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DEAS INFORMATION NETWORKS STUDY. PHASE 2. COMPARISON AND COMPAT--ETC(U)
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The objectives of the Phase 2 Data Entry Aboard Ship (DEAS) Information Networks Study are: (1) to compare supply data with the administrative and maintenance data that describe the information that flows between destroyers/frigates and CONUS activities; and (2) to determine those requirements that DEAS must meet in order to be compatible with current and new telecommunications equipments and subsystems.

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The various supply, administrative, and maintenance information flow paths were identified by data acquired from selected Navy establishments. The information processing activities were identified and grouped according to function. The actual comparison was based on established parameters and scenarios.

Information pertaining to current and new telecommunications equipments and subsystems was acquired from the Naval Telecommunications personnel and documents. This information was analyzed for requirements which DEAS must satisfy in order to be operationally compatible. The results are summarized in tabular form.

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SUMMARY

This portion of the Data Entry Aboard Ship (DEAS) study investigates the information flow paths and requirements of ships which are not equipped with the Shipboard Uniform Automated Data Processing System (SUADPS). The analysis covers operations in port and at sea and is presented in two phases. Phase 1, the initial effort, was completed and documented in DTNSRDC Report 4704, "Current Ship-Shore Information Transfer Description", published June 1975. That report describes supply information flow paths between ships* and ashore activities. This Phase 2 analysis is concerned with (1) a comparison and analysis of information flow paths, means of information transfer, and the data requirements of the supply functions with those of the maintenance and administrative functions, and (2) a compatibility analysis to determine those characteristics which DEAS must possess to be compatible with current and new telecommunications equipment and subsystems.

The methodology for the Phase 2 analyses was based on scenarios and information transfer configurations related to ship location (i.e., whether in port or at sea). Data used as a basis for the analyses were obtained from the following sources:

Bureau of Naval Personnel, Washington, D.C.
- Code 503, Fleet Liaison Branch

Commander, Naval Material
- Code MAT 04M, 3M Staff

Commander, Naval Surface Force U.S. Atlantic Fleet, Norfolk, Virginia
- Code N11, Force Personnel Division
- Code N14, Fleet Personnel Readiness Branch
- Code N45, 3M Division
- Code N63, Readiness and Training Division

Fleet Maintenance Assistance Group, Norfolk, Virginia
- Maintenance Document Control Officer

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* Ships are defined in this study as destroyers and frigates.

Navy Finance Center, Cleveland, Ohio

Code 0A1, Public Affairs Office

Head, Fleet Department

Navy Regional Finance Center, Washington, D.C.

Code NRFC FO, Executive Director

Ships at Norfolk, Virginia

USS BYRD, DDG 23

USS NEW, DD 818

USS VREELAND, FF 1068

Considered in the analyses were activity functions and groupings, message preparation equipment, information requirement descriptions, processing and flow paths, and current/new telecommunications equipment and subsystems.

The study indicated that:

(1) The principal means of transfer for maintenance transactions is mail - in port or at sea. Administrative transactions are more evenly distributed between mail and radio. Outgoing supply transactions make use of mail, telephone, and handcarry in port: at sea the primary mode is mail. Incoming supply transactions use mail to a greater extent than the other means of transfer while in port, with relatively low use of all other means of information transfer at sea.

(2) After discussions with knowledgeable personnel, the basic parameters chosen in making DEAS compatible with major current and new telecommunications equipment and subsystems were: operational speed, information format, store-and-forward capabilities, transmission modes and hardware interfaces.

Due to the density of information transferred via AUTODIN, a dial-up telephone line is proposed for ships in port as a supplementary means for administrative, supply, and maintenance information transfer. This telephone line would not be affected by the different types of host computers (IBM, UNIVAC, or Burroughs) since the proposed dial-up method

would include a regular dial-up connection between the shipboard DEAS and the UNIVAC 1500, IBM 360, and Burroughs 3500 computers.

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ABSTRACT

The objectives of the Phase 2 DEAS Information Networks Study are: 1. to compare supply data with the administrative and maintenance data that describe the information that flows between destroyers/frigates and CONUS activities; and (2) to determine those requirements that DEAS must meet to be compatible with current and new telecommunications equipments and subsystems

The various supply, administrative, and maintenance information flow paths were identified by data acquired from selected Navy establishments. The information processing activities were identified and grouped according to function. The actual comparison was based on established parameters and scenarios.

Information pertaining to current and new telecommunications equipments and subsystems was acquired from the Naval Telecommunications personnel and documents. This information was analyzed for requirements which DEAS must satisfy in order to be operationally compatible. The results are summarized in tabular form

1. INTRODUCTION

1.1 BACKGROUND

The implementation of existing manual procedures for ship-shore supply information handling require significant amounts of time, manpower, and money. The Data Entry Aboard Ship (DEAS) project is intended to improve shipboard supply operations; to expedite the preparations of logistics requisition (and related information) and their transfer to shoreside processing facilities.

The DEAS Information Networks study is being conducted in two phases. Phase 1, which includes an overview of the two phases, has been completed[1*]. Phase 2 was performed to assure system compatibility. It analyzed the characteristics of shipboard, ship-shore, and supply center communications resources currently in operation and correlated them with the Navy proposed communications equipment and systems for DEAS-equipped ships operating at sea. In addition, the sponsor had requested an investigation of potential application of the DEAS system in support of the ship-shore information and transfer processes of the administrative and maintenance functions. Consequently, the Phase 2 study was expanded to include a comparative analysis of the current administrative and maintenance functions and the supply ship-shore information transfer processes.

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1. Siegel, B. and C. Ash, "DEAS Information Networks Study, Phase 1 - Current Ship-Shore Information Transfer Description," DTNSRDC Report 4704, June 1975.

1.2 OBJECTIVES

1.2.1 Comparison Objectives

The objectives of the comparison analysis section of the Phase 2 study were:

To identify and describe the characterisitcs of the current ship-shore administrative and maintenance information processes.

To compare the administrative and maintenance data with supply data.

1.2.2 Compatibility Objectives

The objectives of the compatibility analysis section of the Phase 2 study were:

To identify and describe the major new telecommunications equipment/systems which are applicable to ship-shore information transfer.

To identify and describe the characteristics of the new telecommunications equipment/systems which will influence the DEAS system requirements.

To determine and specify the Data Entry Aboard Ship requirements that will make the system compatible with current and new telecommunications equipment and systems that are or will be used in transferring supply, maintenance, and admin istrative information between destroyers/frigates and ashore (CONUS) activities.

In order to respond to these objectives, comparison and compatibility analyses have been performed. Appendixes indicating the data sources and visits, bibliography, and glossary (see Appendixes A, B, and C respectively) are included in this report.

2. COMPARISON ANALYSIS

2.1 APPROACH

2.1.1 General

The method used in this study was to identify, analyze, and compare current ship-shore administrative and maintenance information flow with that of the supply function as described in the Phase 1 report. This approach offered:

Comparable scope of information requirements
Identity as to information flow networks
Identity as to communications equipment
Description of activities used in handling maintenance and administrative information, and parametric comparisons with those handling supply information.

2.1.2 Activity Groups

The information processes described in the Phase 1 report, which analyzed the supply function, were grouped as follows:

Logistics Requestor
Logistics Manager
Message Adjustor
Supply Source

The present study compares the information flow networks of the supply, maintenance, and administrative functions. Since the processes of the message adjusting activities in the present study are the same as in the Phase 1 study, this group is not discussed here.

2.1.3 Data Sources

The data used as a basis for describing and evaluating the requirements of the destroyers/frigates administrative and maintenance information processes were acquired during visits to the USS NEW (DD 818), the USS VREELAND (FF 1068), and the USS BYRD (DDG 23). The principal sources of data aboard these ships were the administrative, engineering, and

communications personnel. Documents describing the information transfer procedures and processes were researched and are listed in the References (Appendix B). The amount of data obtained on the administrative and maintenance processes was limited by the number of visits made to the ships. Therefore, this analysis of destroyer and frigate information requirements must be regarded as representative rather than definitive.

2.1.4 Parameter Selection

The formats and scenarios used to acquire data and to describe and represent the processes and relationships of the major activities of the ship-shore administrative and maintenance information transfer functions were based on those used in the Phase I report.

One criterion used for the choice of parameters in the Phase 1 report was whether the user of a military information system is likely to have quantitative knowledge of his information needs. A second criterion was the applicability of a parameter to network information flow description. The parameters for which data were sought were:

) User location
(b) User Identity
(c) Transaction Content
(d) Transaction Type
(e) Volume (usually an estimate of the average number of transactions originated per week, month)
(f) Transaction Length
(g) Documents and Transactions
(h) Precedence
(i) Issue Priority Group (IPG)
(j) Classification
(k) Means of Transfer
(l) Format
(m) Medium type
(n) Ship Mix
(o) Restricted or Non-Restricted Communications
(p) Replenishment Type

Figure 1 is the format in which these parameters were organized

From Location	To Location	Transaction Content	Transaction Type	Volume	Transaction Length	Documents/ Transaction	Precedence	Issue Priority Group	Classifi-cation	Restricted or Non-Restricted Communications	Means of Transfer	Format	Medium Type	Replen-ishment Type	Ship Mix

Figure 1 – Ship Data Description

The list of parameters indicated on the Ship Data Description format was adjusted after the administrative and maintenance data were acquired and screened.

Documents/Transactions was deleted because total volume of words per transaction was determined at the data source.

Issue Priority Group was eliminated as not applicable.

Restricted or Non-Restricted communications was deleted because the same constraints were followed in sending communications for maintenance, administrative, and supply.

Replenishment Type was deleted because it was not applicable.

Precedence was deleted because most transactions are sent ROUTINE except for Emergency types such as CASREPTs and Situation Reports (same as supply).

Type of schedule was added to indicate whether the transaction was to be sent at a predesignated time or as required.

Classification was eliminated because most maintenance and administrative transactions were unclassified (except for some CASREPTs and Readiness Reports).

The format used in the Phase 1 report for consolidating supply data was similar to the one used in this study for describing administrative and maintenance activities (see Figure 2).

2.1.5 Comparison Descriptors

The following descriptors are used in the Process Description Section:

Input Medium - Describes the physical form of the information entering the activity.

Input Format - Describes the arrangement of the information entering the activity.

Intra-activity transaction handling - Describes the means by which the information is processed within the given activity.

Output Medium - Describes the physical form of the information leaving the activity.

Output Format - Describes the arrangement of the information leaving the activity.

These descriptors were chosen to define the flow and processing of information from entry to exit for each given activity.

Activity Number

Function/Activity Group

Activity Name

DEFINITION

ABSTRACT

INPUT

OUTPUT

CRITERIA

Figure 2 – Standard Activity Description Format

2.2 PROCESS ANALYSIS AND COMPARISONS

2.2.1 Activity Grouping

The Navy activities considered in each function (Supply, Maintenance, Administrative) are as follows:

Function	Activities
Supply	Ship
	Naval Supply Center (NSC)
	Defense Supply Agency (DSA)
	General Services Administration (GSA)
	Inventory Control Point (ICP)
	DSA-Depot
	GSA-Depot
Maintenance (corrective)	Ship
	Naval Surface Force, U.S. Atlantic Fleet (NAVSURFLANT - Type Command)
	Readiness Support Group (RSG) Atlantic Fleet Data Processing Service Center (DPSCLANT)
	Fleet Maintenance Assistance Group (FMAG)
	Tender Maintenance Support Office Department (MSOD)
Maintenance (planned)	Ship
	Naval Sea Support Center (NAVSEACEN)
	Type Command
	Naval Sea Systems Command - not described in functional descriptions
Administrative	Ship
	Type Command
	Bureau of Naval Personnel (BUPERS)
	Navy Finance Center (NFC)
	Enlisted Personnel Management Center (EPMAC)

These activities were then grouped according to the process (Requestor, Manager, or Source) they perform.

Several activities qualify for placement in more than one group. However, for the purpose of this study, an activity was placed in only one group. The group to which the mission of the activity is most closely related was the one to which it was assigned.

The requestor in this analysis is the ship. The managerial group includes activities in which the principal decision-making actions are applied to a service request. The source group comprises activities that satisfy service requests.

Table 1 relates the activity groups, the functions, and activities which apply to each function.

2.2.2 Comparison Tables

A process comparison was made among the supply, maintenance, and administrative functions within each activity group to determine whether there are significant differences among the information handling processes within the activity groups. The comparison descriptors used are input-output media, formats, and intra-activity transaction handling. These descriptors were chosen because they identify the information processing. Tables 2, 3, and 4 show the actual comparisons.

2.2.3 Process Description

This section contains process descriptions of current ship and ashore information processing activities. Since information type and flow differences between a ship in port and at sea were found to be negligible, one set of descriptions was made for both. Table 5 is a list of the functions described in this section. Figure 3 should be used as a guide to the supply related process descriptions. Figures 4 and 5 should be used as guides to the maintenance and administrative related process descriptions, respectively.

TABLE 1 – GROUPS, FUNCTIONS, AND RELATED ACTIVITIES

ACTIVITY GROUP	FUNCTIONS	ACTIVITIES
Requestor	Supply	Ship
	Maintenance	Ship
	Administrative	Ship
Manager	Supply	ICP DSA GSA
	Maintenance	Type Command RSG
	Administrative	Type Command BUPERS
Source	Supply	NSC DSA-depot GSA-depot
	Maintenance	FMAG Tender MSOD NAVSEACEN DPSCLANT
	Administrative	EPMAC NFC

TABLE 2 – FUNCTION COMPARISON OF REQUESTOR ACTIVITIES

FUNCTION:	SUPPLY	MAINTENANCE	ADMINISTRATIVE
REQUESTOR ACTIVITIES:	SHIP	SHIP	SHIP
DESCRIPTORS			
Input medium	Hard copy, Message	Hard copy, Message	Hard copy, Message
Input formats	DD 1348, DD 1149, Narrative	OPNAV 4790 formats Narrative	Various formats
Intra-activity transaction handling	Manual	Manual	Manual
Output medium	Hard copy, Message	Hard copy, Message	Hard copy, Message
Output formats	DD 1348, DD 1149, Narrative	OPNAV 4790/2K, 4790/7B	NAVPERS 1306, EDVR 1080-14, NAVCOMPT 3055/56, 1219

TABLE 3 – FUNCTION COMPARISON OF MANAGERIAL ACTIVITIES

FUNCTION:	SUPPLY	MAINTENANCE	ADMINISTRATIVE
MANAGERIAL ACTIVITIES:	ICP	TYPE COMMAND	TYPE COMMAND
DESCRIPTORS			
Input medium	Message	Hard copy, Message	Hard copy, Message, Telephone
Input formats	JANAP 128	OPNAV 4790/7B, NWIP 10-1(E)	Various formats, NWIP 10-1(E), Narrative
Intra-activity transaction handling	Manual, Machine-aided	Manual	Manual
Output medium	Message	Hard copy	Hard copy, Message
Output formats	JANAP 128, Narrative	NAVSURFLANT INST 9000.1, OPNAV 4790.4 series, Narrative	Various formats, NWIP 10-1(E), Narrative

TABLE 3 – Continued

FUNCTION:	SUPPLY	MAINTENANCE	ADMINISTRATIVE
MANAGERIAL ACTIVITIES:	GSA/DSA	RSG	BUPERS
DESCRIPTORS			
Input medium	Message	Hard copy	Hard copy
Input formats	JANAP 128	OPNAV 4790/2K, NAVSURFLANT INST 9000.1	NAVPERS 1306
Intra-activity transaction handling	Manual, Machine-aided	Manual	Manual
Output medium	Message	Hard copy	Hard copy, Message
Output formats	JANAP 128	OPNAV 4790/2K	Various formats, Narrative

TABLE 4 – FUNCTION COMPARISON OF SOURCE ACTIVITIES

FUNCTION	SUPPLY			MAINTENANCE			ADMINISTRATIVE	
SOURCE ACTIVITIES:	NSC	GSA-DEPOT	DSA-DEPOT	FMAG/Tender (IMA)*	MSOD	NAVSEACEN (Planned)	NFC	EPMAC
DESCRIPTORS:								
Input Medium	Hard copy, Message	Message	Message	Hard copy, Message	Magnetic tape	Hard copy	Hard copy, Message	Hard copy, Message
Input Formats	DD 1348, JANAP 128	JANAP 128	JANAP 128	OPNAV 4790/2K, Narrative	OPNAV 4790/2R	OPNAV 4790/7B	NAVCOMPT 3055, 3056, 1219	NAVPERS 1306, EDVR 1080-14, Narrative
Intra-activity transaction handling	Manual, Machine-aided	Manual, Machine-aided	Manual, Machine-aided	Manual, Machine-aided	Manual, Machine-aided	Manual	Manual, Machine-aided	Manual, Machine-aided
Output medium	Hard Copy, Message, Telephone	Message	Message	Hard copy, Message	Hard copy	Hard copy	Hard copy, Message	Hard copy, Message
Output formats	DD1348, JANAP 128, Narrative	JANAP 128	JANAP 128	OPNAV 4790/2K, Narrative, OPNAV 4790/2R	As required	OPNAV 4700-1, 4700-3, Narrative	DD 1624, Narrative	NAVPERS 1306, Narrative

*Intermediate Maintenance Activity.

TABLE 5 - LIST OF FUNCTIONS DESCRIBED IN SECTION 2.2.3

FUNCTION/ACTIVITY GROUP	ACTIVITY NAME	INDEX NO.	PAGE
SUPPLY			
Requestor	Ship	1.1.1	20
Manager	Navy Inventory Control Point	1.2.1	22
	Defense Supply Agency Center	1.2.2	25
	General Services Administration Office	1.2.3	27
Source	Naval Supply Center	1.3.1	29
	DSA Depot	1.3.2	31
	GSA Depot	1.3.3	33
MAINTENANCE			
Requestor	Ship	2.1.1	34
Manager	Type Command	2.2.1	37
	Readiness Support Group	2.2.2	39
Source	Fleet Maintenance Assistance Group	2.3.1	41
	Tender	2.3.2	44
	Maintenance Support Office Department	2.3.3	45
	Naval Sea Support Centers	2.3.4	46
	Atlantic Fleet Data Processing Service Center	2.3.5	48
ADMINISTRATIVE			
Requestor	Ship	3.1.1	51
Manager	Type Command	3.2.1	53
	Bureau of Naval Personnel	3.2.2	55
Source	Enlisted Personnel Management Center	3.3.1	57
	Navy Finance Center	3.3.2	59

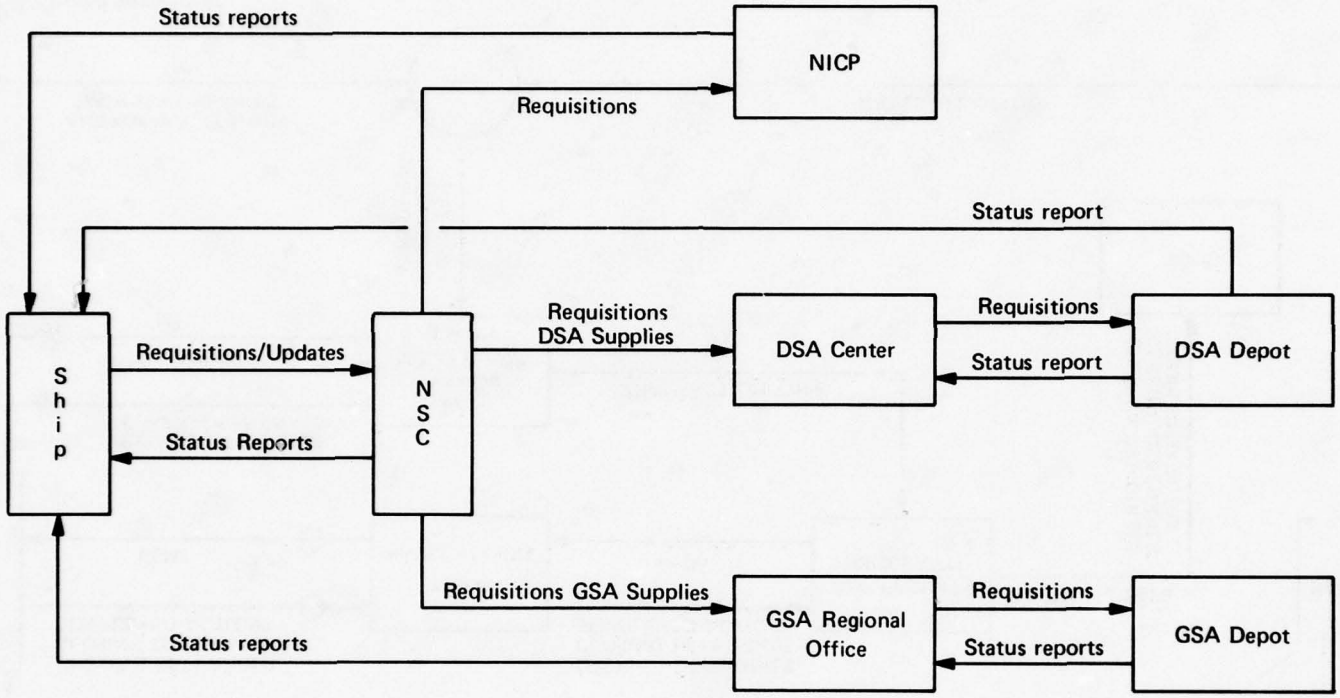


Figure 3 – Supply Information Flow Paths

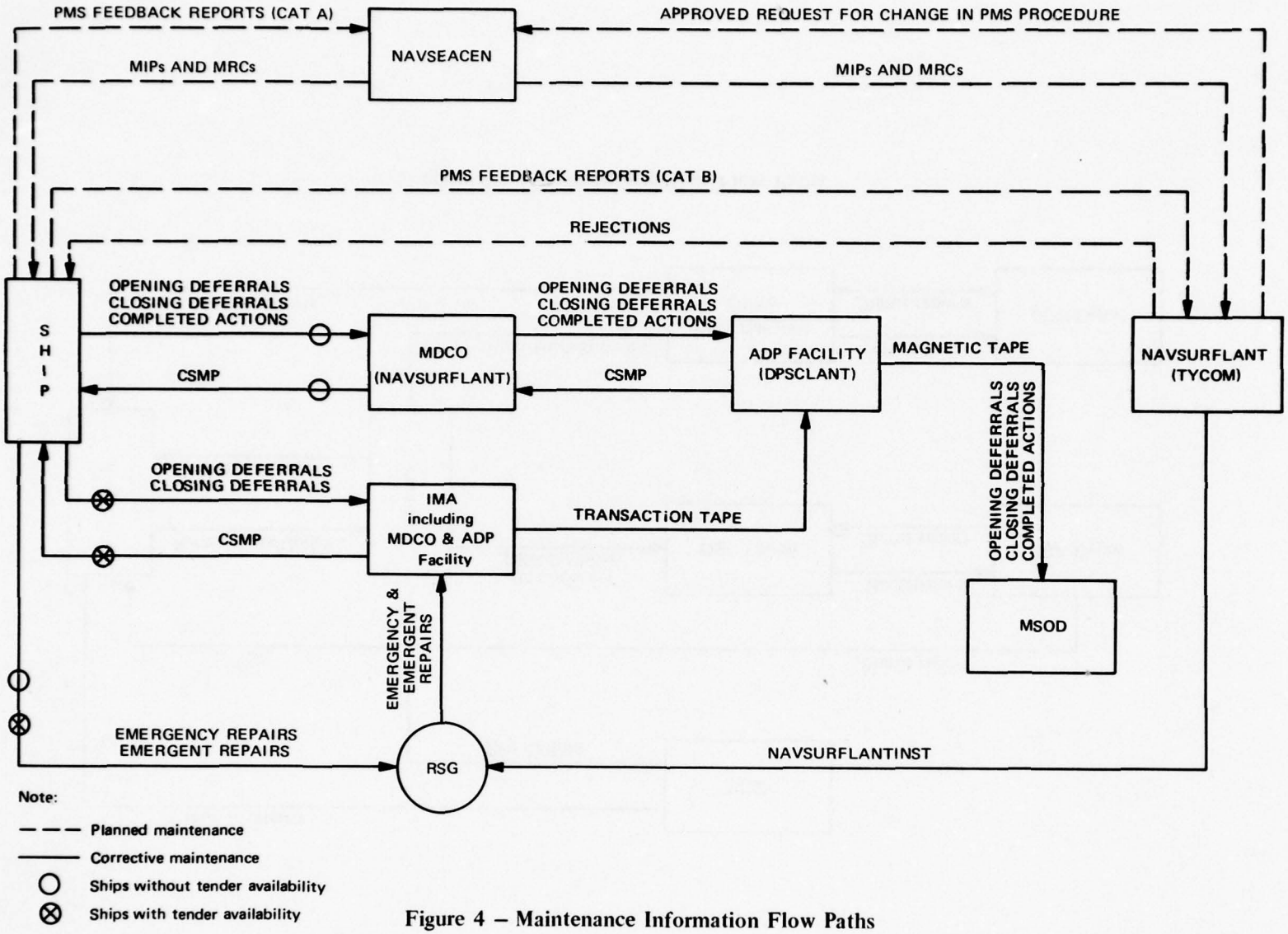


Figure 4 – Maintenance Information Flow Paths

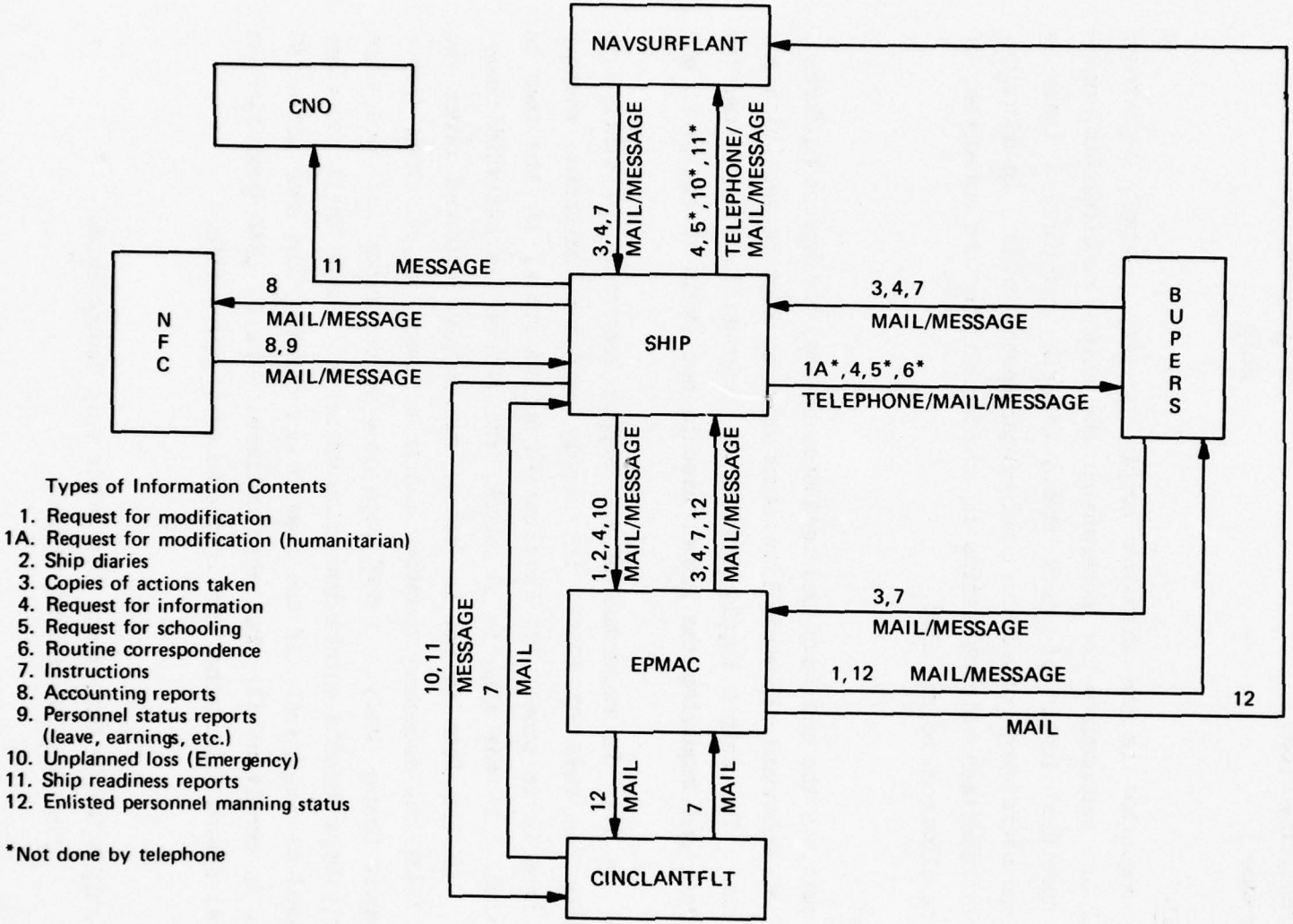


Figure 5 – Administrative Information Flow Paths

Activity Number	1.1.1
Function/Activity Group	Supply/Requestor
Activity Name	Ship

DEFINITION

The requestor is the shipboard supply facility. Supply Department personnel are responsible for determining the ship's requirements, maintaining specified levels of stock items, ordering not-carried items as needed, and satisfying request for intra-departmental needs. In addition, the Supply Department of most ships is responsible for the management of all monies allocated to the ship.

ABSTRACT

To maintain the endurance and readiness desired for operating forces, supplies of shipboard allowance-list items must be kept between high and low limits. The ship's Supply Officer is responsible for determining requirements and acquiring the proper amounts and types of equipment and supplies.

When an item is requested of the Supply Department by other ship departments (on Form DD 1250), the supply personnel determine whether (1) the item is in stock, (2) the item is not in stock, (3) the item is not carried. If the item is in stock, the request is satisfied immediately. If the item is not in stock, the supply personnel order (on Form DD 1348) the necessary quantity (units of issue) of the item from a Naval Supply Center (NSC). A duplicate copy of the order form goes into the Supply Department's outstanding file where it is kept until the order is received or cancelled. If the item is not carried, the same action is taken as in condition (2), but the duplicate Form DD 1348 goes into an historical demand file rather than into the outstanding file.

INPUT

To ship's Supply Department from other ship departments.

Hard copy (Format DD 1250)

OUTPUT

From the ship's Supply Department to NSC.

Cards (Format DD 1348)

CRITERIA

Sufficient lead time and proper format (DD 1250) by other ship departments

Proper format (DD 1348) to request item from NSC

Item inventory status (high/low limits)

Acceptable time delay

Availability of funds in department budget

Intra-ship priority

Activity Number	1.2.1
Function/Activity Group	Supply/Manager
Activity Name	Navy Inventory Control Point

DEFINITION

Navy Inventory Control Points (ICPs) under the Commander, Naval Supply Systems Command, manage established items of equipment, components, and repair parts. Prior to February 1975, the established ICPs were the Ships Parts Control Center (SPCC), the Aviation Supply Office (ASO), and the Electronics Supply Office (ESO). Effective 4 February 1974, ESO merged with SPCC. Since ASO supports aviation supply requirements rarely requested by cruisers and destroyers, the information flow to and from this ICP is not considered for demonstration purposes.

ABSTRACT

When a local NSC cannot satisfy a requisition, it forwards the requisition to the appropriate ICP. The ICP maintains information banks on the availability of items within other supply sources under its cognizance. The ICP queries its information banks to determine which supply source(s) can satisfy the requisition. Then the ICP, considering source and originator location, forwards the requisition to the proper supply source for delivery. Transactions (requisition, modification, status, etc.) may be transfered between a ship and the ICP (for example, SPCC) by various (including combined) means. A message originating from a ship may be transmitted to a Naval Communication Station (NAVCOMMSTA) via SBMSS* or Land Lines. From NAVCOMMSTA, the message is relayed to SPCC via the AUTODIN* system.

Other means of transaction transfer between a ship and NSC activities include handcarry, telephone (voice), and mail. These transactions may be relayed from NSC (in a Joint Army, Navy, Air Force Publications (JANAP)* 128 format) to SPCC via teletype or data pattern messages within

* See Glossary (Appendix C)

AUTODIN system. Messages containing MILSTRIP* formatted contents and transmitted through the AUTODIN system may be addressed to the Defense Automatic Addressing System (DAAS)*. DAAS will check the message content for addresses designated by the originator and relay all SPCC-destined messages to SPCC via AUTODIN.

At SPCC, received messages enter at either the Communications Center or the Automatic Data Processing (ADP) Branch.

The Communications Center receives narrative messages via teletype (AUTODIN) in a JANAP format. Messages from NSC, Naval Purchase Offices, and other services may be of any type (requisition, status, update, etc.). Messages from ships are limited to non-requisitions. The Communications Center routes the messages to the Customer Requirement Branch where the information is verified for logic and accuracy. After the message has been checked and corrected, Customer Requirement personnel put it into the computer in the MILSTRIP format.

The ADP Branch receives messages via AUTODIN. Only requisition messages enter SPCC through the ADP Branch. These messages are received via DAAS in the JANAP 128 format. If the header card does not indicate special handling, the messages go directly into the computer. If special handling is required, the messages are routed to the Customer Requirement Branch for final computer preparation. The message is then entered into the computer by the Customer Requirement Branch Personnel.

Messages from SPCC which are destined for the ship are usually sent in MILSTRIP format via AUTODIN.

INPUT

To SPCC (ADP Branch and Communications Center) from NSC (AUTODIN Terminal)

AUTODIN (JANAP 128 Format)

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* See Glossary (Appendix C)

To SPCC via NAVCOMMSTA from Ship

To NAVCOMMSTA from Ship

SBMSS

Land Line

To SPCC-ADP Branch and Communications Center from NAVCOMMSTA

AUTODIN (JANAP 128 Format)

OUTPUT

From SPCC via NAVCOMMSTA to Ship

From SPCC (AUTODIN Terminal) to NAVCOMMSTA

AUTODIN (JANAP 128 Format)

From NAVCOMMSTA to Ship

SBMSS

Land Line

CRITERIA

Specified message type

Message header column instructions

Media and status code (on MILSTRIP Card - Column 7)

Supply source item availability

Applicable supply source

Activity Number	1.2.2
Function/Activity Group	Supply/Manager
Activity Name	Defense Supply Agency Center

DEFINITION

The Defense Supply Agency (DSA) is directly responsible to the Secretary of Defense for providing supplies and services used in common by the military services. The Defense Supply Center (DSC) is the manager of the DSA depots which satisfy the designated requisitions.

ABSTRACT

The Naval Supply Center houses certain stock items which are owned and managed by DSA. (This arrangement follows a Navy-DSA agreement). DSA is responsible for record keeping and replenishing these stock items. This method is commonly known within the Navy as the "push system". DSC performs all supply management functions, including procurement, distribution, requisition processing, inventory, accountability, stock replenishment, financial accounting, billing, collecting, and reporting. If a ship requisition to NSC for a DSA-managed item cannot be satisfied, the requisition is forwarded to the appropriate DSC.

AUTODIN is the principal means of message (requisition, status, etc.) transfer between NSC and DSC. Requests for DSA-cognizant supplies are forwarded from the ship to NSC via methods previously discussed. When the requests cannot be filled at NSC, they are forwarded (via the AUTODIN system) to DSC after NSC makes the necessary format (JANAP 128) adjustments. DSC tasks its appropriate supply depot to satisfy the requisition. The ship receives at least two messages: a status report from DSC and a shipping report from the depot. Messages to and from DSA are in the MILSTRIP format and are transmitted via the AUTODIN system.

INPUT

To DSC via NSC from ship

Message (JANAP 128 Format) content in MILSTRIP

OUTPUT

From DSC and/or depot to ship

Message (JANAP 128 Format)

CRITERIA

Specified Message type

Message header column instructions

Media and status code (on MILSTRIP Card - Column 7)

Supply source item availability

Location of requestor and DSA depots

Acceptable time delay

Activity Number	1.2.3
Function/Activity Group	Supply/Manager
Activity Name	General Services Administration Regional Office

DEFINITION

The General Services Administration (GSA) is divided into ten service regions and provides designated supplies to all federal government agencies. Each service region contains a Regional Office and depots. The Regional Office manages the depots; the depots satisfy requisitions.

ABSTRACT

In addition to regular Navy supplies, the Naval Supply Center (NSC) houses stock items which are managed completely by GSA. At NSC Norfolk, there are 81 types of items (e.g., toilet tissue, paper napkins, staples, etc.). These items are called "prepositioned stock". GSA is responsible for record-keeping and replenishing prepositioned stock. If NSC cannot satisfy a requisition for items stored in its prepositioned stock, NSC will forward the requisition to the proper GSA regional office.

The principal medium for message flow between NSC and GSA Regional Office is AUTODIN. Messages (requisitions, status, etc.) are prepared in a JANAP 128 format for transmission. Message contents are prepared in standard MILSTRIP format.

At the Regional Office, the requisition is received by the Order Processing and Control Branch. This branch checks the requisition for the correct MILSTRIP format and address file as well as for the availability of the requested item within its supply depots. The requisition is then forwarded to the appropriate GSA supply depot.

INPUT

To GSA (Regional Office) from NSC (AUTODIN Terminal)

Message (JANAP 128 format)

OUTPUT

From GSA (Regional Office) to ship

Message (JANAP 128 format)

CRITERIA

Specified message type

Message header column instructions

Media and status code (on MILSTRIP Card - Column 7)

Supply source item availability

Applicable supply source

Activity Number	1.3.1
Function/Activity Group	Supply/Source
Activity Name	Naval Supply Center

DEFINITION

The Naval Supply Center (NSC) is a major military supply facility. This facility receives and satisfies requisitions from the Navy's Operating Forces.

ABSTRACT

The ship's supply personnel requisition supplies from the Naval Supply Center. Requisitions sent electronically enter at the NSC Communications Center where they are punched on cards, or recorded on magnetic tape, or printed as hard copy. The cards/tapes are manually carried to the NSC Computer Section. Requisitions requiring special handling are sent on hard copy to the NSC Custor Service Division (CSD) prior to entering the ADP facility. The ADP personnel keypunch these transactions onto cards for input to the NSC Computer. With the aid of the computer, the NSC information files are queried for availability of the requested items. If requested items are available, the requisition is satisfied from the local ship-assigned NSC. If requested items are not available, the local NSC forwards the requisition to an Inventory Control Point to be satisfied by another facility.

INPUT

To NSC from ship

via Communications Center

AUTODIN Terminal via NAVCOMMSTA (JANAP 128 Format)

via Customer Service Division

Mail (Format DD 1348m, DD 1348)

Telephone

Handcarry

OUTPUT

From NSC to ship

via Communications Center

AUTODIN Terminal via NAVCOMMSTA (JANAP 128 Format)

via Customer Service Division

Mail (Format DD 1348m, DD 1348)

Telephone

CRITERIA

Transaction type

Cognizance of item

Availability of item

Media and status code (on MILSTRIP Card - Column 7)

Acceptable time delay

Activity Number	1.3.2
Function/Activity Group	Supply/Source
Activity Name	DSA Depot

DEFINITION

A DSA Depot is a supply facility with the designated function of housing materials, maintaining inventory records, and satisfying requisitions for items within its cognizance.

ABSTRACT

There are four DSA activities which are classified as Defense Depots. They are Defense Depot, Mechanicsburg, PA.; Defense Depot, Memphis, TN.; Defense Depot, Ogden, UT.; and Defense Depot, Tracy, CA. In addition to these four depots, three Defense Supply Centers also serve as Depots. They are the Defense Construction Supply Center, Columbus, OH.; the Defense Electronics Supply Center, Dayton, OH.; and the Defense Supply Center, Richmond, VA.

The Depots, including the three co-located at supply centers, are charged with receipt, storage, and issuance of supplies as directed by the proper authorities. Distribution of DSA commodities is handled principally by the seven DSA-managed depots backed by two Navy-managed depots: The Naval Supply Center, Norfolk, VA.; and the Naval Supply Center, Oakland, CA.

"Six of the nine depots - Construction Supply, General Supply, and the four Defense Depots at Mechanicsburg, Memphis, Ogden, and Tracy are classed as Principal Distribution Depots. They stock a wide range of DSA commodities and each depot provides distribution support to all activities within a designated geographical area."[2]

Messages to and from the DSA depots and the Defense Supply Centers are prepared in MILSTRIP format and are forwarded via the AUTODIN system.

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2. Defense Supply Agency, "An Introduction to the DSA," 1974 (U)

When a requisition is satisfied, the depot sends two messages: A shipping report to the originator of the requisition (the ship) and a status report to its DSC.

INPUT

To DSA Depot from DSC

AUTODIN (JANAP 128 Format)

OUTPUT

From DSA Depot to DSC/Ship

AUTODIN (JANAP 128 Format)

CRITERIA

Specified message type

Availability of item

Acceptable time delay

Media and status code (on MILSTRIP Card - Column 7)

Activity Number	1.3.3
Function/Activity Group	Supply Source
Activity Name	GSA Depot

DEFINITION

A GSA Depot is a supply facility that warehouses GSA-cognizant items. This facility is directly responsible to the GSA Regional Office.

ABSTRACT

Requisitions originate from ships, NSC, non-military activites, etc., and are forwarded to a Regional Office. The Regional Office forwards the requisitions to the appropriate GSA depot for action. Each region has one or more depots. A depot receives requisitions for stock items within its cognizance. When a requisition is satisfied, the depot sends a confirmation of shipment report to its Regional Office. The Regional Office sends a status report, in MILSTRIP format, to DAAS.

From the MILSTRIP format, DAAS is able to determine the destination(s) of the message(s) and transmit them accordingly. All messages are transmitted via the AUTODIN system or by mail.

INPUT

To GSA Depot from Regional OFfice

AUTODIN (JANAP 128 Format)

OUTPUT

From GSA Depot to Regional Office

AUTODIN (JANAP 128 Format)

CRITERIA

Specified message type

Availability of item

Issue priority group

Media and status code (on MILSTRIP Card - Column 7)

Activity Number	2.1.1
Function/Activity Group	Maintenance/Requestor
Activity Name	Ship

DEFINITION

The ship is defined in this study as a destroyer or a frigate. Although the ship has many functions, its primary function is to maintain combat readiness. This function requires information transfer transactions between the ship and shore activities such as the Type Command and Intermediate Maintenance Activities (IMA)*.

ABSTRACT

Maintenance service may be required within any of the Ship's departments. Before maintenance service can be performed, the appropriate support documents must be available aboard the ship. Two basic types of documents are required: those related to corrective maintenance and those related to planned maintenance.

Corrective maintenance documents include completed actions, opening deferrals*, and closing deferrals*. Each corrective maintenance document from NAVSURFLANT ships is submitted on OPNAV Form 4790/2K to DPSCLANT via the Maintenance Document Control Office (MDCO). A completed action document represents work which was done by the ship's force. This work is considered historically significant and is sent to the Maintenance Support Office Department (MSOD), Mechanicsburg, Pennsylvania, where it is kept in the ship's history file. When a maintenance problem cannot be corrected by the ship's force, an OPNAV form 4790/2K (opening deferral) is prepared and submitted. An opening deferral document is a request for outside assistance. The internal handling of the document is a manual operation. The maintenance form is prepared by hand, approved by the Commanding Officer, and handcarried to the 3M* coordinator for review and mailing. If a ship has been assigned Tender Availability (TAV), the

* See Glossary (Appendix C)

forms are mailed to the IMA to which it is assigned. Opening deferrals are finally processed by an ADP facility and put on the ship's Current Ship Maintenance Project (CSMP) file. A copy (hard copy) of this file is mailed to the ship monthly. A closing deferral is a request for a job to be deleted from the ship's CSMP file.

Planned maintenance documents include PMS feedback reports (OPNAV 4790/7B) and reports of supply parts usage. Feedback reports are addressed to either the Type Commander (TYCOM) or a Naval Sea Support Center (NAVSEACEN). The type of problem determines the action addressee. Feedbacks addressed to the TYCOM are normally requests for technical changes or for clarification of existing planned maintenance documents and are designated Category B. Feedbacks addressed to NAVSEACEN are normally administrative-related requests, such as those for missing documents, and are designated Category A. Planned maintenance support documents include the OPNAVINST 4790.4 series which has the List of Effective Pages (LOEP), the Maintenance Index Page (MIP), and the Maintenance Requirement Cards (MRC). MIP gives a general, but short, explanation of the maintenance procedures to be performed on a given piece of hardware. LOEP is an indexed listing of MIPs. MRC cards give detailed descriptions of planned maintenance procedures for specific equipment.

The internal shipboard handling of the feedback reports is a manual operation. The 3M Coordinator reviews and mails the reports, as required.

Replies to feedback reports from NAVSEACEN (administrative) and TYCOM (technical) are received by the ship. The TYCOM normally replies on hard copy in narrative form. NAVSEACEN's replies are on hard copy on the OPNAV Forms 4790/1 and 3.

INPUT

From DPSCLANT or IMA to ship (via MDCO)

CSMP Reply to PMS feedback reports (hard copy - narrative form)

From NAVSEACEN to ship

MIP and MRC (OPNAV Forms 4790-1 and 3)

OUTPUT

From ship (via MDCO) to DPSCLANT or IMA

Completed Actions (OPNAV Form 4790/2K)

Opening deferrals (OPNAV Form 4790/2K)

Closing deferrals (OPNAV Form 4790/2K)

From ship to NAVSEACEN

PMS Feedback Reports (OPNAV Form 4790/7B)

From ship to TYCOM

PMS Feedback Reports (OPNAV Form 4790/7B)

CRITERIA

Type* of maintenance requested

Completed standard form, as required

Status of maintenance

Type of documentary problem (Feedback report, Category A or B)

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* IMA, depot, etc.

Activity Number	2.2.1
Function/Activity Group	Maintenance/Manager
Activity Name	Type Command

DEFINITION

A Type Command is an administrative subdivision of a fleet into ships of one or more designated types. NAVSURFLANT is an example of a Type Command. NAVSURFLANT's ships included Cruisers, Destroyers, Frigates, Support Ships, and Amphibious Ships which are assigned to the Atlantic.

ABSTRACT

NAVSURFLANT's ships personnel are responsible for preparing and submitting corrective maintenance (completed and deferral actions), planned maintenance (PMS feedback reports), and CASREPT documents, as required.

Completed and deferral actions (OPNAV 4790/2K) from NAVSURFLANT ships are mailed to DPSCLANT via the NAVSURFLANT MDCO. However, when the Type Commander (TYCOM) assigns Tender Availability (TAV) to a ship, the ship mails the OPNAV 4790/2K forms to the Intermediate Maintenance Activity (IMA) to which it is assigned. The deferral actions are put on the ships Current Ship Maintenance Project (CSMP) file by an ADP facility (DPSCLANT or IMA). The ADP facility mails a copy of the ship's CSMP file to NAVSURFLANT, as required. The TYCOM manually screens the ship's CSMP file for jobs which the ship has determined to be beyond IMA capability (Type 1). Deferrals for Type 1 (beyond IMA capability) work are normally satisfied by commercial contractors or during ship overhaul. Rejected deferrals (Type 1) remain in the ship's CMSP file until they are downgraded to Type 2 (IMA level) and satisfied or deleted.

NAVSURFLANT receives planned maintenance subsystem (PMS) documents from both the NAVSEACEN and the ship. The documents from NAVSEACEN are used to establish and maintain a master PMS Library. Documents from the ship are Feedback Reports (OPNAV Form 4790/7B - Categories A and B). Category A reports describe problems which are related to maintenance procedures for existing equipments and are not normally sent to the TYCOM.

Category B reports, which are sent to the TYCOM, describe technical problems or are requests for TYCOM assistance.

NAVSURFLANT receives CASREPTs also from the ship for action or information. The ship's physical condition/operational situation, location, and nature of the CASREPT determine the action adressees. CASREPTs are sent via the AUTODIN system and are formatted in accordance with the NWIP 10-1(E) specifications.

INPUT

To NAVSURFLANT from ship

PMS feedback reports (OPNAV 4790/7B, Category B)

CASREPT formatted in accordance with NWIP 10-1(E)

To NAVSURFLANT from ADP Facility

CSMP as requested (hard copy)

OUTPUT

From NAVSURFLANT to ship

Clarification of PMS instructions (narrative)

Rejected PMS feedback reports (OPNAV 4790/7B)

CRITERIA

Work beyond ship's force capability

Completed form (4790/7B) for decision making

Ship's mission assignment

Activity Number	2.2.2
Function/Activity Group	Maintenance/Manager
Activity Name	Readiness Support Group

DEFINITION

A Readiness Support Group (RSG) is a Naval activity representing the TYCOM within a local area. The principal function of the RSG is to balance the work load among the IMAs. Another function of the RSG is to screen certain maintenance opening deferral actions (emergent and urgent work requests) to determine if and when a job assignment is warranted.

ABSTRACT

Opening deferrals from ships with TAV in effect (after arrival conference) are called emergent. Once a ship's TAV is in effect, its opening deferrals are forwarded to the RSG. Opening deferrals from the ships without TAV and whose captains consider repairs urgent are also sent to the RSG. Within the RSG, the deferrals are screened to determine whether the requested repairs are essential to the ship's mission and to assign them to facilities which are capable and available for satisfying the jobs. RSG may send IMA type jobs to a tender or a Fleet Maintenance Assistance Group. If the selected IMA cannot do the repair, the deferral is directed to another IMA. The Type Command provides RSG with the necessary operational instructions for support in decision making. These instructions include the NAVSURFLANTINST 9000.1 and OPNAV 4790.4 series.

INPUT

From ship to RSG

Opening deferrals (OPNAV 4790/2K)

From NAVSURFLANT to RSG

Operational instructions (NAVSURFLANTINST 9000.1 and OPNAV 4790.4 series)

OUTPUT

From RSG to IMA

Work request/deferrals (OPNAV 4790/2K)

CRITERIA

Job within IMA capabilities and availability

Job urgency (pertinent to ship's mission)

NAVSURFLANT guidelines (instruction 9000.1)

Activity Number	2.3.1
Function/Activity Group	Maintenance/Source
Activity Name	Fleet Maintenance Assistance Group

DEFINITION

A Fleet Maintenance Assistance Group (FMAG) is an ashore ship repair activity which performs intermediate maintenance service (repairs which exceed the capability of the ship's resources but do not require industrial (shipyard) facilities). There are several of these repair activities located both in CONUS and overseas. One is located in Norfolk, Virginia.

ABSTRACT

Prior to Intermediate Maintenance Activity (IMA) service, a ship must be assigned Tender Availability (TAV) by the Type Commander. TAV is a specific period of time during which a ship is scheduled for repairs by an IMA. At the beginning of the quarter (fiscal year), preceding the one in which the ship is scheduled for IMA service, its CSMP file is transferred from the ADP monitoring facility to the assigned IMA. CSMP files are generated by a computer aboard a tender or at an ashore facility. FMAG keeps CSMP files for ships which are scheduled for TAV within 60 days. CSMP files for ships without TAV are kept at the NAVSURFLANT automatic data processing (ADP) facility (DPSCLANT).

A ship with scheduled TAV forwards its maintenance action documents (Form OPNAV 4790/2K) to the Maintenance Document Control Office (MDCO) within the IMA. These documents are handcarried or mailed, if the ship is in port, or mailed if the ship is at sea.

The MDCO Officer screens the documents for completeness and accuracy, then sorts them into two basic categories: closing or opening deferrals. A closing deferral states that a job has been satisfied. The closing deferrals are sent to the computer facility and the jobs they represent are deleted from the ship's CSMP file. An opening deferral is a request for maintenance service beyond the ship's capability or for service within

the ship's capability but which the ship's resources cannot implement for some reason.

Opening deferrals are placed in three principal types: Types 1, 2, and 4. The nature/complexity of the job determines the type to which it belongs. Type 1 is a depot/shipyard level job. Type 2 is an IMA level job. Type 4 is a ship's force level job which the ship's force cannot satisfy within 30 days. Deferrals of types 1 and 4 are forwarded to the Data Processing (computer facility) Department. Within this department, the deferrals are keypunched and put on the ship's CSMP file.

Type 2 jobs are transferred from MDCO to the Repair Officer (TYCOM representative) for screening. The TYCOM Representative will return them to MDCO after review. The MDCO will forward deferrals to be handled by the IMA to the Analysis, Records, and Reporting Section (ARRS). All others are sent to an ADP facility to update the ship's CSMP file. The ARRS serves as a point of contact among the repair groups, the ADP facility, and the MDCO. The deferrals which relate to the jobs that are accepted by the Repair Officer are sent to the Planning and Estimating (P&E) Department. Deferrals describing jobs that are rejected by the Repair Officer due to lack of facilities, etc., are completed and routed to the P&E Department, if required, and returned to the local MDCO.

Within the P&E Department, the jobs are planned and estimated for the ship's on-coming TAV. The plans and estimates are based on such factors as time required to do the job, materials needed, personnel required, cost, etc. Deferrals which have been processed by P&E are returned to the ARRS. The ARRS sends the deferrals to the Data Processing Department to be put on the ship's CSMP file. The IMA's MDCO sends the rejected deferrals to the TYCOM Representative who sends them to the ADP facility to be put on the ship's CSMP file. The TYCOM Representative will either seek another IMA or depot to handle the rejects or let the rejection stand.

Each IMA sends a weekly transaction tape to DPSCLANT. This tape provides DPSCLANT with input for updating its master file. Each IMA also mails to each ship within its cognizance monthly copies of its CSMP file.

INPUT

To FMAG from ship

Deferral Actions Document (OPNAV 4790/2K)

TAV Message (narrative)

OUTPUT

From FMAG to ship

TAV Response Message (narrative)

Copy of CSMP file (computer printout)

From FMAG to DPSCLANT

Magnetic Transaction tape (CSMP update)

CRITERIA

Type of action requested

Available facilities within FMAG

Activity Number	2.3.2
Function/Activity Group	Maintenance/Source
Activity Name	Tender

DEFINITION

A tender is a ship that services and supplies warships. The type of tender concerned in this study provides intermediate level maintenance service to destroyers and frigates. Due to limited space and repair resources aboard, a tender may not be able to provide full services to all ships as its ashore counterpart, FMAG, can. A tender always works in port but since it is mobile, it can move from port to port, as required.

Destroyer Tenders (ADs) are divided into four classes which include a total of eleven ships presently operating in the Navy. These tenders have automatic data processing capabilities for maintenance actions.

ABSTRACT

Destroyers/Frigates with TAV and scheduled for intermediate maintenance services by a tender follow the same procedures as those requesting service from FMAG. Within the tender, processing of maintenance information is similar to processing in FMAG. The distinct advantage a tender has over FMAG is its mobility.

INPUT

Same as FMAG

OUTPUT

Same as FMAG

CRITERIA

Available space on board
Available types and amounts of resources
Available repair parts (amounts and types)
IMA type repair
Work load
Repair schedule

Activity Number	2.3.3
Function/Activity Group	Maintenance/Source
Activity Name	Maintenance Support Office Department

DEFINITION

The Maintenance Support Office Department (MSOD) is a component of the Fleet Material Support Office (FMSO) located in Mechanicsburg, Pennsylvania. MSOD is the central depository for all 3M data. This department generates and supplies maintenace reports to 3M managers, as required, and also designs, develops, and installs systems of integrated computer programs for maintaining master files of 3M data.

ABSTRACT

The Atlantic Fleet Data Processing Service Center, Norfolk, Virginia converts 3M source documents into machine sensible form (magnetic tape) for periodic transmission to MSOD. At MSOD the tape is catalogued for use by MSOD personnel. From these tapes and other related data, MSOD publishes reports, as required, for managers at various levels and interests. These reports are on microfilm, magnetic tape, or hard copy.

INPUT

To MSOD from DPSCLANT

Computer tape (mechanized deferral actions)

OUTPUT

From MSOD to maintenance managers

Report (microfilm, magnetic tape, hard copy)

CRITERIA

3M documents

Input in machine sensible form

Activity Number	2.3.4
Function/Activity Group	Maintenance/Source
Activity Name	Naval Sea Support Centers

DEFINITION

Naval Sea Support Centers (NAVSEACENs) are field activities of the Naval Ship Systems Command. There are two such offices: NAVSEACENLANT located in Norfolk, Virginia; NAVSEACENPAC located in San Diego, California. These offices have the following functions:

> "Maintain and operate a planned maintenance sub-system (PMS) library which
>
> 1. Provides software for all PMS Installations and hardware for new construction and major conversion ships.
> 2. Provides stock of appropriate PMS software (schedules excepted) for shipboard replacement requirements.
>
> Peform PMS feedback screening and take appropriate action. Maintain liaison with Type Commanders (TYCOMs) and assist with shipboard PMS installation and equipment verifications as requested by them.
>
> Provide TYCOMs with documentation necessary to establish and maintain a master PMS library.
>
> Provide ships with documentation necessary to establish and maintain PMS."[3]

ABSTRACT

PMS feedback reports (OPNAV Form 4790/7B), sent directly to NAVSEACEN, request missing documentation for performing planned maintenace on hardware. These documents provide the planned maintenance requirements for given types of hardware. The documents are on OPNAV Form 4700-3 (Maintenance Index Pages (MIP)) and OPNAV Form 4700-1 (Maintenance Re-

3. OPNAVINST 4790.4 "Ships' 3M Manual", Vol. 1, 1 June 1973.

quirement Cards (MRC)). Form 4700-3 includes system or component name, reference publications, date, confirmation, MRC control number, maintenance requirement, periodicity code, skill level, man-hours, safety precautions, tools and parts, and procedures. Changes affecting maintenance procedures are also noted by the coverage. Form 4700-1 includes (in addition to those entries stated on form 4700-3) MRC code, system, related maintenance, and location but excludes the periodicity code, reference publications, and confirmation.

PMS feedback reports containing adjustments in technical information (such as changes in maintenance procedures) are normally initiated by the ship's personnel and sent to TYCOM for approval. If the report is rejected, the request is returned to the ship. If the report is approved, the TYCOM sends it to the appropriate ship system command where its feasibility and practical application are evaluated by a team of technical specialists.

Feedback reports are screened and satisfied manually within NAVSEACEN where a library of information is maintained. In addition to sending MIPs and MRCs to ships, NAVSEACEN provides the Type Commanders with documentation necessary to establish and maintain a master PMS library.

INPUT

To NAVSEACEN from ship

PMS feedback reports (OPNAV Form 4790/7B)

OUTPUT

From NAVSEACEN to ship

Maintenance Requirement Cards (OPNAV 4700-1)

Maintenance Index Pages (OPNAV 4700-3)

CRITERIA

Completed PMS Feedback Reports

Required documentation

Activity Number	2.3.5
Function/Activity Group	Maintenance/Source
Activity Name	Atlantic Fleet Data Processing Service Center

DEFINITION

The Atlantic Fleet Data Processing Service Center (DPSCLANT) is a Navy data processing facility located within the Naval Air Station, Norfolk, Virginia. Maintenance data from the Atlantic Fleet, as well as other types of data, are processed within the facility. The Navy has three facilities of this type. The other two facilities (DPSCPAC) are located in San Diego and Pearl Harbor.

ABSTRACT

Maintenance forms (OPNAV 4790/2K), completed maintenance actions on selected equipment, and deferrals on all equipment are received from the ships via a Maintenance Document Control Office (MDCO) for DPSCLANT processing.

There are several MDCO's (NAVSURFLANT and IMAs). The function of MDCO is to screen completed and deferral maintenance actions (OPNAV 4790/2K) from NAVSURFLANT ships for accuracy and completeness. Ships without Tender Availability (TAV) send their corrective maintenance documents to the NAVSURFLANT MDCO located in Norfolk, Virginia. Ships with scheduled TAV send their corrective maintenance documents to the assigned IMA.

The MDCO not only screens for accuracy and completeness, but makes corrections to OPNAV 4790/2K forms whenever necessary. It is the clearing house through which the OPNAV 4790/2K passes prior to entering the ADP facility (DPSCLANT or tender). The operation is a manual process.

Within each IMA there is a local MDCO. The screening process within the IMA MDCO is basically the same as that of NAVSURFLANT MDCO.

When the forms meet the MDCO requirements, they are sent to an ADP facility (DPSCLANT or IMA) where the ship's CSMP file is updated. Once a month the ADP facility sends a copy of the CSMP file to the appropriate MDCO for ship distribution.

The OPNAV 4790/2K forms enter DPSCLANT at Production Control The Production Control personnel make records of the incoming maintenance action forms and send them to the Keypunch Division. Within this division, the information from the forms is keypunched on cards for computer input. The keypunched cards are sent to Production Control. Production Control sends the cards, along with processing instructions, to the Computer Center for processing. This center processes the information in accordance with the given instructions and generates output which is sent to Production Control. Within DPSCLANT, a cumulative opening deferral file is maintained for each ship. This file is the Current Ship Maintenance Project (CSMP) file. When new deferrals enter the computer, it updates the CSMP file. The computer generates both a tape (opening deferrals and comleted actions) and hard copy of each ship's CSMP file. Production Control forwards (monthly) these reports (hard copy) to MDCO for final distribution to each ship.

The tape is forwarded by mail to the Maintenance Support Office Department (MSOD), Mechanicsburg, Pennsylvania to be put in the 3M Central Depository. A master file is maintained within the DPSCLANT facility. The intermediate maintenance activities send weekly transaction tapes to DPSCLANT. These tapes provide input from ships with tender availability to the DPSCLANT master file.

INPUT

To DPSCLANT from ship via NAVSURFLANT MDCO

Deferrals (Opening and Closing - Form OPNAV 4790/2K)

Completed actions (form OPNAV 4790/2K)

To DPSCLANT from Intermediate Maintenance Activities

Weekly transactions (magnetic tape)

OUTPUT

From DPSCLANT to ship via NAVSURFLANT MDCO

CSMP reports (hard copy)

From DPSCLANT to MSOD

Magnetic tape (opening deferrals, closing deferrals, completed actions)

CRITERIA

Maintenance documents (OPNAV Form 4790/2K)

ADP capability

Activity Number	3.1.1
Function/Activity Group	Administrator/Requestor
Activity Name	Ship

DEFINITION

The administrative functions of the ship are normally divided into two principal categories: personnel and disbursing. the administrative staff is responsible for various transfer transactions between the ship and many ashore activities. This study considers only those ashore activities which receive a significant number of ship's administrative transactions. These activities are the Bureau of Naval Personnel (BUPERS), the Enlisted Personnel Management Center (EPMAC), the Navy Finance Center (NFC), and the Type Command (NAVSURFLANT).

ABSTRACT

The administrative staff is responsible for transactions related to personnel service records, pay and leave status, and other personnel related actions.

When a member of the ship's crew requests, or when a situation merits, an administrative transaction, the appropriate staff member records the action on the applicable form. Several Naval instructions are used for guidelines. The action is first approved by a subordinate to the Commanding Officer (CO) and then by the CO. However, some actions do not require approval by a CO's subordinate prior to going to the CO for approval.

Incoming transactions, formatted in accordance with Naval guidelines, enter the ship at the Communications Division. The transactions are taken to the CO for action or information.

Emergency transactions are always sent or received by radio when the ship is at sea. When the ship is in port and its communications guard is assumed by another activity, an emergency transaction is hand-carried to/from that activity and the ship. Otherwise, the transactions are made by radio.

INPUT

To ship from ashore activities

Reply to personnel-related requests

Routine correspondence (pay documents, leave status reports, etc.)

Navy instructions and manuals

OUTPUT

From ship to ashore activities

Action requests (NAVPERS 1306)

Routine correspondence (EDVR 1080-14, NAVCOMPT 3055/56, 1219)

Emergencies as required

CRITERION

Naval guidelines (COMNAVSURFLANTINST 1320.1, INCCLANTFLTINST 1080-2B and 5400.2D, NAVPERS 15791B)

Activity Number	3.2.1
Function/Activity Group	Administrative/Manager
Activity Name	Type Command

DEFINITION

A Type Command is an administrative subdivision of a fleet by ships of the same type, e.g., NAVSURFLANT which includes cruisers, destroyers, frigates, support ships, and amphibious ships. NAVSURFLANT sends various types of administrative documents to destroyers and frigates for guidelines. Destroyers and frigates send personnel-related documents to NAVSURFLANT for approval or information.

ABSTRACT

Most administrative transactions between ships (destroyers and frigates) and NAVSURFLANT concern personnel training which requires funding and temporary duty assignments. These transactions may be made via telephone (when ship is in port), message (AUTODIN), or mail. All training transactions destined for NAVSURFLANT are directed to its School Quota Control (SQC) Department.

Other administrative documents in various formats include routine correspondence, recurring reports, requests for personnel manning assistance, personnel manning information, instructions, and manuals. The documents received (mail or message) by NAVSURFLANT are directed by its mail division to the appropriate department for action or information.

Training transactions from the ships via telephone are for information only. Training transactions (request for schooling) from the ships, whether they are sent via mail or message, are processed in the same way. These transactions are formatted in accordance with NAVSURFLANTINST 1320. Within SQC, a request is evaluated to determine whether the training is required and the requestor qualified. If the request is rejected, the requestor is notified by mail. If the request is approved, SQC arranges for seating in the appropriate class, provides funding, and replies to the requestor by mail or message.

INPUT

To NAVSURFLANT from ship

Hard copy (action or information - various formats)

Message, including emergencies, as required (action - various formats)

Telephone (information only)

OUTPUT

From NAVSURFLANT to ship

Hard copy (reply to request - narrative)

Message (reply to request - narrative)

CRITERIA

Training applicability to job assignment

Available funds

Available space for trainee in appropriate class

Activity Number	3.2.2
Function/Activity Group	Administrative/Manager
Activity Name	Bureau of Naval Personnel

DEFINITION

The Bureau of Naval Personnel (BUPERS), located in Washington, D.C., is responsible for several Navy personnel functions including maintaining records of service; planning and providing for procurement and distribution of personnel and for career motivation; maintaining military manpower; providing administrative guidance for discipline, promotions, advancements, and separations; and discharging other responsibilities which may be assigned by the Chief of Naval Operations (CNO).

ABSTRACT

The BUPER's mail division is the central office through which information transactions flow. Within the mail division, the transactions are screened for content and forwarded to the appropriate PERS code for action. Within the appropriate codes, the transactions are satisfied, as required, for both officers and enlisted personnel. BUPERS, using Chief of Naval Personnel/CNO guidelines, makes decisions, endorses and retrieves information, and updates records that pertain to received transactions. Numerous transaction formats and narratives are acceptable to BUPERS. Replies to the transactions, including endorsements as required, are mailed to the ships or to field offices for further action. BUPERS instructions are also forwarded to the ship for personnel-related guidance.

INPUT

To BUPERS from ship

Hard copy (requests for action - various formats)

Message (urgent requests for action - narrative)

To BUPERS from field office

Hard copy (endorsed action requests - including Form NAVPERS 1306)

OUTPUT

From BUPERS to ship

Hard copy (reply to received information transaction - formatted in accordance with the nature of transactions)

Message (urgent - narrative)

CRITERIA

CNO guidelines

Chief of Naval Personnel guidelines (NAVPERS 151791B, NAVPERS 15909, etc.)

Activity Number	3.3.1
Function/Activity Group	Administrative/Source
Activity Name	Enlisted Personnel Management Center

DEFINITION

The Enlisted Personnel Management Center (EPMAC), located in New Orleans, Louisiana, provides centralized management support for distribution of active duty enlisted personnel in accordance with overall personnel management policies established by the Chief of Naval Personnel (CNP) and the Manning Control Authorities (MCA). EPMAC is the MCA agency for CNP, CINCLANTFLT, and CINCPACFLT. Information transfer between EPMAC and its higher echelon is required.

ABSTRACT

The principal ship-related input to EPMAC includes (1) requests for personnel actions (cancellations, extensions, modifications, etc.) on Form NAVPERS 1306, (2) diaries for active duty personnel on Form NAVPERS 1070/75 (effective 1 January 76) as a result of the merger of Personnel Management Information Center (PERMIC) with EPMAC. Unplanned personnel loss reports are also addressed to EPMAC for action. These reports are classified as emergency items and are always sent as a message.

All information to or from EPMAC is relayed by its Mail and Files Division. This division distributes incoming information to the appropriate EPMAC code for action. Outgoing information is put into regular mail or message service medium, as required. Within the appropriate EPMAC code, the requests are screened for content, endorsed or rejected, and fowarded to BUPERS for further action. A copy of the EPMAC action is mailed to the ship. The diaries are recorded in the EPMAC data bank.

EPMAC also advises CNP, NAVSURFLANT, CINCLANTFLT, and CINCPACFLT or matters concerning enlisted personnel manning and submits recommendations to them concerning policy, plans, procedures, and actions with respect to such matters.

INPUT

To EPMAC from ship

Hard copy (request for action - Form NAVPERS 1306)

Message, including emergencies as required (requests for action - narrative)

Ship diaries (NAVPERS 1070/75)

OUTPUT

From EPMAC to ship

Hard copy (reply to request - narrative)

Enlisted personnel manning status report

From EPMAC to BUPERS

Hard copy (NAVPERS 1306 form plus endorsement and all EDVR* 1080-14)

From EPMAC TO CNP, CINCLANTFLT, CINCPACFLT, and NAVSURFLANT

Enlisted personnel manning status report

CRITERIA

Chief of Naval personnel guidelines

CINCLANTFLT guidelines

CINCPACFLT guidelines

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* Enlisted Distribution Verification Report - see glossary

Activity Number	3.3.2
Function/Activity Group	Administrative/Source
Activity Name	Navy Finance Center

DEFINITION

The Navy Finance Center (NFC), located in Cleveland, Ohio, provides financial services for military members (active, retired, and reserve) located around the world. NFC is under the direction of the Navy comptroller.

Included in this Center's functions are the payment of the allotments a Navy man authorizes to his dependents, and the processing of paychecks to members on the Retired and Fleet Reserve rolls. In addition, the Navy Finance Center (Cleveland) makes monthly payments to Naval Reservists for attending drills; issues special pay and travel requests to area military personnel and transient servicemen from all branches of the Armed Forces; provides medical care for qualified military personnel and their dependents, retired members, and certain civilian federal employees; and examines and audits the financial records for every ship in the Fleet.

ABSTRACT

Transactions enter NFC via the mail room. The mail room personnel send the transactions to the appropriate code or department. The principal ship input to NFC is via Forms NAVCOMPT 3055, 3056, and 1219.

NAVCOMPT 3055 is a special payment report form. This form may be used when paying an individual or a group. The form is to be completed at the end of the day in which the payment is made. The form includes such items as name of payee, amount, where paid, officer or enlisted man, etc. The ship's Disbursing Officer is responsible for preparing and forwarding this and all other such forms to NFC.

NAVCOMPT 3056 is a regular military payment document form. This report identifies each man by name, social security number, amount, when and where paid, etc. The Disbursing Officer prepares and mails this form at the end of each regular payday.

NAVCOMPT 1219 is a summary report form. This report summarizes all transactions within a calendar month and is due at NFC on the 15th of the following month.

At NFC, reports are screened for opening and closing balances. Reports from afloat activities are consolidated and put on a magnetic tape for further distribution as required.

The three principal documents sent to the ship by NFC Cleveland are Leave and Earning Statement, Commanding Officer's Leave List, and a Computer Evaluation report. The Leave and Earning Statement, Form DD 1624, gives a status profile of each individual aboard ship. The Commanding Officer's Leave List is a computer printout which gives leave status of both officers and enlisted personnel aboard his ship. The Computer Evaluation report is a monthly summary of all ship-received reports (such as Optical Character Recognition) that are accepted or rejected by the NFC computer.

INPUT

To NFC from ship

Special Payment Report (Form NAVCOMPT 3055)
Military Payment Document (Form NAVCOMPT 3056)
Transactions Summary Report (Form NAVCOMPT 1219)

OUTPUT

From NFC to ship

Leave and Earnings Statement (Form DD 1624)
Commanding Officer's Leave List (computer printout)
Computer Evaluation Report (hard copy)

CRITERION

Navy Comptroller guidelines (NAVCOMPT Vol. 3 and 4)

2.3 EQUIPMENT ANALYSIS AND COMPARISONS

Equipment considered for comparison includes all the information preparation hardware used intra-ship by the supply, maintenance, and administrative personnel. The use of this equipment is the same whether the ship is in port or at sea.

Since the applications of shipboard communications equipment are the same whether transferring supply, maintenance, or administrative information, communications equipment comparison will not be made.

2.3.1 Assumptions

The following assumptions were made in the analysis:

Equipment used for information preparation aboard any frigate or destroyer will be similar within each particular function (supply, maintenance, or administrative).

Intra-ship information preparation procedures aboard all frigates and all destroyers are similar.

2.3.2 Equipment Description and Comparison

Table 6 describes and compares the equipment used for preparing supply, maintenance, and administrative information documents. The following parameters were used in comparing equipment:

Item
Function
Type Operation
Input
Output

Within the administrative column of Table 6, all like numbered entries are correlated with the listed parameters.

TABLE 6 – EQUIPMENT DESCRIPTION AND COMPARISON

	SUPPLY	MAINTENANCE	ADMINISTRATIVE
ITEM	Typewriter	Pencil	1. IBM Selectric Typewriter 2. Computer - Typewriter 3. Copying Machine
FUNCTION	Prepare document	Prepare document	1. Prepare document 2. Prepare documents 3. Duplicate documents
TYPE OPERATION	Manual	Manual	1. Manual 2. Manual/Automatic 3. Automatic
INPUT	Blank form/paper	Blank form	1. Blank forms/paper 2. Blank forms/paper 3. One document (hard copy)
OUTPUT	Completed forms (hard copy)	Completed form	1. Completed form or document (hard copy) 2. Completed form (hard copy) 3. Several documents (hard copy)

2.4 INFORMATION REQUIREMENTS, DESCRIPTIONS, AND COMPARISONS

2.4.1 Assumptions

The following assumptions were made in the adjustment and consolidation of the acquired data:

The distribution of destroyers and frigates under the command of CINCLANTFLT is

IN PORT

Number of Ships
Assigned to Naval Supply Centers

IN PORT	NORFOLK	CHARLESTON	MAYPORT
Reporting to assigned port but physically located at "other ports"	17	4	-
Physically located at assigned port	23	11	10

AT SEA

Number of Ships
Assigned to Overseas Operations

2nd Fleet	6th Fleet
15	30

Casualty Report (CASREPT) transmissions (at sea) include messages sent out concurrently to
- Operational Control Officer (OPCON)
- COMNAVSURFLANT Headquarters, Norfolk (in narrative) with multi-information addresses.

Facilities which are originators and/or destinations for ship Administrative/Maintenance information transactions (other than the major CONUS ashore activities) are identified as Other Activities (within CONUS).

Emergency types of administrative and maintenance transmissions occur under limited EMCON* (considered in this analysis). Total EMCON would usually require a complete shutdown in radio signal operations.

Administrative and Maintenance transaction data acquired during visits arranged by NAVSURFLANT (Code N12) to the DD-818, DDG-23, and the FF-1068 are considered representative of destroyers and frigates.

The adjusted information requirements represent those of destroyers/frigates (in the Atlantic) at the present time.

The acquired data were stated in terms of monthly or weekly amounts. The data were adjusted to a common daily basis and fitted to the scenarios described in Section 2.4.2, using the following procedures:

- The average number of transactions per day was arithmetically determined for each means of transfer for each ship per destination.
- The peak number of transactions per day per ship was estimated by doubling the average daily value per destination and rounding up to the nearest integer (never less than 1 per ship). The results were summed to give the peak value for all the noted destinations (per originator).

These assumptions are of the same type as, and comparable to, those made in the Phase 1 study.

2.4.2 Scenario Application and Data Analysis

The analysis of the information requirements generated transaction volume for several adminstrative/maintenance network configurations.

The information in these transactions initiated events that set in motion the overall administrative/maintenance functions. The volume, frequency, and other characteristics of these inputs influenced the level of activity within the administrative information flow system.

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* See glossary

For study purposes, two baseline applications were considered: one in port and one at sea. Types of information schedules were varied. Descriptors used in the ship-related information flow were user location and identity.

The supply scenarios were categorized as follows:

IN PORT

Non-Restricted, Independent, Non-Scheduled, IPG (Issue Priority Group) II

Non-Restricted, Independent, Deploying*, IPG II,III

AT SEA

Non-Restricted, Independent, Non-Scheduled, IPG II,III

Non-Restricted, Independent, Emergency, IPG I,II

Non-Restricted, Group, Scheduled, IPG III

Non-Restricted, Group, Non-Scheduled, IPG III

Non-Restricted, Group, Emergency, IPG I,II

Restricted, Group, Emergency, IPG II

Restricted, Group, Non-Scheduled, IPG II

Restricted, Group, Emergency, IPG I,II

The maintenance and administrative scenarios considered are as follows:

IN PORT - INDEPENDENT

Scheduled	Non-Scheduled	Emergency

AT SEA - INDEPENDENT

Scheduled	Non-Scheduled	Emergency

A ship is considered to be at sea when it is physically underway and cannot transmit information directly to CONUS activities. A ship

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* A special replenishment situation reflecting a need for a shorter processing time.

is considered to be in a restricted situation when it is operating under a limited EMCON (Emission Control) condition. However, the Scheduled, Non-Scheduled, and Emergency descriptors used in describing the maintenance, administrative, and supply information flows have different connotations. When used with the maintenance/administrative function, they describe the type of schedule that is followed in transferring various transactions. That is, if a transaction is sent periodically or during a specified time interval each month, it is considered scheduled. When transactions are initiated and transferred as required, they are considered non-scheduled. When the descriptors are applied to the supply function, they refer to the type of replenishment to be implemented by the action of these transactions. Consequently, the only meaningful comparison that can be made is between the incoming or outoing information requirement levels (amounts and percent) and totals from either the individual ship or area point of view.

2.4.3 Data Consolidation

The data were acquired in terms of monthly or weekly amounts. The data were adjusted to a common daily basis to fit the six maintenance and administrative scenarios by the following procedures:

- The average number of transactions per day was arithmetically determined for each means of transfer for each ship for each destination.
- The peak number of transactions per day was estimated by doubling the average daily value per destination and rounding up to the nearest integer (never less than 1 per ship). The results were summed to give the peak value for all destinations (per originator).
- Each originator-to-destination (all activities) average transaction length was determined by multiplying the transaction length to each activity destination by the number of transactions that it received, summing the results (all activities), and dividing by the total number of transactions.

The consolidated results, representing the maintenance and administrative information requirements per ship, are indicated in Tables 7 through 10. Tables 11 through 27 present these consolidations in several relevant ways as discussed in the text.

The consolidated data were adjusted to represent the information that must flow within the administrative and maintenance networks. These adjustments were made for current individual ship and area transactions. The parameters considered for each scenario were:

- Means of information transfer
- Direction of information flow between transaction originators and destinations
- Peak number of transactions per day
- Average transaction lengths

Ship information requirements were developed from two points of view: first, that of the individual ship in terms of administrative and maintenance information sent or received by various means of transfer; and second, that of ships in an area. The area determination described the information requirements of all ships assumed to originate or receive transactions within a designated area. This study included the numbers of ships, on the average, assigned to Norfolk (CONUS) port activities and the 2nd Fleet. The ship distributions were those described in Section 2.4.1 - Assumptions.

Adjustments were made, in developing the peak number of transactions per day, for area information requirements under the following conditions:

Random Use - When concurrent use of a transfer means by a number of ships was to be determined, it was assumed that:

- The transaction rates for all ships were the same.
- The peak number of daily transactions per ship was double the average number of daily transactions per destination and was rounded up to the nearest integer. The results were then summed to give the peak value for all the noted destinations (per originator).
- The distribution of the number of transactions per day can be represented by a Normal (Gaussian) distribution.

TABLE 7 – ADMINISTRATIVE FUNCTION CONSOLIDATED DATA - IN PORT

SCHEDULED

FROM	TO	MEANS OF TRANSFER	MEDIUM	FORMAT	DAILY TRANSACTIONS		AVERAGE TRANSACTION LENGTH (WORDS)*
					AVERAGE SUM	PEAK SUM	
SHIP	EPMAC, OTHER ACTIVITIES	M	HC	NAVPERS 1070/75, MULTI-FORMATS	1.6	3	260
OTHER ACTIVITIES	SHIP	M	HC	MULTI-FORMATS	.1	1	250
SHIP	OTHER ACTIVITIES	R**	MESSAGE	NARR	.2	1	75
OTHER ACTIVITIES	SHIP	R	MESSAGE	NARR	.2	1	75

LEGEND: H = Handcarry, HC = Hard Copy, M = Mail, T = Telephone, R = Radio, NARR = Narrative

*Assumed to be five characters per word

**In Port, radio (R) transactions are equivalent to those made via SBMSS/AUTODIN

TABLE 7 – Continued

EMERGENCY

FROM	TO	MEANS OF TRANSFER	MEDIUM	FORMAT	DAILY TRANSACTIONS		AVERAGE TRANSACTION LENGTH
					AVERAGE SUM	PEAK SUM	
SHIP	TYCOM, OPCON*	R	MESSAGE	NARR	.3	1	200
TYCOM, OPCON	SHIP	R	MESSAGE	NARR	.3	1	200

NON SCHEDULED

SHIP	BUPERS, TYCOM, EPMAC, NFC, OTHER ACTIVITIES	M	HC	MULTI-FORMATS	2.5	6	120
BUPERS, EPMAC, TYCOM, NFC, OTHER ACTIVITIES, NPPS**	SHIP	M	HC	MULTI-FORMATS	2.4	6	135

*Operational Commander
**Naval Publishing & Printing Service

TABLE 7 – Continued

NON SCHEDULED

FROM	TO	MEANS OF TRANSFER	MEDIUM	FORMAT	DAILY TRANSACTIONS		AVERAGE TRANSACTION LENGTH
					AVERAGE SUM	PEAK SUM	
SHIP	BUPERS, TYCOM, EPMAC, NFC, OTHER ACTIVITIES, OPCON	R	MESSAGE	NARR	3.9	9	110
BUPERS, TYCOM, EPMAC, NFC, OTHER ACTIVITIES, NPPS	SHIP	R	MESSAGE	NARR	2.3	6	135
SHIP	BUPERS	T	VOICE SIGNAL	NARR	.5	1	115
SHIP	OPCON	R	MESSAGE	NARR	2	4	100
OPCON	SHIP	R	MESSAGE	NARR	2	4	100

TABLE 8 – ADMINISTRATIVE FUNCTION CONSOLIDATED DATA - AT SEA

SCHEDULED

FROM	TO	MEANS OF TRANSFER	MEDIUM	FORMAT	DAILY TRANSACTIONS		AVERAGE TRANSACTION LENGTH
					AVERAGE SUM	PEAK SUM	
SHIP	EPMAC, OTHER ACTIVITIES	M	HC	NAVPERS 1070/75, MULTI-FORMATS	1.6	3	260
OTHER ACTIVITIES	SHIP	M	HC	MULTI-FORMATS	.1	1	250
SHIP	OTHER ACTIVITIES	R	MESSAGE	NARR	.2	1	75
OTHER ACTIVITIES	SHIP	R	MESSAGE	NARR	.2	1	75

EMERGENCY

SHIP	TYCOM, OPCON	R	MESSAGE	NARR	.3	1	200
TYCOM, OPCON	SHIP	R	MESSAGE	NARR	.3	1	200

TABLE 8 – Continued

NON SCHEDULED

FROM	TO	MEANS OF TRANSFER	MEDIUM	FORMAT	DAILY TRANSACTIONS		AVERAGE TRANSACTION LENGTH
					AVERAGE SUM	PEAK SUM	
SHIP	BUPERS, TYCOM, EPMAC, NFC, OTHER ACTIVITIES	M	HC	MULTI-FORMATS	2.5	6	120
BUPERS, EPMAC, TYCOM, NFC, OTHER ACTIVITIES, NPPS	SHIP	M	HC	MULTI-FORMATS	2.4	6	135
SHIP	BUPERS, EPMAC, TYCOM, NFC, OTHER ACTIVITIES	R	MESSAGE	NARR	2.4	6	110
SHIP	OPCON	R	MESSAGE	NARR	2	4	100
OPCON	SHIP	R	MESSAGE	NARR	2	4	100

TABLE 9 – MAINTENANCE FUNCTION CONSOLIDATED DATA - IN PORT

SCHEDULED

FROM	TO	MEANS OF TRANSFER	MEDIUM	FORMAT	DAILY TRANSACTIONS		AVERAGE TRANSACTION LENGTH
					AVERAGE SUM	PEAK SUM	
SHIP	MDCO/ ADP	M	HC	4790/2K	.08	1	1,700
ADP, NAVSEACEN	SHIP	M	PRINTOUT	NARR	.04	2	70,000*
SHIP	MDCO/ ADP	H	HC	4790/2K	.08	1	1,700

EMERGENCY

SHIP	TYCOM/ OPCON	R	MESSAGE	NARR	.16	1	230

*Includes average of CSMP and Quarterly Force Revision printouts

TABLE 9 – Continued

NON SCHEDULED

FROM	TO	MEANS OF TRANSFER	MEDIUM	FORMAT	DAILY TRANSACTIONS		AVERAGE TRANSACTION LENGTH
					AVERAGE SUM	PEAK SUM	
SHIP	NAVSEACEN, TYCOM	M	HC	4790/7B	.16	1	100
NAVSEACEN, TYCOM	SHIP	M	HC	4700-1 & 3, NARR	.07	1	100
SHIP	NAVSEACEN	R	MESSAGE	DD 173	.1	1	100

TABLE 10 – MAINTENANCE FUNCTION CONSOLIDATED DATA – AT SEA

SCHEDULED

FROM	TO	MEANS OF TRANSFER	MEDIUM	FORMAT	DAILY TRANSACTIONS		AVERAGE TRANSACTION LENGTH
					AVERAGE SUM	PEAK SUM	
SHIP	MDCO/ ADP	M	HC	4790/2K	.16	1	1,700
ADP	SHIP	M	COMPUTER PRINTOUT	NARR	.04	2	70,000
SHIP	MDCO/ ADP	M	HC	4790/2K	.08	1	1,700

EMERGENCY

SHIP	TYCOM/ OPCON	R	MESSAGE	NARR	.16	1	230

NON SCHEDULED

SHIP	NAVSEACEN, TYCOM	R	MESSAGE	NARR	.16	1	100
NAVSEACEN, TYCOM	SHIP	M	HC	4700-1 & 3, NARR	.07	1	100
SHIP	NAVSEACEN	R	MESSAGE	DD 173	.1	1	100

- The area defined under the distribution curve was equivalent to 3 (standard deviations).

The results of this analysis indicated that the peak number of area transactions (A_p) per day was equal to the number of ships (n) concurrently using a means of transfer, times the daily average number of transactions (m) per ship, times the factor 1.2* or $A_p = 1.2nm$.

At Sea - It was assumed that the number of frigates and destroyers in the area that had access to and used each means of transfer was equivalent to the number in the 2nd Fleet (see Section 2.4.1, Assumptions). The area emergency situation peak number of transactions per day was assumed to be double the individual ship's peak number of transactions per day per destination.

Final adjustments to the Consolidated Data included:

- The determination of the resultant average message length for each means of information transfer between origination and destination activities.
- The consolidation of Major and Other Activities into a single CONUS originator or destination when evaluating information requirements.

The results of these adjustments and evaluations are indicated in Tables 11 through 14.

Compilations have been made that describe the amounts (measured in words) and percents of the total incoming and total outgoing information flow by each means of transfer for each scenario. (See Tables 15 through 22).

In addition peak day summaries of these values are presented in Tables 23 and 24.

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* The value 1.2 was used to approximate the factor $\frac{n + \sqrt{n}}{n}$ for the ship values of n (see Section 2.4.1, Ships Distribution Assumptions).

TABLE 11 – ADMINISTRATIVE FUNCTION – SHIP INFORMATION REQUIREMENTS (PEAK DAY) - INDEPENDENT

MEANS OF TRANSFER	IN PORT			AT SEA		
	SCHEDULED	NON-SCHEDULED	EMERGENCY	SCHEDULED	NON-SCHEDULED	EMERGENCY
MAIL						
FROM SHIP TO NORFOLK/ OTHER ACTIVITIES	3/260	6/120		3/260	6/120	
FROM NORFOLK/OTHER ACTIVITIES TO SHIP	1/250	6/135		1/250	6/135	
RADIO						
FROM SHIP TO NORFOLK/ OTHER ACTIVITIES	1/75	5/110		1/75	6/110	1/200
FROM NORFOLK/OTHER ACTIVITIES TO SHIP	1/75	6/135		1/75	6/135	1/200
FROM SHIP TO OPCON (AFLOAT)		2/100			2/100	
FROM OPCON (AFLOAT) TO SHIP		2/100			2/100	
TELEPHONE						
FROM SHIP TO OTHER ACTIVITY		1/115				

Legend: x = number of transactions
y = average transaction length (measured in words)

TABLE 12 – MAINTENANCE FUNCTION – SHIP INFORMATION REQUIREMENTS (PEAK DAY) - INDEPENDENT

MEANS OF TRANSFER	IN PORT			AT SEA		
	SCHEDULED	NON-SCHEDULED	EMERGENCY	SCHEDULED	NON-SCHEDULED	EMERGENCY
MAIL						
FROM SHIP TO NORFOLK/ OTHER ACTIVITIES	1/1700	1/100		1/1700	6/100	
FROM NORFOLK/OTHER ACTIVITIES TO SHIP	2/70000	1/100		2/70000	1/100	
HANDCARRY						
FROM SHIP TO NORFOLK	1/1700					
RADIO						
FROM SHIP TO NORFOLK/ OTHER ACTIVITIES		1/100	1/230		1/150	1/230

TABLE 13 – ADMINISTRATIVE FUNCTION – AREA INFORMATION REQUIREMENTS (PEAK DAY) - INDEPENDENT

MEANS OF TRANSFER	IN PORT			AT SEA		
	SCHEDULED	NON-SCHEDULED	EMERGENCY	SCHEDULED	NON-SCHEDULED	EMERGENCY
MAIL						
FROM SHIP TO NORFOLK/ OTHER ACTIVITIES	77/260	12/120		29/260	5/120	
FROM NORFOLK/OTHER ACTIVITIES TO SHIP	5/250	11/135		2/250	4/135	
RADIO						
FROM SHIP TO NORFOLK/ OTHER ACTIVITIES	10/75	91/110	2/200	/75	86/110	2/200
FROM NORFOLK/OTHER ACTIVITIES TO SHIP	10/75	108/135	2/200	3/75	81/135	2/200
FROM SHIP TO OPCON (AFLOAT)		96/100			36/100	
FROM OPCON (AFLOAT) TO SHIP		96/100			36/100	
TELEPHONE						
FROM SHIP TO OTHER ACTIVITIES		24/115				

TABLE 14 – MAINTENANCE FUNCTION – AREA INFORMATION REQUIREMENTS (PEAK DAY) – INDEPENDENT

MEANS OF TRANSFER	IN PORT			AT SEA		
	SCHEDULED	NON-SCHEDULED	EMERGENCY	SCHEDULED	NON-SCHEDULED	EMERGENCY
MAIL						
FROM SHIP TO NORFOLK/ OTHER ACTIVITIES	4/1700	8/100		3/1700	4/100	
FROM NORFOLK/OTHER ACTIVITIES TO SHIP	2/70000	4/100		2/70000	2/100	
HANDCARRY						
FROM SHIP TO NORFOLK	4/1700					
RADIO						
FROM SHIP TO NORFOLK/ OTHER ACTIVITIES		5/100	8/230		3/150	

TABLE 15 – ADMINISTRATIVE FUNCTION - INDIVIDUAL SHIP INFORMATION REQUIREMENT LEVELS (IN PORT) - PEAK DAY

SCENARIO	INCOMING						OUTGOING			
	MAIL		TELEPHONE		RADIO		MAIL		RADIO	
	AMOUNT	PERCENT	AMOUNT	PERCENT	AMOUNT	PERCENT	AMOUNT	PERCENT	AMOUNT	PERCENT
SCHEDULED	250	77			75	23	780	91	75	9
NON-SCHEDULED	810	42	115	6	1010	52	720	49	750	51
EMERGENCY					200	100			200	100

NOTE: Amount is measured in number of words transferred during a peak day

TABLE 16 – ADMINISTRATIVE FUNCTION - INDIVIDUAL SHIP INFORMATION REQUIREMENT LEVELS (AT SEA) - PEAK DAY

SCENARIO	INCOMING				OUTGOING			
	MAIL		RADIO		MAIL		RADIO	
	AMOUNT	PERCENT	AMOUNT	PERCENT	AMOUNT	PERCENT	AMOUNT	PERCENT
SCHEDULED	250	77	75	23	780	91	75	9
NON-SCHEDULED	810	45	1010	55	720	46	869	54
EMERGENCY			200	100			200	100

TABLE 17 – MAINTENANCE FUNCTION - INDIVIDUAL SHIP INFORMATION REQUIREMENT LEVELS (IN PORT) - PEAK DAY

SCENARIO	INCOMING		OUTGOING					
	MAIL		MAIL		HANDCARRY		RADIO	
	AMOUNT	PERCENT	AMOUNT	PERCENT	AMOUNT	PERCENT	AMOUNT	PERCENT
SCHEDULED	140,000	100	1700	50	1700	50		
NON-SCHEDULED	100	100	100	50			100	50
EMERGENCY							230	100

TABLE 18 – MAINTENANCE FUNCTION - INDIVIDUAL SHIP INFORMATION REQUIREMENT LEVELS (AT SEA) - PEAK DAY

SCENARIO	INCOMING		OUTGOING			
	MAIL		MAIL		RADIO	
	AMOUNT	PERCENT	AMOUNT	PERCENT	AMOUNT	PERCENT
SCHEDULED	140,000	100	1700	100		
NON-SCHEDULED	100	100	100	50	100	50
EMERGENCY					230	100

TABLE 19 – ADMINISTRATIVE FUNCTION - AREA INFORMATION REQUIREMENT LEVELS (IN PORT) - PEAK DAY

SCENARIO	INCOMING						OUTGOING			
	MAIL		TELEPHONE		RADIO		MAIL		RADIO	
	AMOUNT	PERCENT	AMOUNT	PERCENT	AMOUNT	PERCENT	AMOUNT	PERCENT	AMOUNT	PERCENT
SCHEDULED	1250	62			750	38	20020	96	750	4
NON-SCHEDULED	1485	5	2760	10	24180	85	1440	7	19610	93
EMERGENCY		)			400	100			400	100

TABLE 20 – ADMINISTRATIVE FUNCTION - AREA INFORMATION REQUIREMENT LEVELS (AT SEA) - PEAK DAY

SCENARIO	INCOMING				OUTGOING			
	MAIL		RADIO		MAIL		RADIO	
	AMOUNT	PERCENT	AMOUNT	PERCENT	AMOUNT	PERCENT	AMOUNT	PERCENT
SCHEDULED	500	69	225	31	7540	97	225	3
NON-SCHEDULED	540	2	24535	98	600	4	13060	96
EMERGENCY			400	100			400	100

TABLE 21 – MAINTENANCE FUNCTION - AREA INFORMATION REQUIREMENT LEVELS (IN PORT) - PEAK DAY

SCENARIO	INCOMING		OUTGOING					
	MAIL		MAIL		HANDCARRY		RADIO	
	AMOUNT	PERCENT	AMOUNT	PERCENT	AMOUNT	PERCENT	AMOUNT	PERCENT
SCHEDULED	140,000	100	6800	50	6800	50		
NON-SCHEDULED	400	100	800	62			500	38
EMERGENCY							1040	100

TABLE 22 – MAINTENANCE FUNCTION - AREA INFORMATION REQUIREMENT LEVELS (AT SEA) - PEAK DAY

SCENARIO	INCOMING		OUTGOING			
	MAIL		MAIL		RADIO	
	AMOUNT	PERCENT	AMOUNT	PERCENT	AMOUNT	PERCENT
SCHEDULED	140,000	100	5100	100		
NON-SCHEDULED	200	100	400	57	300	43
EMERGENCY					1040	100

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TABLE 23 – ADMINISTRATIVE FUNCTION - INFORMATION REQUIREMENT TOTALS - PEAK DAY

SCENARIO	INDIVIDUAL SHIP		AREA	
	INCOMING	OUTGOING	INCOMING	OUTGOING
SCHEDULED (IN PORT)	325	855	2000	20770
NON-SCHEDULED (IN PORT)	1935	1470	28425	21050
EMERGENCY (IN PORT)	200	200	400	400
SCHEDULED (AT SEA)	325	855	725	7765
NON-SCHEDULED (AT SEA)	1820	1480	25075	13660
EMERGENCY (AT SEA)	300	200	400	400

NOTE: Entries represent words transferred during a peak day

TABLE 24 – MAINTENANCE FUNCTION - INFORMATION REQUIREMENT TOTALS - PEAK DAY

SCENARIO	INDIVIDUAL SHIP		AREA	
	INCOMING	OUTGOING	INCOMING	OUTGOING
SCHEDULED (IN PORT)	140,000	3400	140,000	13600
NON-SCHEDULED (IN PORT)	100	200	400	1300
EMERGENCY (IN PORT)		230		
SCHEDULED (AT SEA)	140,000	1700	140,000	5100
NON-SCHEDULED (AT SEA)	100	200	200	700
EMERGENCY (AT SEA)		230		1040

2.4.4 Data Comparison

2.4.4.1 General. Comparisons were made on a qualitative/relative basis among the Administrative, Maintenance, and Supply functions.

The two factors considered were:

Use of means of transfer

Volumes

The terms used in comparing the volumes were High, Medium, Low, or None, where generally:

- High represents volumes greater than or equal to 10,000 words/day
- Medium represents volumes less than 10,000 words but greater than or equal to 1000 words/day
- Low represents volumes less than 1000 words/day but greater than or equal to 1 word/day
- None represents no transfer of information

In addition, comments were made on the relative effects on the levels and volumes of information as the situation changes for In-Port, At-Sea, Individual Ship, and Area Requirements, both within and between functions.

The "Non-Scheduled" designation for supply refers to the type of replenishment, not the type of schedule used in information handling.

The summations of the non-scheduled and scheduled maintenance and administrative information requirement levels were each compared with the non-scheduled supply data because the supply requirements (type of replenishment) include both the non-scheduled and scheduled information. Emergency data are compared for all the functions and are discussed in Section 2.4.4.2. Tables 15 through 24 (previously shown) and 25 through 27 include data on which the comparisons and analyses were based. Tables 28 through 35 represent the results of these comparisons and analyses by requirement levels and totals.

NOTE: Situations reflecting "Group" handling of information for the administrative and maintenance functions were neither included nor considered applicable. Therefore, comparisons and analyses were not made for those situations.

TABLE 25 – SUPPLY FUNCTION - INDIVIDUAL SHIP INFORMATION REQUIREMENT LEVELS (IN PORT/AT SEA) - PEAK DAY

IN PORT

SCENARIO SITUATION	INCOMING								OUTGOING							
	MAIL		SBMSS/ AUTODIN		HAND-CARRY		TELE-PHONE		MAIL		SBMSS/ AUTODIN		HAND-CARRY		TELE-PHONE	
	AMT	%	AMT	%	AMT	%	AMT	%	AMT	%	AMT	%	AMT	%	AMT	%
NON-SCHEDULED	960	55	414	24	384	21			732	24	374	12	936	31	1050	33

AT SEA

SCENARIO SITUATION	INCOMING						OUTGOING					
	MAIL		MANUAL		RADIO SIGNAL		MAIL		MANUAL		RADIO SIGNAL	
	AMT	%	AMT	%	AMT	%	AMT	%	AMT	%	AMT	%
NON-SCHEDULED	336	78			111	22	720	92			62	8
EMERGENCY					111	100					82	100

NOTE: Amount is measured in number of words transferred during a peak day by noted means of transfer.
Percent is calculated for the incoming and the outgoing information flow for each means of transfer

TABLE 26 – SUPPLY FUNCTION - AREA INFORMATION REQUIREMENT LEVELS (IN PORT/AT SEA) - PEAK DAY

IN PORT

SCENARIO SITUATION	INCOMING								OUTGOING							
	MAIL		SBMSS/ AUTODIN		HAND-CARRY		TELE-PHONE		MAIL		SBMSS/ AUTODIN		HAND-CARRY		TELE-PHONE	
	AMT	%	AMT	%	AMT	%	AMT	%	AMT	%	AMT	%	AMT	%	AMT	%
NON-SCHEDULED	21120	71	2898	10	5568	19			19032	51	3179	9	13862	38	800	2

AT SEA

SCENARIO SITUATION	INCOMING						OUTGOING					
	MAIL		MANUAL		RADIO SIGNAL		MAIL		MANUAL		RADIO SIGNAL	
	AMT	%	AMT	%	AMT	%	AMT	%	AMT	%	AMT	%
NON-SCHEDULED	4116	97			111	3	1800	75			589	25
EMERGENCY					222	100					164	100

TABLE 27 – SUPPLY FUNCTION - INFORMATION REQUIREMENT TOTALS - PEAK DAY

SCENARIO	INDIVIDUAL SHIP		AREA	
	INCOMING	OUTGOING	INCOMING	OUTGOING
NON-SCHEDULED (IN PORT)	1758	3112	29586	36873
NON-SCHEDULED (AT SEA)	447	728	4227	2389
NOTE: All values are measured in words				

TABLE 28 – REQUIREMENT LEVELS COMPARISON
INDIVIDUAL SHIP - IN PORT

	INCOMING				OUTGOING			
	MAIL	TELEPHONE	HANDCARRY	RADIO*	MAIL	TELEPHONE	HANDCARRY	RADIO
ADMIN.	MED	LOW	NONE	MED	MED	NONE	NONE	MED
MAINT.	HIGH	NONE	NONE	NONE	MED	NONE	MED	LOW
SUPPLY	MED	NONE	LOW	LOW	MED	MED	MED	LOW

*Equivalent to SBMSS/AUTODIN

TABLE 29 – REQUIREMENT LEVELS COMPARISON
INDIVIDUAL SHIP - AT SEA

	INCOMING		OUTGOING	
	MAIL	RADIO	MAIL	RADIO
ADMIN.	MED	MED	MED	MED
MAINT.	HIGH	NONE	MED	LOW
SUPPLY	LOW	LOW	MED	LOW

TABLE 30 – REQUIREMENT LEVELS COMPARISON
AREA - IN PORT

	INCOMING				OUTGOING			
	MAIL	TELEPHONE	HANDCARRY	RADIO*	MAIL	TELEPHONE	HANDCARRY	RADIO
ADMIN.	MED	MED	NONE	HIGH	HIGH	NONE	NONE	HIGH
MAINT.	HIGH	NONE	NONE	NONE	MED	NONE	MED	LOW
SUPPLY	HIGH	NONE	MED	MED	HIGH	LOW	HIGH	MED

*Equivalent to SBMSS/AUTODIN

TABLE 31 – REQUIREMENT LEVELS COMPARISON
AREA - AT SEA

	INCOMING		OUTGOING	
	MAIL	RADIO	MAIL	RADIO
ADMIN.	LOW	HIGH	HIGH	HIGH
MAINT.	HIGH	NONE	HIGH	LOW
SUPPLY	MED	LOW	MED	LOW

TABLE 32 – REQUIREMENT TOTALS COMPARISON INDIVIDUAL SHIP - IN PORT

	INCOMING	OUTGOING
ADMIN.	2260	2325
MAINT.	140,100*	3600
SUPPLY	1758	3112
*Includes CSMP		

TABLE 33 – REQUIREMENT TOTALS COMPARISON AREA - IN PORT

	INCOMING	OUTGOING
ADMIN.	30,425	41,775
MAINT.	140,400	14,900
SUPPLY	29,586	36,873

TABLE 34 – REQUIREMENT TOTALS COMPARISON
INDIVIDUAL SHIP - AT SEA

	INCOMING	OUTGOING
ADMIN.	2145	2335
MAINT.	140,100	1900
SUPPLY	447	782

TABLE 35 – REQUIREMENT TOTALS COMPARISON
AREA - AT SEA

	INCOMING	OUTGOING
ADMIN.	25,800	21,425
MAINT.	140,200	5800
SUPPLY	4227	2389

2.4.4.2 Comments. Observations of the developed and compared data indicated the following:

Levels - The principal means of transfer for maintenance transactions is mail - in port or at sea. Administrative transactions are more evenly transferred by mail and radio. Outgoing supply transactions make use of mail, telephone, and handcarry in port. They use primarily mail at sea.

Incoming supply transactions use mail to a greater extent than the other means of transfer while in port, with relatively low use of all other means of transfer at sea.

In summary - Maintenance is primarily mail-oriented, administrative transactions are more evenly divided between radio and mail, and supply information flow uses relatively more mail than radio. In port, supply uses a significant amount of handcarry and telephone.

Emergency - the means of transfer, percent of use of transfer, and the number of transactions and message lengths for the supply, maintenance, and administrative functions are very similar. They all use radio (SBMSS/AUTODIN) in port as the sole means of message transfer and might be expected to send one or two messages of approximately 100 or 200 words during a peak day.

Totals (volume) - The volumes of incoming and outgoing data are similar for the administrative and supply functions; the incoming traffic in maintenance data is significantly higher that its outgoing traffic, largely due to the CSMP. If that printout (CSMP) is neglected, the volume of incoming data is large compared to the ship's outgoing information flow.

The volumes of the individual ship's (in port) administrative and supply information flow are similar; that of the maintenance function is higher for its incoming (due to the CSMP) and lower (relatively) for its outgoing (in port).

At sea, there is a distinctly larger volume of administrative than supply information. This could be accounted for by the fact that the DD 1348 requisitions supporting the "replenishment at sea" operation are NOT included.

3. COMPATIBILITY ANALYSIS

3.1 APPROACH

3.1.1 General Discussion

The processing and transfer of information involved in the administrative, maintenance, and supply functions aboard ship were considered for DEAS processing. To satisfy the requirements of these functions, DEAS assemblies may be required in several locations aboard a ship.

One of the basic functions of the DEAS assembly is to prepare information in such a way that it will be acceptable to, and usable by, both intra-ship and off-ship equipment/subsystems. This means that the formats and mediums used in handling such information as well as the equipment itself must be compatible with new telecommunications equipment and systems as well as with present ones. (Non-telecommunications means of information transfer are not considered in this compatibility analysis.) Major equipments, subsystems, and systems which may be used in conjunction with DEAS-originated information have been investigated to determine equipment compatibility. New equipment and subsystems that have been investigated include NAVMACS, MPU, MPA, FLTSATCOM, NAVCOMPARS, LDMX, and RIXT. These equipment and subystems are defined and described in Section 3.4.

When a ship is at sea, telecommunications means of transfer for administrative and supply information currently include radio and AUTODIN. The 3M system for maintenance information normally does not use telecommun ications. If a maintenance problem which cannot be satisfied by the ship's force merits immediate action, it is considered a CASREPT and is placed into the CASREPT system. This system will not be considered in this analysis.

The at-sea transmission facilities for administrative and supply information use the same telecommunications equipment and subsystems. However, at the message destination, EPMAC and NFC (both administrative activities) use IBM 360's for the host computer, and NSC (a supply activity) uses a Burroughs 3500. Since both of these computers use the same

type of AUTODIN interface, the type of host computer makes no significant difference to the total information flow system.

The primary telecommunications means of transfer for administrative and supply information for ships in port* is AUTODIN and the two functions use the same equipment and subsystems. At Norfolk, the Naval Communication Station (NAVCOMMSTA) provides a handcarry system (SBMSS)** for transferring information to and from ships in port. Corrective maintenance information (opening/closing deferrals, completed actions) is currently transferred by mail or handcarried from the ship to an ADP facility (DPSCLANT or IMA) for computer processing. These ADP facilities presently use a UNIVAC 1500 for maintenance information processing.

The shortage of Naval personnel (military and civilian) has prompted the Navy to seek alternatives to some of the present information transfer methods, described in Section 4.

3.1.2 Parameter Selection and Data Sources

To satisfy the compatibility objectives (see section 1.2.2) several system configurations were identified for handling end-to-end (ship/shore) information (supply, maintenance, administrative) flow for ships both at sea and in port. The basic characteristics sought for describing the major current, new, and proposed equipment and subsystems for these configurations were:

Operational Speeds
Message formats
Medium
Bit code
Transmission mode
Processing equipment
Store-and-forward capability

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* For this analysis, a ship is defined to be in-port when its telecommunications responsibilities (transmitting and receiving) are assumed by the local NAVCOMMSTA. Otherwise, the ship is at sea.

** See Glossary (Appendix C).

Several Navy activities were visited to acquire data. The activities visited included:

Naval Telecommunications Command, Code 33

Naval Communication Station, Norfolk, Code 50

Naval Surface Force U.S. Atlantic Fleet, Code N45

USS NEW DD 818, 3M Coordinator, Executive Officer, Personnel, Accounting, and Supply Officers

USS VREELAND FF 1068, 3M Coordinator, Executive Officer, Personnel, Accounting, and Supply Officers

USS BYRD DDG 23, 3M Coordinator, Executive Officer, Personnel, Accounting, and Supply Officers

Telecommunications personnel ashore were consulted for information on current and new equipment and subsystems. Shipboard personnel were consulted for information on message preparation requirements, information flow networks, processing equipment, and means of information transfer. Telecommunications documents were analyzed to identify the basic characteristics of new subsystems.

The acquired data were reduced to basic information flow configurations (nodes and links) and operational requirements to eliminate duplications and information not applicable to DEAS. In this way the requirements that the DEAS System must satisfy to be compatible with the described system configurations were identified.

3.2 EQUIPMENT DESCRIPTION AND ANALYSIS

3.2.1 Current Equipment and Subsystems

Current telecommunications equipment and subsystems applicable to DEAS information transfer were divided into three categories: shipboard, ashore, and ship-shore interchange. Each subsystem is capable of transmitting supply, administrative, or maintenance information.

3.2.1.1 Shipboard. Current shipboard telecommunications transmission are made largely by radio. The shipboard radio transmission system includes teletype devices, crypto units, signal converters, antennas,

receivers, and transceivers. Certain combinations of these are used for receiving, others for sending information.

The principal information format for radio transmission is the Allied Communication Publications (ACP)* 126 (modified) in the ASCII* bit code. Equipment operational speed is normally 100 words per minute (wpm), which is equivalent to 75 bits per second (bps).

The supply and administrative information flow paths from ship to destination use basically the same telecommunications equipment.

3.2.1.2 Ashore. The current major telecommunications (ship-shore) subsystems ashore include Relay Stations (Fleet Centers), Naval Communications Processing and Routing System (NAVCOMPARS), and the Automatic Digital Network (AUTODIN). The relay station and NAVCOMPARS are components of the CONUS Naval Communications Stations (NAVCOMMSTA)*. AUTODIN interfaces with NAVCOMMSTA.

A Relay Station is an interface for ship-shore transmitting and receiving of information. The relay station provides tactical circuit termination which includes fleet multi- and single-channel broadcast, full period ship-shore termination, landline termination with ships in port, and other dedicated circuits to ashore activities. Relay devices include antennas, receivers, transceivers, crypto units, teletype devices, and control devices.

The equipment operates independently of message text and is capable of handling messages in ACP 126 (modified) or JANAP 128 formats. The relay station has store-and-forward capability and processes information at 100 wpm. Messages are processed according to precedence and are transmitted or received in either the synchronous* or asynchronous* mode.

NAVCOMPARS is an automatic message processing and routing system within major Naval Communication Stations (NAVCOMMSTA). NAVCOMPARS is located in Norfolk, Guam, Honolulu, and Italy. The primary function of NAVCOMPARS is the automation of the NAVCOMMSTA fleet center operations.

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* See Glossary (Appendix C).

NAVCOMPARS provides ship-shore interface to the Defense Communication System.

NAVCOMPARS uses UNIVAC series 70/45 computer systems with full system redundancy (including central processing units) for system back-up. The redundancy is necessary to meet the command and control requirements inherent in the ship-shore interchange.

NAVCOMPARS processes messages from various equipment sources, including:

AUTODIN Switching Centers
On-line dedicated/full-period channels
Off-line dedicated/full-period channels
High-speed paper tape readers
Optical Character Readers (OCR)
Card readers
Magnetic tapes

Acceptable formats to the NAVCOMPARS are JANAP 128 (plaindress, abbreviated plaindress, Codress, data pattern), modified ACP 126, and DD 173 (OCR). The JANAP 128 and modified ACP 126 are normally received via electronic signals; the DD 173 (OCR) is received on hard copy.

Message processing within NAVCOMPARS includes adding routing indicators, format adjustments, corrections to addresses as required, etc.

NAVCOMPARS delivers messages via the following subsystems:

AUTODIN
Fleet Broadcast
Full-period ship-shore circuits
Dedicated on-line circuits
Over-the-counter

Outgoing messages from NAVCOMPARS via AUTODIN, Fleet Broadcast, Full-period ship-shore, and Dedicated on-line circuits are normally transferred in the JANAP 128 formats; over-the-counter messages are sent in narrative form.

Information transfer between NAVCOMPARS and ships is normally at 100 words per minute. Information transfer speed between NAVCOMPARS and AUTODIN is 1200 and 2400 bps with ASCII bit code.

AUTODIN is a high-speed data communication network used by the military services and other government agencies. It uses the UNIVAC DCT 9000 computer to process information prior to data transmission through the AUTODIN system. It has an off-line interface with the Fleet Center. Messages prepared in the ACP 126 or JANAP 128 formats are acceptable to AUTODIN. The operation speed of AUTODIN ranges from 75 to 4800 bps. AUTODIN has store-and-forward capabilities and transmits in both synchronous and asynchronous modes.

3.2.1.3 Ship-Shore Interchange. Current ship-shore interchange transmissions are normally handled via radio signals. Information to and from ships at sea may be transmitted (1) directly between a ship and a CONUS NAVCOMMSTA and (2) between a ship and a CONUS NAVCOMMSTA via an overseas Communication relay facility.

Direct ship-shore radio transmissions may be made by either high (3MHz to 300 MHz), medium (300 KHz to 3MHz), or low (30KHz to 300 KHz) frequencies. Environmental factors influence the type of transmission frequencies required during a given period. Naval Tactical Publication (NTP) 6 is a guide to the types of frequencies suited to various environmental conditions.

The primary overseas relay facilities are NAVCOMMSTAs and AUTODIN.

Equipment in an overseas NAVCOMMSTA is basically the same as that in a CONUS NAVCOMMSTA.

The overseas AUTODIN is composed of ten switching centers, with a number of associated subscriber terminals. Interswitch trunks connect these switching centers and CONUS switching centers.

The basic AUTODIN terminal equipment for a synchronous transmission includes the common control unit, the input/output devices, and the universal keyboard. The equipments for an asynchronous transmission are a teletypewriter control unit and the 75-baud teletype equipment.

3.2.2 New Equipment and Subsystems

New telecommunications equipment and subsystems which DEAS may be required to use were investigated. These equipment/subsystems were categorized as follows: shipboard, ashore, and ship-shore interchange.

The function of these equipment and subsystems will be independent of ship location (in port, at sea). Each subsystem can be used in transmitting supply or administrative information.

3.2.2.1 Shipboard. New shipboard equipment/systems include the Naval Modular Automated Communications System (NAVMACS), the Message Processing Unit (MPU), and the Message Preparation Aid (MPA).

NAVMACS incorporates currently employed message communications methods and equipment into a newly automated system which offers a wide range of communications capabilties. NAVMACS is being designed to aid shipboard telecommunications personnel by reducing operator workloads and requirements and improving the speed of originator-to-destination flow. The objective of NAVMACS is "to automate telecommunications functions within presently available technology, while providing an information distribution, exchange and transfer system that will afford afloat commands the telecommunications capability necessary for mission performance".[4]

The total system is composed of six subsystems (classes). These classes are arranged serially and are designated A, A+, B, C, D, and E. Each successive class includes the functions of the class that precedes it. Only Class B has been designated as applicable to destroyers. The remaining classes will not be discussed in this report.

The Class B Subsystem will:

Operate off-line with full period termination or netted ship/ship and ship/shore circuits via torn paper tape.

Perform extensive analysis of all messages received by the system (e.g., locate and validate message elements).

Separate printed messages into two categories: those ready for distribution and those that require operator attention.

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4. COMNAVTELCOM, "Subsystem Project Plan", SSP1-69 (Revised), October 1974

Retain three days of messages on-line and ninety days of messages off-line.

Automatically format message output.

Log all messages.

Send and receive narrative.

Connect on-line to the high speed satellite radio link.

Print reruns as required.

Use a keyboard visual terminal for message composition.

The AN/UYK 20 is the basic computer used to support the system. This computer has been adopted by the Navy as a standard tactical mini-computer. Class B subsystem will operate at both medium and high speeds (1200, 2400, 4800 bps).

The Class B subsystem will interface with:

The regular shore to ship broadcast.

The satellite link.

The off-line output with full period termination or netted ship/ship and ship/shore circuits via torn paper tape.

These interfaces will allow Class B to utilize all the major communications circuits.

The Message Processing Unit (MPU) was designed only for DD-963 class destroyers. It was designed and is being installed by Litton Systems Inc. The function of the MPU is to provide automatic message screening of the shore-to-ship broadcast for those messages which are applicable to the command. The addressees of each broadcast message are compared with an established list of addressees called a guard list. If a match is found, the complete message (heading and text) is printed in hard copy. Only the heading of other messages is printed. If a match is not found, the printer is stopped when the prosign (BT), which separates the heading and the text of the message, is reached. When the unit recognizes the end-of-message (EOM), the printer is again available. In making the comparison between broadcast message header and guide list, the system can handle minor errors.

The Message Preparation Aid (MPA/black box) is designed to be located in the Main Communications Radio Room. Control of MPA may be handled

in one of two ways: (1) communications personnel can maintain complete control with a buzzer or light system between the supply (or other departments) and radio room, or (2) control can be divided between radio and supply rooms (special design).

MPA can prepare messages in most specified formats. MPA can also be used to transfer data electronically from intra-ship systems to the radio room, thus eliminating a significant amount of personnel involvement in main communications.

The objectives of MPA are:

To assist radiomen in rapid, accurate preparation of formats and other record traffic.

To make maximum use of existing shipboard equipment with minimum addition of new equipment.

To provide equipment that is low-cost, reliable, and easy to maintain and operate.

MPA has:

Store and forward capabilities.

A storage capacity of 1.3 million bits (floppy disk).

An operating speed of 75 baud.

INTEL 8008 as its host processor.

MPA is designed to interface with NAVMACS Main Communication patch panels and punched paper tape. The system is being designed by the Navy Electronics Laboratory Center, San Diego, California.

3.2.2.2 Ashore. Included in the new ashore communications equipment/systems are the Local Digital Message Exchange (LDMX) and the Remote Information Exchange Terminal (RIXT).

LDMX is a message processing system that interfaces with AUTODIN. The system automatically processes and distributes information for major telecommunications centers.

"The LDMX is a third generation computerized communications system which automates the message processing functions of major telecommunications centers to provide reliable, accurate communications information exchange at the high speeds necessary to support modern operational

requirements. The LDMX system provides high speed communications processing to replace slow, error-prone manual operations".[4] The system is capable of operating in asynchronous and synchronous transmission modes.

"The system comprises a UNIVAC Series 70/45 central processing unit front-ended by two Model 1600 AUTODIN terminals. Standard peripheral equipment includes disk and tape storage, a mass storage unit, video display terminals, teleprinters, card readers/punches, paper tape units, and optical character readers (OCR).

"In the event of a Series 70 central processor failure, one Model 1600 AUTODIN Communications Controller (ACC) is configured with extra memory and additional peripheral switching capability to permit continued receipt of AUTODIN traffic on cards, paper and magnetic tapes, and medium speed printers".[4]

The LDMX is designed for use in a major Telecommunications Center (TCC). Installation of a LDMX to meet the requirements for automation at smaller TCC's would not be cost effective due to insufficient traffic volume.

The LDMX receives messages by way of AUTODIN and on- and off-line dedicated teletype circuits. When a message enters the LDMX, it is logged and properly stored for processing according to precedence. Narrative and JANAP 128 (data pattern) formats are acceptable to the LDMX. Data pattern and narrative messages are analyzed and processed by precedence. The system automatically monitors the processing function by logging the entrance and exit of each message and by logging all messages requiring service.

Outgoing communications messages from the LDMX may be entered into the telecommunications system by a paper tape reader, card reader, magnetic tape, or OCR in either JANAP 128, ACP 126 (modified), or DD 173 (OCR) formats.

RIXT terminals extend the LDMX and NAVCOMPARS message processing functions to users within a local geographical area. RIXT equipment configurations are based on mission requirements and message volume at each location. The processing functions include message entry, logging,

file and retrieval, distribution assignment and update, message transmission, duplicate search, and special handling. The associated peripheral equipment used at each location depends on mission requirements and message volume. The RIXT uses the host computer system (LDMX or NAVCOMPARS) for message processing functions, including routing indicator assignment, formatting, etc. Extension of the automated functions of the LDMX or NAVCOMPARS to remote locations by means of the RIXT greatly enhances the capability for intra-service as well as inter-service telecommunications center consolidation. The RIXT is required to operate at selected speeds ranging from 150 through 2400 bps. The transmission modes include both asynchronous and synchronous.

3.2.2.3 Ship-Shore Interchange. The principal new ship-shore interchange subsystem is the satellite Information Exchange Subsystem (IXS). IXS is an adjunct to the Fleet Satellite Communications (FLTSATCOM) program and its function is to make optimum use of the high speed data transfer capabilities of satellites. FLTSATCOM is designed to relay information at speeds ranging from 75 to 9600 bps. The up and down links of a channel to the satellites use the same operational speeds but there is no store-and forward capability. The satellite assembly is independent of message formats and bit codes.

The two principal subsystems of FLTSATCOM currently envisioned are:

Common User Digital Information Exchange Subsystem (CUDIXS)
Small Ship Teletypewriter Information Exchange Subsystem (SSTIXS)

"In order to implement the goals of the Naval Telecommunications Automation Program, an integration of the IXS program with NAVCOMPARS is currently being developed and implemented. This integrated system will extend the automated facilities of NAVCOMPARS to the IXS program and facilitate the satellite communications interface with NAVCOMPARS, while at the same time reducing the required equipment and personnel.

"The NAVCOMPARS/IXS interface will provide CUDIXS and SSTIXS an online AUTODIN interface, both send and receive, via NAVCOMPARS. Additionally NAVCOMPARS will provide message routing and validation/correction to

CUDIXS/SSTIXS traffic as currently provided to full-period termination and fleet broadcast traffic. The NAVCOMPARS will provide file/recall and accountability reporting for CUDIXS/SSTIXS as well. CUDIXS and SSTIXS will continue to be responsible for those functions relative to network control and exchange of traffic with subscribers. CUDIXS and SSTIXS are bi-directional ship/shore/ship relay systems for narrative and data pattern traffic functioning within a round-robin cyclic network discipline. The AN/USQ-64 (V)2 CUDIXS/SSTIXS shore terminal installed at the NAVCOMMSTA and interfaced with the NAVCOMPARS contains three AN/UYK-20 mini-computers and other peripherals required for link control of three satellite channels operating at 2400 baud or higher. One of these channels will operate as a CUDIXS network, one as a SSTIXS network, and the third as a spare. CUDIXS and SSTIXS are functionally identical, differing only in utilization. CUDIXS will support ship/shore/ship operations for up to 10 heavy volume subscribers. SSTIXS will support up to 60 lesser volume subscribers with up to 10 of these also having a shore/ ship capability".[4]

4. INFORMATION TRANSFER CONCEPT

4.1 SYSTEM CONFIGURATIONS AND PROPOSED METHODS

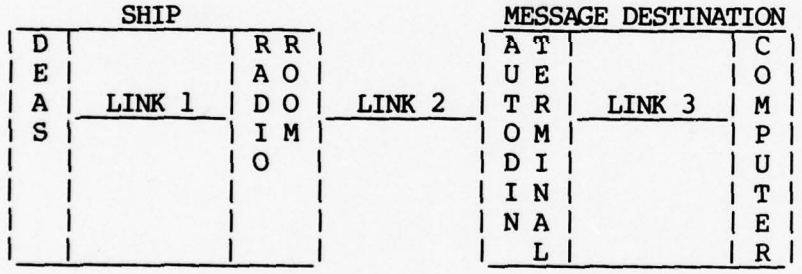
The Data Entry Aboard Ship (DEAS) information flow path (ship to shore) is composed of nodes and links. The nodes are the DEAS assembly (shipboard), the Main Communication radio room (shipboard), the AUTODIN terminal at message destination point (ashore), and the computer facility at the message destination (ashore). The links, which do not include the nodes, are defined as follows:

Link 1: Information flow path between DEAS assembly and the radio room.

Link 2: Information flow path between the radio room and the AUTODIN terminal at the message destination point.

Link 3: Information flow path between the AUTODIN terminal and the computer facility at the message destination.

The nodes and links are shown in the folling diagram:



The major information transfer situations considered are:

1. Ship in port
   a. Configurations with current equipment
   b. Configurations with current and new/proposed equipment
2. Ship at sea
   a. Configurations with current equipment
   b. Configurations with current and new/proposed equipment

Configuration diagrams are provided to illustrate the equipment and subsystems used in the two designated situations (i.e., information flow paths between ship and message destination).

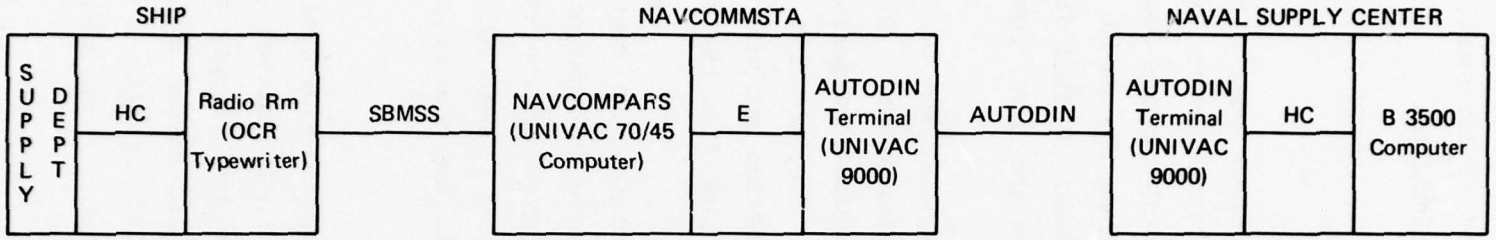
4.1.1 Ship in Port

4.1.1.1 Current Information Flow Configurations. Information transfer along links 1 and 2 requires a significant amount of handcarry. The ship's location (in port or at sea) determines the degree to which handcarry is used to transfer information along the ashore segment of Link 2. When a ship is in port at Norfolk, handcarry (SBMSS) is a standard way of moving information between the ship and the Naval Communication Station (NAVCOMMSTA).

Figure 6 (Configuration A) illustrates the current equipment and subsystems used to transfer supply information. Shipboard originated messages are first prepared by the communications personnel on an optical character recognition (OCR) typewriter. They are then sent to NAVCOMMSTA via SBMSS and relayed to their destination activity by AUTODIN. The information is again handcarried along Link 3 to the B 3500 computer for further processing and distribution.

Figure 7 (Configuration B) illustrates the current equipment and subsystems used to transmit administrative information. Here again the shipboard originated messages are prepared by the communications personnel on an OCR typewriter prior to being transferred to the SBMSS. The difference between Figures 6 and 7 is in the type of computer (B 3500 vs IBM 360) used at the ashore locations.

4.1.1.2 Combined New and Current Information Flow Configuration. Figure 8 (Configuration C) illustrates a combination of new and current equipments and subsystems which can handle both supply and administrative information. LDMX has been developed and tested to provide high speed command and control communications. LDMX is also designed to meet the expected growth in the information exchange requirements. The RIXT was



HC - Handcarry
SBMSS - Shore Based Message Service System
AUTODIN - Automatic Digital Network
E - Electronic Transfer

Figure 6 – Configuration A–Basic Telecommunication Supply Information Flow Path – Ship In Port

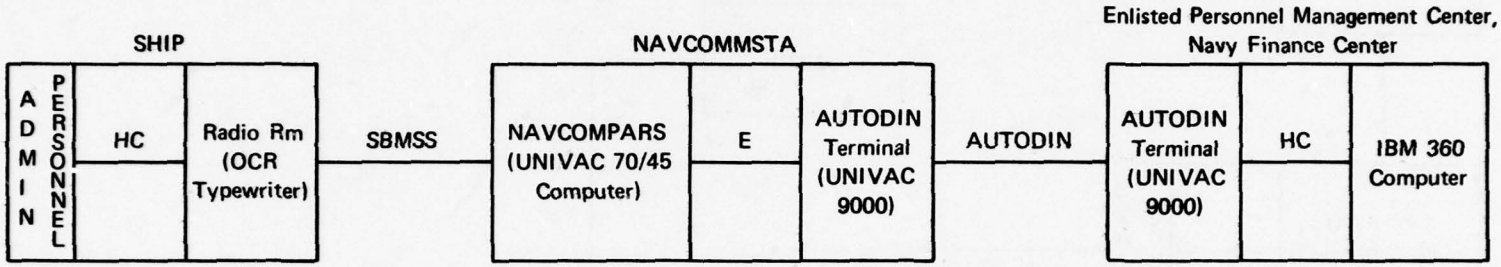


Figure 7 – Configuration B–Basic Telecommunication Administrative Information Flow Path – Ship In Port

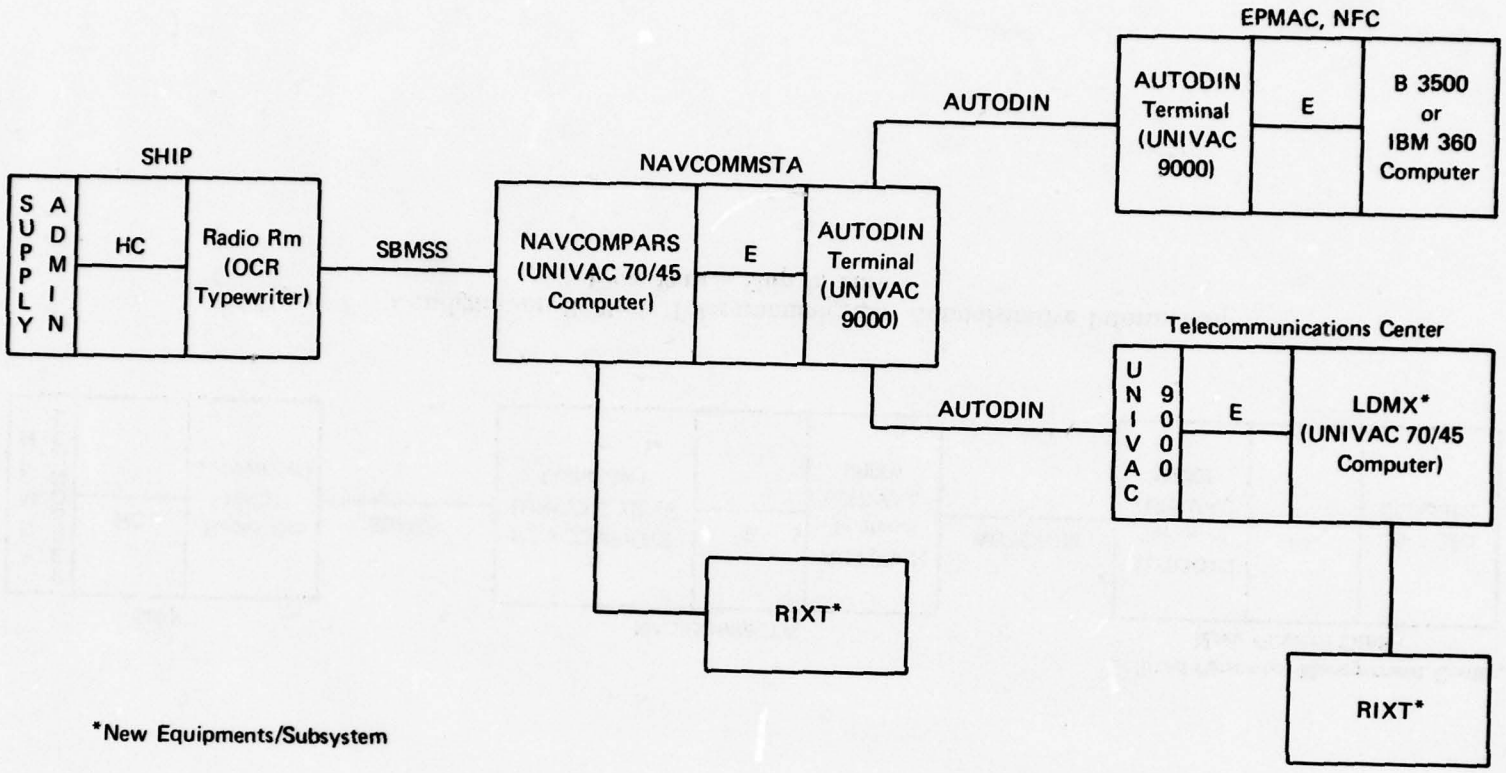


Figure 8 – Configuration C–Supply and Administrative Flow Paths with Combined Current and New Equipments and Subsystems – Ship In Port

developed to extend the services of the NAVCOMPARSs and the LDMXs within their local geographical areas.

4.1.1.3 Proposed Methods. Figure 9 (Configuration D) illustrates a proposed system for transmission of information (supply, maintenance, administrative) between DEAS ships in port and ashore activities (CONUS) via a regular dial-up telephone circuit.

The proposed system for ship-shore transfer of information (in port) permits transmission of unclassified data directly from the ship's DEAS assembly to shoreside host computers via a voice-grade dial-up telephone line.

The proposed system (see Figure 10) requires a telephone with a voice-data switch connected to a modem as part of the DEAS equipment configuration. The present DEAS breadboard equipment configuration consists of a processor, I/O channel with three floppy disk drives, keyboard, cathode-ray tube, printer, card reader, communications adaptor, and modem.

Data from a floppy disk will be transmitted at 1200 bits per second by the DEAS equipment via a voice-grade telephone line to the host computers. The equipment at the receiving facility will consist of the following components: data set (modem)*, adaptor, multi-line controller, and a computer. The equipment aboard the ship consists of a data set (modem), communications adaptor, and a processor (computer) and its peripherals. The proposed system may be upgraded to handle classified materials by placing CRYPTO devices aboard the ship and at the receiving facility (see Figure 10).

This proposed system permits each ship, in port, to transmit information directly to the destination computer. Most computer-to-ship information is not assigned precedence. Therefore, classified information will not be handled in this proposed way. Density of transaction traffic will be used as a basis for determining the number of points of entry (depending on a desired grade of service) to the host computers.

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* See Glossary (Appendix C).

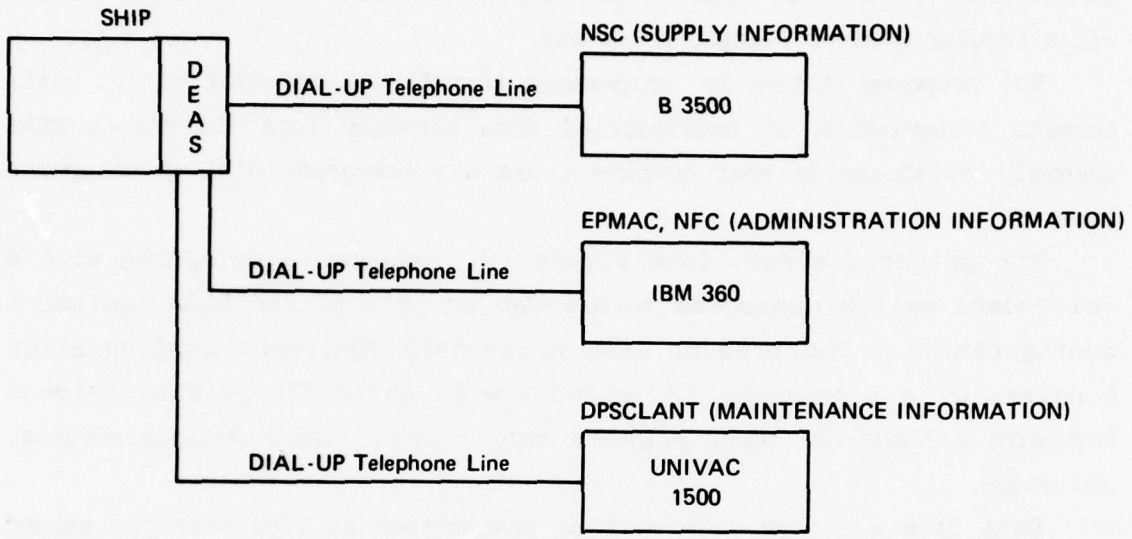


Figure 9 – Configuration D–Ship-Shore Dial-Up Telephone Line Transmission – Ship In Port

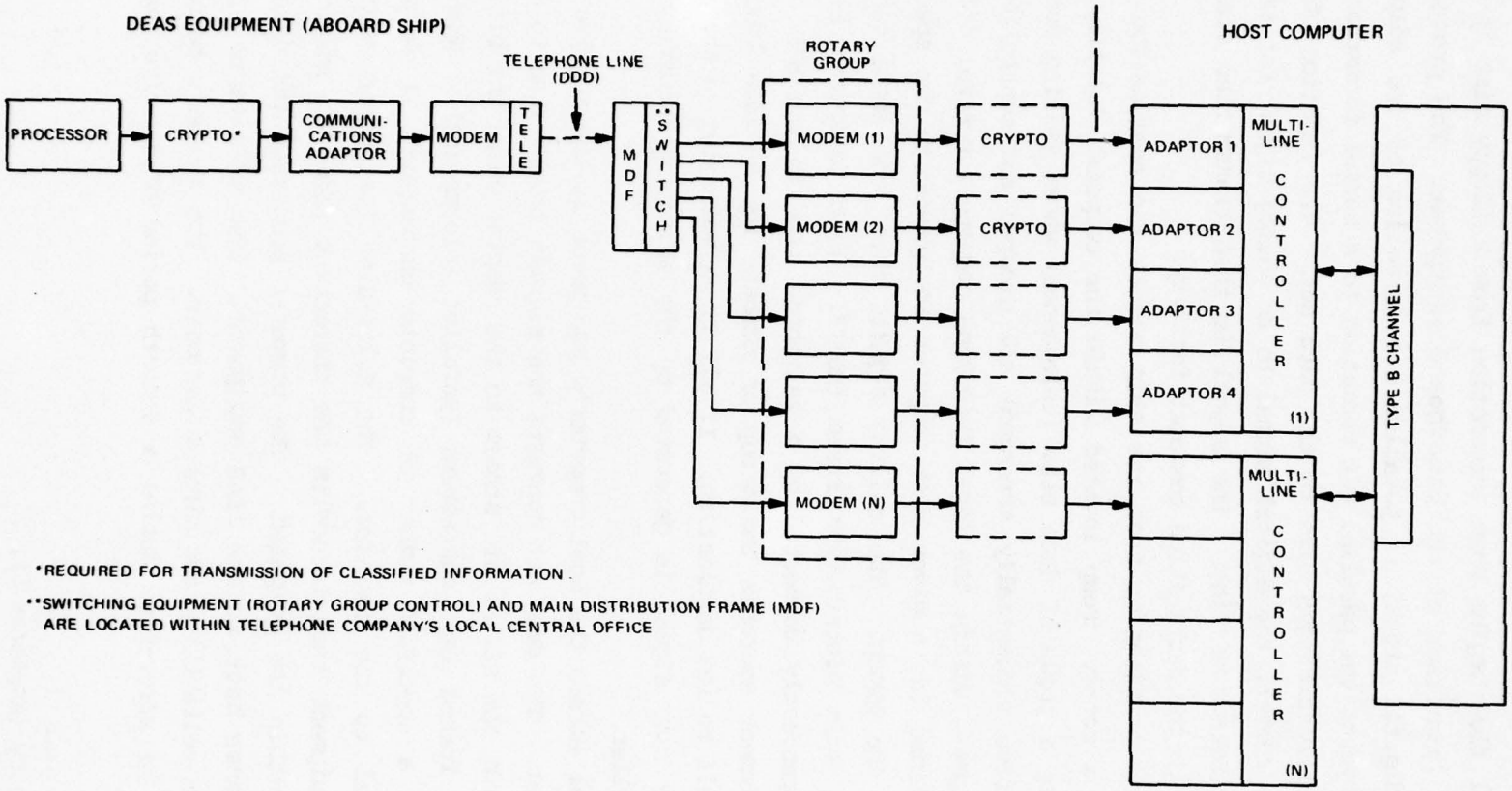


Figure 10 – Proposed Ship-Shore Message Transfer System (In-Port)

The signal flow begins when information from a floppy disk is read into the DEAS processor of the breadboard equipment. The processor forwards the digital signal in parallel bit formation to the adaptor. The adaptor converts the parallel bit formation to a serial formation and moves the serially arranged bits to the data set. The function of the data set is to convert the digital signal to an analog signal for transmission via a telephone line. The signal is then transmitted via the telephone line to the destination computer facility.

Information originating from the ship enters the destination computer through a rotary group located within the computer facility. A rotary group is a group of data sets (telephones) whose calling numbers (two through five sequentially arranged) are grouped and controlled by switching equipment within the local telephone company's central office. All calls destined for a given host computer are placed to one specific number within the group. The calling signals enter the local central office at the Main Distribution Frame (MDF)*. Each telephone in the group is independently connected by a telephone line to the MDF. The switching equipment searches the group of numbers for an idle line and directs the call to its destination. If all lines belonging to the group are in use, a busy signal is generated by the switching equipment and sent to the caller.

The signal enters the host computer's equipment at the receive side of the data set. The data set converts the signals from analog to digital and forwards the serial bit stream to the adaptor where the bits are collected and formed into characters (parallel information). When the adaptor forms a specified number of complete characters, it sends an interrup signal to the computer. The Multi-Line Controller (MLC) or equivalent equipment then transmits the characters from the adaptor to main memory within the computer. The computer processes the data and sends a response back to the DEAS equipment. The advantages of the system include reliability and minimum manpower. The system's operation was found to be error-free during a 6-month period of observation and

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* See Glossary (Appendix C).

analysis using the NAVMAT Facsimile System. The system connects directly from the ship to the host computer and requires no manpower at the host computer.

The next proposal is applicable to information handling within ashore activities. This proposal is addressed to the Link 3 portion of the total information flow paths.

Link 3 is defined as the information flow path between the message destination's AUTODIN terminal and its host computer. This definition is independent of the ship location (in port or at sea). The AUTODIN terminal itelf and the host computer are excluded from the link. Currently, information is transferred manually along Link 3.

A proposal for electronically transferring information between AUTODIN terminals (see Figure 11) and host computers has been developed by the ADP and Communications Branch, Code 0413D, Data Communications Division of the Naval Supply Systems Command. This concept, documented in unpublished form and currently awaiting approval by NAVTELCOM, is called the "On-Line Logistic Data Communications System" and is applicable to transmission of unclassified data only. It is considered for electronically transferring information along Link 3, as shown in Figure 12, and is independent of ship location. The concept calls for two types of messages (on-line and off-line) to enter the AUTODIN terminal (DCT 9000) via the AUTODIN system. On-line messages will be electronically transmitted from the DCT 9000 to a host computer. Off-line messages will be manually routed from the DCT 9000 to their destinations. The type of message will be identified by its routing indicator, which is an entry located in a specified position on the header of the message. These routing indicators identify the message addressees. The messages are in the JANAP 128 format which requires a header identifying the message specifications and a trailer (End-of Transmission (EOT)). The on-line and off-line message screening is performed by software located within the DAAS.

The DCT 9000 receives messages from AUTODIN in the ASCII bit code pattern. The messages are arranged in blocks which consist of 80 data characters and 4 framing characters. The DCT 9000 removes the framing characters and transmits the remaining data.

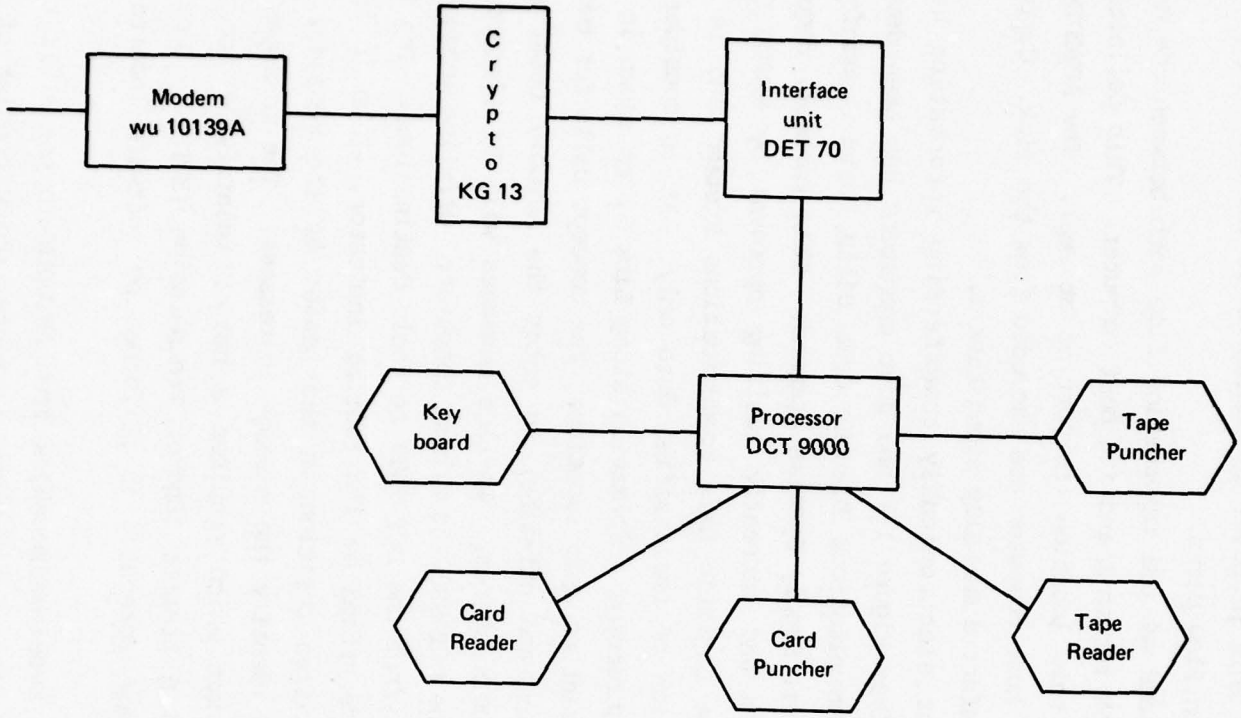


Figure 11 – An AUTODIN Terminal Assembly

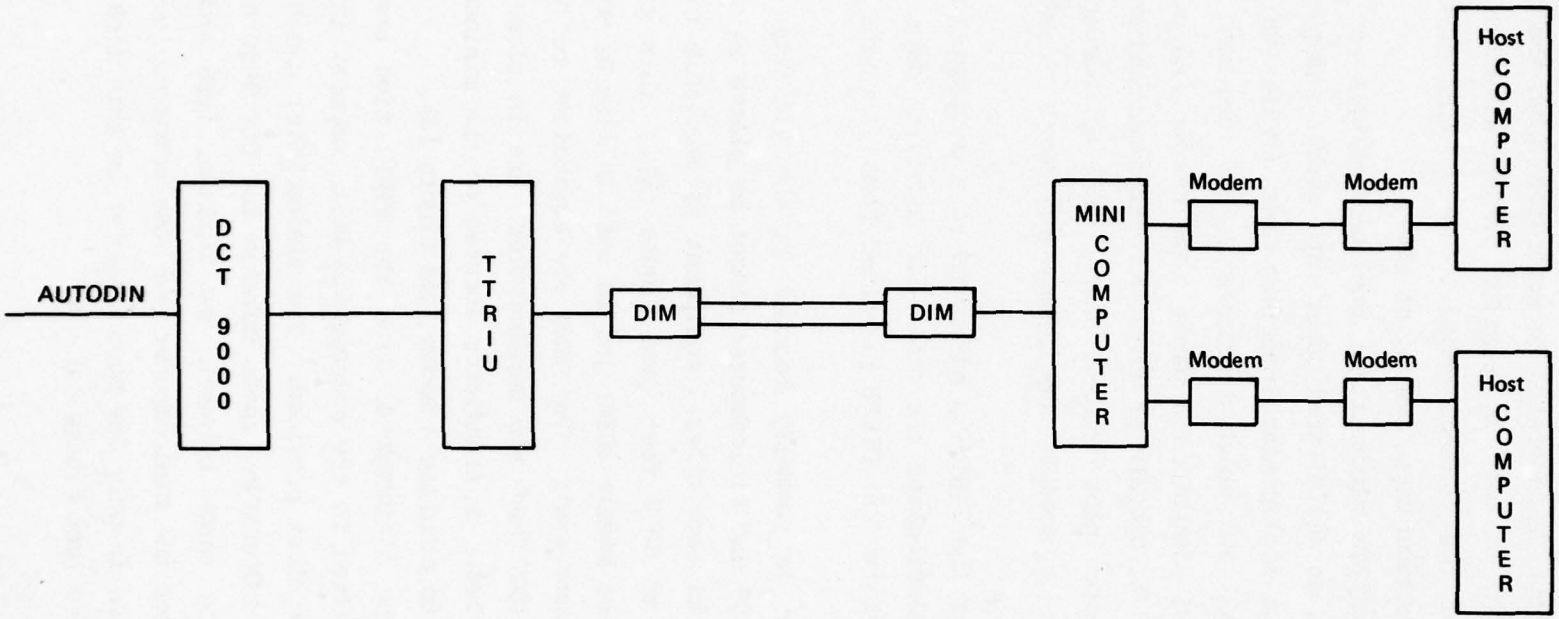


Figure 12 – On-Line Logistic Data Communications System Concept Applicable to Link 3

The DCT 9000 output is generated in accordance with the originator's request. The request is made by placing predetermined characters in specified columns of the message header. An originator may request output to be on either hard copy, cards, or tape.

Off-line messages are handcarried; on-line messages are transmitted to a minicomputer via an assimilated paper tape reader and puncher. This device is a Torn Tape Replacement Interface Unit (TTRIU) which is hardwired to the DCT 9000 and which functions as an interface to a minicomputer. the TTRIU simulates a paper tape reader and puncher, and requires the DCT 9000 to operate as if it were transmitting and receiving data to and from a paper tape device. Since TTRIU is independent of the type of information, it accepts any format and makes no adjustment to the data.

The other side of the TTRIU is hardwired to a minicomputer. It uses two wires, one for sending and the other for receiving data. Any minicomputer can connect to the TTRIU provided that it meets the RS232C standard.

The minicomputer is normally located in the vicinity of the DCT 9000. If the DCT 9000 and minicomputer cannot be placed in close proximity (within 50 feet of each other), equipment is available to extend the connecting cable up to 5000 feet (see Figure 12). This equipment is called a Data Interface Module (DIM) and is used in lieu of modems (digital-analog signal converters). Two DIMs are equivalent to four modems. When the processors (DCT 9000 and minicomputer) are in close proximity, a modem is not required. A translator located on the minicomputer side of the TTRIU is used to simulate a modem (see Figure 13).

Data entering the minicomputer from the TTRIU side are stored on tape and then transmitted to the appropriate host computer in accordance with the routing indicators provided. The minicomputer can handle up to four host computers. Operating speed between the DCT 9000 and minicomputers is expected to range between, and include, 1200 and 9600 bps. Operating speed between the minicomputer and host computer is expected to be 1200 bps. If there is only one host computer in this link, the minicomputer can be omitted (see Figure 14).

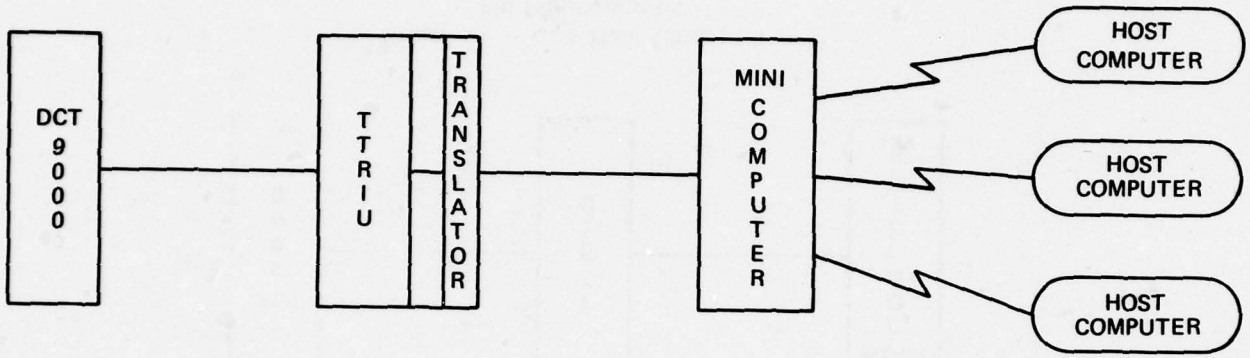


Figure 13 -- DCT 9000 and Minicomputer Within 50 Ft of Each Other

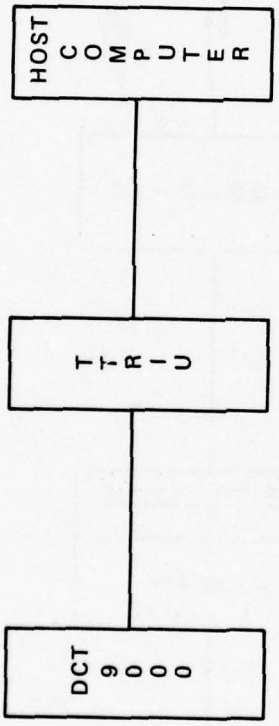


**Figure 14 – One Host Computer–
No Minicomputer**

If service is interrupted at the TTRIU interface of the minicomputer, the DCT 9000 will divert the on-line incoming messages from the AUTODIN side to magnetic tape. This process will continue for a period up to one hour. If the problem is corrected within an hour, the messages will be directed to the TTRIU. The messages which are spooled to tape will be read by the DCT 9000 and sent to the TTRUI as normal messages. If the elapsed time exceeds an hour, the DCT 9000 operator will notify the AUTODIN Switching Center* to reroute traffic to a predefined location.

Data are transmitted between the mini and host computers via a normal communications channel which consists of a dedicated line with a modem at each end. Transmission along the dedicated line requires the data to be in analog signals. All other equipment utilizes digital signals.

This concept appears to be feasible for data transmission along Link 3. The authors recommend the concept for consideration.

4.1.2 Ship At Sea

4.1.2.1 Current Information Flow Configurations. Information is handcarried along Link 1 and is generally transmitted along Link 2 by automatic equipment. Ship to shore information transfer is made via radio (HF/LF) only or radio-satellite (UHF/SHF) and then via AUTODIN ashore. Handcarry is also the means of information transfer along Link 3. Configurations are given to illustrate the equipment, means of tranfer, and subsystems used to generate information from ships at sea to ashore destinations.

Figure 15 (Configuration E) illustrates the current equipment, means of transfer, and subsystems used to transmit supply information directly from ships at sea to CONUS activities. Figure 16 (Configuration F) illustrates the current equipments, means of transfer, and subsystems used to transmit administrative information directly from ships at sea to CONUS activities.

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* See Glossary (Appendix C).

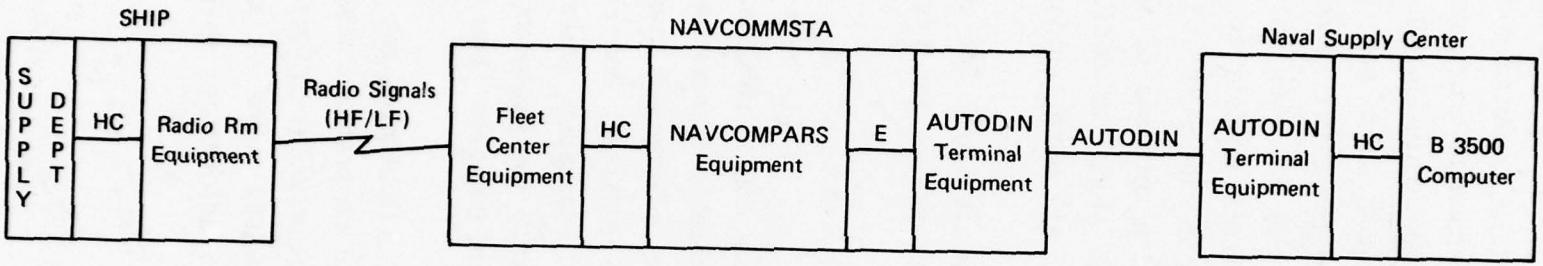


Figure 15 – Configuration E–Supply Information Flow Path – Ship At Sea

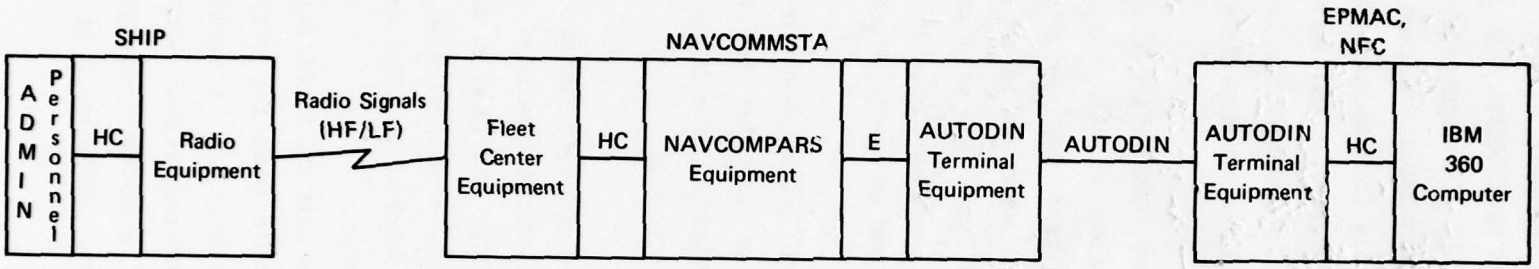


Figure 16 – Configuration F–Administrative Information Flow Path – Ship At Sea

When a ship at sea cannot transmit directly to a CONUS NAVCOMMSTA, it relays information to a CONUS NAVCOMMSTA via an overseas telecommunications relay station. Figure 17 (Configuration G) illustrates current equipment, means of transfer, and subsystems used to transmit information (supply, administrative) indirectly from ships at sea to CONUS activities.

The equipment, means of transfer, and subsystems used for transmission of indirect and direct information are similar. The noticeable difference is in the computers at the message destination.

4.1.2.2 Combined New and Current Information Flow Configuration. Within the Fleet Satellite Communication Program, a high-speed transmission satellite is planned to enhance transmissions along Link 2. This satellite will relay information between ships at sea and NAVCOMMSTAs at speeds up to and including 9600 bps. The previous proposal for information transmission along Link 3 is independent of ship location and functional type of information and can be used in conjunction with the Fleet Satellite.

Figure 18 (Configuration H) illustrates combined new and current equipment/subsystems and means of transfer for transmitting information from ships at sea to CONUS activities. The basic characteristics of each subsystem were discussed in section 3.2.

4.1.2.3 Proposed Method. An electronic means of transferring information along Link 1 is proposed which combines new equipment with that currently in use. In this method, the DEAS assembly, housed in a suitable location (supply department, etc.) outside of main communications (radio room), is hardwired or patched to DEAS related/compatible equipment within the communications area.

The DEAS assembly would include an intelligent terminal for processing and managing data, a flexible disc for storing information, a high speed printer for printing information, a cartridge tape and keyboard used to input information, a communications adaptor for signal arrangement and speed selection, and a modem (telephone included) used for digital/analog signal conversion. DEAS will be required to operate at

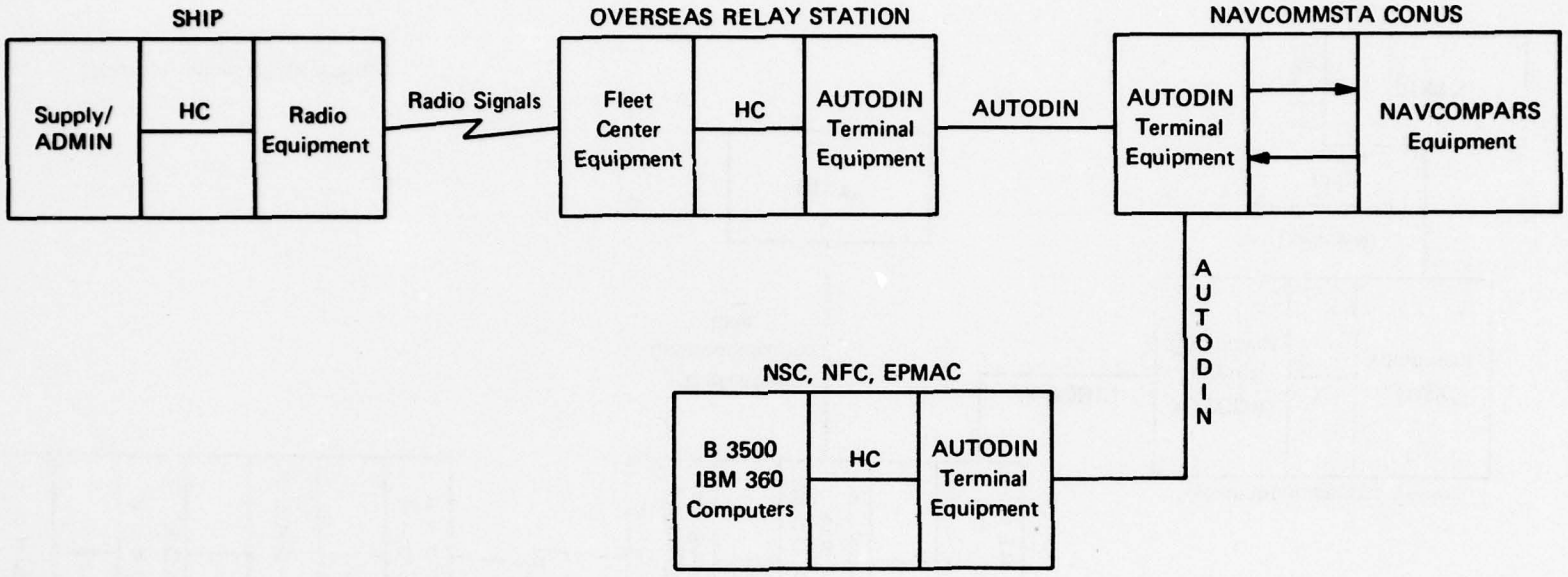


Figure 17 – Configuration G–Indirect Transmission of Supply and Administrative Information Between Ships At Sea and CONUS Activities

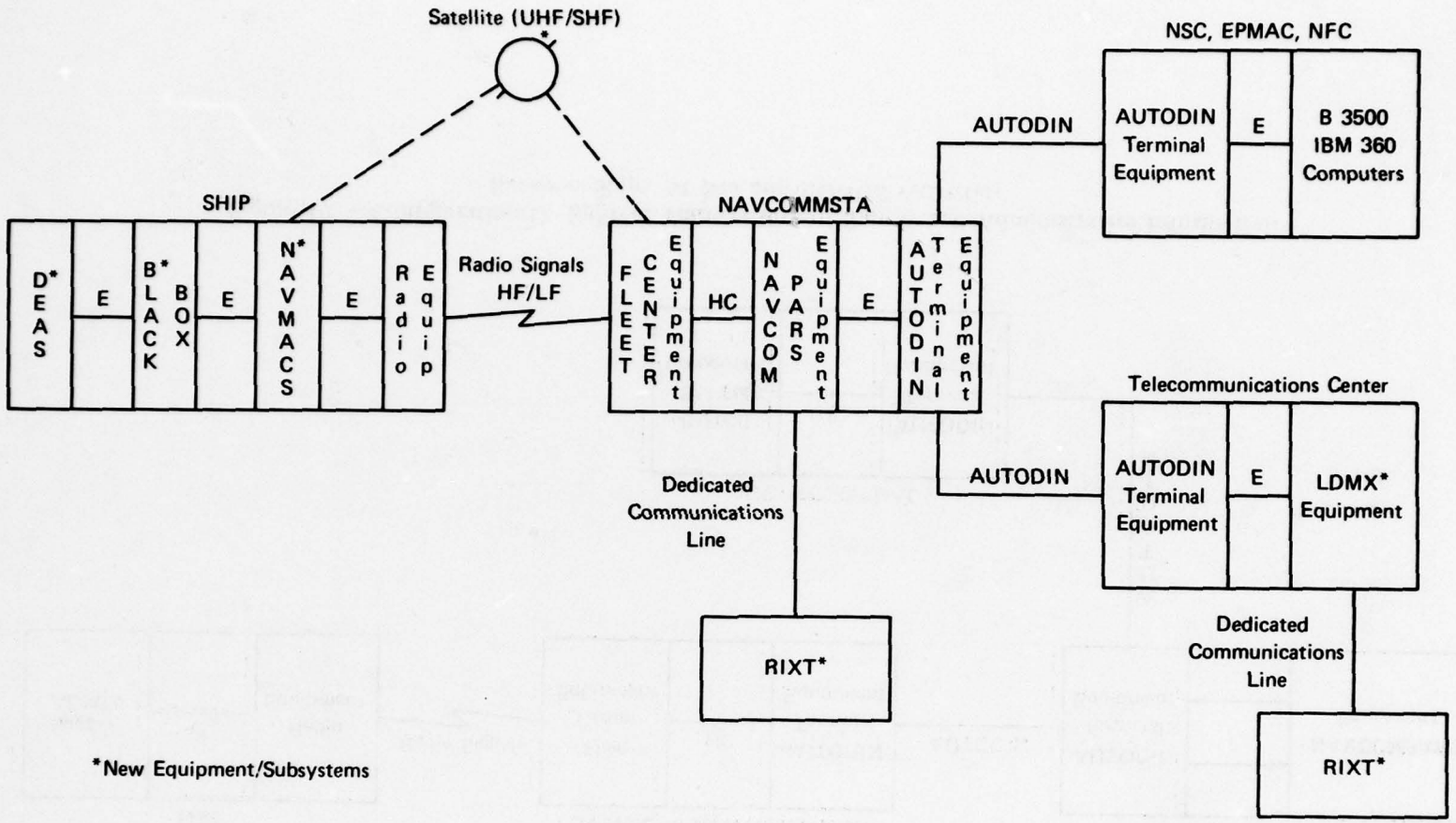


Figure 18 – Configuration H–Combined Current – New Equipments/Subsystems for Transmission of Supply and Administrative Information – Ship At Sea

the following transmission speeds: 110, 150, 300, 600, 1200, and 4800 bps.

This concept requires DEAS-related equipment located within the radio room to include a modem (telephone included); a "black box" information processor with send, receive, store-and-forward capabilities, and transmission speeds equal to those of the DEAS assembly; and other peripherals, including a paper tape reader, as required.

The first two assemblies must be connected (modem to modem) with a dedicated shipboard telephone line. Shipboard telephone lines are normally voice grade. A voice grade line (channel) is one suitable for transmission of speech, generally with a bandwidth capable of handling a frequency range of about 300 to 3000 cycles per second. If such a line is not satisfactory for data transmission, conditioning can be applied by inserting filters in the channel. The filters keep the frequency components in alignment with each other.

When information is to be transmitted between DEAS and the radio room, the send operator (one man per assembly) informs the receive operator by telephone that he has traffic. Information originating from the DEAS assembly is fed into the processor by keyboard or cartridge tape in the required format. Within the processor, the information is converted from the form (tape, hard copy, etc.) in which it is received to electronic digital signals and sent to the modem. The modem converts the digital signals to analog signals for transmission through the telephone line and then sends them to the DEAS-related equipment's (black box) modem. This modem converts analog signals to digital for local processing. The "black box" assembly delivers the information in the form (tape, hard copy, etc.) specified. The radio operator makes message adjustments, if required, and forwards the information through the regular communications equipment (radio, NAVMACS, etc.) from the ship to the previously described communications system.

Input received by the radio room from off-ship and destined for DEAS is read into a paper tape reader (a peripheral of the "black box" assembly), converted to a signal form, and transmitted to DEAS.

Since DEAS can be designed to handle supply, administrative, and maintenance information, there may be several DEAS assemblies located in various places aboard a ship. These assemblies can be connected in several ways, as shown in Figure 19.

The proposed method for transferring information along Link 1 is for the transmission of unclassified information only. Without modification of the system to include crypto devices, classified information must be transferred manually (handcarry) between DEAS and the radio room.

4.2 DEAS COMPATIBILITY REQUIREMENTS

To be operationally compatible with the configurations given in section 4.1, DEAS must meet the requirements stated in Table 36. Each configuration was considered using the basic characteristics previously used to describe the major current and new equipment/subsystems, and pro posed methods. Included in the table are the basic requirements that DEAS must satisfy in order to be operationally compatible with current and new equipments/subsystems described in section 3.2.

Configurations A, B, and C have the same set of compatibility requirements; however, the flow paths are for different information types and host computers at the ashore locations. Configurations D and H have a similar set of requirements. Both configurations transfer information electronically with little or no manual handling and eliminate possible human error. Configurations E, F, and G have similar sets of requirements, which indicate that the systems are independent of information types and operational speeds.

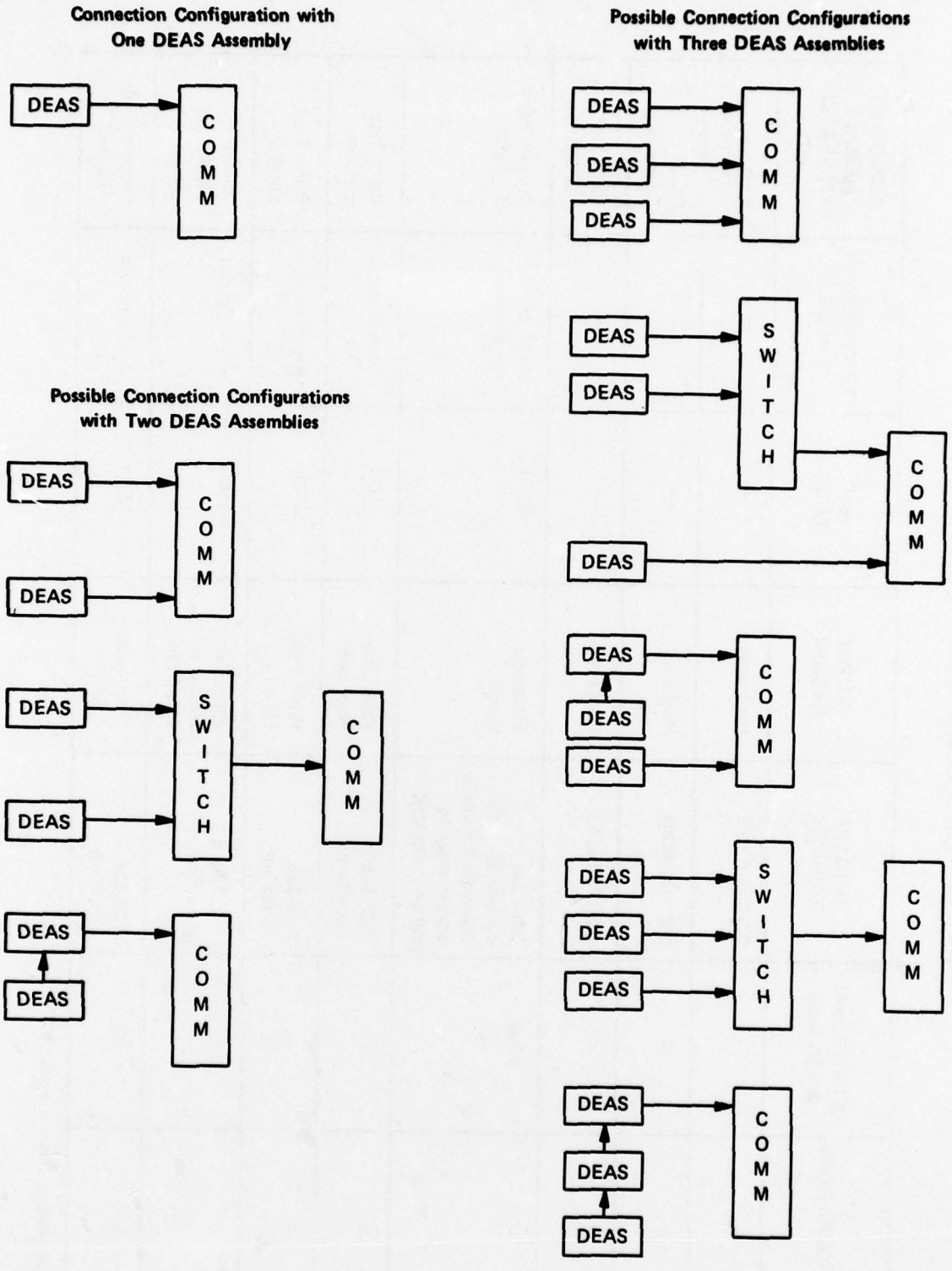


Figure 19 – DEAS Configurations

TABLE 36 – DEAS COMPATIBILITY REQUIREMENTS

CONFIGURATIONS	OPERATIONAL SPEED (bps)	MESSAGE FORMATS	OUTPUT MEDIUM	BIT CODE	TRANSMISSION MODE	SPECIAL MESSAGE PREPARATION AID
A	—	DD 173 (OCR)	Hard copy	—	—	OCR Typewriter
B	—	DD 173 (OCR)	Hard copy	—	—	OCR Typewriter
C	—	DD 173 (OCR)	Hard copy	—	—	OCR Typewriter
D	1200	DD 1348 NAVPERS 1306 NAVPERS 1070/75 EDVR 1080-14 OPNAV 4790/2K	Electronic signals	ASCII	Synchronous, Asynchronous	Programmable Terminal
E	—	ACP 126 (modified)	Paper Tape, Hard copy	ASCII	Asynchronous	Paper Tape puncher
F	—	ACP 126 (modified)	Paper Tape, Hard copy	ASCII	Asynchronous	Paper Tape puncher
G	—	ACP 126 (modified)	Paper Tape, Hard copy and Paper Tape	ASCII	Asynchronous	Printer, Paper Tape puncher
H	100	ACP 126 (modified)	Electronic signals	ASCII	Asynchronous	Programmable Terminal

Note:—Designates not applicable

APPENDIX A
DATA SOURCES AND VISITS

Bureau of Naval Personnel, Washington, D.C.
- Code 503, Fleet Liaison Branch

Commander, Naval Material
- Code MAT 04M, 3M Staff

Commander, Naval Surface Force, U.S. Atlantic Fleet, Norfolk, Virginia
- Code N11, Force Personnel Division
- Code N14, Fleet Personnel Readiness Branch
- Code N45, 3M Division
- Code N63, Readiness and Training Division

Fleet Maintenance Assistance Group, Norfolk, Virginia
- Maintenance Document Control Officer

Navy Finance Center, Cleveland, Ohio
- Code OAI, Public Affairs Office
- Head, Fleet Department

Navy Regional Finance Center, Washington, D.C.
- Code NRFC FO, Executive Director

Ships at Norfolk, Virginia
- USS BYRD, DDG 23
- USS NEW, DD 818
- USS VREELAND, FF 1068

APPENDIX B
REFERENCES

1. Siegel, B., and C. Ash, "DEAS Information Networks Study, Phase 1 - Current Ship-Shore Information Transfer Description", DTNSRDC Report 4704, June 1975, (U)

2. Defense Supply Agency, "An Introduction to the Defense Supply Agency", 1974, (U)

3. OPNAVINST 4790.4, "Ship's 3-Maintenance, Material, Management Manual", Vol. 1, 1 June 1973, (U)

4. Commander, Naval Telecommunications Command, "Subsystem Project Plan", October 1974, (U)

APPENDIX C
GLOSSARY

ACP - Allied Communication Publications that describe telecommunication messages.

Analog Signals - Electronic signals generated by a continuously varying voltage or frequency.

ASCII - American Standard Code for Information Interchange which transmits seven information bits per character. An eighth bit may be added for error detection (parity).

Asynchronous Transmission - Transmission in which time intervals between transmitted characters may be of unequal length. Transmission is controlled by START and STOP bits at the beginning and end of each character.

AUTODIN - Automatic Digital Network. AUTODIN is a high-speed communications network used by military services and other government agencies.

AUTODIN Switching Center - A relay station within the AUTODIN system which performs a message store-and-forward switching function.

CINCLANTFLT - Commander In Chief, U.S. Atlantic Fleet.

CINCPACFLT - Commander In Chief, U.S. Pacific Fleet.

Closing deferral - A document (OPNAV 4790/2K form) which states that a job requirement is satisfied.

DAAS - Defense Automatic Addressing System, a real-time random access digital computer system with buffered line connections to AUTODIN.

EDVR - Enlisted Distribution Verification Report, document that deals with Navy enlisted personnel matters.

EMCON - Emission Control. A restricted radio transmission condition set by the Officer in Tactical Command (OTC). If limited EMCON condition is put into effect, the OTC or CO can authorize important radio transmissions. If a total EMCON condition is in effect, no radio transmissions are authorized.

Intermediate Maintenance Activity - A Naval activity that provides repair services which are beyond ship force capability but less than shipyard (depot) requirements, like ship overhaul, to authorized ships. These repair activities are located ashore and afloat, i.e., FMAGs and Tenders.

JANAP - Joint Army, Navy, Air Force Publications. A series of publications produced by supporting agencies of the Joint Chiefs of Staff and intended for distribution through the approved offices of distribution within the Army, Navy, and Air Force.

Main Distribution Frame - A piece of hardware within a telephone company's local central office that performs automatic line switching and to which all lines serviced by that office are independently connected.

MILSTRIP - Military Standard Requisitioning and Issue Procedures. A program designed to simplify supply management by the use of standard forms, formats, and codes for requisitioning and issuing supplies and repair parts.

Modem - A device that modulates and demodulates signals transmitted over communications circuits.

NAVCOMPT - Navy Comptroller - The official in charge of Naval expenditures.

NAVCOMMSTA - A message relay station which relays messages between ships, ship-shore activities, and ashore activities. Input/output message mediums include radio, AUTODIN, and hard copy.

NAVPERS - Naval Personnel

Opening defferal - A document (OPNAV 4790/2K form) that requests maintenance service which is beyond the ship force repair capability.

SBMSS - Shore Based Message Service System. A courier system provided by the Naval Communication Station (NAVCOMMSTA), Norfolk, to pick-up and deliver messages between ship units berthed at the Naval Station and the D and S Piers, Norfolk and NAVCOMMSTA.

Synchronous Transmission - Transmission of a number of characters called a "block" for which timing information (between sending and receiving stations) is usually sent at the beginning of the block with no interval between individual characters.

3M - Maintenance and Material Management.

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