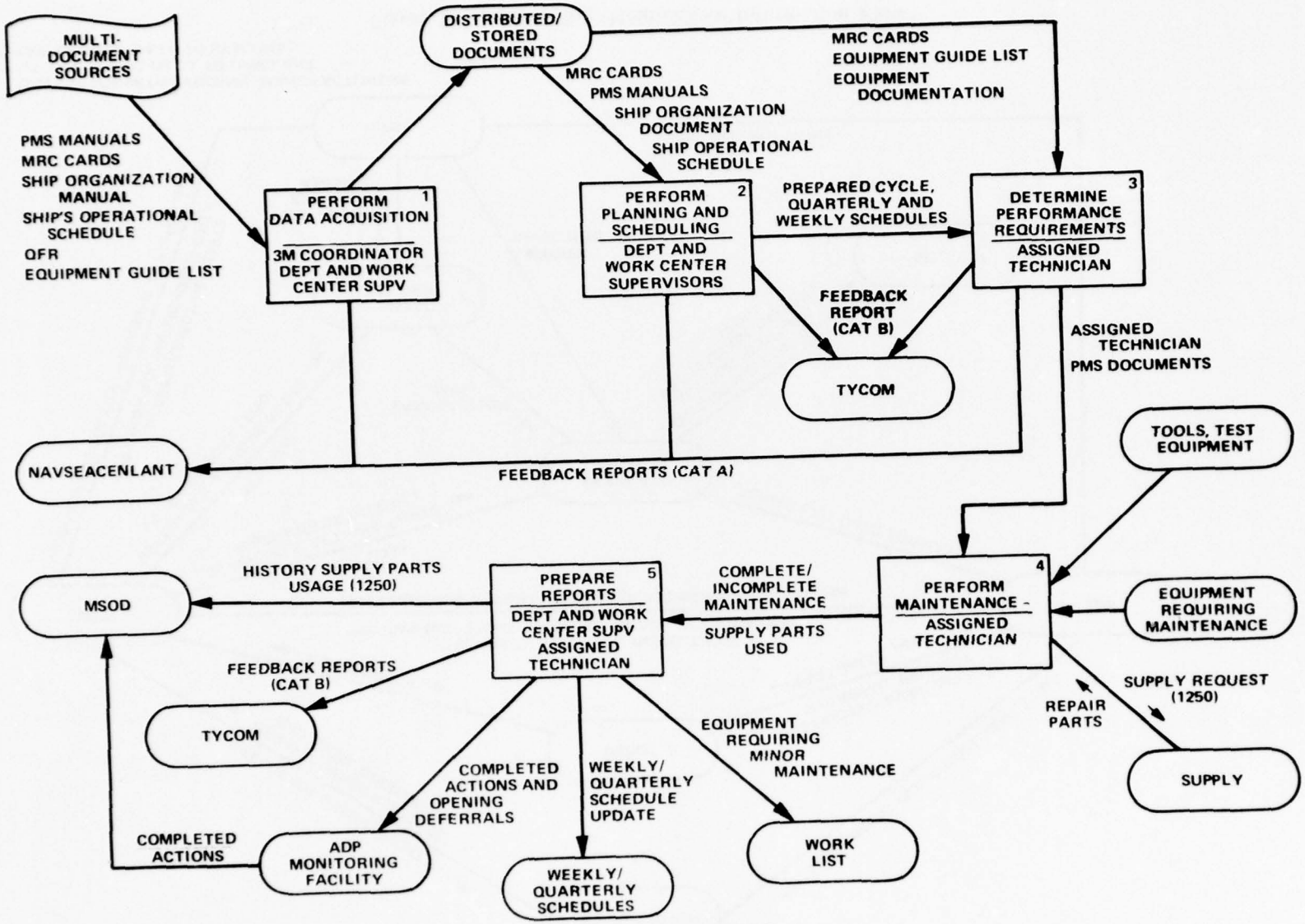

Figure 2 – Surface Ship PMS Processes

Maintenance Number	1
Maintenance Type	Perform Data Acquisition
Maintenance Performer	Department and Work Center Supervisors/ 3M Coordinator

DESCRIPTION

Navy documents, manuals, instructions, etc., are acquired at the time of the customer ship's outfitting and thereafter, as required. Updates are continually received. Planned Maintenance System (PMS) documents are "pushed" from NAVSEACENLANT (sender) to the customer ship. These documents include the OPNAVINST 4790.4 series* (List of Effective Pages (LOEP's), Maintenance Index Pages (MIP's), Summary of Action) and Maintenance Requirements Cards (MRC's) which give detailed descriptions of maintenance procedures. A Quarterly Force Revision report updates the LOEP, MIP, and MRC data (see figures in Appendix B). The LOEP contains a list of MIPs, number of equipments for which there is information, the allowance parts list (APL), if applicable, and the Equipment Guide List (EGL) which is to be filled in by each department, as necessary, and which provides the numbers of each equipment per location. In addition, before job schedules can be set, the Ship's Operational Schedule is required. It specifies the ship's forthcoming locations and the number of days it will be at sea or in port. This schedule is used in determining the level of maintenance that can be scheduled.

---

*See OPNAVINST 4790.4 Ships' 3M Manuals, Vol. I, II, and III 1973 (U) for details - formerly 43P2.

If a ship is returning from deployment, it goes into STAND-DOWN, which usually implies a minimum of maintenance. If a ship is in port, and it is in UPKEEP, it can perform a normal amount of maintenance (possibly COLDIRON-no steam). If it is going into Tender Availability (TAV), it can perform and schedule a large amount of maintenance while the tender is performing the designated corrective/planned maintenance.

The documents are stored in the department offices and work centers throughout the ship. If PMS documents are missing, a Category A (administrative) Feedback Report (OPNAV Form 4790/7B) is sent to NAVSEACENLANT, which functions as a library and source for these documents.

INPUTS

PMS Manuals (OPNAVINST 4790.4 series)

MRC Cards (OPNAV Form 4700.1B)

Quarterly Force Revision (QFR)

Ship Organization Document

Equipment Guide List (OPNAV Form 5400.1)

Ship's Operational Schedule

OUTPUTS

Distributed/stored documents (planned maintenance)

Feedback Report (Category A)

Maintenance Number	2
Maintenance Type	Perform Planning and Scheduling
Maintenance Performer	Department and Work Center Supervisors

DESCRIPTION

Using the PMS documentation acquired, the department/group supervisors develop the Cycle Schedule. This document is a long-range schedule that designates the yearly quarters (or more frequent intervals) during which planned maintenance (for each component/equipment) is to be performed between major overhauls by each work center. Existing PMS records (department and work center) and applicable MRC's are used in developing this schedule. The Cycle Schedule will indicate situation*, annual, semi-annual, quarterly and monthly situation maintenance actions. It begins with the end of the most recent overhaul period and extends, by quarters, to the end of the next overhaul period. Using the Cycle Schedule, the work center supervisor develops a Quarterly Schedule which provides a weekly status of PMS items for each work center. This schedule includes MIP designation and the weekly schedule. On this schedule, an X is used to designate "completed" work and an O is used to indicate "not completed" jobs. The Weekly Schedule** is used by the work center supervisor to assign and monitor the accomplishment of work during each week. It

---

* Situation requirements (planned maintenance is performed according to frequency of use of equipment)

** If required, an Equipment Guide List can be used in scheduling maintenance on the Weekly Schedule. A weekly Work Card (controlled by the Division Officer) is used to transfer information from the Quarterly to the Weekly Schedule.

includes such information as the work center code, MIP code, components, personnel assigned to each job (by name), and PMS periodicity codes to be performed per day. If documentation is found to be incomplete, a Feedback Report (Category A) is sent to NAVSEACENLANT.

INPUTS

PMS Manuals

MRC Cards

Ship Organization Manual

Ship's Operational Schedule

OUTPUTS

Prepared Cycle, Quarterly and Weekly Schedules

Feedback Reports (Categories A and B)

Maintenance Number	3
Maintenance Type	Determine Performance Requirements
Maintenance Performer	Assigned Technician

DESCRIPTION

The technician reads the Weekly Schedule for his assignment, acquires the appropriate documentation, and determines:

- procedures to be followed
- tools required
- test equipment required
- related maintenance, if required
- number of manhours designated
- dates of performance
- skill levels for each job assignment
- equipment description documents
- equipment location

INPUTS

MRC Cards

Weekly Schedule

Equipment Guide List

Equipment documentation

OUTPUTS

Feedback Reports (Categories A and B)

Assigned technician

PMS documents

Maintenance Number	4
Maintenance Type	Perform Maintenance
Maintenance Performer	Assigned Technician

DESCRIPTION

The assigned technician follows the designated maintenance procedures and determines whether parts are required, whether he can perform maintenance as assigned, and whether other planned maintenance is required. If parts are required to fulfill the planned maintenance, he prepares/sends a NAVSUP Form 1250 (part request) to Supply. If they are in stock, he acquires parts and completes maintenance. If parts are not available (as required) to perform PMS, he notifies the supervisor. If a need for unforeseen (corrective) maintenance is found, he reports it to the work center supervisor.

INPUTS

- Assigned technician
- Repair parts
- Equipment requiring maintenance
- PMS documents
- MRC cards
- Tools/test equipment

OUTPUTS

- Supply part request (1250)
- Complete/incomplete maintenance (percent completed)
- Supply parts used
- Feedback Report (Category B)

Maintenance Number	5
Maintenance Type	Prepare Reports
Maintenance Performer	Department and Work Center Supervisors/ Assigned Technician

DESCRIPTION

The assigned technician indicates status of job completion/incompletion on the Weekly and Quarterly Schedules (with reasons for delays, if any, on the reverse side of the Quarterly Schedule). If corrective action is required as a result of PMS check, he initiates an OPNAV Form 4790/2K (Opening Deferral), if necessary. The extent of completed actions for corrective action (reported) that are sent to MSOD will vary and is a function of each ship's internal directives. Completed actions for equipments that are on the Selected Equipment List require a 4790/2K (for the ship interviewed) to be initiated (although the ship's force does not require outside assistance). They are sent to MSOD via the monitoring ADP Facility.

A feedback report (Category B) is sent to TYCOM if a technical problem results from the use of a particular PMS document. If the problem is safety-related, a message is sent to various activities such as TYCOM, NAVSEACENLANT, and NAVSEA.

INPUTS

Complete/incomplete maintenance

Supply parts used

OUTPUTS

History of supply parts usage (1250)

Feedback Reports (Category B)

Weekly Schedule update

Quarterly Schedule update

Equipment requiring minor maintenance

Completed actions and opening deferrals

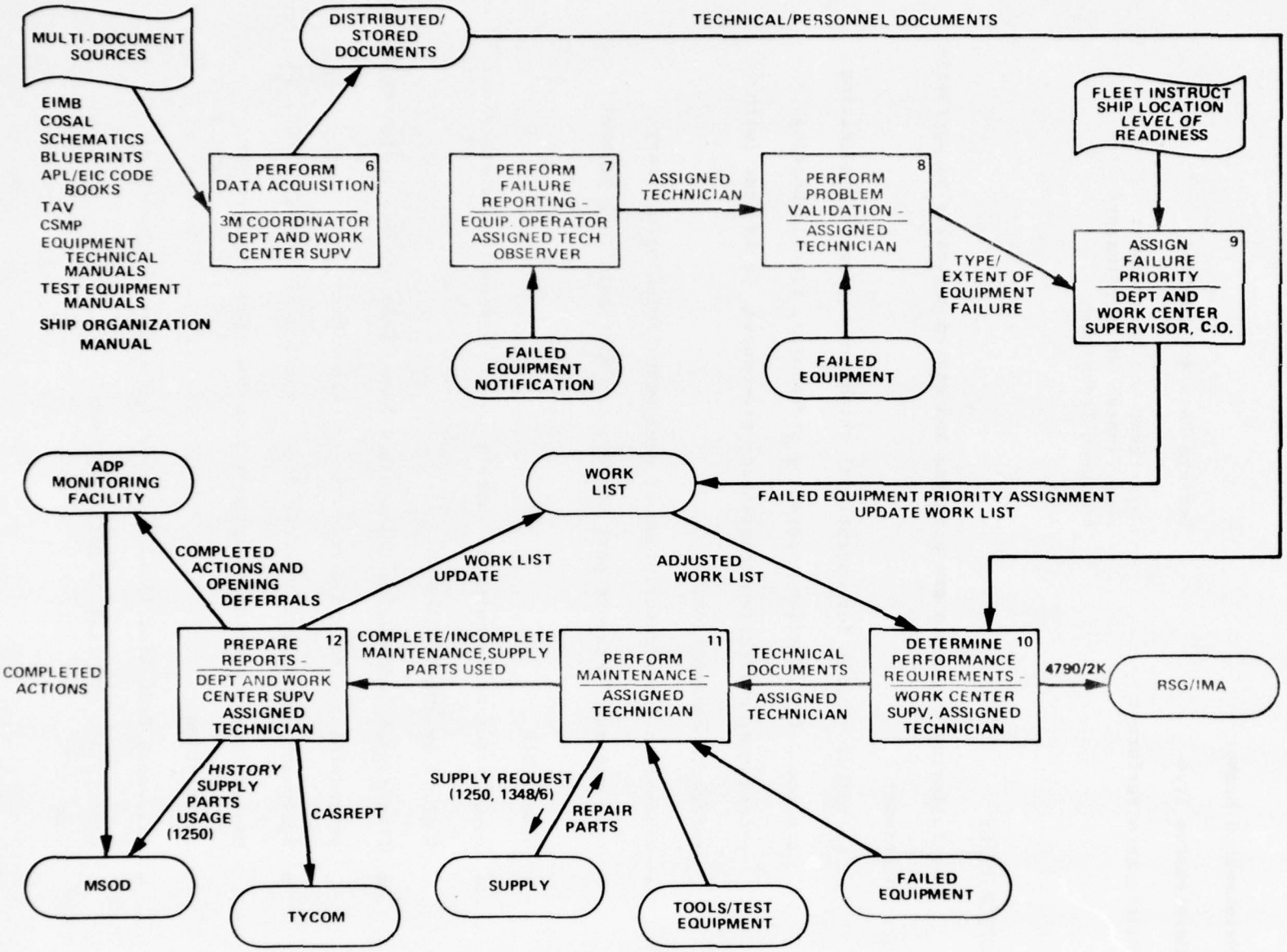

Figure 3 – Surface Ship Corrective Maintenance Processes

Maintenance Number	6
Maintenance Type	Perform Data Acquisition
Maintenance Performer	Department and Work Center Supervisors/ 3M Coordinator/ Assigned Technician

DESCRIPTION

The following documents are acquired and stored centrally in appropriate locations:

- technical manuals for operational shipboard equipment (indicating equipment installation, operating procedures, troubleshooting procedures, corrective maintenance procedures, parts list (with reference designation))
- schematics (name/description of equipment including military type and manufacturers part number, and National Stock Number)
- blueprints
- manuals for test equipment (with types of information similar to that in technical manuals)
- Electronics Information Maintenance Book (from NAVSEC) indicates procedural checks and electronic reference data
- Equipment Identification Code Book (used for 4790/2K's - MSOD, 3M Master Index) uses four alphanumerics for item nomenclature/ description
- Allowance Part List (APL) Code Book indicates nomenclature/ description and list of parts/equipment

- COSAL (includes an Index (APL/Allowance Equipment List (AEL)), APL pages, and master cross reference list (National Stock Number to APL/AEL)

Information on personnel work capabilities is based primarily on the Work Center supervisor's knowledge of technicians' abilities. The CSMP (Current Ships Maintenance Project), which represents a computerized listing of the ship's outstanding (opening deferrals) corrective maintenance requirements for outside assistance, is also available and stored. A message from TYCOM indicating assignment of the ship to Tender Availability (TAV) is also acquired.

INPUTS

Equipment technical manuals

EIMB (Electronics Information Maintenance Book)

Test equipment manuals

APL/EIC Code books

Schematics, blueprints

COSAL (Consolidated Shipboard Allowance List)

CSMP (Current Ship Maintenance Project)

TAV

Ship Organization Manual

OUTPUT

Distributed/stored documents (corrective maintenance)

Maintenance Number	7
Maintenance Type	Perform Failure Reporting
Maintenance Performer	Equipment Operator/Assigned Technician/ Observer

DESCRIPTION

Failure of equipment is indicated by verbal notification to the appropriate work center supervisor. The Division Officer or Department Head is notified.

INPUT

Failed eqiupment notification

OUTPUT

Assigned technician

Maintenance Number	8
Maintenance Type	Perform Validation
Maintenance Performer	Assigned Technician

DESCRIPTION

An assigned technician is sent to test/operate and/or visually inspect the reported malfunctioning equipment. If possible, the technician will identify and assess the problem.

INPUTS

Assigned technician (to investigate failure report)

Failed equipment

OUTPUT

Type/extent of equipment failure

Maintenance Number	9
Maintenance Type	Assign Failure Priority
Maintenance Performer	Department and Work Center Supervisor/ Commanding Officer

DESCRIPTION

Basic considerations made in determining priority to be assigned to handling of failed equipment are Safety, Mobility, Mission, and Habitability. In addition, the required condition of ship readiness is is a factor in assigning a priority. Priorities are assigned sequentially (by number) and if a failure with a higher priority than the last assigned corective maintenance job occurs, it is inserted in an appropriate location on the work list.

INPUTS

Level of readiness

Ship location

Type/extent of equipment failure

Fleet instructions

OUTPUTS

Failed equipment priority assignment

Updated work list

Maintenance Number	10
Maintenance Type	Determine Performance Requirements
Maintenance Performer	Work Center Supervisors/Assigned Technician

DESCRIPTION

The Work Center supervisor evaluates the problem. He determines whether it is within the capability of the ship's force. If not, he completes a 4790/2K (2K) recommending the Type Availability* to correct the deficiency. If it is an emergency failure, he contacts RSG (Readiness Support Group). If it is within the capability of the ship s force, he assigns a technician. If the ship is in Tender Availability (TAV) - in port, and the failure is a Type 2 (IMA Level), a 2K is filled out, approved by the Department Head/CO, and, in most cases, manually carried to RSG (TYCOM representative). If approved, the failed equipment and the approved 2K with its document cover sheet are carried to the tender for repair performance. Approval for an emergency repair is handled by telephone. Normally, a tender requires 45 days prior notice to schedule IMA corrective maintenance.

The assigned technician determines the date/location for performing corrective maintenance and acquires the necessary manuals (technical and test equipment). He then determines the procedures, tools, and test equipment needed.

---

* See 3M Manual OPNAVINST 4790.4 - Volume II, Section 9 - 5.2.3h for detailed description of Type Availability (Type Availability 1 = Depot Level; 2 = IMA Level; 4 = Ship's Force Level)

INPUTS

Adjusted work list

Technical/personnel documents

Failed equipment priority assignment

OUTPUTS

4790/2K (to RSG/IMA)

Technical documents

Maintenance Number	11
Maintenance Type	Perform Maintenance
Maintenance Performer	Assigned Technician

DESCRIPTION

An assigned technician checks failed equipment and maintenance performance procedures. If possible he makes repairs. If necessary, he uses EIC/APL books to order parts (NAVSUP Form 1250). He uses the NSN from the APL and assigns a Job Sequence Number (JSN) if a maintenance document is to be completed. If there is no NSN, he fills out a Form DD 1348.6 (non-NSN). If he cannot complete maintenance, he notifies the supervisor.

INPUTS

Assigned technician

Failed equipment

Technical manuals

Tools/test equipment

Repair parts

OUTPUTS

Supply request (1250, 1348.6)

Complete/incomplete maintenance

Supply parts used

4790/2K

Maintenance Number	12
Maintenance Type	Prepare Reports
Maintenance Performer	Department and Work Center Supervisors / Assigned Technician

DESCRIPTION

Completed corrective maintenance actions are noted on a work list which includes the name of the assigned technician. As designated by the ship's directives, a completed action form* (4790/2K) may be sent to MSOD via MDCO/ DPSCLANT. If maintenance action is beyond the capability of the ship's force, the technician fills out a 4790/2K (to be signed by the CO) which is forwarded to the monitoring Automatic Data Processing (ADP) facility for entry into the automated CSMP. The supervisor will then check the report for completeness and accuracy. Completed actions noted on work lists include names of assigned technicians and dates that jobs have been completed. A CASREPT is sent, if required.

INPUTS

Completed/incomplete maintenance

Unavailable repair parts (not available aboard ship)

---

*A failure of equipment on the Selected Equipment List is always noted by sending a completed action form (for the ship interviewed).

OUTPUTS

Completed action report

Opening Deferral (4790/2K)

History supply parts usage (1250)

Work list update

CASREPT

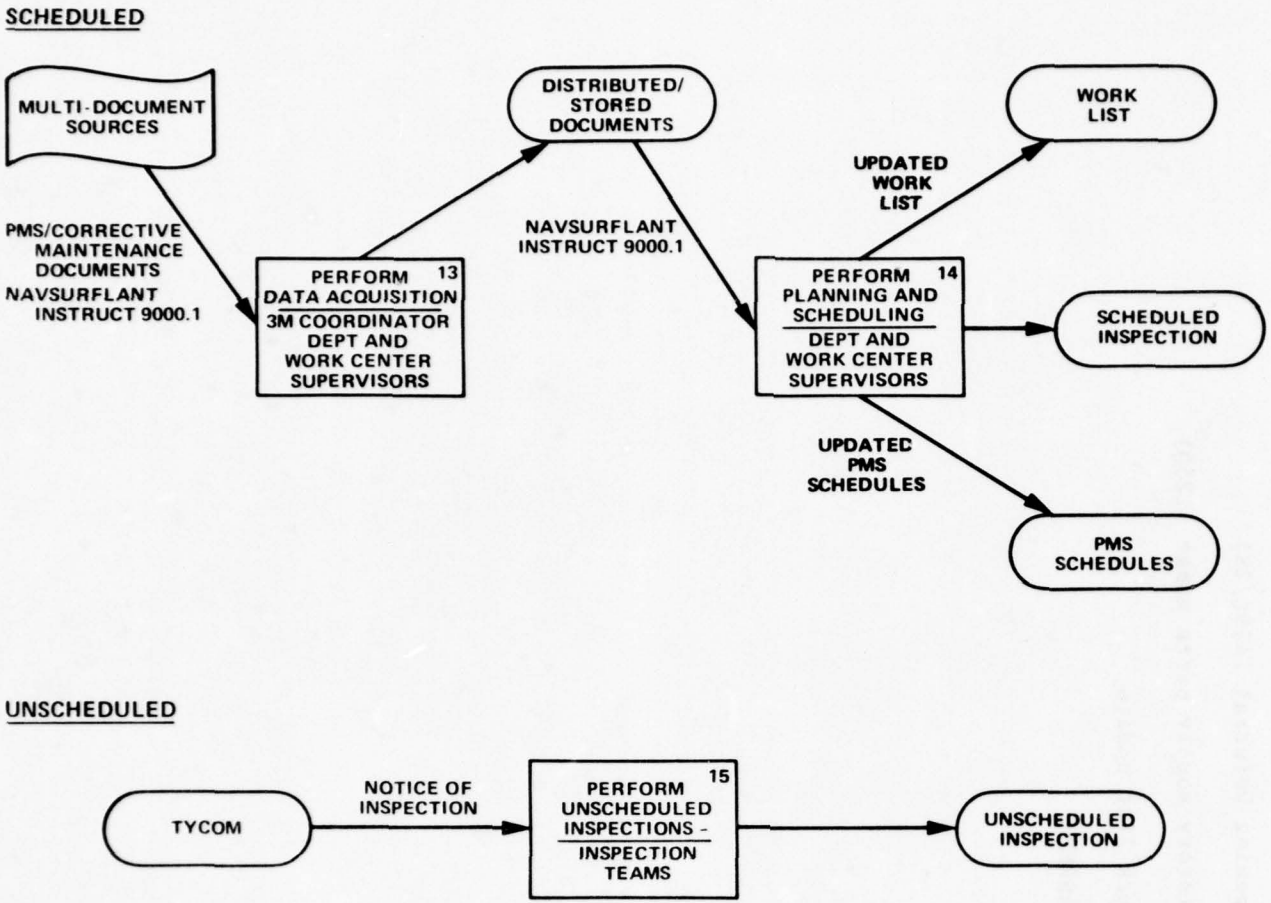

Figure 4 – Surface Ship Inspection Processes

Maintenance Number	13
Maintenance Type	Perform Data Acquistion
Maintenance Performer	Department/Work Center Supervisors

DESCRIPTION

The available PMS and corrective maintenance documentation are acquired plus documents describing forthcoming scheduled inspections such as NAVSURFLANT Instruction 9000.1, which includes periodicity of inspections and specification of equipment to be inspected.

There are several types of inspections:

Administrative (review of documents, records, 3M data)

Operational (Combat Systems Readiness) Reviews

INPUTS

Planned/corrective maintenance documents

NAVSURFLANT Instruction 9000.1

OUTPUTS

Distributed/stored documentation (planned and corrective maintenance)

NAVSURFLANT Instruction 9000.1

Maintenance Number	14
Maintenance Type	Perform Planning and Scheduling
Maintenance Performer	Department/Work Center Supervisors

DESCRIPTION

If a scheduled inspection is to take place (see NAVSURFLANT Instruction 9000.1), preparations are made to meet the required standards and capabilities of the designated data/equipment to be inspected by adjusting the priority assignment of the jobs on the work list, if necessary. The procedure for preparing for an inspection is to check the PMS schedules to see if they are up to date and to fulfill corrective maintenance (indicated on shipboard work list) that is included within the scope of inspection. The maintenance actions that are undertaken are those indicated in the PMS and corrective maintenance process descriptions. Inspections may be undertaken by personnel from NAVSEC, MOTU, etc.

INPUTS

PMS schedules

Work list schedule

NAVSURFLANT Instruction 9000.1

OUTPUTS

Updated work list

Updated PMS schedules

Scheduled inspection

Maintenance Number	15
Maintenance Type	Perform Unscheduled Inspection
Maintenance Performer	Inspection Teams

DESCRIPTION

Unscheduled inspections are primarily initiated from two sources - the Commanding Officer (CO) of the ship or TYCOM. The CO may want to check the readiness of his ship while TYCOM may come in unannounced. In either case, the inspection of administrative data (schedules, logs, manuals, etc.) and of the condition of equipment takes place without prior notice.

INPUT

Notice of inspection (unscheduled)

OUTPUT

Unscheduled inspection

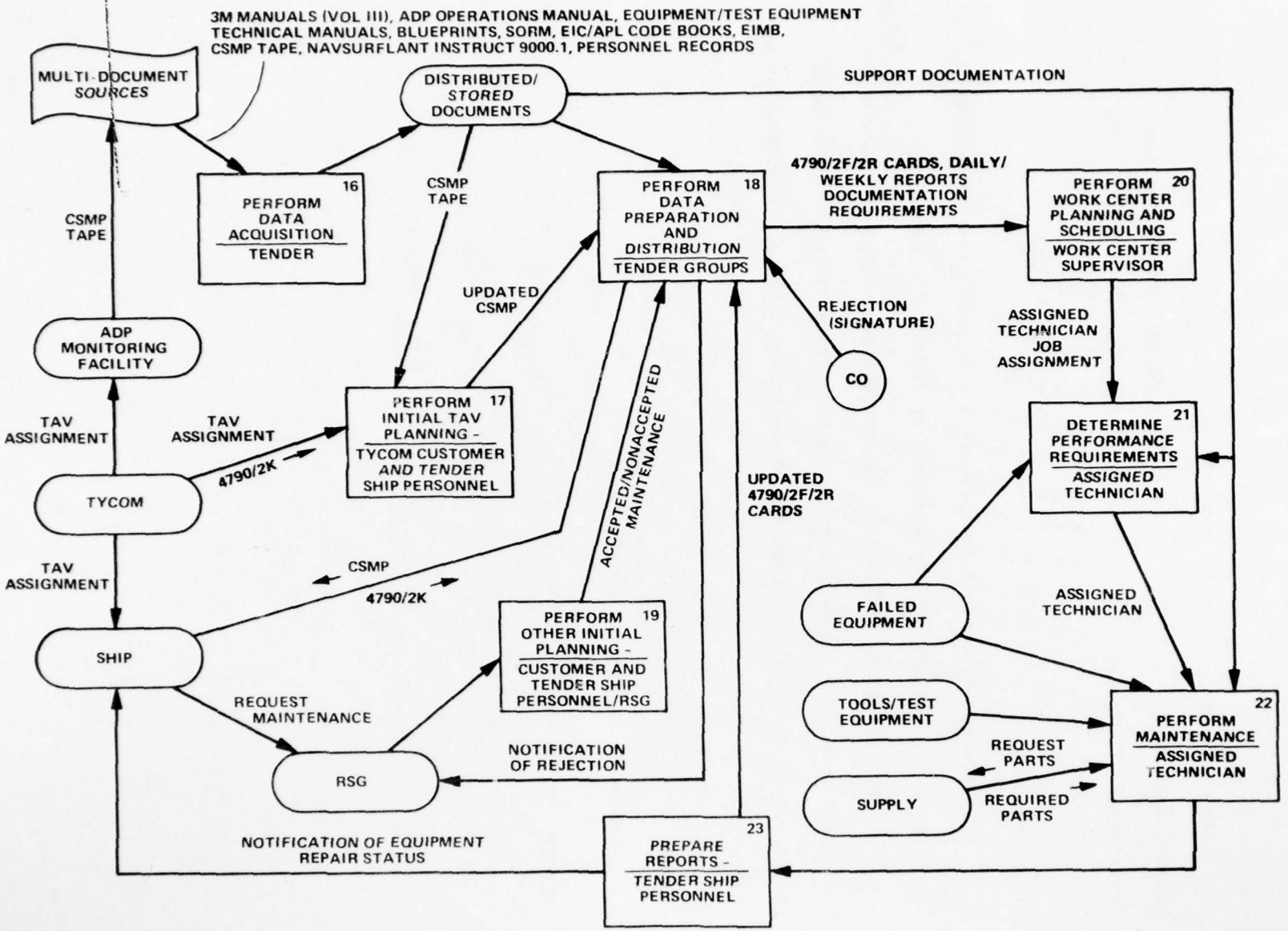

Figure 5 – Tender Maintenance Processes

Maintenance Number	16
Maintenance Type	Perform Data Acquisition
Maintenance Performer	Tender

DESCRIPTION

The Ship's 3M Manual (OPNAVINST 4790.4, Vol. III), Automatic Data Processing Operations Manual, Quality Assurance Manual, NAVSHIPS Technical Manual, blueprints, NAVSURFLANT Instruction 9000.1 series, Ship Organization Manual (SORM), EIC/APL Code Books, EIMB, personnel records, and CSMP tapes (which identify the ship's outstanding corrective maintenance actions) make up the major portion of acquired shipboard documentation.

INPUTS

3M Manuals

ADP Operations Manual

Equipment/test equipment technical manuals

Blueprints

NAVSURFLANT Instruction 9000.1

SORM

EIC/APL Code books

Personnel Records

EIMB

CSMP tape

Note: CSMP tapes may be acquired from other ADP activities for ships assigned to TAV.

OUTPUT

Distributed/stored documentation (corrective maintenance)

Maintenance Number	17
Maintenance Type	Perform Initial TAV Planning
Maintenance Performer	TYCOM / Customer and Tender Ship Personnel

DESCRIPTION

Tender Availability (TAV) is initiated by a message, which includes the assignment dates, from the TYCOM to the customer ship and to the tender. Upon receipt, the ADP Group (aboard the tender) is provided with a CSMP tape (file) of the customer ship. The customer ship then starts the flow of all documents (for input into its CSMP file) to the tender. Approximately 45 days prior to the start of the TAV, the customer ship provides the tender with a message list of Job Control Numbers (JCN's) from their CSMP file which they desire to be accomplished (in a priority sequence). A separate section of the same listing includes (as a part of the work to be accomplished) any items that the tender has in its Master Job Catalog (repetitive jobs) and any other items which the customer ship desires to change to Type 2 (IMA) availability.

The tender extracts the jobs (in Automated Work Request (AWR) format) from the ship's CSMP file for planning. The tender accepts or rejects jobs according to its work load, availability of resources, etc. Accepted and planned jobs are put back into the computer (see Maintenance Number 18).

An arrival conference is scheduled with the customer ship at which the tender and customer ship personnel discuss and tradeoff jobs that were rejected (and desired to be accomplished) with those that were accepted but are considered less important.

After a regularly assigned TAV is completed, the tender continues to act as the customer ship's ADP monitoring facility until the CSMP file is directed to be transferred. This transfer may be due to assignment of the customer ship to a new TAV with a different IMA or customer ship deployment. If changes are made, the Analysis, Records and Reporting Section (ARRS) is notified. It adjusts the P&E (2P) sheet which is then forwarded to ADP to perform the necessary updating.

INPUT

TAV Assignment (to tender and customer ships)

CSMP tape

4790/2K (deferrals).

OUTPUTS

Updated CSMP

Maintenance Number	18
Maintenance Type	Perform Data Preparation and Distribution
Maintenance Performer	Tender Groups

DESCRIPTION

Opening Deferrals (4790/2K) are received from customer ships by the tender MDCO (Maintenance Document Control Office) which reviews/corrects errors and attaches a planning/estimating cover sheet (4790/2P) on which the Job Control Number for the 4790/2K is written. This document is reviewed by the Repair Officer (RO) and forwarded to the Quality Assurance Group (QA) which assigns the level of quality assurance. It is then forwarded to the Planning and Estimating (P&E) section where it is accepted, rejected, or modified as to the manner* of tender maintenance performance. This section then assigns the lead work center and start and stop dates for the pending TAV period, estimates necessary man-hours, and lists the documentation required for corrective action. The document is then forwarded to the ARRS (Analysis, Records and Reporting Section) which logs the JCN on a card (for internal use), indicating the date received and whether the job was accepted or rejected. The document is then forwarded to the RO who reviews it. If accepted**, the RO forwards the document to ADP via ARRS. ADP updates (processes) the CSMP file, from which an automated CSMP printout is produced and forwarded to the ship (customer) monthly.

---

* Depends on level of ship load, capability of tender, and level of job type

** Whether accepted or not, document must be included in CSMP if IMA holds subject CSMP tape

In a scheduled TAV, the ADP Group also takes the processed CSMP, and prints out 4790/2R (2R) and 4790/2F (2F) cards plus daily reports which are forwarded to each designated work center. If the RO rejects it, the document is sent to the tender CO for signature (on tender visited), then returned to the RO who then forwards the document (copies) to MDCO, ARRS, and P&E. MDCO sends its copy to RSG. ARRS places its copy in a file. P&E sends its copy to the customer ship. The repair work center uses necessary documentation to determine the work to be done and as a vehicle for keeping track of maintenance actions. ARRS uses the documentation for keeping track of job status; the RO uses the documentation for management control.

INPUTS

Accepted/non-accepted maintenance

4790/2K

Updated 4790/2F/2R

CSMP tape

Updated CSMP

OUTPUTS

CSMP

Daily/monthly report

4790/2F/2R cards

Notification of rejection

Documentation requirements

Note: While in TAV, a ship's superintendent is assigned to oversee tended ship's corrective maintenance.

Maintenance Number	19
Maintenance Type	Perform Other Initial Planning and and Tender Ship Personnel
Maintenance Performer	Customer/RSG

DESCRIPTION

If a ship desires Type 2 (IMA) level corrective maintenance and the ship is not in TAV, it forwards the request (with 2K's) to RSG who may assign a tender to do the work. If so, RGS forwards 2K's (with an attached cover letter) to the tender (MDCO); the planning procedures followed are the same as those in a normal TAV except that when the tender does not hold the ships CSMP file (Level One*), it will not accept deferral documents other than those approved for the availability and will not update the tended unit's CSMP file.

If a ship desires additional work after its TAV has started (emergent), it follows the same procedures as above.

If a ship has emergency work (whether or not it is in TAV), it notifies RSG who then may direct work to the assigned tender, assign another tender, or reject it. If work is assigned to the tender, the RO may find his ship not capable of performing the job. If so, he can reject it by notifying RSG. If work is accepted, the planning procedures are the same as if the ship were in TAV.

---

* See 3M Manual OPNAVINST 4790.4 - Volume III, section 12-7.4.1 for detailed descriptions of Level One and Level Two.

INPUTS

Request maintenance (to RSG)

2K plus cover letter (from RSG to tender)

OUTPUT

Accepted/non-accepted corrective maintenance (by tender)

Maintenance Number	20
Maintenance Type	Perform Work Center Planning and Scheduling
Maintenance Performer	Work Center Supervisor

DESCRIPTION

The work center supervisor reviews the daily reports (manhours assigned, percent completion, hours performed/completed, job rejection, in progress action, start/completion dates) assigned to his work center. The work center supervisor can adjust start and completion dates according to his judgment and work situation. He assigns personnel and screens the daily production report (from ADP) which indicates the previous day's transactions in the work center (there is also a monthly summary report). He also reviews 2R's which give him information that includes the JCN, work center assigned, equipment (failed) noun name, equipment problems, and type of work to be performed on the equipment. He uses 2F cards to document progress of jobs.

INPUTS

Daily/monthly reports

4790/2F/2R cards

Documentation requirements

OUTPUT

Assigned technician

Maintenance Number	21
Maintenance Type	Determine Performance Requirements
Maintenance Performer	Assigned Technician

DESCRIPTION

The assigned technician checks equipment problems and acquires the necessary documentation (equipment and test equipment manuals, etc.) to determine corrective procedures and necessary tools. He may order parts, if he considers them necessary. If the problem was incorrectly described, he notifies the supervisor.

INPUTS

Assigned technician

Failed equipment

Support documentation

Job assignment

OUTPUT

Assigned technician

Maintenance Number	22
Maintenance Type	Perform Maintenance
Maintenance Performer	Assigned Technician

DESCRIPTION

The assigned technician performs the necessary maintenance (which may be aboard customer ship) using appropriate tools, procedures, test equipment, and other support documentation. He will order necessary parts from supply (and will wait or take on another assignment while waiting for their arrival). He notifies the supervisor of percent of job completed each day.

INPUTS

Assigned technician

Required parts

Failed equipment

Tools and test equipment

Support documentation

OUTPUTS

Complete/incomplete corrective maintenance

Request parts

Maintenance Number	23
Maintenance Type	Prepare Reports
Maintenance Performer	Tender Ship Personnel

DESCRIPTION

- Partial Completion

Upon partial completion of a job, the technician notifies the work center supervisor of the status of work. The supervisor fills out a 2F card (status) which is forwarded to ARRS, reviewed, and sent to ADP. ADP fills out the 2F information on a punched card and updates the daily report (work center).

- Incompletion

The technician notifies the supervisor of incomplete work (cannot perform corrective maintenance). The supervisor notifies the ship superintendent who requests the customer ship representative to sign off the job and pick up failed equipment. The work center supervisor fills out the 2R, indicating the reason(s) for incompletion, requests the customer ship signature (may require a customer-tender ship conference), and sends the 2R to ARRS who transfers it to RO (for signature). He returns it to ARRS, who forwards it to ADP, who indicates the transaction on the daily/monthly reports.

- Completed

The technician notifies the supervisor who notifies the ship superintendent (if in TAV). If the ship is not in TAV, there is no ship superintendent. The ship superintendent notifies the customer ship. The ship representative picks up and signs for repaired

equipment (2R). The work center supervisor sends the signed 2R equipment to ARRS who forwards it to the ADP. ADP fills out a punched card indicating 2R information and updates daily reports (which becomes part of the future monthly report). Daily reports go to the repair work center, division office, RO, customer ship (status of equipment), and ARRS. Monthly, reports go to TYCOM, ARRS, RO, and a tape goes to DPSLANT.

Reasons for incomplete or partial completion may be:

- waiting for parts
- unavailable support equipment
- insufficient technical data
- overload of work in the center

INPUT

Completed/incomplete maintenance

OUTPUTS

Updated 4790/2F/2R cards

Notification of equipment repair status (to customer ship)

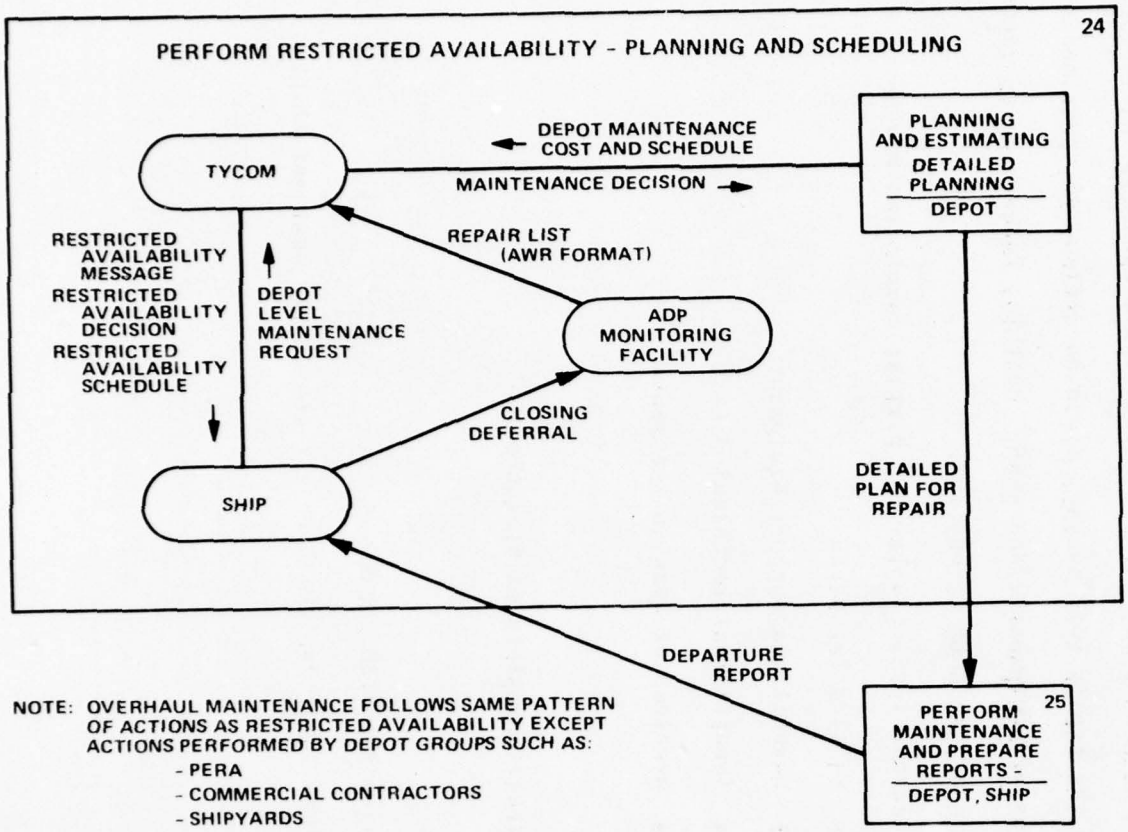

Figure 6 – Depot Restricted Availability Processes

Maintenance Number	24
Maintenance Type	Perform Restricted Availability Planning and Scheduling
Maintenance Peformer	TYCOM /Ship/ Depot/ ADP Monitoring Facility

DESCRIPTION

Restricted Availability (corrective maintenance of specific equipment) is initiated by a message from TYCOM to the ship requesting the jobs from its CSMP which it wishes to have performed in the shipyard (on priority basis). The ship identifies the job(s) from its CSMP (it can also note non-CSMP desired jobs) via a message or letter. The 3M representative at TYCOM sends the list to the ADP facility monitoring the ship's CSMP and requests a "dump" in Automated Work Request (AWR) format. TYCOM then decides which item(s) are to be repaired at the depot level. He notifies the ship as to when, where, and what is to be done by the depot in accomplishing the corrective maintenance. A copy is sent to the depot whose planning and estimating group determines the cost and time required for the maintenance. The depot notifies TYCOM of these data. TYCOM decides on the action to be undertaken and notifies the ship and depot.

If work is approved, the depot groups undertake detailed planning (including the assignment of a job order to its shops) in preparation for the ship's arrival. The shipyard uses a shipyard management information system, not 3M.

INPUTS

Restricted Availability message

Depot level maintenance request -(CSMP and non-CSMP)

OUTPUTS

Repair list (AWR Format)

Restricted Availability schedule

Depot maintenance cost and schedule

Maintenance decision

Detailed plan for repair

Note: General overhaul maintenance planning and scheduling is performed in a manner similar to that indicated for Restricted Availability except that the actions are performed by other groups (depot level) such as PERA (Planning, Engineering, Repair, and Alteration), commerical contractors, and private shipyards.

Maintenance Number	25
Maintenance Type	Perform Maintenance and Prepare Reports
Maintenance Performer	Depot / Ship

DESCRIPTION

Maintenance is performed according to the previously designated plan and schedule. Upon completion, a departure report is sent to the ship and TYCOM. The ship then sends a closing deferral to the ADP facility monitoring its CSMP. PMS items beyond ship's force and IMA levels are performed at the depot as part of the general overhaul.

INPUT

Detailed plan for repair

OUTPUTS

Department report

Closing deferral

4. TRIDENT SYSTEM MAINTENANCE PROCESSES

This section contains descriptions of future TRIDENT* system maintenance processes. The processes are classified by organization level, category, and type of maintenance to be performed. Table 2 lists the locations of each process description.

Figures synthesizing these processes are located at the beginning of each category and should be used as a guide to the text. Figure 8, for example, diagrams the planned maintenance subsystem processes for TRIDENT ships. The alphanumeric indicator noted in each rectangular box in these figures refers to the Maintenance Number used in the corresponding process description.

Figure 7 offers an overview of the maintenance information flow among the major activities.

The TRIDENT System has been conceived as an Integrated Logistic Support (ILS) Project. Whenever logistic support is mentioned in this section, it refers to the entire range of logistic support such as tools, test equipment, repair parts and logistic technical documentation. A feature of the TRIDENT System is the envisioned Shipboard Data Terminal whose functions include the acquisition, storage, retention and retrieval of supply and maintenance data.

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* The TRIDENT Submarine shall be designed to meet a continuing 95-day operational/refit cycle, i.e., 70-day patrol period, 18-day refit period, and 7-day turn around time.

TABLE 2 - LIST OF PROCESSES DESCRIBED IN SECTION 4

Organization Level	Category	Maintenance Type	Maintenance Numbers	Page
Ship's Force	Planned (on patrol)	Perform Data Acquisition	1a	54
		Perform Planning and Scheduling	2a	56
		Determine Performance Requirements	3a	57
		Perform Maintenance and Monitoring	4a	59
		Prepare Reports	5a	61
	Corrective (on patrol)	Perform Data Acquistion	6a	64
		Perform Failure Reporting	7a	66
		Perform Problem Validation	8a	67
		Assign Corrective Job Sequence	9a	68
		Obtain Logistics Support	10a	69
		Perform Maintenance	11a	79
		Prepared Reports	12a	71
	Inspections	Perform Unscheduled Inspection	15a	74
IMA (Refit Facility)	Corrective/ Planned	Perform Data Acquisition	16a	76
		Perform TRF Planning	17a	77
		Perform Data Preparation and Distribution	18a	79
		Perform Work Center Planning and Scheduling	20a	81
		Review Performance Requirements	21a	82
		Perform Maintenance	22a	83
		Prepare Reports	23a	84
		Perform Rotatable Pool Planning	24a	87

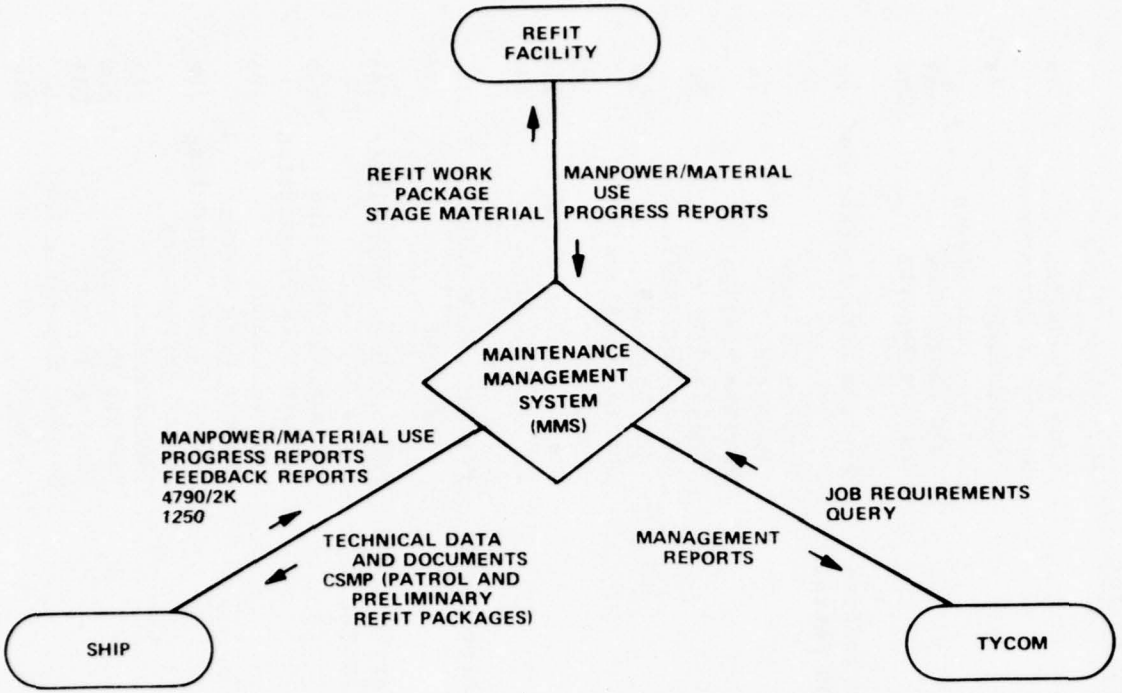

Figure 7 – TRIDENT Maintenance Information Flow

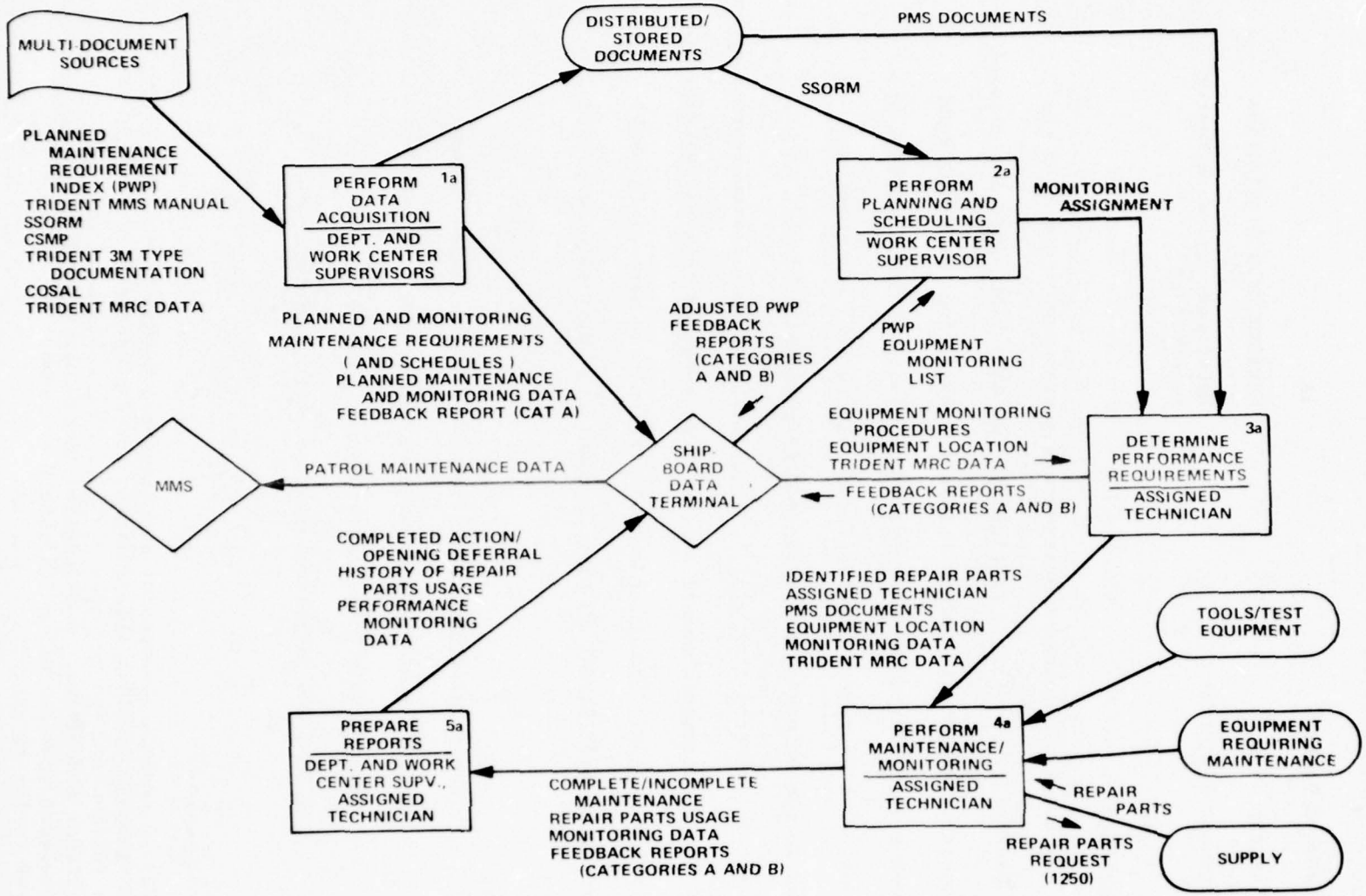

Figure 8 — TRIDENT Ship PMS Processes (On Patrol)

Maintenance Number	1a
Maintenance Type	Perform Data Acquisition
Maintenance Performer	Department and Work Center Supervisors

DESCRIPTION

The Index of Planned Maintenance Requirements included in the Patrol Work Package (PWP)* will be provided to the ship along with the Planned Maintenance Management Systems Manual. Information including such documents as MRC's, maintenance/material history, CSMP, feedback procedures, test equipment-handling/test calibration, and COSAL will be stored in the shipboard maintenance data terminal.

All information that will be required to support the monitoring procedures and requirements aboard ship will be acquired from the Performance Monitoring Analysis System (PMAS) and included as part of the PWP. Ship Organization and TRIDENT 3M type documentation will also be provided to the ship.

INPUTS

Planned Maintenance Requirement Index (included in PWP)

TRIDENT Maintenance Management System (MMS) Manual

Standard Ship Organization Manual (SSORM)

TRIDENT MRC data (including monitoring procedures).

---

*Unique to each ship patrol and developed by MMS software, the TRF Planning and Estimating (P&E)/Maintenance Engineering Group (MEG)- to be designated, and key crew members, on the basis of the ship's operational procedures. A maintenance performance schedule may be developed (ashore) using the ashore resources and included in the PWP (prior to patrol), if desired.

CSMP

TRIDENT 3M type documentation

Test Equipment handling/test calibration data

COSAL

OUTPUTS

Distributed/stored documents

Planned and monitoring maintenance requirements (and schedules, if desired)

Feedback Report (Category A)

Planned maintenance and monitoring data

SSORM

Maintenance Number	2a
Maintenance Type	Perform Planning and Scheduling
Maintenance Peformer	Work Center Supervisor

DESCRIPTION

The work center supervisor will request the planned maintenance work packages and monitoring data (PWP) from the Shipboard Data Terminal. The Patrol Work Package acquired from the data terminal will include planned maintenance requirements and will relate jobs to each other. The monitoring data will designate which equipment will be monitored and the manner in which it should be done. The work center supervisor will update the work package manning assignments and start/completion of each job, if necessary.

If maintenance documents are not available aboard the ship, a Feedback Report (Category A) will be entered into the terminal. If a technical problem is found in the content of the documentation, a Feedback Report (Category B) will be entered into the terminal.

INPUTS

PWP

SSORM

Equipment monitoring list

OUTPUTS

PWP (adjusted)

Feedback Reports (Categories A and B)

Planned/monitoring assignment

Maintenance Number	3a
Maintenance Type	Determine Performance Requirements
Maintenance Performer	Assigned Technician

DESCRIPTION

The assigned technician will read his work/monitoring assignment and request appropriate data and document identification from the data terminal. The data* will identify:

- special requirements**
- procedures to be followed
- tools required
- test equipment required
- related maintenance, if required
- designated number of manhours
- dates of performance
- skill level for each job assignment
- equipment description documents
- equipment location
- ship conditions (safety, operational, etc.)
- identification of required parts

If documentation is found to be missing, a Feedback Report (Category A) will be entered into the data terminal. Technical document discrepancies will be indicated by entering a Feedback Report (Category B).

---

* Except for equipment location, these data will be found in the TRIDENT 3M type MRC's.

** e.g. - reentry/interface controls

Requests for MRC's that are not available will be filled within 24 hours after the ship returns from patrol.

INPUTS

Monitoring assignment (including planned maintenance)

TRIDENT MRC data

PMS documents

Equipment location

Equipment monitoring procedures

OUTPUTS

Assigned technician

Feedback Reports (Categories A and B)

PMS documents

Equipment location

TRIDENT MRC data

Monitoring data (including planned maintenance)

Identified repair parts

Maintenance Number 4a

Maintenance Type Perform Maintenance and Monitoring

Maintenance Performer Assigned Technician

DESCRIPTION

The assigned technician will follow the designated procedures (see Maintenance Number 3a) in preparing and implementing the monitoring/planned maintenance requirements. He will acquire identified repair parts, if indicated, and perform the assigned maintenance (using a hard copy of MRC type data, if necessary). He will determine if any corrective maintenance is indicated. If parts will be required that were not initially identified, the technician will request them from Supply via the data terminal. If they are not available, he will notify the work center supervisor. He will indicate the extent and designation of parts usage. If corrective maintenance is indicated, he will notify the work center supervisor (see Maintenance Number 7a). Each job will have an assigned Job Control Number (JCN). If performance requirements are found to be deficient or incorrect, appropriate feedback reports will be filed.

INPUTS

Assigned technician

Identified repair parts

Equipment requiring maintenance

PMS documents

MRC type data

Tool/test equipment

Planned maintenance and monitoring data

OUTPUTS

Repair parts request (1250)

Complete/incomplete maintenance

Repair parts usage

Feedback Report (Categories A and B)

Monitoring data

Maintenance Number	5a
Maintenance Type	Prepare Reports
Maintenance Performer	Department and Work Center Supervisors/Assigned Technician

DESCRIPTION

The assigned technician will indicate, by JCN and comments, the status of job completion/incompletion via a data input to the terminal (for all maintenance actions performed). If corrective action is found to be required as a result of performing planned maintenance, he will initiate a 2K, which includes parts usage, and enter the data into the terminal. He will indicate material usage, components tested, and performance monitoring data. If a technical problem is found to exist as a result of following the currently assigned documentation, he will input a Feedback Report (Category B).

INPUTS

Complete/incomplete maintenance

Repair parts usage

Planned maintenance and monitoring data

Feedback Report (Category A)

---

*Completed, planned maintenance actions may not be included if an acceptable method of exception reporting is developed. Completed, planned maintenance requiring the collection of monitoring data will be reported.

OUTPUTS

History of repair parts usage

Feedback Reports (Category B)

Performance monitoring data

Completed actions and opening deferrals

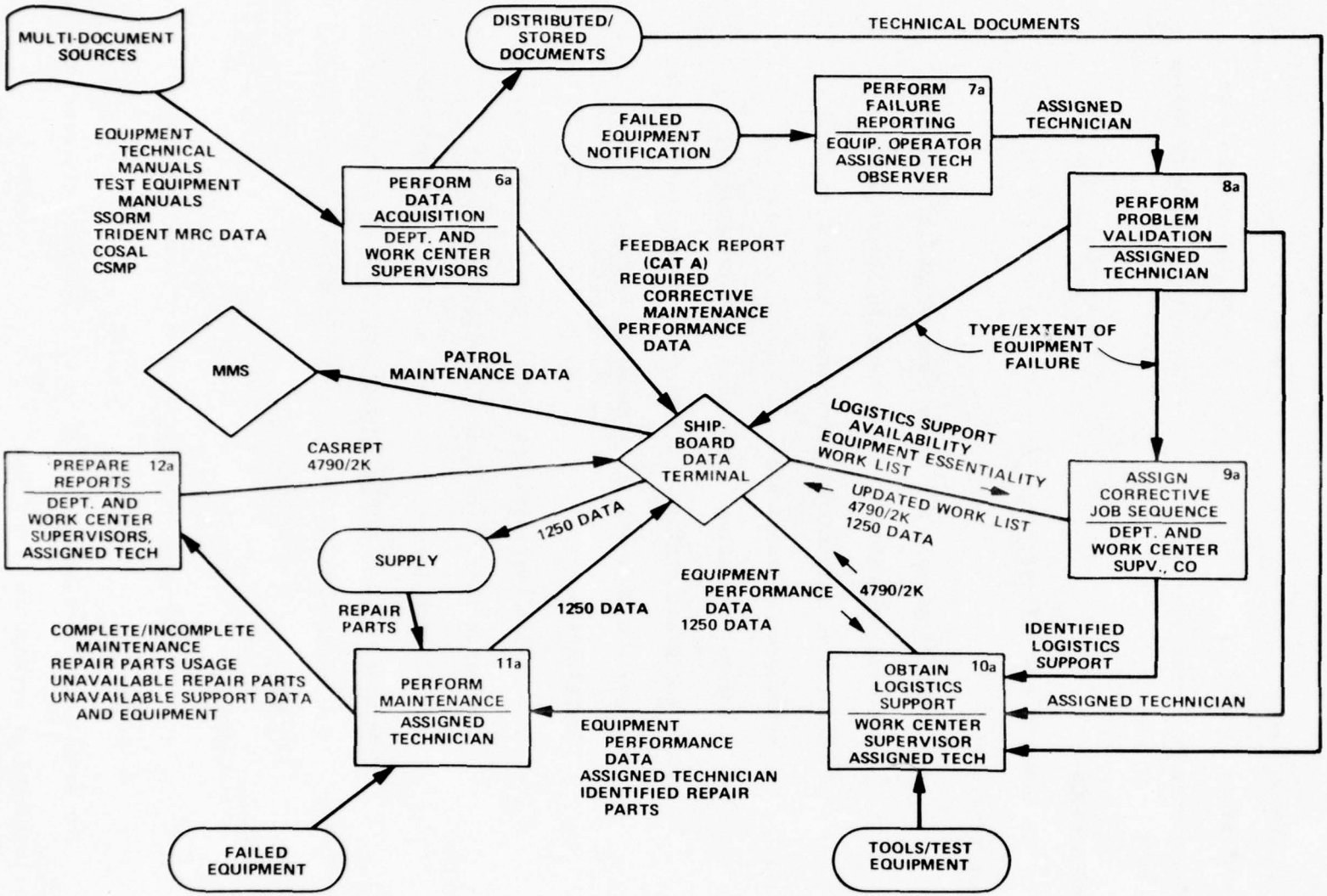

Figure 9 – TRIDENT Ship Corrective Maintenance Processes (On Patrol)

Maintenance Number	6a
Maintenance Type	*Perform Data Acquisition*
Maintenance Performer	Department and Work Center Supervisors

DESCRIPTION

An index of the following documents will be stored in the shipboard data terminal:

- technical manuals for operational shipboard equipment, operating procedures, troubleshooting procedures, corrective maintenance procedures, parts list (with reference designations)
- drawings, including schematics (name/description of equipment including military and manufacturer's part number and National Stock Number), equipment installation, etc.
- manuals for test equipment (with types of information similar to that in technical manuals)
- general technical manuals (such as Electronic Information Maintenance Book (EIMB) indicating procedural checks and electronic reference data and Naval Ships Technical Manual (NSTM))
- COSAL
- TRIDENT MRC type data for corrective maintenance
- SSORM

The actual documents may be stored in work centers, division/department offices, and/or appropriate locations.

INPUTS

Equipment technical manuals

General technical manuals

Test equipment manuals

Drawings

COSAL

CSMP

SSORM

TRIDENT MRC data

OUTPUTS

Distributed/stored documents (corrective maintenance)

Required corrective maintenance performance data

Feedback Report (Category A)

Maintenance Number	7a
Maintenance Type	Perform Failure Reporting
Maintenance Performer	Equipment Operator/Assigned Technician/Observer

DESCRIPTION

Failure of equipment will be reported to the appropriate work center supervisor. The division officer or department head will be be notified, if required. The work center supervisor will assign a technician to investigate the problem.

INPUT

Failed equipment notification

OUTPUT

Assigned technician

Maintenance Number	8a
Maintenance Type	Perform Problem Validation
Maintenance Performer	Assigned Technician

DESCRIPTION

An assigned technician will be sent to test/operate and inspect the the reported malfunctioning equipment. If possible, the techician will identify, isolate, and assess the problem*.

INPUTS

Assigned technician

Failed equipment

OUTPUTS

Type/extent of equipment failure

Assigned technician

* With equipment documentation, if required

Maintenance Number	**9a**
Maintenance Type	**Assign Corrective Job Sequence**
Maintenance Performer	**Department and Work Center Supervisors/CO**

DESCRIPTION

A description of the equipment/component (including its designation and location aboard ship) will be resident in the terminal and will be displayed/identified upon query. The nature of the malfunction (2K data-JCN, comments, and date) will be entered into the data terminal and the availability of logistics support will be determined. Basic considerations that will be addressed in determining the handling of failed equipment are Safety, Mobility, Mission, and Habitability. If the job is not to be done, the data required to complete the deferred maintenance action will be entered into the data terminal. If the job is to be done, it will be appropriately positioned (relative priority) on the work list.

INPUTS

Logistics support availability

Type/extent of equipment failures

Work list (current)

Equipment essentiality

OUTPUTS

Updated work list

4790/2K (partially completed/deferred action)

Identified logistics support (including 1250 data)

Maintenance Number	10a
Maintenance Type	Obtain Logistic Support
Maintenance Performer	Work Center Supervisor/Assigned Technician

DESCRIPTION

The work center supervisor/assigned technician will obtain the logistics support necessary to perform the maintenance.

INPUTS

1250 data

Technical documents

Work list (current)

Equipment performance data

OUTPUTS

Identified repair parts

Technical documents

Equipment performance data

Support equipment

Maintenance Number	**11a**
Maintenance Type	**Perform Maintenance**
Maintenance Performer	**Assigned Technician**

DESCRIPTION

The assigned technician will follow the designated TRIDENT maintenance procedures in implementing the corrective maintenance. He will perform the necessary maintenance, if possible. If other parts are found to be needed, he will request parts from Supply via the data terminal. If the additionally required parts are not available in Supply and/or he cannot complete maintenance, he will notify the work center supervisor (*see Maintenance Number 9a*).

He will use the part identification data (as available).

INPUTS

Assigned technician

Failed equipment

Technical documents

Support equipment

Repair parts

OUTPUTS

1250 data

Complete/incomplete maintenance

Unavailable repair parts

Repair parts usage

Unavailable support data and equipment

Maintenance Number	12a
Maintenance Type	Prepare Reports
Maintenance Performer	Department and Work Center Supervisors/Assigned Technician

DESCRIPTION

Completed corrective maintenance actions will be entered into the terminal as 4790/2K type data that will include such items as:

- Job completion/incompletion
- Comments
- Manpower use (in hours)
- Material not used
- Document discrepancies
- Additional data for selected equipment reporting

All actions and deferrals will be entered into the shipboard data terminal.

The supervisor will check the report for completeness and accuracy before entering the data into the terminal.

Each 4790/2K type data will identify the assigned technician.

All data will be transferred from shipboard data terminal to the MMS after the ship returns from patrol (including CASREPT).

If a safety-related problem is found, the technician will correct it, if possible. If he is unable to correct it, he will notify his supervisor and the CO will determine whether the ship can fulfill its mission. If the ship cannot fulfill its mission, it will return to base and TYCOM will be notified (via message).

INPUTS

Completed/incomplete maintenance

Unavailable repair parts (shipboard)

Repair parts usage

Unavailable support data and equipment

OUTPUTS

Opening Deferral (4790/2K)

CASREPT

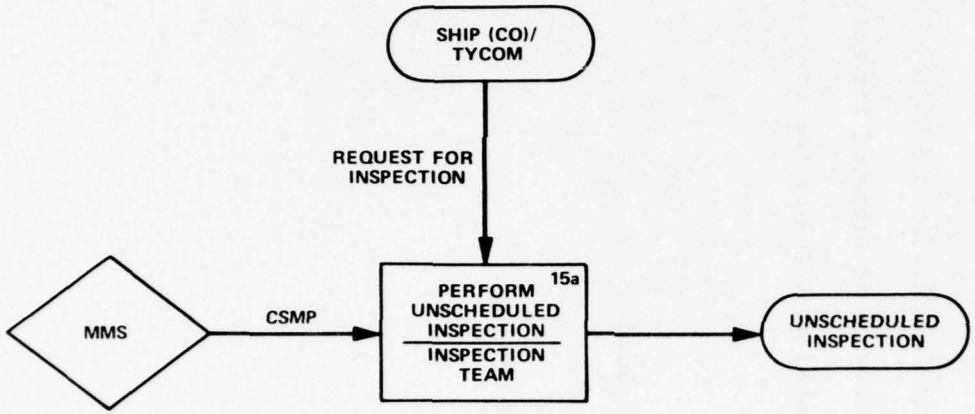

Figure 10 – TRIDENT Ship Inspection Process

Maintenance Number	15a
Maintenance Type	Perform Unscheduled Inspection*
Maintenance Performer	Inspection Team

DESCRIPTION

Inspections may be made without prior notice. A review of the CSMP should indicate those areas of maintenance which should be performed by the ship/Refit Facility in order to be prepared for any forthcoming inspections. Inspections may be requested by TYCOM or the ship's CO.

INPUTS

CSMP

Request for inspection

OUTPUT

Unscheduled inspection

*Inspections will not be made while the ship is on patrol

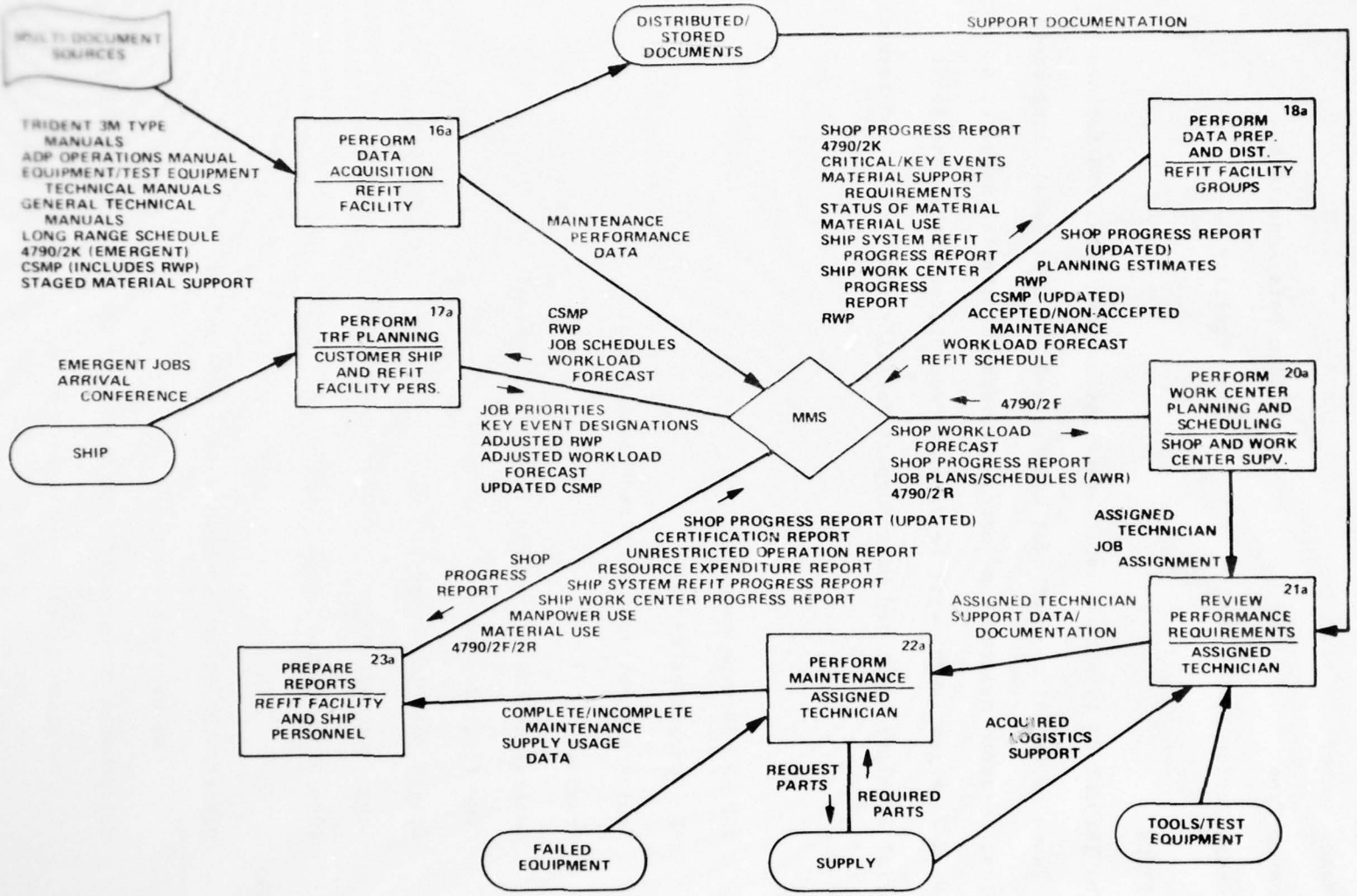

Figure 11 – TRF Maintenance Processes

Maintenance Number	16a
Maintenance Type	Perform Data Acquisition
Maintenance Performer	Refit Facility

DESCRIPTION

The TRIDENT 3M type Manuals, history/performance data, PMS documentation (such as technical/equipment manuals and MRC type data), long range schedules, deferred maintenance (emergent), staged material support, and Refit Work Packages (RWPs) will be supplied and stored within the Refit Industrial Facility (RIF) and Data Support Facility (DSF) shops and terminal data banks.

INPUTS

TRIDENT 3M type manuals

ADP Operations Manual

Equipment/test equipment technical manuals

Drawings

General technical manuals (EIMB, NSTM, etc.)

CSMP (includes RWP)

Staged material support

Long range schedules

4790/2K (emergent)

OUTPUTS

Distributed/stored documents in MMS data banks and RIF and DSF work shops

Maintenance performance data stored in the Refit Maintenance Management System (MMS) data bank

Maintenance Number	17a
Maintenance Type	Perform TRF Planning
Maintenance Performer	Customer Ship and Refit Facility Personnel

DESCRIPTION

Planning for the next refit of a TRIDENT submarine is initiated by the development of a Preliminary RWP by Refit Facility, off-crew, and squadron personnel (with the support of MMS). The preliminary RWP, which includes job schedules developed by the P&E section and all requirements scheduled for the next refit, will be entered into the MMS files. This document will then be delivered to the submarine prior to its departing on patrol. While on patrol, submarine personnel will review and make appropriate adjustments to this document, if necessary. While on patrol, the submarine will be implementing its PWP and performing corrective maintenance. Maintenance that has to be deferred (emergent) will be entered into the shipboard data terminal.

Upon return from patrol, the CO of the submarine will meet with the Commanding Officers of the Refit Facility and the Squadron at an Arrival Conference. During this conference they will resolve the Preliminary RWP with the deferred actions (emergent) of the completed patrol. The result will be the RWP to be inplemented during the current refit period.
The Preliminary RWP will include:

- The proposed Key Event Schedule
- The Selected Job Retrieval Report (which indicates job priorities, status of outstanding requisitions, etc.)
- The staged support requirements

- The Shop Workload Forecast (workload of Refit Facility work centers and shops)
- The Job Scheduling Worksheet (job schedules of the Preliminary RWP)

The MMS files will be updated to reflect the decisions made during the Arrival Conference. Emergent requirements will be entered into the MMS as they occur. The Refit Facility will always act as the ship's ADP monitoring activity. Tapes, cards, etc., from the Shipboard Data System (which will include the data inputs made during the previous patrol) will be transferred to the Maintenance Management System (MMS) as soon as the ship returns from its patrol.

INPUTS

RWP

Job Schedules

Workload Forecasts

Emergent jobs

CSMP

Arrival Conference

OUTPUTS

Job priorities

Key Event designations

Adjusted RWP (AWR and work schedules)

Adjusted Workload Forecasts

Updated CSMP

Material requisitions and staging orders

Maintenance Number	18a
Maintenance Type	Perform Data Preparation and Distribution
Maintenance Performer	Refit Facility Groups

DESCRIPTION

The P&E Group will receive scheduled refit requirements (Refit Work Package) from the MMS. It will utilize Workload Shop Progress Reports (based on current maintenance being performed) and send maintenance requirements/jobs to the shops/work centers. Refit Progress Reports will be made available to the Ship Superintendent and appropriate management personnel. P&E will provide such data as planning estimates, job schedules and shop workloads. The P&E Group may identify job delay causes by utilizing management aids (such as video displays and statistical summaries) and query capability (to respond directly to questions) to the MMS. The MMS will accept requirements in the 2K or CSMP format, provide centralized management control and jeopardy* displays of critical jobs (decisions will be made at the RO level), and make known the effect of Emergent** work.

The P&E Group will review the scheduled summary of forthcoming jobs.

---

*Conditions indicating that scheduled commitments can't be met.

**Emergent/emergency work will be entered continuously into the data terminal with hourly turn around time (outputs) and be related to Key Events and priorities causing required adjustments in job scheduling.

INPUTS

RWP

Shop Progress Report

4790/2K

CSMP

Critical/Key Events

Material support requirements

Status of material

Material use

Ship's System Refit Progress Report

Ship's Work Center Progress Report

OUTPUTS

Shop Progress Report (updated)

Planning estimates

RWP

Accepted/non-accepted maintenance

Workload forecast

Refit Schedule (reviewed)

Maintenance Number	20a
Maintenance Type	Perform Work Center Planning and Scheduling
Maintenance Performer	Shop and Work Center Supervisors

DESCRIPTION

The shop/work center supervisor will review the Shop Progress Report which will indicate the status of all active jobs - JCN sequenced - for each shop or work center including the scheduled, expended, and remaining manhours. The supervisor will use this information to control assignments and illuminate the status of the activity. He will use the Shop Workload Forecasts for planning and job scheduling.

The supervisor may make queries directly to the terminal and get responses with minimum delay times (hourly).

The supervisor will review OPNAV 4790/2R (2R) type data which will indicate the JCN, shop/work center assigned, failed equipment, noun name, equipment problems, and type of work to be performed on the equipment. OPNAV 4790/2R/2F type information will be prepared to maintain the progress of jobs and the data will be entered directly into the terminal.

INPUTS

Job plans and schedules

Shop Progress Report

Shop Workload Forecast

4790/2R

OUTPUTS

Assigned Technician

Job assignment (including performance data)

4790/2F

Maintenance Number	21a
Maintenance Type	Review Performance Requirements
Maintenance Performer	Assigned Technician

DESCRIPTION

The assigned technician will review his assignment and acquire the staged logistic support. He will review the performance requirements which include such items as:

- procedures to be followed
- tools
- test equipment
- number of manhours to be expended
- dates of performance
- designated repair parts

If documentation is found to be missing, the supervisor will be advised and an entry will be made into the data terminal.

INPUTS

Assigned technician

Support documentation

Job assignment(including performance data/identified logistics support)

Equipment performance data

OUTPUTS

Assigned technician

Support data/documentation

Acquired logistics support

Maintenance Number	22a
Maintenance Type	Perform Maintenance
Maintenance Performer	Assigned Technician

DESCRIPTION

The assigned technician will perform the necessary maintenance (which may be either aboard the customer ship or in the RIF and DSF shops) using appropriate tools, procedures, test equipment, and necessary support documentation. He will request necessary parts from Supply (via data terminal) if they have not been staged. If they will not be available, he will notify his supervisor.

The technician will notify (minimum-daily) his supervisor of the extent of job completion or of any problem that may have arisen. He may also monitor the performance of the equipment while maintenance is being performed (if applicable) and query the data terminal for information, as required.

The RIF and DSF shops and ship work centers may perform their maintenance concurrently while the ship is at The Delta.

INPUTS

Assigned technician

Required parts

Failed equipment

Support data/documentation

OUTPUTS

Complete/incomplete corrective maintenance

Request parts

Supply usage data

Maintenance Number 23a

Maintenance Type Prepare Reports

Maintenance Performer Refit Industrial Facility and Ship Personnel

DESCRIPTION

o Partial Completion

Upon partial completion of a job, the technician will notify his supervisor of the job status. Designated shop/work center personnel will enter 4790/2F type data into the terminal and software, within the MMS, will automatically update the Shop Progress Report.

o Incompletion

The technician will notify his supervisor of incomplete work (including the reasons). He will indicate if job was a Key Event, related to a Key Event, and/or of high priority. If so, this information will be entered into the data terminal within the hour. All pertinent data, such as reason(s) for incompletion, will be entered into the terminal. Decisions as to further action to be taken on the job may be made by the RO or other designated authority.

o Completed

The technician will notify his supervisor of job completion. The supervisor, in turn, will notify the ship superintendent. If applicable, the customer ship will be notified to send personnel to pick up and sign for repaired equipment. During refit, designated shop/work center personnel will enter job completion, manpower use, and material status into the data terminal (via 2R type data). Reports such as Certification (quality assurance), Unrestricted Operation (URO) for specific equipment, and Resource Expenditure reports will be entered into the MMS data terminal.

Additional Actions

If staged supplies were partially, completely, or not used, the appropriate information will be noted and entered to the data terminal. Periodic reports will be made by terminal printout and will go to appropriate activities.

New problems that may be discovered during performance of maintenance will be indicated via input to the data terminal.

Work not completed may be deferred for the next refit or patrol. This type of information will be entered on the Ship's System Refit Progress Report and the Ship's Work Center Progress Report and will be used by management to monitor each work center.

INPUTS

Shop Progress Report

Status of material

Completed/incomplete maintenance

OUTPUTS

4790/2F/2R type data

Shop Progress Report (updated)

Manpower use

Material use

Ship's System Refit Progress Report

Ship's Work Center Progress Report

Certification Report

Unrestricted Operation Report

Resource Expenditure Report

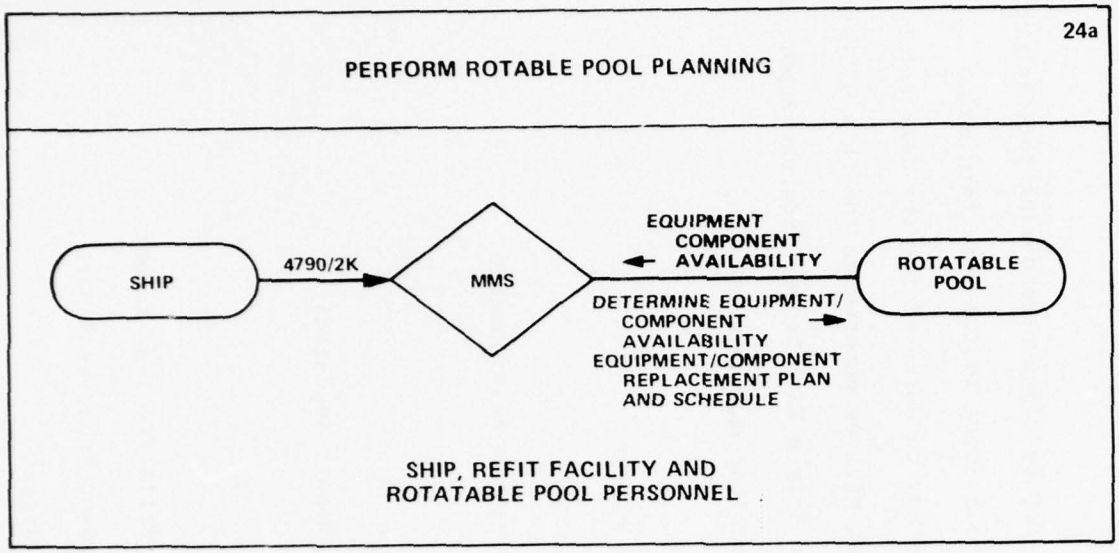

Figure 12 – TRIDENT Rotatable Pool Equipment Availability and Planning Process

Maintenance Number 24a

Maintenance Type Perform Rotatable Pool Planning

Maintenance Performer Ship, Refit Facility, Rotatable Pool

DESCRIPTION

The Rotatable Pools maintenance action will be based on the concept of module replacement. Rotatable Pool equipment will be scheduled for replacement primarily in response to planned maintenance requirements. It may also be replaced as a result of a 2K input to the Shipboard Data Terminal (at sea) or the MMS (in port) for an equipment failure.

Consequently, when a malfunctioning item comes to the Rotatable Pool location, a replacement will be taken "from the shelf" and made Ready for for Issue (RFI). The malfunctioning equipment component will be repaired at an appropriate time (depending upon the Rotatable Pool's work schedule) and stored* for future issuance to another ship.

The appropriate authority will decide whether or not to replace the failed equipment/component. If he considers replacing it, he will query the data terminal to determine the availability of the equipment/component at the Rotatable Pool. If the equipment is RFI, and if he decides to replace it, he will notify the ship and the Rotatable Pool to implement the the maintenance action and will coordinate the physical transfer of the equipment (using the MMS for planning and scheduling).

---

* Most Rotatable Pool equipment will be stored at a location within the Refit Facility complex

INPUTS

Planned maintenance requirement

4790/2K (Rotatable Pool equipment/system corrective maintenance request)

Equipment/component availability

OUTPUTS

Equipment/component replacement plan and schedule

Request for determination of equipment/component availability

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TRIDENT SYSTEM/SURFACE SHIP MAINTENANCE PROCESS DESCRIPTION AND--ETC(U)
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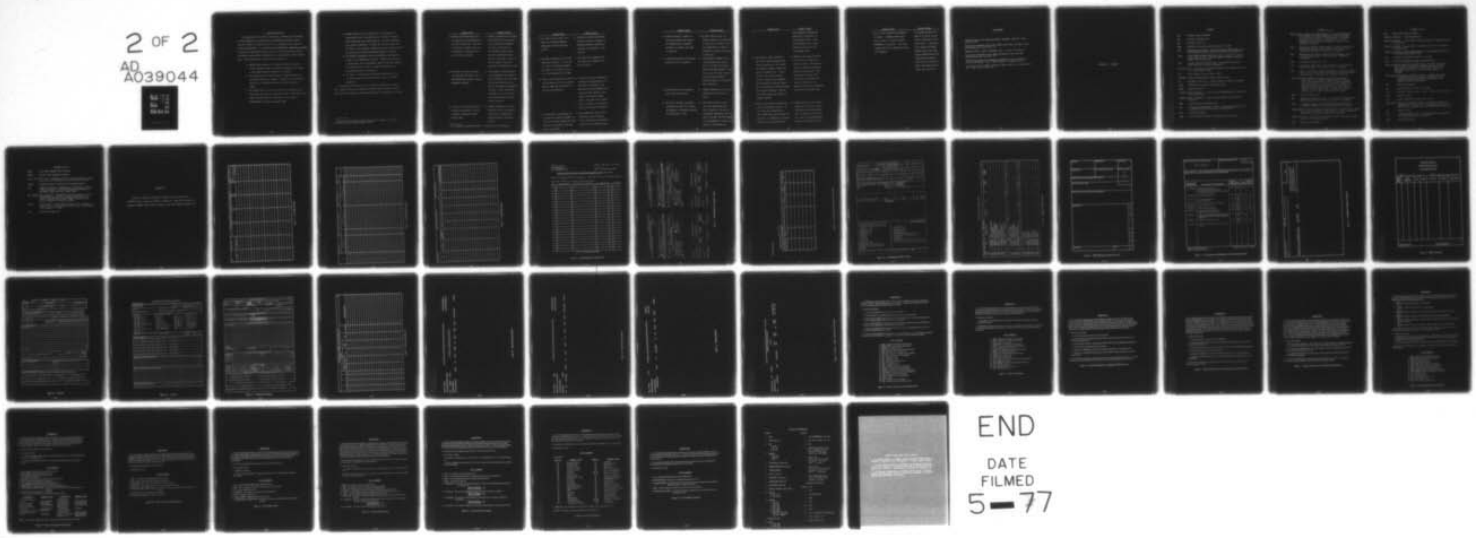

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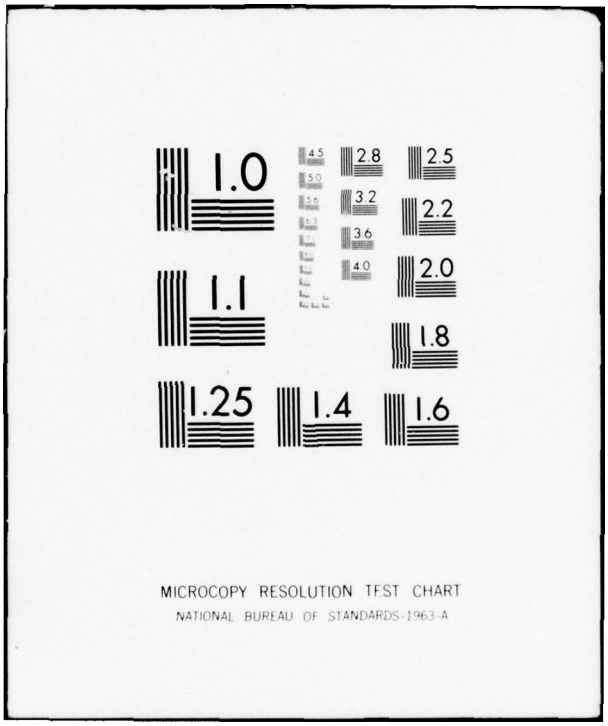
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MICROCOPY RESOLUTION TEST CHART
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5. COMPARISON ANALYSIS

The comparison of the salient situations, procedures, and handling of data associated with surface ship and TRIDENT maintenance related actions is based on acquired data and is not judgmental with respect to related preferability. It is realized that maintenance operations performed by surface and sub-surface naval forces are influenced by many factors, including the operational considerations of their specific mission assignments. The following list illustrates these factors:

- TRIDENT submarines will not communicate while on patrol. Surface combatant ships can communicate while at sea unless a total EMCON (Emission Control) is in effect.
- All warships have a limited amount of space available for maintenance resources. However, submarines are particularly limited as to available space due to their functional design.
- The TRIDENT Refit Facility will perform intermediate level maintenance for only one type/class of ship. The surface ship tender performs IMA level maintenance for a range of types/classes of surface combatant ships.

- TRIDENT submarines will automatically be assigned to an intermediate level of maintenance for a period of 18 days after completing their 70-day patrols. A surface combatant ship requires assignment to Tender Availability (TAV) from its TYCOM. This assignment depends upon such factors as available resources and scheduled workload aboard the tender*.
- The TRIDENT intermediate level of maintenance will be performed at one geographical location. Surface ship IMA level of maintenance can be performed by ashore activities (FMAG's) and tenders which can move to several designated ports (including overseas), as required.
- The number of surface ships requiring maintenance is significantly greater than the potential number of TRIDENT submarines.

The analysis and comparison of the current representative surface ship (Atlantic) and the contemplated TRIDENT submarine system (ship and Refit Facility) maintenance process descriptions is summarized as follows:

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*IMA level of maintenance is performed aboard tenders and at Fleet Material Assistance Groups (FMAGs) ashore.

SURFACE SHIP	TRIDENT SYSTEM
• Deferral and Completed Actions are reported on jobs designated by the ship's directives. The extent of data sent to MSOD varies and, consequently, influences the results of their analyses.	• Reports on Deferrals and Completed Actions* will be required on all maintained equipment. Data will be entered into the shipboard terminal data bank and transferred (after patrol) to the LSMS. Analyses will be based on the total spectrum of maintenance actions.
• Maintenance reference information (manuals, MRC cards, etc.) is distributed and stored in various shipboard locations.	• Data capable of being entered in the Shipboard Data Terminal will be stored in the data bank and can be called up, as required, from various designated locations. Other information (drawings, etc.) will be distributed and stored at appropriate locations.
• In order to have an IMA level of maintenance performed on ship's equipment, TYCOM must assign ships to TAV.	• TRIDENT submarines will automatically go into an intermediate level of maintenance (Refit Facility) after each patrol.

*All completed, planned maintenance actions may not be included

SURFACE SHIP	TRIDENT SYSTEM
• If a ship is not in TAV, a request for emergent/emergency maintenance requires approval by RSG.	• The RO will review the RWP and determine whether a request for emergent/emergency maintenance justifies an adjustment in the schedule.
• The CSMP is generated by the ADP monitoring facility. If the ship is in TAV, the tender generates the CSMP. If the ship is not in TAV, DPSLANT generates the CSMP.	• The CSMP will be generated by the ashore ADP located at the Refit Facility.
• Tender (IMA) planning and scheduling is based on the Automated Work Request (AWR) and the results of the Arrival Conference.	• The Refit Facility intermediate planning and scheduling will be performed by software of the MMS and by off-crew/squadron personnel who will develop a preliminary Refit Work Package (RWP). This RWP will be adjusted, if necessary, to decisions made at the Arrival Conference.
• The IMA level of maintenance is performed by tenders and FMAG's at various locations along both coasts (Atlantic and Pacific) and overseas, as required.	• The TRIDENT will have its intermediate level of maintenance performed at one physical location by one Refit Facility.

SURFACE SHIPS	TRIDENT SYSTEM
• Tenders maintain a variety of ship types/classes and require the range/depth of resources necessary to support this type of operation.	• The Refit Facility will in general maintain one type/class of ship and will require only the range/depth of resources necessary to support this type of operation.
• A shipboard equipment monitoring program is not in operation.	• The shipboard equipment monitoring program will acquire data to be used in analyzing and determining equipment reliability, and will plan resource allocation and staging of material support (at the Refit Refit Facility).
• Surface ships can be supplied while they are on patrol.	• TRIDENT submarines will not be supplied while they are on patrol.
• The Cycle, Monthly, and Weekly schedules are used in the manual performance of shipboard planning and scheduling of jobs.	• Data acquired from various files and appropriate software, adjusted to the ship's operational procedures, will be used by the MMS, the TRF P&E/MEF (to be designated), and key crew members in developing the

SURFACE SHIP	TRIDENT SYSTEM
	semi-automated planning and scheduling (if desired) of work packages (PWP). These work packages will be implemented by the ship on its forthcoming patrol.
• The AN/YUK-5, which represents the current major automated maintenance capability of the tender, also supports SUADPS, administrative processes, etc. Consequently, the turn-around-time is slow. There are no shipboard data terminals on customer ships. All intra-ship data transfers aboard the customer ship and a significant number aboard the tender are handled manually.	• Shipboard and ashore terminals will be able to handle data queries, entries, and manipulations, as required, with near real-time turn-around. Data query/entry terminals will be located on shipboard and ashore. There will be a minimum of manual data handling both ashore and aboard ship.
• Reports are manually prepared and sent to designated locations. In port, they are transferred by mail, SBMSS (hand-carry/AUTODIN combination), or telephone, as require At sea, they are transferred by	• Shipboard reports will be prepared with the aid of a data entry device and then entered into the Shipboard Data Terminal. Data (including Feedback reports and 4790/2K) will not

SURFACE SHIPS	TRIDENT SYSTEM
mail or radio (unless total EMCON is in effect). Feedback reports are sent to ashore activities (TYCOM, NAVSEACEN), as required. All intra-customer ship data transfers are manually handled.	be transmitted while the ship is on patrol but deferred (ship-shore) until after patrol. Intra-ship data transfer will make maximum use of the input-output capabilities of the Shipboard Data Terminal. There will be a minimum of manual data handling both aboard ship and ashore.

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OPNAVINST 4790.4, Ships` 3M Manuals, Vol I, II and III, 1973, (U)

Maintenance Management System (MMS) Development Plan, SPCC 880, Mechanicsburg, Pa, June 1975, (U)

TRIDENT Class Submarine Maintenance Management System Requirements, SPCC, WBS # B6A02RS - Rev A, Mechanicsburg, Pa, August 1975,(U)

TRIDENT Submarine Integrated Logistic Support Master Plan, NAVSEA 0905 - 501 - 7090, August, 1974, (U)

APPENDIX A - GLOSSARY

GLOSSARY

ADP - Automatic Data Processing

AEL - Allowance Equipment List

APL - Allowance Parts List

ARRS - Analysis, Records and Reporting Section (at IMA)

AWR - Automated Work Request - extracted from the ship's CSMP by the monitoring ADP activity (prior to overhaul and availability)

COSAL - Consolidated Shipboard Allowance List - a list of the repair parts, specific tools, test and support equipment required to support the specific ship

CSMP - Current Ship Maintenance Project - consolidated listing of ship's deferred corrective maintenance

DD Form 1348.6 - Form used for requesting materials from Supply Department (in a non-automated ship)

DSF - Delta Support Facility (part of TRF)

DPSCLANT - Data Processing Service Center Atlantic Fleet

EGL - Equipment Guide List - location guide for identical equipment

EIMB - Electronics Information Maintenance Book

EMCON - Emission Control

Feedback Report (Category A) - used to notify NAVSEACENLANT on administrative PMS matters

Feedback Report (Category B) - used to notify TYCOM on technical PMS matters

FMAG - Fleet Material Assistance Group

IMA - Intermediate Maintenance Activity - performs maintenance that is beyond ship's force but less than depot level

JCN - Job Control Number

LOEP - List of Effective Pages - an indexed listing of MIPs

LSMS (Logistic Support Monitoring System) - will provide techniques and procedures to assist management in the control and coordination of the MMS, the determination of equipment Refit Maintenance Activity characteristics, and the management of maintenance and logistics support in the shipboard environment

MDCO - Maintenance Document Control Office - screens completed and deferred maintenance action documents for accuracy and completeness and makes corrections, as required

MDS - Maintenance Data System - means by which personnel report corrective maintenance actions on specific categories of equipment

MEG - Maintenance Engineering Group

MIP - Maintenance Index Page - brief description of the maintenance requirements on a system or piece of equipment

MJC - Master Job Catalog - specifies repetitive, routine jobs and is used to pre-plan IMA work (called Master Job File in TRIDENT System because it includes more information than MJC)

MMS (Maintenance Management System) - will perform maintenance scheduling for the TRIDENT submarines, Refit Facility, (TRF), and Training Facility (TTF); support maintenance workload planning and control for the TRF; prepare overhaul work packages; and accommodate the collection of maintenance data for analysis. It will consist of five modules: the PMMS, RMMS, PMAS, Shipboard Data System, and the Logistic Support Monitoring System (LSMS)

MOTU - Mobile Technical Unit

MRC - Maintenance Requirement Card - lists detailed descriptions of planned maintenance procedures for a specific equipment

MSOD - Maintenance Support Office Department, Mechanicsburg, PA - prepares reports for maintenance managers, as required

NAVSEACENLANT - Naval Sea Support Center Atlantic - field activity of Naval Sea Systems Command whose responsibility includes maintaining PMS library and issuing changes to PMS documents

NAVSUP Form 1250 - Form used for requesting materials from Supply Department (in a non-automated ship)

NSN - National Stock Number

GLOSSARY (cont d)

NSTM - Naval Ships Technical Manual

OPNAV Form 4790/2F - Work Progress Card

OPNAV Form 4790/2K - Form used to report deferred and completed maintenance actions

OPNAV Form 4790/2P - Form attached to 4790/2K that is used for detailed planning by IMA

OPNAV Form 4790/2R - Automated Work Request - form combining information from 4790/2R and 4790/2K forms

P&E - Planning and Estimating Section - (at IMA)

PERA - Planning, Engineering, Repair, and Alteration

PMAS (Performance Monitoring Analysis System) - provides techniques and procedures to determine equipment material condition and to assist management in the decision to modify the maintenance plans, logistic resource requirements, or schedules

PMMS (Planned Maintenance Management System) - provides ADP support to management for the planning, scheduling, and forecasting of TRIDENT Class Submarine maintenance and logistic resource requirements

PWP - Patrol Work Package

QA - Quality Assurance Section - (at IMA)

QFR - Quarterly Force Revision - update of LOEP, MIP, and MRC data

RFI - Ready for Issue

RIF - Refit Industrial Facility (part of TRF)

RMMS (Refit Maintenance Management System) - provides ADP support to management for control of all maintenance activity at the TRF including organizational level maintenance during refit

RO - Repair Officer

RSG - Readiness Support Group - TYCOM representative responsible for balancing work load among IMAs

RWP - Refit Work Package

SBMSS - Shore Based Message Service System

SSORM - Standard Ship Organization Manual

Ship's Force Work List - recommended, but not required, format for keeping a record of discrepancies to be corrected by ships

SUADPS - Shipboard Uniform Automated Data Processing System

TAV - Tender Availability - assignment and scheduling of ship by TYCOM for primarily IMA level maintenance performed by a designated repair activity (tender, FMAG)

TRF (TRIDENT Refit Facility) - Intermediate level maintenance activity established to provide the capability and capacity to support scheduled and emergent TRIDENT submarine tasks without disrupting the patrol schedule

TYCOM - Type Command - an administrative division of a fleet by type(s) of ship (Naval Surface Forces Atlantic (NAVSURFLANT) is an example of a TYCOM)

URO - Unrestricted Operation

APPENDIX B

Figures 13 through 32, pages B-2 through B-21, were taken from OPNAVINST 4790.4 series and Figures 33 through 45, pages B-22 through B-34, suggested TRIDENT system format types, were taken from TRIDENT documentation.

SHIP	WORK CENTER	SCHEDULE QUARTER AFTER OVERHAUL AS INDICATED				APPROVAL SIGNATURE
		1 13	2 14	3 15	4 16	DATE
		5 17	6 18	7 19	8 20	
MIP	COMPONENT	9 21	10 22	11 23	12 24	EACH QUARTER

Figure 13 – Cycle PMS Schedule

MIP	WORK CENTER	YEAR	QUARTER AFTER OVERHAUL	APPROVAL SIGNATURE	DATE	RESCHEDULE
	MONTH _____		MONTH _____	MONTH _____		

Figure 14 – Quarterly PMS Schedule

WORK CENTER			PMS SCHEDULE FOR WEEK OF				APPROVAL SIGNATURE		
MIP	COMPONENT	MAINTENANCE RESPONSIBILITY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SAT. SUN.	OUTSTANDING REPAIRS AND CHECKS DUE IN NEXT 4 WEEKS

Figure 15 – Weekly PMS Schedule

Card No.___ of ___ QTR Alter, O/H _____ YR _____

ACCOMPLISHED "X"

NOT ACCOMPLISHED "O" WEEK OF _____

DIVISION OFFICER'S WEEKLY MAINTENANCE SCHEDULE CARD - - M DIVISION

Department: _____ Work Center: _____ Work Center Sup's Signature: _____

Division Officer's Signature: _____

MIP	COMP. DESCRIPT.	MB CHECKS DUE THIS WEEK	ACCOMPLISHED BY		NEXT 4 WKS

INDICATE REMARKS ON REVERSE

Figure 16 – Weekly Maintenance Schedule Card

REPORT SYMBOL OPNAV 4790-4

SEE INSTRUCTIONS ON BACK OF GREEN PAGE

FROM (SHIP NAME AND HULL NUMBER)	SERIAL #
	DATE

TO

☐ NAVY MAINTENANCE MANAGEMENT FIELD OFFICE (Category A)

☒ TYPE COMMANDER (Category B)

SUBJECT: PLANNED MAINTENANCE SUB SYSTEM FEEDBACK REPORT

SYSTEM SUB SYSTEM OR COMPONENT	APL/CID/AN NO. /MK. MOD.
SYSTEM MIP CONTROL NUMBER	SYSTEM MRC CONTROL NUMBER

DESCRIPTION OF PROBLEM

CATEGORY A	CATEGORY B
☐ MIP/MRC/EGL REPLACEMENT	☒ TECHNICAL
☐ EQUIPMENT ADDITION	☐ TYCOM ASSISTANCE
☐ EQUIPMENT DELETION	☐ OTHER (Specify)
☐ CHANGE TO EQUIPMENT	

REMARKS

ORIGINATOR	WORK CENTER CODE
DEPARTMENT HEAD	3 M COORDINATOR

TYCOM ☐ CONCUR ☐ DO NOT CONCUR ☐ TAKES ACTION ☐ PASSES FOR ACTION

SIGNATURE	DATE

OPNAV 4790/7B(6-73) ACTION COPY PAGE ____ OF ____

REPORT SYMBOL OPNAV 4790-4

SEE INSTRUCTIONS ON BACK OF GREEN PAGE

FROM (SHIP NAME AND HULL NUMBER)	SERIAL #
	DATE

TO

☒ NAVY MAINTENANCE MANAGEMENT FIELD OFFICE (Category A)

☐ TYPE COMMANDER (Category B)

SUBJECT: PLANNED MAINTENANCE SUB SYSTEM FEEDBACK REPORT

SYSTEM SUB SYSTEM OR COMPONENT	APL/CID/AN NO. /MK. MOD.
SYSTEM MIP CONTROL NUMBER	SYSTEM MRC CONTROL NUMBER

DESCRIPTION OF PROBLEM

CATEGORY A	CATEGORY B
☒ MIP/MRC/EGL REPLACEMENT	☐ TECHNICAL
☐ EQUIPMENT ADDITION	☐ TYCOM ASSISTANCE
☐ EQUIPMENT DELETION	☐ OTHER (Specify)
☐ CHANGE TO EQUIPMENT	

REMARKS

ORIGINATOR	WORK CENTER CODE
DEPARTMENT HEAD	3 M COORDINATOR

TYCOM ☐ CONCUR ☐ DO NOT CONCUR ☐ TAKES ACTION ☐ PASSES FOR ACTION

SIGNATURE	DATE

OPNAV 4790/7B(6-73) ACTION COPY PAGE ____ OF ____

Figure 17 – Feedback Reports (Categories A and B).

WORK CENTER [ ]

EQUIPMENT NOUN NAME	SERIAL OR IDENT	PROBLEM DESCRIPTION	DATE DISCOVERED	DATE CORRECTED	CORRECTED BY

Figure 18 – Recommended Format for Ship's Force Worklist

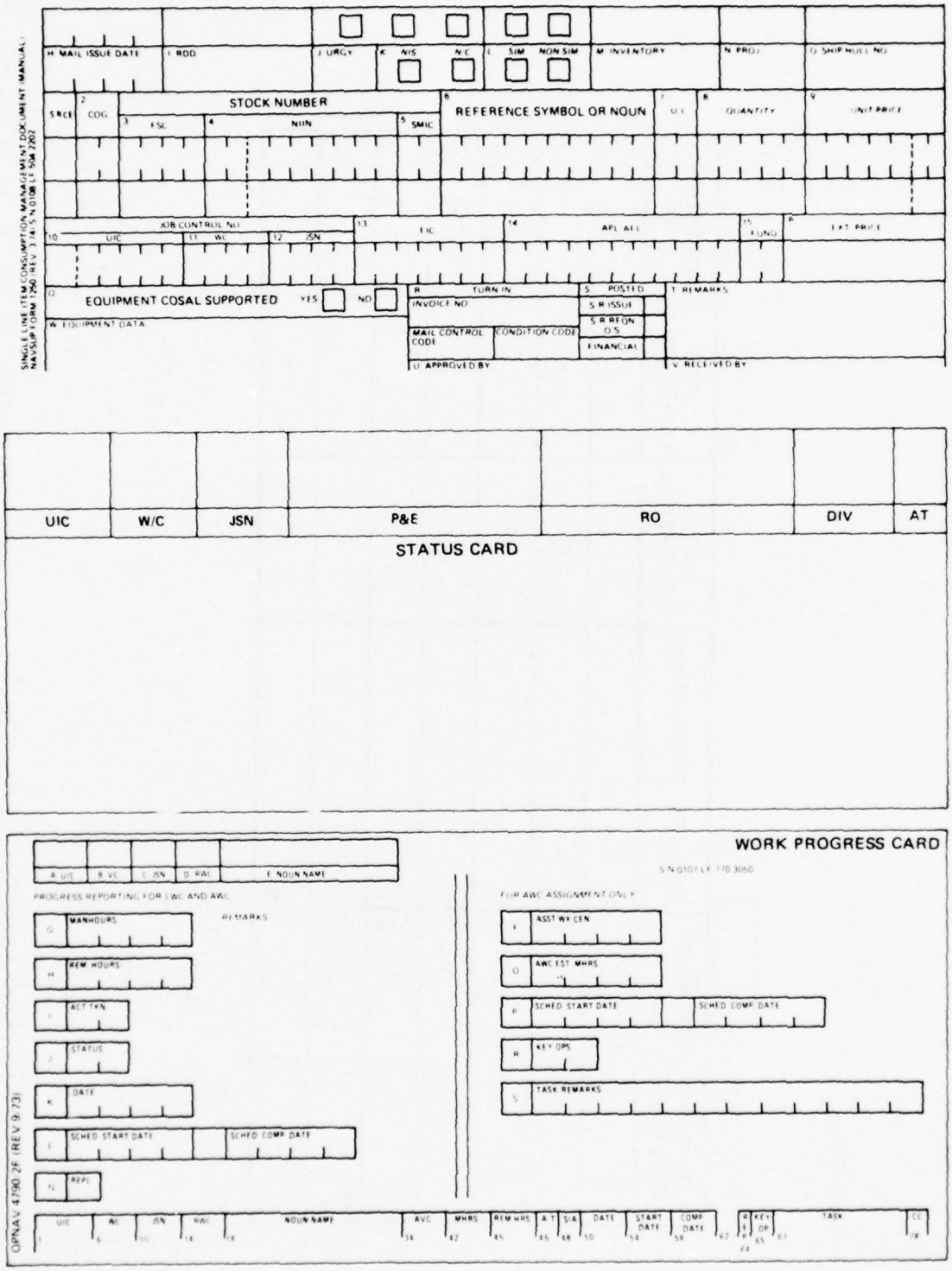

Figure 19 – 1250, Status and 4790/2F Cards

LIST OF EFFECTIVE PAGES (LOEP)

TYCOM - - CRUDESLANT UNIT - - DD - WORK CENTER - -

LINE ITEM		MIP	NOMENCLATURE	CID/APL/TM	QTY	EIC	EQUIP STAT	ADDS/ CHNGS
0010	A	- 015/036-60	ZINCS					
0020	A	- 700/003-98	ST SB DR SURF/BOT BLOW PP					
0030	A	- 700/004-A8	ST PIPE EXP JOINTS					
0040	A	- 700/005-29	BLR FO PIPING & VALVES					
0050	A	- 700/007-39	PIPE SUPPORT HANGERS					
0060	A	- 700/012-71	HP & LP DRAIN PIPING					
0070	A	- 700/013-71	FUEL PIPING					
0080	A	- 701/001-B8	ST EXH RELIEF VALVES					
0090	A	- 701/002-B8	SW RELIEF VALVES					
0100	A	- 701/003-B8	FW EDW RELIEF VALVES					
0110	A	- 701/005-B0	LUBE VALVES					
0020	C	- 045/001-01	STABLE ELEM MK 6					
0030	C	- 051/001-22	RADAR MK 25 MOD 3					
0040	C	- 053/003-32	COMPUTER MK 1A MOD 13					
0050	C	- 053/002-32	GUN DIR MK 37 MOD 49					
0060	C	- 058/011-12	SRT/GFCS MK 37					
0065	C	- 099/001-69	DUM DIR MK 6 MOD 1					
0560	C	- 726/001-61	SB-82/SRR					
0570	C		SB-83/SRT					
0580	C	- 413/001-41	SB-863/SRT					
0590	C	- 726/001-61	SB-973/SRR					
0600	C	- 413/001-41	SB-988/SRT					
0610	C	- 028/001-55	TCS-12					
0620	C	- 206/003-39	TS-2232/UCC-1					
0630	C	- 368/001-39	TT-276B/UC					
0640	C	- 059/001-22	TT-102C/UC					
0650	C	- 058/001-39	TT-253A/UC					
0660	CT	- 007/001-A9	23496					

Figure 20 – **LOEP (List of Effective Pages)**

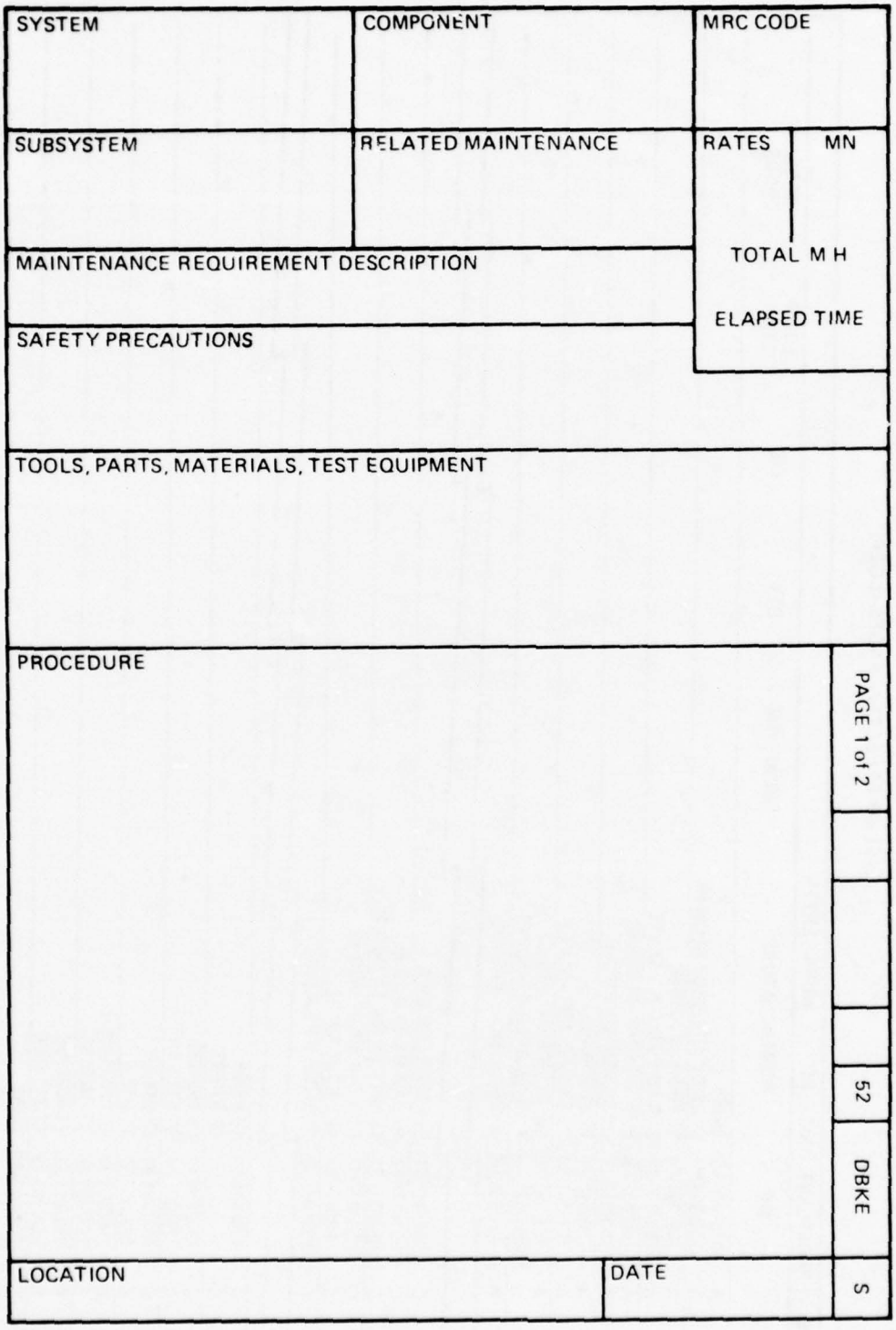

Figure 21 – MRC (Maintenance Requirement Card)

SYSTEM, SUBSYSTEM, OR COMPONENT	REFERENCE PUBLICATION	DATE
Main Circulating Pump		15 June 1968

CONFIGURATION: THESE MAINTENANCE REQUIREMENTS ARE APPLICABLE TO EQUIPMENT IN WHICH THE FOLLOWING CHANGES HAVE BEEN ACCOMPLISHED:

SYSCOM, MRC CONTROL NO.	MAINTENANCE REQUIREMENT	PERIODICITY CODE	SKILL LEVEL	MAN HOURS	RELATED MAINTENANCE
84 5076 W	1. Sample and inspect lube oil. 2. Lubricate the speed limiting governor. 3. Turn pump several revolutions by hand; if steam is available, turn by steam.	W-1	MM3	0.5	None
66 5079 M	1. Test speed limiting governor.	M-1	MM1 FN	0.2 0.2	None
25 7998 Q	1. Clean pump and renew oil. 2. Clean lube oil filter.	Q-1	MM3 FN	0.5 1.5	None
68 P778 Q	1. Test spring-loaded exhaust valve by steam.	Q-2	MM2	0.2	W-1
A4 4830 Q	1. Inspect reduction gears.	Q-3	MM1	0.5	None
65 4079 Q	1. Renew stuffing box packing.	Q-4	MM3	1.0	None
84 5082 A	1. Sound and tighten foundation bolts. 2. Inspect and clean steam strainer.	A-1	MM3	1.0	None
85 5083 C	1. Inspect internal water lubricated bearing and journal for condition. Measure bearing and propeller clearances.	C-1	MM1 2FN	12.0 24.0	Q-4
95 D045 C	1. Inspect carbon packing for wear.	C-2	MM2 FN	2.0 2.0	None
16 5510 C	1. Clean, inspect, and preserve exterior of turbine casing.	C-3	MM2	1.0	C-2

MAINTENANCE INDEX PAGE
OPNAV FORM 4700-3 (A) (REV. 4-71)

SYCOM MIP CONTROL NUMBER

Figure 22 – An Example of a Hull Mechanical or Electrical Equipment MIP

Equipment Guide List MRC CODE _____

TITLE _____

Page

NOMENCLATURE/EQUIPMENT NAME	LOCATION	QTY.	Applicable data as required by MRC such as brush length, psi setting, number of grease fittings, thickness, etc.

Figure 23 – Standard EGL (Equipment Guide List)

USS PUGET SOUND

MASTER JOB CATALOG

CALLDOWN REQUEST

SHIP: _____ U.I.C.: _____

DO NOT USE	MJC ROUTINE		W/C	JSN	APL/CID	SERIAL	TECH. MAN.

SUBMITTED BY: AUTHORIZED BY:

Figure 24 – Master Job Catalog

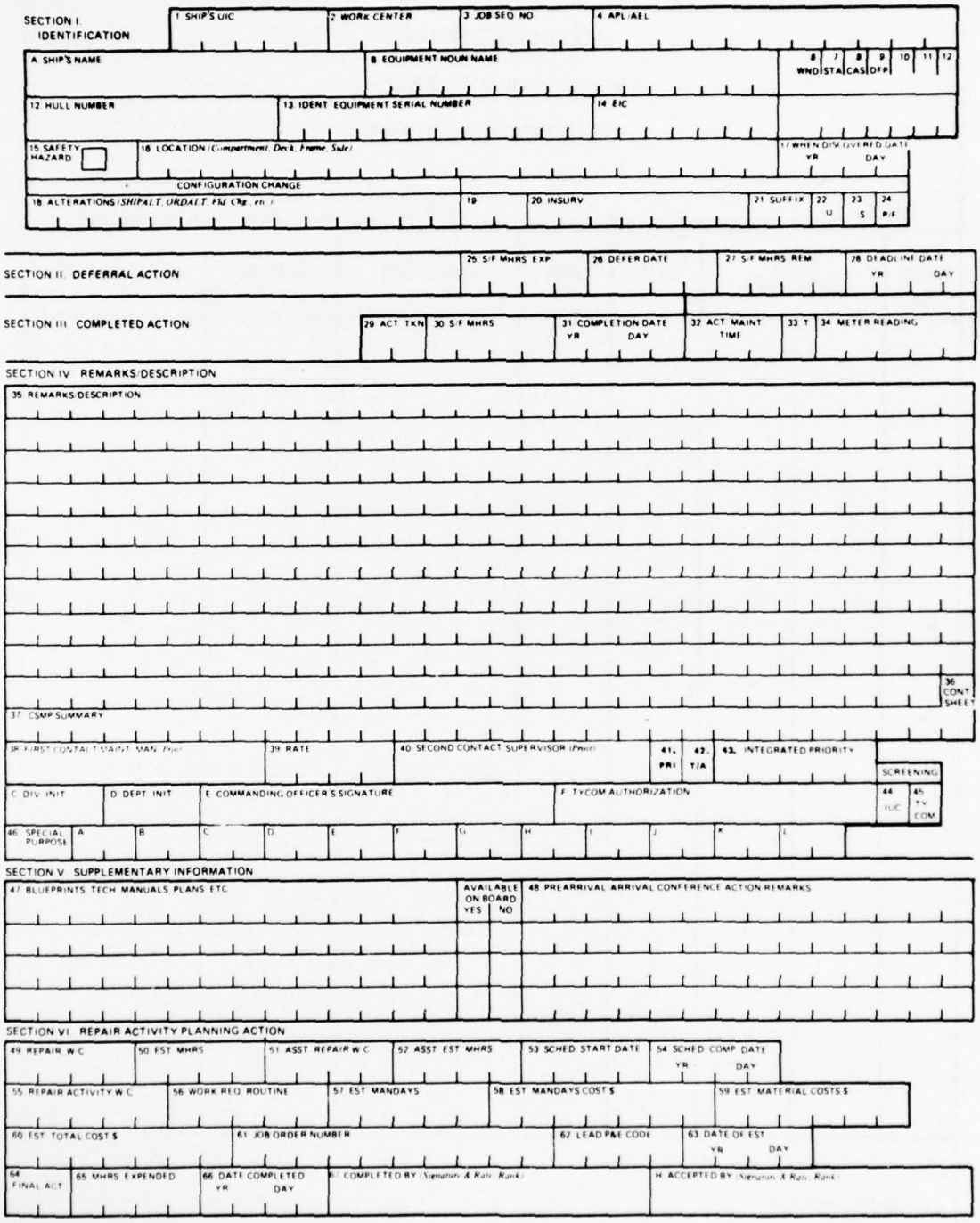

Figure 25 – 4790/2K

MAINTENANCE PLANNING & ESTIMATING FORM (P & E)

4790/2P (8 73) SIN 0107 720 3078

SECTION I. PLANNING

JOB CONTROL NUMBER

A SHIP'S NAME	B HULL NUMBER	1 SHIP'S UIC	2 WORK CENTER	3 JOB SEQ NO

4 PERIODIC MAINTENANCE REQUIREMENT	5 PERIODICITY	6 YYMM ISSUED	7 SPECIAL DATA

8 SCREENING ACTION

	IUC	TYCOM	
a	☐	☐	DEPOT ACCOMPLISH
b	☐	☐	IMA ACCOMPLISH
c	☐	☐	TIU/NAVSEC/NOSSO/ETC
d	☐	☐	SHIPS FORCE (IMA) (DEPOT) ASSIST
e	☐	☐	SHIP TO SHOP
f	☐	☐	ACCOMPLISH WITH MODIFICATIONS
g	☐	☐	DISAPPROVE

9 QUALITY ASSURANCE REQUIREMENTS

a ☐	SUBSAFE	g ☐	SPECIAL CLEANING
b ☐	LEVEL 1	h ☐	SPECIAL TESTING
c ☐	NUCLEAR LEVEL 1	i ☐	SPECIAL IDENTIFICATION
d ☐	NON DESTRUCT TEST	j ☐	NOISE CRITICAL
e ☐	NUCLEAR WORK PROCEDURES	k ☐	RADIOLOGICAL CONTROL
f ☐	SUBMARINE ANTENNA ENGINEERING DIVISION	l ☐	OTHER CONTROLS

10 SPECIAL REQUIREMENTS

a ☐	KEY EVENT
b ☐	SPECIAL INTEREST
c ☐	DRY DOCK REQUIRED
d ☐	PRE OVERHAUL TEST REQUIRED
e ☐	POST OVERHAUL TEST REQUIRED
f ☐	DEPARTURE TEST REQUIRED

C IUC SIGNATURE	D TYCOM SIGNATURE	11 NORMALLY DONE BY
		a ☐ S F b ☐ IMA c ☐ DEPOT

SECTION II. SCHEDULING

12 LEAD WORK CENTER	13 SCHED START DATE YR DA	14 SCHED COMP DATE YR DA	15 EST MHRS	16 KEY OP	17 TASK
18 ASST WORK CENTER	19 SCHED START DATE YR DA	20 SCHED COMP DATE YR DA	21 EST MHRS	22 KEY OP	23 TASK
24 ASST WORK CENTER	25 SCHED START DATE YR DA	26 SCHED COMP DATE YR DA	27 EST MHRS	28 KEY OP	29 TASK
30 ASST WORK CENTER	31 SCHED START DATE YR DA	32 SCHED COMP DATE YR DA	33 EST MHRS	34 KEY OP	35 TASK
36 ASST WORK CENTER	37 SCHED START DATE YR DA	38 SCHED COMP DATE YR DA	39 EST MHRS	40 KEY OP	41 TASK
42 ASST WORK CENTER	43 SCHED START DATE YR DA	44 SCHED COMP DATE YR DA	45 EST MHRS	46 KEY OP	47 TASK

SECTION III. TECHNICAL DOCUMENTATION

48	ON BOARD YES	ON BOARD NO

SECTION IV. IUC/REPAIR ACTIVITY/TYCOM REMARKS

49

SECTION V. SUPPLEMENTAL PLANNING

50 EST MANDAYS	51 EST MANDAYS COST $	52 EST MATERIAL COST $	53 EST TOTAL COST $	54

Figure 26 – 4790/2P

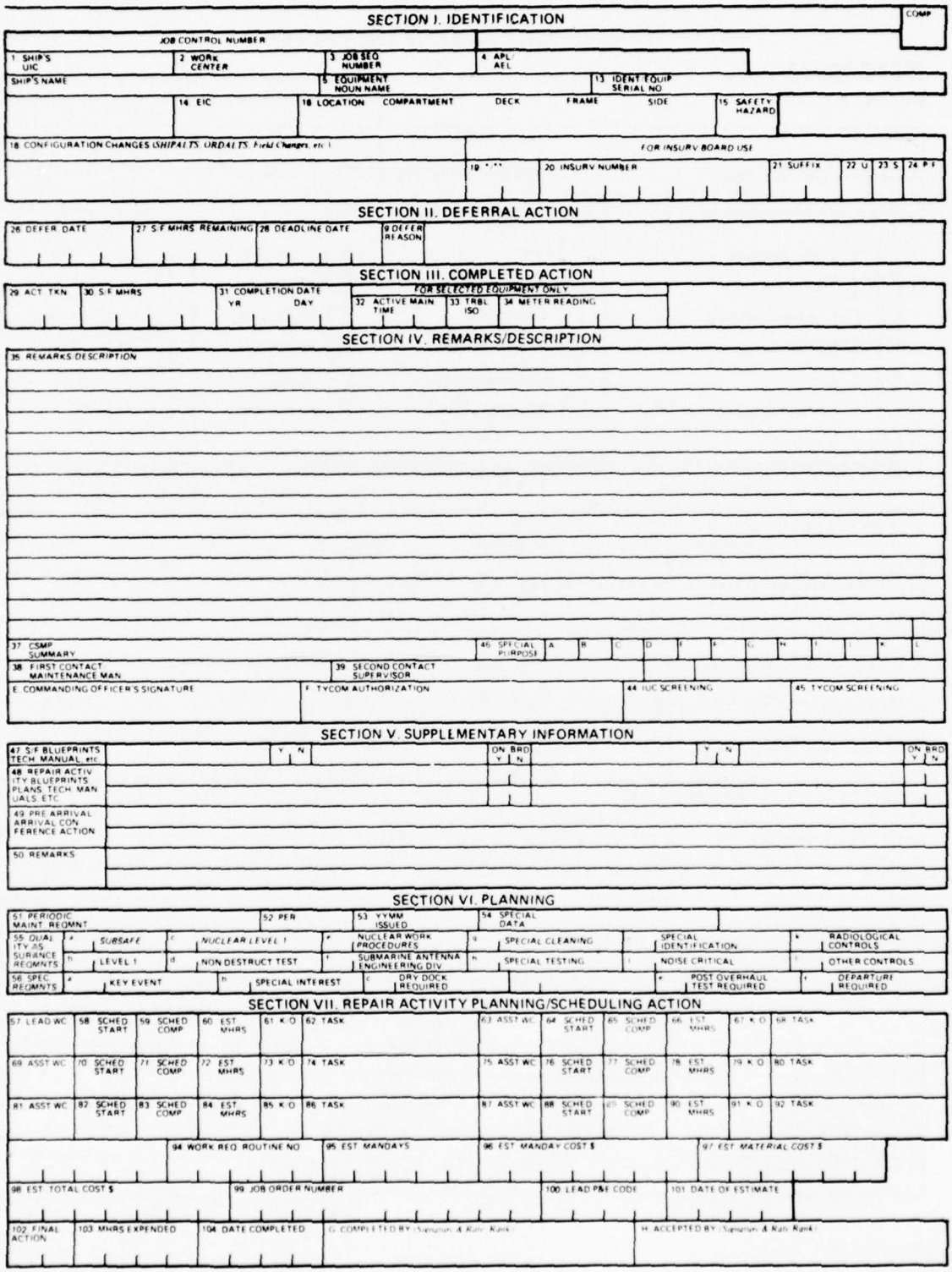

Figure 27 – Automated Work Request

JOB SEQUENCE NUMBER ACCOUNTABILITY LOG										
				4790/2K						
JSN	DATE	EIC	A/T	COMPL. ACTION	OPENING DEF.	DEF	SPEC W.R.	1250 1348	4790/2K	JOB DESCRIPTION

Figure 28 – JSN Accountability Log

USS PUGET SOUND — INTERMEDIATE MAINTENANCE MANAGEMENT SUB-SYSTEM — PRODUCED 08 MAR 76

SHIP SUPERINTENDENT REPORT — DATA AS OF 08 MAR 76

627 2 DANIELS BLG 27 — AVAILABILITY FROM 05 JAN 76 TO 06 FEB 76

67B CALIBRATION

W/C	JSN	NOUN NAME	ID NUM	EIC	START	COMPL	PRI	R/HRS	%CMP	D/HRS	ACTION TAKEN	STATUS

Figure 29 – Ship Superintendent Report

USS L Y SPEAR AS-36 INTERMEDIATE MAINTENANCE MANAGEMENT SUB-SYSTEM PRODUCED 26 FEB 74

REPAIR WORK CENTER REPORT DATA AS OF 25 FEB 74

31A INSIDE MACHINE

USS SUNFISH SSN 649

W/C	JSN	NOUN NAME	ID NUM.	EIC	START	COMPL	PRI	R/HRS	%CMP	D/HRS	ACTION TAKEN	STATUS

Figure 30 – Repair Work Center Report

USS L Y SPEAR AS-36 INTERMEDIATE MAINTENANCE MANAGEMENT SUB-SYSTEM PRODUCED

PRODUCTION REPORT DATA AS OF

31A INSIDE MACHINE

JOB CONTROL NO.	DATE	EIC	NOUN NAME	A/T	LWC	M/HRS	AWC	M/HRS	STATUS

Figure 31 – Production Report

CURRENT SHIPS MAINTENANCE PROJECT REPORT 1 - OPTION B
SUMMARY BY WORK CENTER

USS SPRINGFIELD CLG-7 UIC-03566 IUC-CCDL

WORK CENTER EB01

JSN	NOUN NAME	IDENT	CSMP SUMMARY	DEFR DATE	DEFR REAS	PRI	SCRN ACTN	DEF. MAN HOURS S/F	IMA	DEP

Figure 32 – Report 1 – Option B, Summary by Work Center

DESCRIPTION

1. The PMR index is used to provide visibility to the total suit of maintenance requirements applicable to each ship or activity. Various options will provide the capability to display only that portion of the total suit of requirements which is of principal interest to the user.

2. Typical options include:

   a. Any or all requirements for any or all levels of maintenance.

   b. All requirements for any selected component group for any or all ships systems.

   c. Requirements of selected essentiality only, e.g., URO requirements, for any or all component groups for any or all ships systems for any or all levels of maintenance.

   d. Any or all requirements for a selected cognizant organizational work center, division or department or lead work center responsible for accomplishing the requirements.

   e. Any or all requirements having a specific periodicity for any or all maintenance levels, for any or all component groups, equipments or systems.

3. The report will be produced when changes occur to the maintenance plan. It may be produced on demand at the option of the user, however, such demand is expected to be no more frequent than quarterly.

DATA ELEMENTS

1. SWBS - Ships Work Breakdown Structure Code
2. SHIP SYSTEM - Noun Name of Ships System
3. COMP GP - Component Group
4. Requirement - Maintenance Requirement Statement
5. PRD - Periodicity of the Requirement
6. Procedure - Identification Number of the Procedure
7. Issue - Effective issue date of the Procedure
8. E/F - Essentiality Factor
9. M/L - Maintenance Level
10. D/D - Drydocking Required (y or n)
11. STS - Ship to Shop (y or n)
12. LWC - Lead Work Center
13. M/R # - Maintenance Requirement Number
14. Equipment - Noun Name of the Equipment
15. IDENT - Identification Number of the Equipment
16. LOCATION - Shipboard Location of the Equipment
17. RIC - Repairable Identification Code
18. MFGR - Manufacturer of the Equipment
19. S/S - Sub Safe
20. CRT - Criticality of the Equipment
21. CWC - Cognizant Organizational Work Center

Figure 33 – Planned Maintenance Requirement Index

DESCRIPTION

1. The Refit Work Package displays all the planned maintenance requirements, deferred maintenance requirements and alterations scheduled for accomplishment during a specific refit. Patrol discrepancies will be incorporated after the ships arrival from patrol and emergent requirements will be incorporated on a weekly basis. The RWP is used extensively to support refit planning activity.

2. Typical options include:

   a. The display of the KEYOPS required to accomplish the requirements immediately below the requirement statement.

3. The RWP will be produced a minimum of 2 times prior to the ships arrival from patrol, once during the refit final planning phase (2nd or 3rd day after arrival) and weekly thereafter to incorporate emergent requirements.

DATA ELEMENTS

1. SWBS - Ships Work Breakdown Structure Code
2. SHIPS SYSTEM - Noun Name of Ships System
3. FGC - Functional Group Code
4. EQUIPMENT - Noun Name of the Equipment
5. IDENT - Identification Number of the Equipment
6. RIC - Repairable Identification Code
7. LOCATION - Shipboard Location of the Equipment
8. START - Job Scheduled Start Date
9. COMPLETE - Job Scheduled Completion Date
10. SHOP - Shop or Work Center
11. HOURS - Estimated Manhours
12. KEY EVENT - Key Event by which job must be completed
13. JCN - Job Control Number
14. REQUIREMENT - Maintenance Requirement Statement
15. E/F - Essentiality Factor
16. D/D - Drydocking Required (y or n)
17. STS - Ship to Shop (y or n)

Figure 34 – Refit Work Package

DESCRIPTION

1. The Long Range Forecast displays the total aggregate workload (all ships, TTF and TRF) by shop indicating totals for all Industrial Shops, Waterfront Shops and TRF. During the Acquisition Phase the report will include the workload for all planned maintenance requirements as reflected in the LSAF and will be used primarily for workload smoothing and refining TRF personnel build-up rate. During the Operational Phase it will also include the workload for deferred maintenance requirements and alterations and will be used primarily for projecting long range shop manpower loading and TRF personnel distribution.

2. Typical options include:

   a. Total productive labor manhours by shop (as displayed)

   b. Total productive labor manhours by skill level (Military Rate & Rating and basic civilian skill, i.e., apprentice, journeyman, etc.).

   c. Total productive manhours by skill speciality (Military NEC and Civilian Wage Board Classification).

   d. Total mandays for the above options vice manhours.

   e. Application of CM/PM ratio to reflect total projected workload for any of the above options.

   f. Application of Productive Efficiency Index to reflect productive support workload for any of the above options.

3. The report will be produced on a periodic basis (normally no more frequent than quarterly). It may be produced on demand at the option of the user, however, such demand is expected to be infrequent.

Figure 35 – Planned Maintenance Long Range Workload Forecast

DESCRIPTION

1. The Intermediate Range Forecast displays the total planned maintenance workload for each ship, TRF (IPE) and TRITRAFAC by shop for the TRF. It also includes the workload for each organizational work center for TRITRAFAC and ships scheduled to be in refit during the time interval covered by the report. The report is produced for specific periods of time as designated by the user. The time period covered will normally be a specific calendar month, quarter or year. During the Acquisition Phase the report will include the workload for all planned maintenance requirements as reflected in the LSAF and will be used primarily for workload smoothing. During the Operational Phase it will also include the workload for deferred maintenance requirements and alterations and will be used for refinement of shop manpower loading and TRF personnel distribution.

2. Typical options include:

   a. Total productive labor manhours by shop (as displayed)

   b. Total productive labor manhours by skill level (Military Rate & Rating and basic civilian skill, i.e., apprentice, journeyman, etc.).

   c. Total productive manhours by skill speciality (Military NEC and Civilian Wage Board Classification).

   d. Total mandays for the above options vice manhours.

   e. Application of CM/PM ratio to reflect total projected workload for any of the above options.

   f. Application of Productive Efficiency Index to reflect productive support workload for any of the above options.

3. The report will be produced on a demand basis only and would normally be required no more frequently than once a month.

Figure 36 – Planned Maintenance Intermediate Range Workload Forecast

DESCRIPTION

1. The Short Range Forecast displays the daily workload by TRF shop for each customer in refit and for the work center of each customer for any period of time as designated by the user up to a maximum of 22 working days which is normally equivalent to a one month calendar period. The time period can be extended by requesting additional reports covering subsequent consecutive periods of time. The report indicates the percentage of productive capacity that will be utilized and identifies any overload conditions. It also displays the total manhours required to complete the planned maintenance for each customer in refit during the interval of time covered by the report. The report is utilized primarily for job scheduling within a specific refit time period to achieve a balanced workload consistent with the refit key event schedule. During the Operational Phase the report will be produced from the RMMS files and will reflect the total workload as reflected in the various RWP's as of the time the report is produced.

2. Report options include:

   a. The report may be requested for a specific shop only, for Industrial Shops only, for Waterfront Shops only or customer work centers only for any number of working days up to a maximum of 22.

   b. A summary report displaying by shop only the total daily workload, percentage capacity that will be utilized and overload conditions if they exist.

   c. An exception report displaying only those shops or work centers whose productive utilization will exceed a specified percentage.

3. The report will be produced on a demand basis only (normally about once a month). It will also be required when significant changes are made to the planned maintenance schedule.

Figure 37 – Planned Maintenance Short Range Workload Forecast

DESCRIPTION

1. The Planned Maintenance Status Report displays the current accomplishment status (as of the date of the report) of all planned maintenance requirements (or selected requirements) having a periodicity of 3 months or less. Status will be displayed as follows:

a. NOT APPL } to indicate the requirement is not applicable

b. OVD 012 } to indicate the requirement is 12 months overdue

c. COMP R012 } (Optional) to indicate the refit during which the requirement was last accomplished

d. COMP 9120 } (Optional) to indicate the julian date the requirement was last accomplished

e. DUE R012 } (Optional) to indicate the refit during which the requirement is next due (for requirements not overdue)

f. W/C JSN } (Optional) to indicate the JCN under which the requirement was last accomplished

The report is used to provide a profile of planned maintenance status to support Quality Assurance Audits, repair/replace decisions and trade offs in the development of RWP's.

2. Typical options include:

a. Displaying the status of selected requirements only, e.g., URO requirements, calibration requirements, remove & replace requirements, requirements which require dry docking, requirements designated for accomplishment by a specific maintenance level.

b. Displaying only those requirements in a specific status, e.g., requirements overdue for accomplishment.

3. The report will be produced prior to the departure of each ship for patrol and on a demand basis for selected options.

DATA ELEMENTS

1. SWBS - Ships Work Breakdown Structure Code
2. SHIP SYSTEM - Noun Name of Ships System
3. COMP GP - Component Group
4. FGC - Functional Group Code
5. EQUIPMENT - Noun Name of the Equipment
6. IDENT - Identification Number of the Equipment
7. CWC - Cognizant Organizational Work Center
8. PMR # - Planned Maintenance Requirement Number
9. REQUIREMENT - Maintenance Requirement Statement
10. E/F - Essentiality Factor
11. M/L - Maintenance Level
12. D/D - Drydocking Required (y or n)
13. STS - Ship to Shop (y or n)
14. PRD - Periodicity of the Requirement

Figure 38 – Planned Maintenance Status Report

DESCRIPTION

1. The Ship's System Refit Progess Report displays the status of all open jcbs (JSN sequenced) for any or all ship systems at any point in time during the refit. The report indicates productive labor manhours (scheduled, expended and remaining) by job control number for those repair work centers involved and provides the work center totals by each ship's system. It will be used by the Division Officers and the Ship's Project Manager to monitor the refit progress of the ship by each ship's system.

2. The report will be produced on a demand basis only.

3. Typical options include:

   a. The same total productive labor manhour information mentioned above for any selected component group for any or all ship's systems.

   b. A listing of the KEYOPS to accomplish each requirement immediately below the requirement statement.

DATA ELEMENTS

1. SWBS - Ship Work Breakdown Structure code of the system
2. SHIP'S SYSTEM - Noun name of the ship's system
3. COMP GROUP - Component group name and code
4. FGC - Functional Group Code
5. EQUIPMENT - Noun name of the equipment requiring repair actions
6. IDENT - Identification number of the equipment
7. JCN - Job Control Number (Work Center and JSN portions)
8. REQUIREMENT - Maintenance requirement statement for the job
9. WORK CTRS - The number of the work centers performing productive work
10. MANHOURS SCHD, EXPND, RMNG - The productive manhours scheduled/estimated, expended and remaining.
11. KEY EVENT - Key Event description, if applicable
12. STATUS - Status nomenclatures for only those jobs experiencing delays:

DESCRIPTION	NOMENCLATURE	DESCRIPTION	NOMENCLATURE
Not delivered to repair work center	- NOT DELIVERED	Awaiting technical documentation	- WAITG TECH DOC
Awaiting parts/material	- WAITG MATL	Awaiting ship check	- WAITG SHIP CHK
Insufficient manpower	- LACK MANPOWER	Awaiting dry dock	- WAITG DRY DOCK
Repair work center equip. unavailable	- EQUIP UNAVAIL	Awaiting quality assurance check	- WAITG QA
Awaiting lead repair work center	- WAITG LWC	Awaiting final quality assurance check	- WAITG FINAL QA
Awaiting assist repair work center	- WAITG AWC	Complete - not signed off	- COMP-UNSIGNED
		Rework required	- REWORK REQD

NOTE: On schedule and in progress jobs will have no entries shown for the above status data element.

Figure 39 – Ship's System Refit Progress Report

DESCRIPTION

1. The Ship's Work Center Refit Progress Report displays the status of all open jobs (JSN sequenced) organized by cognizant shipboard work center. The report indicates productive labor manhours (scheduled, expended, and remaining) by job control number for those repair work centers involved and provides the work center totals by each cognizant work center. It will be used primarily by Division Officers/Supervisors to monitor the progress of all jobs under their cognizance.

2. The report will be produced on a demand basis only.

3. Typical options: None

DATA ELEMENTS

1. CWG - The number of the shipboard cognizant work center
2. JCN - Job Control Number (Work Center and JSN portions)
3. EQUIPMENT - Noun name of the equipment requiring repair actions
4. WORK CTRS - The number of the work centers performing productive work
5. MANHOURS SCHD, EXPND, RMNG - The productive manhours scheduled/estimated, expended, and remaining
6. KEY EVENT - Key Event description, if applicable
7. STATUS - Status description of the job by work center

Figure 40 – Ship's Work Center Progress Report

DESCRIPTION

1. The Shop Progress Report displays the status of all open jobs (JSN sequenced) for each ship within each work center or shop involved, including shipboard work centers. The report indicates productive labor manhours (scheduled, expended, and remaining) for each job and the total manhours for each work center. It will be used by work center supervisors to control work assignments and to monitor the status of their activities.

2. The report will be produced at specific periods of time as required by the user.

3. Typical options include:

   a. Mandays vice manhours

   b. The report may be requested for a specific work center only or for specific priorities by specific work centers.

DATA ELEMENTS

1. JCN - Job Control Number (Work Center and JSN portions)
2. SSBN - The hull number of the ship for which each job is to be performed
3. PRI - Priority code number of job
4. EQUIPMENT - Noun name of the equipment requiring repair action
5. START - Actual start date of job
6. SCHDLD COMPTN - Scheduled completion date of job
7. MANHOURS SCHD, EXPND, RMNG - The productive manhours scheduled/estimated, expended and remaining

Figure 41 – Shop Progress Report

DESCRIPTION

1. The Shop Workload Forecast displays the daily productive manhours forecasted/scheduled for each shop/work center by each customer - SSBN, TRITRAFAC (TTF), & TRF (IPE). The forecast also includes the total productive manhours forecasted for all customers, the total productive manhours available for each work center and the remaining hours required to complete the scheduled manhours for each customer during the time interval covered by the forecast. It identifies any overload conditions and percentage of capacity forecasted for each work center and for the total refit facility. The forecast provides up to a maximum of 22 working days which is normally equivalent to a one month calendar period. The report will be utilized primarily for workload planning and job scheduling by Shop Planning personnel.

2. The forecast will be produced on a demand basis (normally once a month) or when significant changes are made because of workload planning or job scheduling.

3. Typical options include:

   a. Forecasts for a specific shop or work center only, for Industrial Shops only, or for Waterfront Shops only.

   b. Forecast displaying only those shops or work centers whose scheduled manhours exceed the available manhours by a specified percentage.

DATA ELEMENTS

1. SHOP - The number of the TRF shop/work center
2. SSBN - The productive manhours forecasted for each hull number
3. TTF - The productive manhours forecasted for TRITRAFAC (TTF)
4. TRF(IPE) - The productive manhours forecasted for Industrial Plant Equipment (IPE)
5. TOTAL - The total productive manhours forecasted for all customers by each work center
6. AVAIL - The total productive manhours available in each work center
7. OVERLOAD - The number of forecasted productive manhours exceeding the available productive manhours
8. % CAPACITY - The total forecasted/scheduled productive manhours compared to the total available manhours, expressed as a percentage, i.e.,

$$\frac{\text{Scheduled Manhours}}{\text{Available Manhours}} \times 100$$

9. TRF TOTAL - The total of all TRF work centers by each customer

Figure 42 – Shop Workload Forecast

DESCRIPTION

1. The Daily Performance Summary displays the comparison between the actual performance (% Productive) of each shop or work center and its scheduled/forecasted workload (% Capacity) obtained from the Shop Workload Forecast Summary as shown in Appendix C-6 and overtime indices. It will provide Superintendents and General Foreman with productive and capacity comparisons for their primary area of responsibility.

2. The summary will be produced at specific periods of time as required by the user.

3. Typical options include:

   a. Summaries for a specific shop or work center only, for Industrial Shops only, or for Waterfront Shops only.

   b. Summary displaying only those shops or work centers whose productive percentage is below a specified minimum percentage.

DATA ELEMENTS

1. SHOP - The number of the TRF shop/work center
2. EXPND - The total productive manhours expended each day during the reporting period
3. SCHD - The total productive manhours scheduled/forecasted each day
4. RMNG - The manhours remaining
5. % PRODUCTIVE - The manhours expended compared to the manhours scheduled/forecasted, expressed as a percentage, i.e.,

$$\frac{\text{Manhours Expended}}{\text{Manhours Scheduled}} \times 100$$

6. % CAPACITY - The manhours scheduled/forecasted compared to the manhours available, i.e.,

$$\frac{\text{Manhours Scheduled}}{\text{Manhours Available}} \times 100$$

7. % OVERTIME - The manhours overtime compared to the total manhours expended, expressed as a percentage, i.e.,

$$\frac{\text{Manhours Overtime}}{\text{Manhours Expended}} \times 100$$

8. % CUM AVG - The cumulative average of the above manhours/percentages for the reporting time frame

Figure 43 – Daily Performance Summary

DESCRIPTION

1. The Key Event Schedule displays the start and completion dates and calendar days scheduled for each key event to be performed during each refit. It will be used by Division Officers/Supervisors, Superintendents, Shop Planning and MEG personnel during the arrival conferences to properly interface & sequence all key event related jobs for accomplishment during refit.

2. The schedule will be produced for all arrival conferences and whenever changes occur to key event dates.

3. Typical options: None

DATA ELEMENTS

1. KEY EVENT:

CODE NO.	NOMENCLATURE	CODE NO.	NOMENCLATURE
01	Gooseneck Hook-up	24	Fuel/Defuel
02	Missile Off-Load	25	Sabot/Ballast Load
03	Torpedo Off-Load	26	ECM Testing
04	Change of Command	27	BRA-8 Dock Test
05	First Stores Loading	28	Exercise Torpedo Load
06	Drydocking	29 - 39	Reserved for TYCOM Use
07	Undocking	40 - 49	Reserved for TRF Use
08	Boiler Light-Off	50	Fire Control Alignment
09	Propulsion Plant Testing	51	Calibration Suite Exchange
10	Berth Shift	52	SINS/ESGM Calibration
11	O_2 Loading	53	Missile Testing
12	N2 Loading	54	Ballast Off-Load
13	Reactor Light-Off	55	NAV Patrol Verification
14	Second Stores Loading	56	NAV Optical Alignment
15	Salvage Inspection	57	NAV Performance Evaluation
16	NTPI	58	Detonator Removal
17	Fast Cruise	59	Detonator Installation
18	Sea Trials	60	Arrival Conference
19	ORSE	61	Rip Out & Remove
20	Missile Onload	62	Departure Conference
21	Torpedo Onload	63 - 69	Reserved for Tended Ship
22	Final Stores Loading	70 - 98	Unassigned
23	Hull Surveillance Inspection	99	End of Upkeep

2. MMM & DD - The month & day start and completion dates for each scheduled key event

3. DAYS - The number of calendar days scheduled for each key event

Figure 44 – Key Event Schedule

DESCRIPTION

1. The *Job Scheduling Worksheet* displays the layout of the manhours scheduled/forecasted for each job (JSN sequenced) by ship for each work center. It will be used by Shop Planning and MEG personnel during the arrival conference to properly load all jobs (proposed & in process) for work center accomplishment during each refit.

2. The worksheet will be utilized at all arrival conferences and whenever the manhours expended for a scheduled job alter the manhours remaining within the work center.

3. Typical options: None

DATA ELEMENTS

1. JCN - Job Control Number (Work Center and JSN portions)
2. MANHOURS SCHD - The manhours scheduled/forecasted for each job
3. MANHOURS RMNG - The manhours remaining within the work center after each job is scheduled, i.e., Manhours Available - Manhours Scheduled
4. SSBN - The hull number of the ship for which each job is to be performed
5. MANHOURS AVAILABLE - The productive manhours available within the work center during the scheduling time frame

Figure 45 – Job Scheduling Worksheet

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