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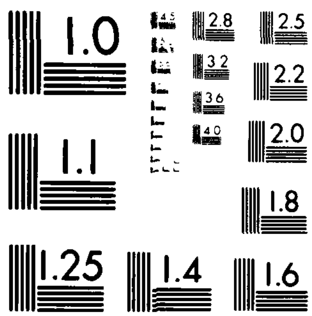

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NALCOMIS AND THE AVIATION
MAINTENANCE ANALYST

by

Glenn J. Boston

December 1979

Thesis Advisor Phillip Ein-Dor

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Although NALCOMIS basically provides for improved mechanization (computerization) of the existing Naval Aviation Maintenance Program, some functional responsibilities may change when NALCOMIS is implemented.

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The analysis function is one of those areas where change of responsibility can be expected. Analysts now perform certain functions generally in accordance with OPNAVINST 4790.2B requirements. When NALCOMIS is implemented, some of their specific responsibilities will be deleted and other responsibilities would or should be added. Exactly what the new role of the Analyst would be under NALCOMIS is a question which should be considered carefully and in-depth. Identification and implementation of required changes in the Analyst's functional responsibilities should commence now in order to meet the demands on the MIS when NALCOMIS is implemented.

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NALCOMIS and the Aviation Maintenance Analyst

by

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Lieutenant Commander, United States Navy
B. A., Naval Postgraduate School, Monterey, 1974

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requirements for the degree of

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I. INTRODUCTION

Naval Aviation Maintenance is a large, tremendously complex endeavor which involves thousands of people and billions of dollars worth of capital equipment and facilities. Aviation maintenance is of paramount importance in the attainment of the overall goal of Naval Aviation. It is also a significant factor contributing to the ability of the Navy Department to meet its responsibilities for national defense.

Operation of this complex maintenance activity demands expert management at all levels of command. Management of the myriad aspects of aviation maintenance is, as might be expected, a very complex and multi-faceted endeavor. Effective aircraft maintenance is contingent on the accomplishment of proper planning and efficient utilization of assets. As technological advances provide more complex and expensive aircraft with their sophisticated weapons sytems, the demand for better maintenance management intensifies.

As aircraft and their systems have evolved over time, the management systems have likewise evolved. The Naval Aviation Maintenance Program (NAMP) defines the organization responsible for aircraft maintenance and prescribes the procedures required in conducting aircraft maintenance. It is the culmination of changes which have been implemented over the years.

Management Information Systems (MIS) are an integral and important part of effective management. The advent of electronic computers with huge data storage capacity enhanced the ability of MIS to provide managers with information upon which they could base their management decisions. Many definitions of MIS have been suggested by various writers over the past several decades but one which seems particularly descriptive and useful for explanatory purposes was suggested by Ein-Dor and Segev [4]. By their definition, "A management information system is a system for collecting, storing, retrieving and processing information that is used, or desired, by one or more managers in the performance of their duties." Thus it is by collecting, storing, retrieving and processing information that an MIS serves as a tool of management at all levels.

The Naval Aviation Logistics Command Management Information System (NALCOMIS) is an MIS designed to provide aviation maintenance managers with decision-making information. Currently a project under the cognizance of the Naval Air Systems Command, NALCOMIS will improve the accuracy and timeliness of management information available to all levels of management. It will update the NAMP and result in improved aircraft availability and readiness by enhancing the effective utilization of manpower and material.

As indicated by the definition of MIS, collection, storage, retrieval and processing of information are essential functions required to provide managers with necessary information. A subsystem of the NAMP, the Maintenance Data System (MDS), serves that purpose. Data Analysts assigned to aviation maintenance activities have a major responsibility for ensuring that maintenance data are accurately reported. The overall primary responsibility of the Analyst is to provide management with analytical reports and recommendations regarding aircraft material condition and utilization, maintenance workload, manpower utilization, and failure trends. It is through information processing that he meets his responsibility to provide management with appropriate information.

This thesis will briefly described the overall Naval Aviation Maintenance Program and will provide a brief description of NALCOMIS. It will show how implementation of NALCOMIS will assist in obtaining improved aircraft maintenance. The functions and responsibilities of the Data Analyst will be discussed with the intention of illustrating the importance of the analysis function as it exists now, as it could be after NALCOMIS is implemented. Potential changes in the Data Analyst's role are predicted and steps necessary to ensure the success of the changes are identified.

II. NAVAL AVIATION MAINTENANCE PROGRAM

The Naval Aviation Maintenance Program (NAMP) is essentially a large and complex management system. Chief of Naval Operations (CNO) instruction, OPNAV Instruction 4790.2B, promulgates the overall maintenance policies, procedures and responsibilities for the conduct of the NAMP at all levels of maintenance throughout Naval Aviation. More specifically, the OPNAVINST 4790.2B outlines command, administrative, and management relationships and establishes policies for assignment of maintenance tasks and responsibilities.

A. EVOLVED INTEGRATED MAINTENANCE SYSTEM

As indicated in the previous chapter, increased complexity and expense of newer aircraft dictated that a more sophisticated system of management be available to maintenance managers. The NAMP was established to provide an integrated system for performing aeronautical equipment maintenance and all related support functions. Due to the dynamic nature of the program, the NAMP has been revised periodically since it was established by CNO in October 1959 to incorporate improved methods and techniques. The Naval Maintenance and Material Management (3-M) System was introduced in January 1965 for the purpose of providing for maintenance data collection, man-hour accounting, and aircraft accounting systems as part of the NAMP. In January 1968 CNO directed that major NAMP implementing directives be revised and updated and promulgated as a cohesive, command oriented publication. As a result, OPNAVINST 4790.2 was issued in July of 1970 and consisted of four volumes, which included the Maintenance Data Collection Subsystem (MDCS). A major update and revision was issued as OPNAVINST 4790.2A in June of 1972. The current volume instruction, OPNAVINST 4790.2B, became effective on 1 October 1979.

B. NAMP OBJECTIVES

The objectives of the NAMP are clearly stated in the promulgating instruction[1]:

> "...to achieve the readiness and safety standards established by the CNO, with optimum utilization of man-power facilities, material, and funds. This is to be accomplished through policy guidance, technical direction, management, and administration of all programs affecting activities responsible for aviation

maintenance, including associated material and equipment. It encompasses the repair of aeronautical equipment and material at the level of maintenance which will ensure optimum use of resources; the protection of weapons systems from corrosive elements through prosecution of an active corrosion control program, the application of a systematic planned maintenance program; and the collection, analysis, and use of pertinent data in order to effectively improve material readiness and safety, while simultaneously increasing the efficient and economical management of human, monetary, and material resources.

C. NAMP APPLICABILITY

The NAMP is applicable to all Navy and Marine Corps activities concerned with the operation, maintenance, rework, production, and support of aircraft and certain training devices. It also applies to specific types of ground support equipment which support aviation meteorological and photographic equipment, air launched weapons missile targets, and aeronautical equipment.

D. THREE LEVELS OF MAINTENANCE

In order to obtain optimum utilization of manpower, facilities, material, and funds, aircraft maintenance has been divided into three levels of maintenance: organizational, intermediate and depot. Each level has been assigned specific responsibilities under the NAMP Manual. Performance of aircraft maintenance is the responsibility of command and is defined for each echelon of command by OPNAVINST 4790.2B.

The three levels of maintenance are listed below with a brief description of assigned responsibilities. [1]

1. Organizational Level. (Lowest Level) Those upkeep maintenance functions normally performed by an operating unit on a day-to-day basis in support of its own operation. In general, the required work is accomplished by maintenance personnel assigned to the aircraft reporting custodians. Organizational level functions include inspection, servicing and handling of equipment as well as "on-equipment" corrective and preventatiave maintenance including removal and replacement of defective parts and components. Incorporation of designated technical directives and necessary record keeping and reports peculiar to organizational level maintenance are also functions assigned to this level of maintenance.

2. Intermediate Level. That upkeep maintenance which is the responsibility of, and is performed by, designated maintenance activities in support of using organizations.

Calibration; off-equipment repair or replacement; repair or replacement of damaged or unserviceable parts, components, or assemblies and the manufacture of certain non-available parts are phases of intermediate responsibility. Accomplishment of certain periodic inspections and providing technical assistance to using activities are also phases of this level of maintenance. The following functions are included in the responsibilities of the intermediate level of maintenance.

- Repair, test, inspection, modification and check of aeronautical components/equipment and related support equipment.
- Calibration of designated equipage.
- Processing of aircraft components/equipment from stricken aircraft.
- Technical assistance, when required, to supported units.
- Incorporation of designated technical directives.

3. Depot Level. (Highest Level) That rework maintenance performed on material requiring major overhaul or a complete rebuilding of parts, assemblies, subassemblies, and end items. Manufacture of parts, modifications, testing and reclamation are also included. This level serves to support lower categories of maintenance by providing engineering assistance and performing maintenance beyond the capability of the lower level activities.

Utilization of three levels of maintenance is based on a concept established by the Department of Defense, designed to provide optimum utilization of manpower, material, and facilities.

E. STANDARD ORGANIZATIONAL STRUCTURES

The remainder of this chapter will concentrate on the organizational and intermediate levels of maintenance since they are the levels affected by NALCOMIS MODULE I. Navy and Marine Corps organization structures differ somewhat from each other at both intermediate (I) and organizational (O) levels, but for the purposes of this paper they are similar enough so that understanding how one system operates will allow the reader to understand how the other operates. Figures 2-1 and 2-2 depict the standard organizational structure of Navy and Marine Corps O level maintenance activities and Figures 2-3, 2-4, and 2-5 depict the standard structure for Navy (Ashore and Afloat) and Marine Corps I level activities, respectively. The Navy organization will be used to illustrate the major aspects of the NAMP as it applies to O and I level maintenance.

F. ORGANIZATIONAL LEVEL RESPONSIBILITIES

The organizational level activities are, in general, the activities to which aircraft are assigned - the aircraft custodians. As shown in Figure 2-1, staff functions include Quality Assurance/Analysis and Administration Divisions. The maintenance effort is conducted by three production divisions which are generally subdivided into work centers as indicated.

1. Maintenance Material Control Officer

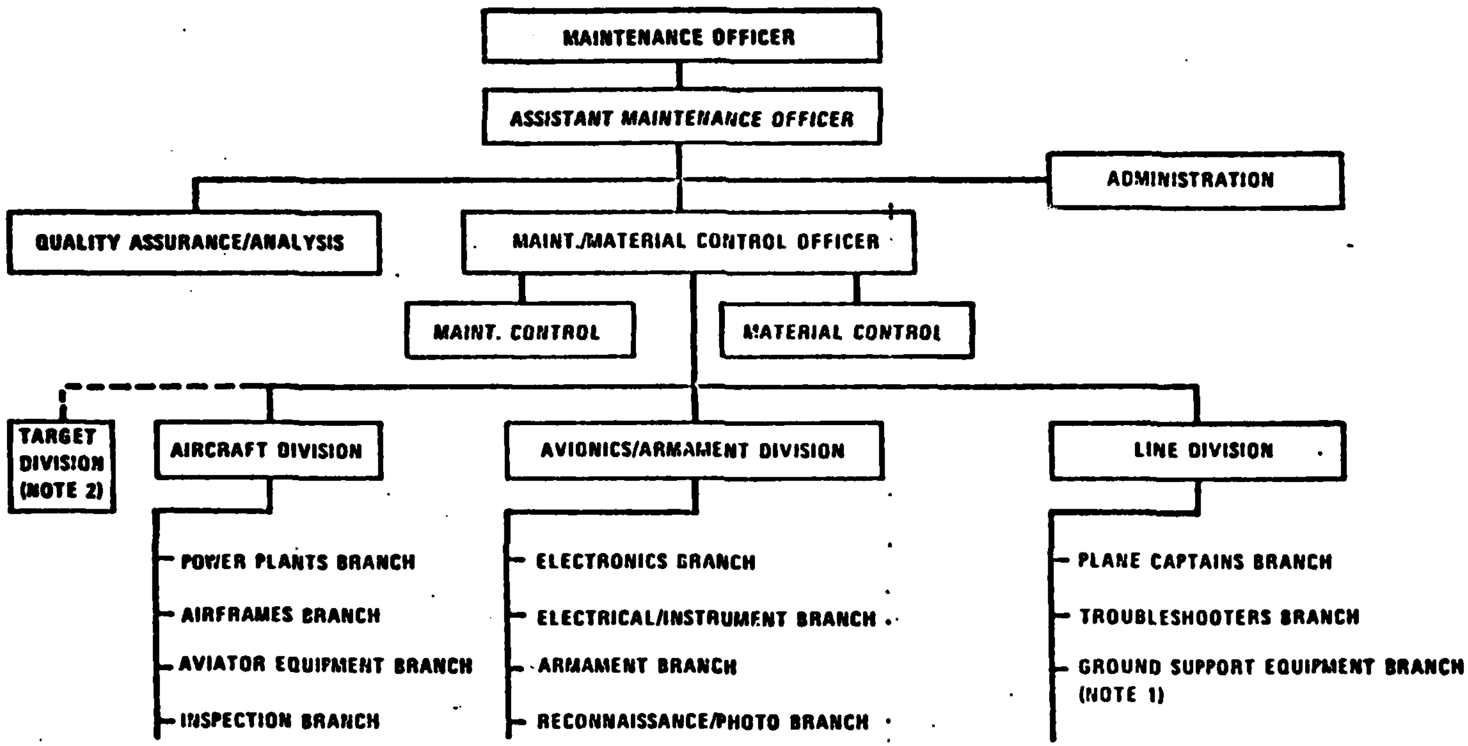
The Maintenance/Material Control Officer (MMCO) is responsible to the Maintenance Officer (MO) for the overall productive effort and material support of the department. Some of his more important responsibilities are listed below.

- Coordinate and monitor the department workload.
- Maintain liaison with supporting activities.
- Maintain technical directive control procedures for the department.
- Review monthly Maintenance Data System (MDS) reports to ensure effective utilization of personnel, equipment, and facilities.
- Establish procedures to monitor the Subsystem Capability Impact Reporting (SCIR) system and such other reports as are required.
- Keep the MO advised of the overall work load and material situation as it affects the department.

2. Maintenance Officer

As indicated in Figure 2-1, the MMCO reports to the MO who is responsible to the Commanding Officer for accomplishment of the department mission. In meeting his responsibilities, the Maintenance Officer must accomplish many functions. Some of his major functions are listed below.

- Employ sound management practices in the handling of personnel, facilities and material.



NOTE 1: When responsibilities relative to operation and maintenance of Ground Support Equipment are extensive, the Commanding Officer will establish a Ground Support Equipment Branch under the Line Division to coordinate and/or carry out organizational maintenance functions on assigned support equipment.

NOTE 2: When responsibilities relative to the operations and maintenance of aerial or surface targets are extensive, the Commanding Officer will establish a Target Division.

Figure 2-1 Navy Organizational Level Maintenance Department Organization

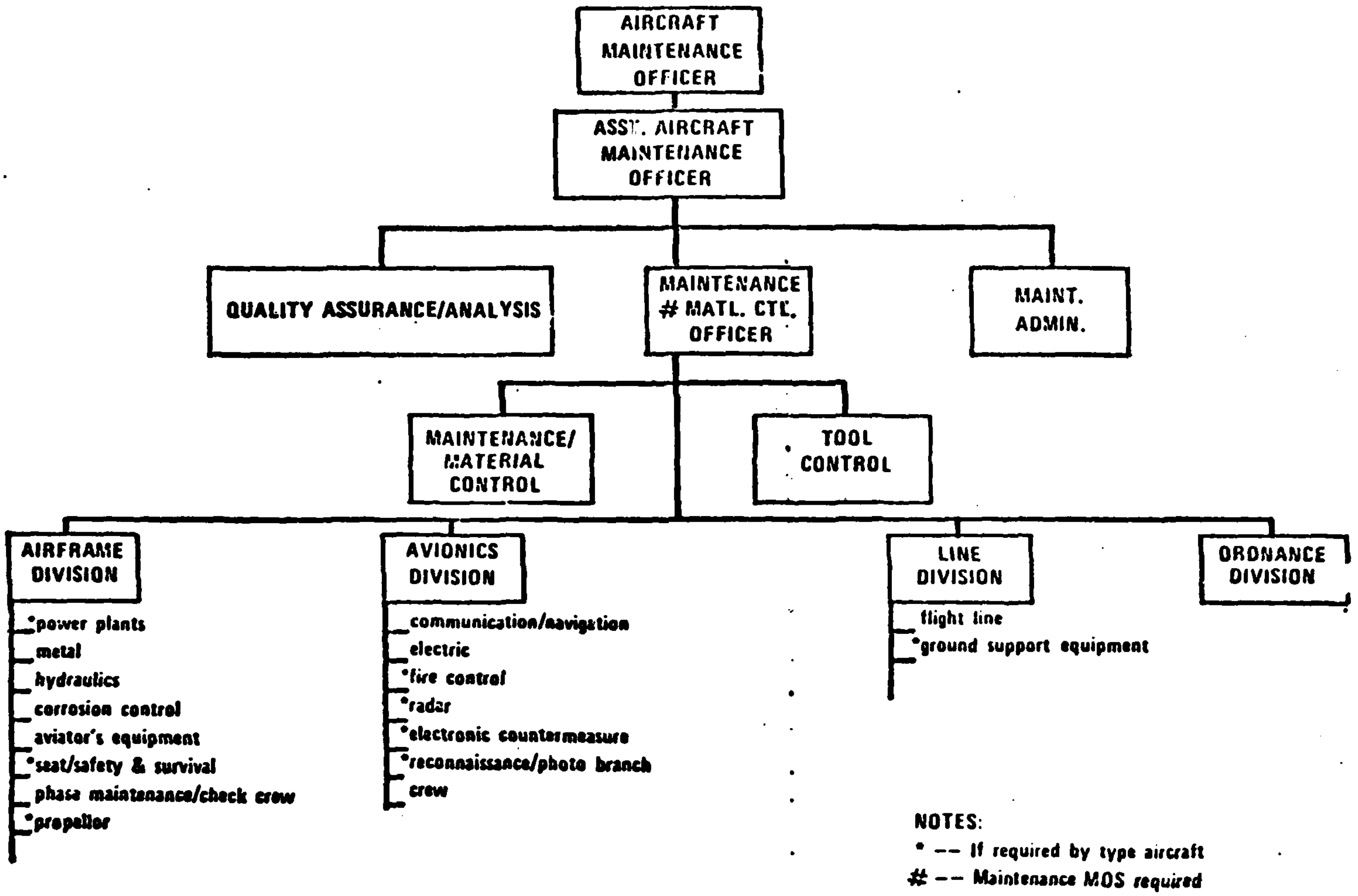
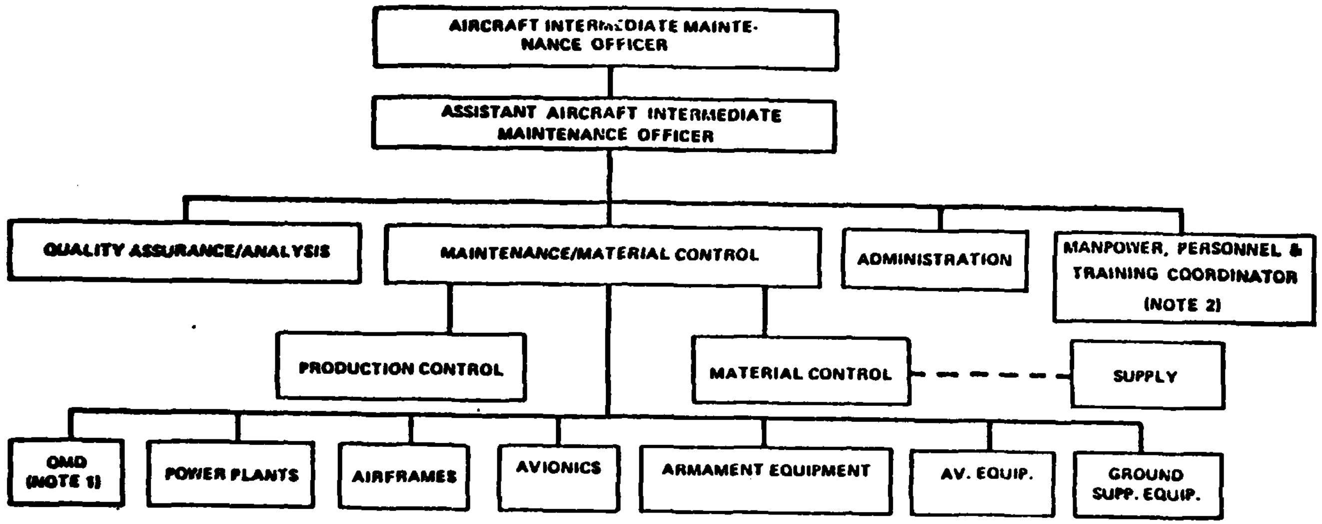


Figure 2-2 Marine Corps Organizational Level Maintnenance Department Organization



BREAKDOWNS BEYOND THE BASIC DIVISIONS ARE NOT ILLUSTRATED BECAUSE OF THE GREAT VARIETY OF BRANCHES POSSIBLE. ACTIVITIES WILL BE REQUIRED TO ESTABLISH THE NECESSARY BRANCHES IN ACCORDANCE WITH THEIR INDIVIDUAL REQUIREMENTS. APPENDIX "F" (STANDARD WORK CENTER CODES WILL BE USED AS A GUIDE TO ESTABLISH BRANCHES/WORK CENTERS WITHIN THE RESPECTIVE DIVISIONS. THE FOLLOWING GUIDELINES SHALL BE USED AS A BASIS:

(A) BRANCHES SHOULD BE ESTABLISHED ONLY WHEN MORE THAN ONE WORK CENTER IS INVOLVED, I.E., JET ENGINE BRANCH WITH WORK CENTERS FOR J-79 ENGINE AND J-52 ENGINE.

(B) WORK CENTERS SHOULD BE ESTABLISHED ONLY WHEN A MINIMUM OF THREE MEN PLUS A SUPERVISOR ARE REQUIRED TO OPERATE A SPECIFIC FUNCTIONAL AREA.

NOTE 1: WHEN SPECIFIC AUTHORITY HAS BEEN GRANTED TO COMBINE THE OMD AND IMA, AN ORGANIZATIONAL MAINTENANCE DIVISION WILL BE ESTABLISHED.

NOTE 2: FOR AIMD's NOT LARGE ENOUGH TO RATE THE E-9 BILLET ASSOCIATED WITH THIS FUNCTION, AND IN THOSE CASES WHERE FULL E-9 AND E-8 MANNING IS NOT AVAILABLE, THIS SEPARATE ORGANIZATIONAL POSITION IS NOT REQUIRED.

Figure 2-3 Intermediate Level Maintenance Department Organization (Ashore)

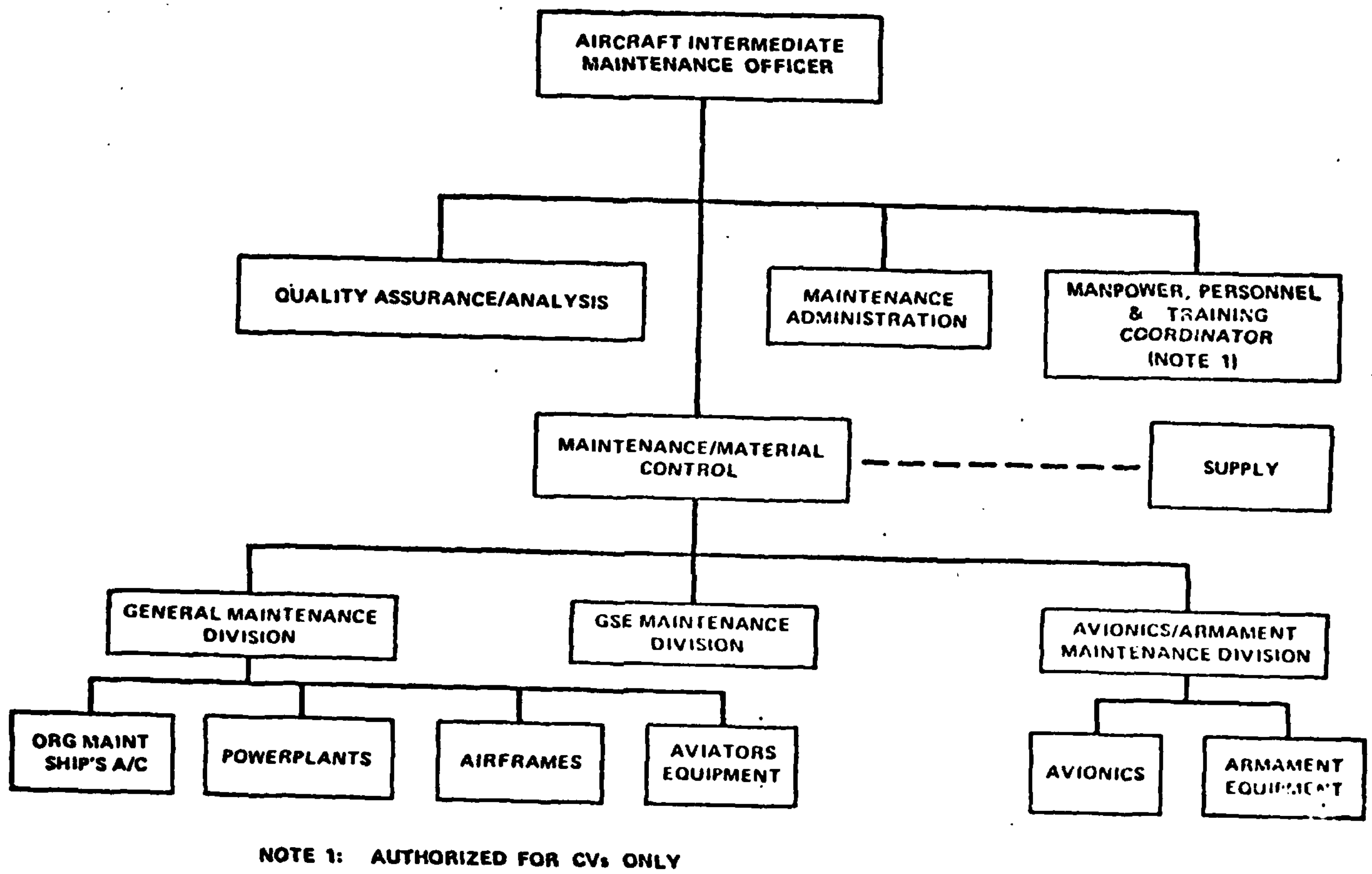
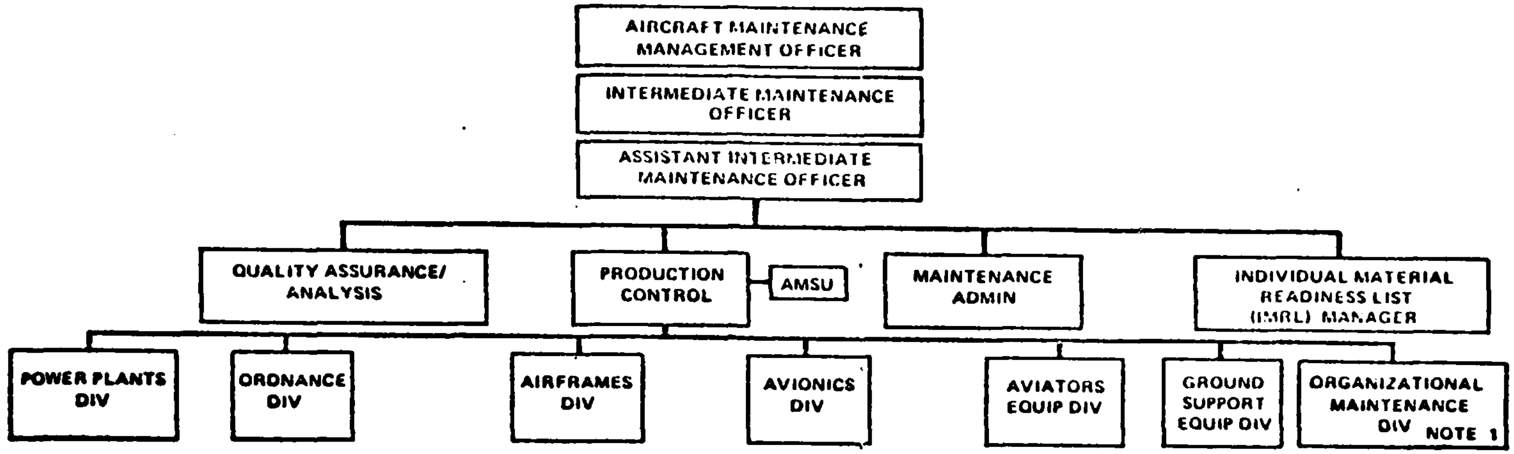


Figure 2-4 Intermediate Level Department Organization (Afloat)



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(A) BRANCHES SHOULD BE ESTABLISHED ONLY WHEN MORE THAN ONE WORK CENTER IS INVOLVED. I.E., JET ENGINE BRANCH WITH WORK CENTERS FOR F-402 ENGINES AND J-52 ENGINE.

(B) WORK CENTERS SHOULD BE ESTABLISHED ONLY WHEN A MINIMUM OF THREE MEN PLUS A SUPERVISOR ARE REQUIRED TO OPERATE A SPECIFIC FUNCTIONAL AREA.

NOTE 1: WHEN OPERATING AIRCRAFT ARE ASSIGNED TO THE IMA: AN ORGANIZATIONAL MAINTENANCE DIVISION WILL BE ESTABLISHED.

Figure 2-5 Intermediate Level Maintenance Department Organization (USMC)

- Ensure the accomplishment of training for both permanently and temporarily assigned personnel.

- Ensure the efficient operation of the Maintenance Data Reporting (MDR) system.

- Provide data analysis summaries to the Commanding Officer and other superiors in the chain of command when requested.

- Ensure that each Work Center Supervisor thoroughly understands the importance of the MDR system, its operation and the need for continual accuracy.

- Continuously analyze the mission of the department and ensure that timely planning is conducted and a statement of requirements to meet future needs is initiated.

3. Quality Assurance/Analysis Division

The Quality Assurance/Analysis Division is a staff division with diverse responsibilities for the inspecting, monitoring and reviewing all phases of the maintenance effort, with the objective of improving the quality, uniformity and reliability of the total maintenance effort. The analysis function is responsible for providing qualitative and quantitative analytical information to the MO to enable him to continually reivew management practices within his department. Chapter IV presents a thorough discussion of the analysis responsibilities.

4. Maintenance Control

Maintenance Control and Material Control are divisions of the Maintenance Material Control function. In general, Maintenance Control is responsible for the total productive effort of the activity which is conducted by the Production Divisions; Aircraft, Avionics/Armament and Line divisions. In controlling maintenance actions, a large variety of documents, forms and procedures are required. A few of the requirements will be mentioned specifically in this section while other requirements will be examined in a typical scenario later in this chapter. The reader is referred to Volume II of OPNAVINST 4790.2B for a more thorough treatment of the specific forms, records and procedures required in controlling organizational level maintenance.

The Visual Information Display System (VIDS) is one of the major methods currently in use which provides current status information to managers at the local level. It was designed to provide a graphic display of vital, up-to-date information on a continuing basis. VIDS display boards are overlapping, cardex-type pockets for visual display of system status. Graphic display is accomplished by using the VIDS board in conjunction with several forms including the Visual Information Display System/Maintenance Action Form (VIDS/MAF), (two-part and five-part), and the Organizational Register. Other forms such as the Aircraft Flight Schedule Card and Aircraft/Engine/Component Time Card are optional forms which are available if desired.

Several operating procedures are available with the system within broad standardized guidelines contained in the NAMP Manual. In essence, the various forms, when placed on the VIDS board, show status of specific aircraft or equipment. Individual discrepancies against aircraft can be identified easily with the identification of the responsible division and work center clearly indicated. The VIDS board system also displays information which indicates whether aircraft (or other equipment) which have discrepancies against them are being worked on (In-work) or if they are waiting to be worked on (Awaiting Maintenance-AWM). Aircraft which require parts in order to complete repair would be shown in an awaiting parts (AWP) status. Location of the forms on the VIDS board indicates the status of the specific aircraft (or equipment).

Maintenance Control also uses plastic status boards and grease pencils to track various aspects of required maintenance. Typical information displayed on such a board are items such as; flight hours to next inspection, number of arrestments on the arresting gear (tailhook) and hours to go before oil samples are required. Maintained by aircraft, exhibited information is updated manually as a result of completion of flights.

Many other programs are the responsibility of Maintenance Control under the direction of the Maintenance Material Control Officer. The Planned Maintenance System (PMS) for Aeronautical Equipment is designed to ensure that aeronautical equipment is properly maintained throughout its life cycle by controlling degradation resulting from time, operational cycles, utilization or climatic exposure. Check lists Maintenance Requirement Cards, Periodic Maintenance Information Cards and Sequence Control Charts/Cards are some of the publications used with the PMS. The PMS facilitates scheduling and controlling maintenance operations and provides a readily manageable maintenance program which ensures that aeronautical equipment receives the necessary servicing, preventative maintenance, and inspections that are required.

Aircraft logbooks are an essential element of aeronautical discipline and provide a history of maintenance, operation and configuration control of the aircraft. The logbooks, in conjunction with the VIDS and other programs which are part of the NAMP, provide the basis for effective and efficient management of aviation maintenance. Chapter 2-6 of Volume II of OPNAVINST 4790.2B sets forth the specific functions and responsibilities of Maintenance Control.

5. Material Control Center

The Material Control Center (MCC) is the contact point within the maintenance organization where requirements for parts and material are coordinated with the Supply Support Center (SSC). Material Control is tasked to ensure that requirements for parts and material are properly forwarded to the SSC in a manner which will reduce work stoppages and aircraft groundings. Expeditious routing of received parts and material to applicable work centers is also an assigned task. In controlling parts and material requisitions, MCC personnel use VIDS display boards to track parts which are required for specific aircraft or equipments in a mannner similar to that used by Maintenance Control.

Turn-in of repairable material and components is a responsibility assigned to the MCC. Prompt removal and turn-in of repairable components allows for early repair and return of the component to a Ready for Issue (RFI) status which is essential for efficient maintenance at minimum costs.

The Material Control Center has other important functions which include control and maintenance of Aircraft Inventory Records and management and control of the Individual Material Readiness List (IMRL). In addition to the above responsibilities, one final important function will be mentioned. All financial accounting for funds expended directly by the organizational activity is accomplished by the MCC. Records are maintained which provide information required for reports to higher authority as directed by applicable directives.

6. Production Divisions

Production Division structure and responsibilities will be discussed briefly in the following paragraphs in order to provide the reader with an understanding of these divisions' functions in the operation of O level activities. This discussion is necessarily brief but is illustrative of the activity and structure common to all organizational level maintenance activities. Chapters 3-1 through 3-6 of Volume II of the NAMP Manual provide detailed information and direction concerning functions and responsibilities of the Production Divisions.

Each division is composed of functional work centers (or branches) as shown in Figure 2-1 and is under the management control of a Division Officer (DO) who is responsible to the Maintenance Officer for all functions assigned to the division in support of the departmental tasks. Branch Officers may be assigned to assist the DO contingent on availability of officer personnel and the desires of the MO. Each work center is supervised by a Work Center Supervisor who has broad responsibility for all aspects of the work center productivity and adherence to the procedures and policies established by the NAMP. In addition to effective employment of assigned personnel in accomplishing specific maintenance functions, the Work Center Superivsor is responsible for ensuring that all Maintenance Data System (MDS) documentation reflects the true maintenance status of all aeronautical equipment. By use of Visual Information Display System (VIDS) boards and appropriate forms, the supervisor monitors the status of assigned maintenance tasks and communicates any changes of status to Maintenance Control. Communications between work centers and Maintenance Control is critical to effective control of maintenance.

Many other specific responsibilities such as training, tool control, quality assurance and equipment calibration are assigned to the Work Center Supervisor. It is through intelligent supervision of the myriad of programs, procedures and requirements that work centers successfully accomplish their assigned tasks.

Specific functions of each division and work center will not be covered but, as indicated earlier, a brief scenario will be used to illustrate the basic process involved in the overall aircraft maintenance.

G. INTERMEDIATE LEVEL RESPONSIBILITIES

Maintenance at the Intermediate (I) level is conducted by the Aircraft Intermediate Maintenance Department (AIMD) both ashore and afloat. Figures 2-3 and 2-4 depict the Navy I level organizations. Volume III of the NAMP Manual [3] addresses the structure, classification of maintenance functions and assignment of responsibility for intermediate level maintenance. The reader is referred to that volume for detailed requirements and responsibilities.

The responsibilities of the Aircraft Intermediate Maintenance Officer are similar to those of the O level Maintenance Officer. The Maintenance Material Control Officer, Division and Branch Officers and Work Center Supervisors also have functions and responsibilities which are essentially like those of their counterparts at the O level of maintenance.

The staff functions of Quality Assurance/Analysis, Maintenance Administration and Material Control are also conducted in a similar manner to those in the organizational activities. The primary difference between the two levels of maintenance is that I level maintenance is generally that which is done "off-equipment." Repair of aeronautical components/equipment is done in functionally organized work centers. While maintenance at the O level involves testing and trouble-shooting of aircraft systems and removal and replacement of faulty components, I level personnel test, repair and calibrate components which have been removed by O level personnel. Some additional functions such as test equipment calibration and manufacture of certain non-available parts is performed at the I level. Management and control of the maintenance functions is however, conducted in a manner similar to that accomplished at the O level. Use of VIDS boards and appropriate forms at Production Control and in work centers provides the required management information for accomplishment of assigned tasks.

H. SUPPLY SUPPORT

One very important aspect of both organizational and intermediate levels of maintenance is supply support. The Naval Supply System has a major responsibility for material support of the operation and maintenance of aeronautical equipment. Close liaison is required between supply and maintenance organizations to achieve the common goal of maximum weapon system operational readiness. Material management involves direct relationships between two complex operations-maintenance and supply and it is important therefore, that a single point of contact be established for these operations. The Material Control Center (MCC) and Supply Support Center (SSC) serve as those points of contact.

I. SUPPLY SUPPORT CENTER

In the following paragraphs a brief description of the Supply Support Center responsibilities will be given. For a more thorough treatment of supply support and material management, the reader is referred to Section 4, Volume III of the NAMP Manual. Figure 2-6 depicts a typical SSC organization.

The SSC is responsible for effective supply support of assigned Organizational Maintenance Activities (OMA) and the AIMD. In carrying out its responsibility the SSC is responsible for the following functions.

- Single point of contact within the Supply Department for maintenance activities requiring direct supply support.
- Supervise the operation of the Supply Response and Component Control Sections.
- Provide the Supply Officer with status on the quality of supply support rendered.
- Ensure continuity of material reporting and applicable local reports.
- Maintain, in liaison with the OMAs, an adequate, authorized level of TAD personnel.

Rapid communication between the supply and maintenance organizations is essential to proper material support. Ideally, each MCC will have direct lines of communications to the SSC for the purpose of material requisitioning. Several types of communication devices are in common use; e.g., teletype and telewriter, but in some cases the telephone system is used to request material.

Material Reporting is a responsibility of the SSC. It is a procedure whereby all supply action documents in support of maintenance are keypunched and forwarded to a central data bank where the information is accumulated, summarized and reported to higher

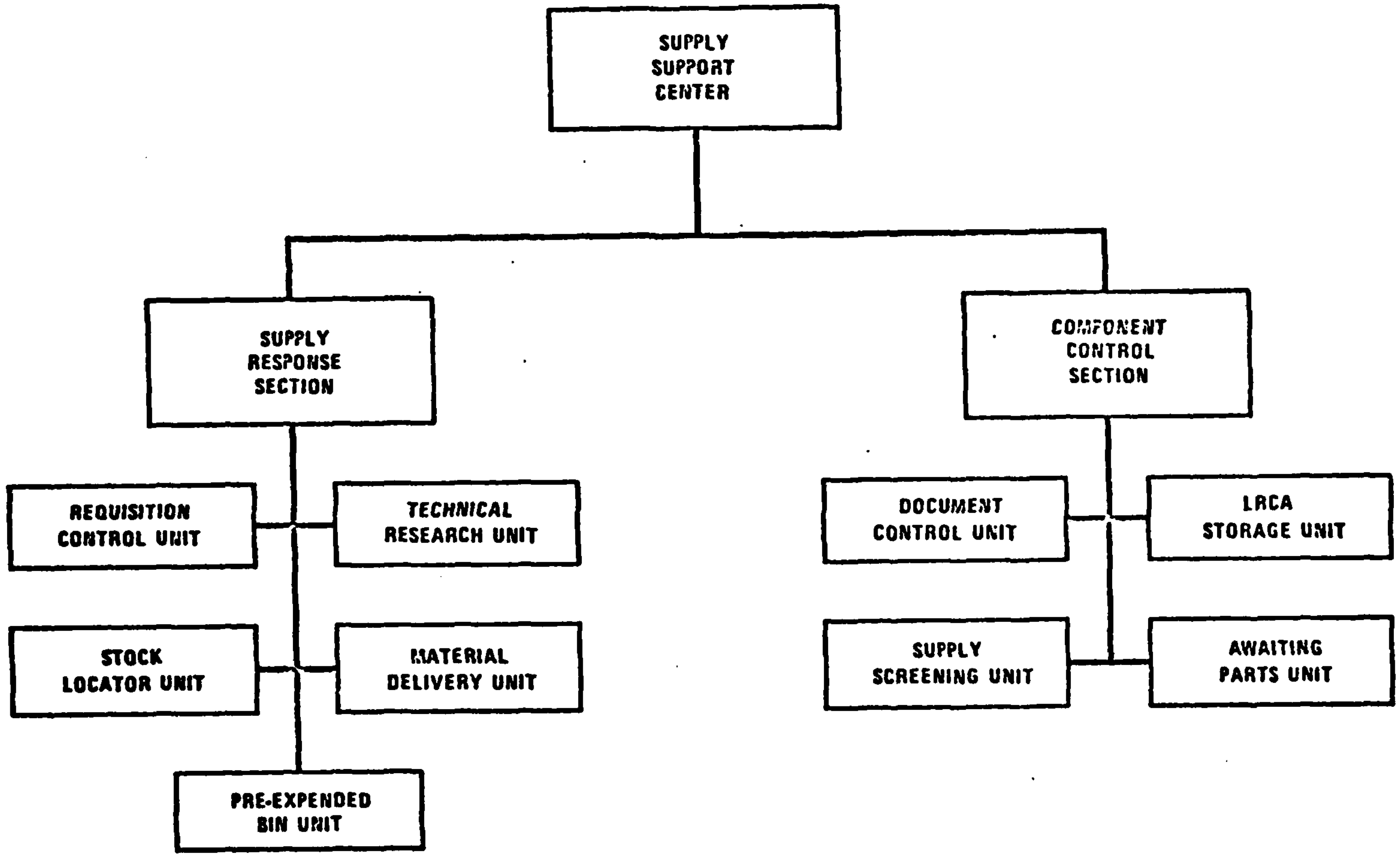


Figure 2-6 Typical Supply Support Center Organization

levels of management. Such information is used to permit management to appraise higher commands of material expenditures in support of maintenance, determine weapons system costing at O and I maintenance levels, and to determine usage, failure and turn-around-time rates for establishing material allowances.

The Supply Support Center is divided into two sections: the Supply Response Section (SRS) and the Component Control Section (CCS) which are, in general, responsible for receiving material requests and delivering material, and repairables management, respectively.

1. Supply Response Section

The SRS, as the section of the SSC that serves as point of contact for satisfying material requirements, is subdivided into five units: (see Figure 2-6)

a. Requisition Control

b. Technical Research

c. Stock locator

d. Material delivery

e. PEB (Pre-expanded bins)

Within these five units, material requests are received and processed with the goal of properly identifying the requested material, locating the material and ultimately delivering the material to the requesting activity.

2. Component Control Section

The CCS is the section of SSC which is responsible for management of repairables including those stored in Local Repair Cycle Asset (LRCA) storage areas, all repairables in the AIMD repair cycle, and all repairables being processed for shipment to Designated Overhaul Points (DOP). The CCS is subdivided into four units: (see Figure 2-6)

a. Document Control

b. LRCA Storage

c. Supply Screening

d. AWP (awaiting parts)

These four units manage repairable assets by physically storing and accounting for LRCAs (formerly called rotatable pool items) in controlled access storage areas and by executing issue and control procedures for processing all repairable demand requests. They also maintain a suspense file for all repairables received from AIMD. They store and manage AWP requisitions for parts. Finally, they assist the AIMD Production Control in setting workload priorities.

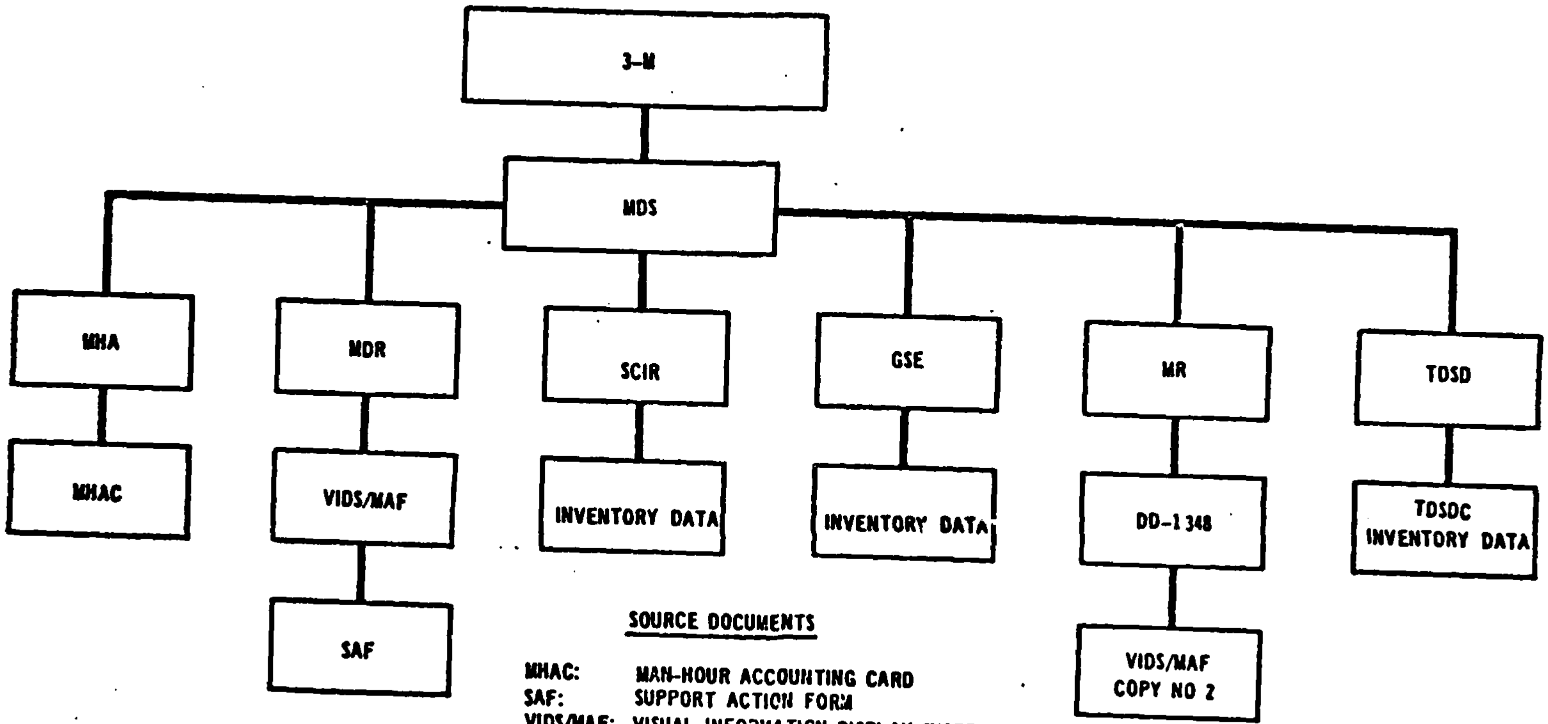
The description of the Supply Support and Material Management procedures provided above should be recognized as only a basic sketch of the specific requirements and procedures set forth in the NAMP Manual. It should also be recognized that the total logistic support of aircraft maintenance involves many organizations and activities throughout the Department of the Navy and the Department of Defense.

J. MAINTENANCE DATA SYSTEM

The following section of this chapter will address the Maintenance Data System (MDS) which is an integral part of the Naval Aviation Maintenance and Material Management (3-M) System. Figure 2-7 illustrates the various elements of the Aviation 3-M System. The MDS is a management information system which is used to document, analyze, and employ data for the management of aviation maintenance and material. It is designed to provide statistical data for use at all echelons relative to: [2]

- Maintenance personnel utilization,
- Equipment maintainability and reliability.
- Equipment configuration, including alteration and technical directive compliance status.
- Equipment mission capability and utilization.
- Maintenance material usage.
- Material Non-availability.
- Maintenance and material processing times.
- Weapon system and maintenance material costing.

The primary purpose of data collection and reporting is to ensure that basic data generated by maintenance/material personnel are documented and the the system provides information to all who have need for it. The MDS includes:



SOURCE DOCUMENTS

MHAC: MAN-HOUR ACCOUNTING CARD
SAF: SUPPORT ACTION FORM
VIDS/MAF: VISUAL INFORMATION DISPLAY SYSTEM/ MAINTENANCE ACTION FORM
*MATERIAL REPORTING WILL BE ACCOMPLISHED ON THE DD-1348 AND THE NUMBER TWO COPY OF THE VIDS/MAF
TDUF: TRAINING DEVICE UTILIZATION FORM

Figure 2-7 Elements of the Naval Aviation Maintenance and Material Management System (3-M Aviation)

- Ground Support Equipment (GSE) Inventory Reporting.
- Material Reporting.
- Man-Hour Accounting (MHA) data.
- Aircraft Inventory Reporting.
- Subsystem Capability Impact Reporting (SCIR).
- Maintenance Data Reporting (MDR).

Discussion of the Maintenance Data System in this section will be as brief as possible and will focus on the MDR which includes the most complex and varied types of information involved in the management system. It should be understood that treatment of many subject areas will, of necessity, be quite general, but should allow for an overall understanding of how the system operates. Section 4 of Volume II and Section 6 of Volume III of OPNAVINST 4790.2B (NAMP Manual) provide detailed procedures and requirements for the MDS and present many completed source document forms as examples of correct documentation.

The MDS is designed so that each worker, when performing a job, converts a narrative description of the job into codes and enters the coded information on standard forms, or source documents. These source documents are collected and transmitted to a Data Service Facility where the information is converted to machine records. The machine records are then used to produce periodic report listings summarizing the submitted data. These reports are supplied to maintenance supervisors to provide assistance in planning and directing the maintenance effort. The information on the machine record is also forwarded to a Central Data Services Facility which provides data to satisfy the management requirements of Aircraft Controlling Custodians, Technical Bureaus, and other managers.

The collected data may be considered to flow through three distinct but related cycles: (1) the Local-Cycle, at the organizational and intermediate levels of maintenance; (2) the Local-Central cycle, between the local activity (ship or station) and the Navy Maintenance Support Office (NAMSO); and (3) the Central-External cycle, between NAMSO and the various system commands, offices and commands other than the originating command. Figure 2-8 illustrates the Aviation 3-M data cycle.

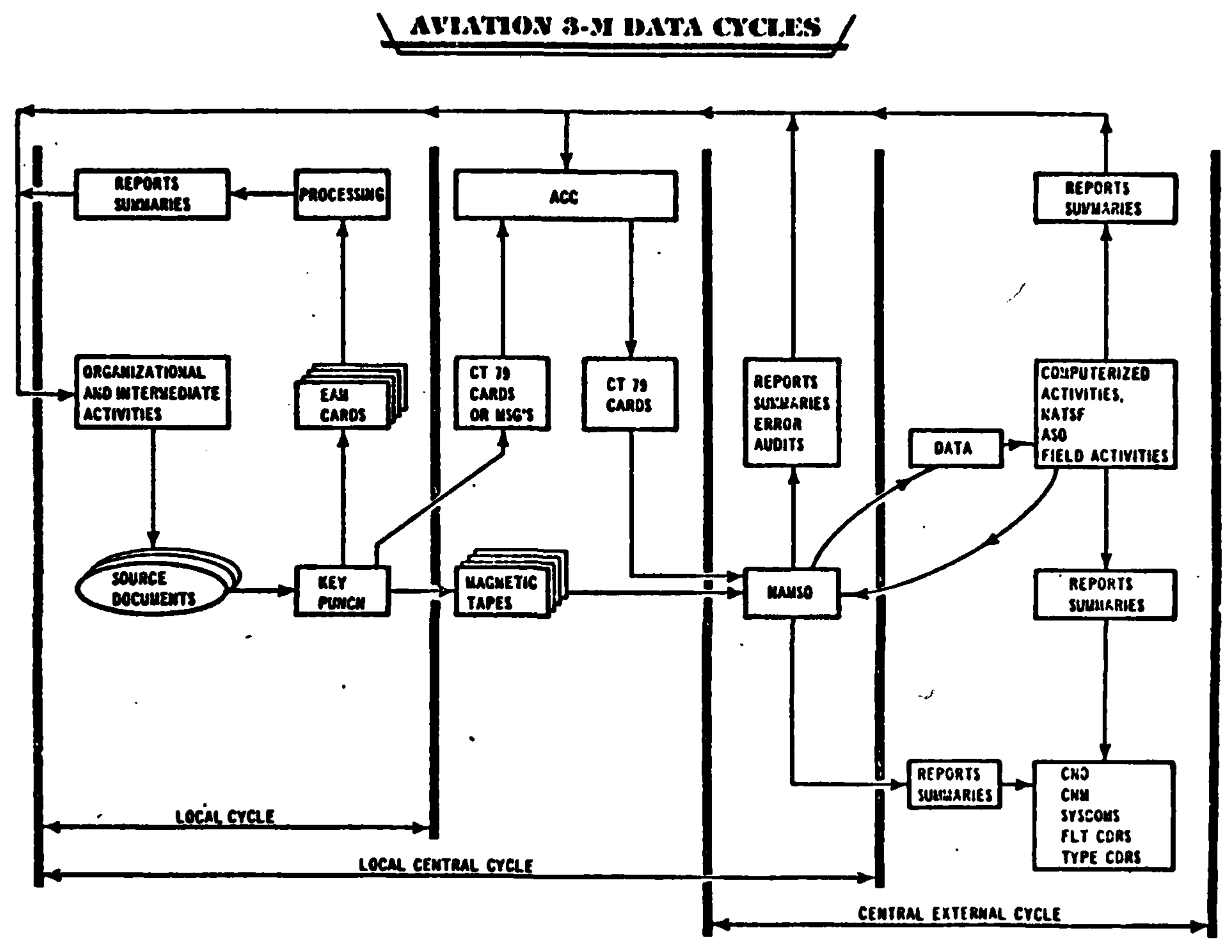


Figure 2-8 Aviation 3-M Data Cycles

1. GSE Inventory Reporting

GSE Inventory Reporting is the area of the MDS which provides information required to determine the Mission Capability condition of each activity. Material conditions of specific areas and/or commands and the overall Navy-wide position may be determined through consolidation of these reports. Redistribution of budget requests and proper equipment procurement management decisions at all management levels depend on these reports.

2. Material Reporting

Material Reporting is the procedure whereby all supply action source documents in support of maintenance are key punched and mailed to a central data bank. The information is accumulated, summarized and reported to management at various levels which allows management to:

- Relate material issue/turn-in to weapon systems and components thereof by activities and maintenance level.
- Apprise higher commands of material expenditures in support of maintenance level.
- Determine weapons systems costing at the organizational and intermediate levels.

3. Man-Hour Accounting

The Man-Hour Accounting (MHA) system provides data on total utilization of personnel assigned to maintenance activities. Data is recorded and collected based on the exception principle, that is, if a man is employed for some purpose other than that assigned, he records the time so spent on a Man-Hour Accounting Card. Man-hour data thus collected and machine processed provides a valuable tool for measuring the effectiveness of maintenance personnel assignment when compared to actual maintenance productive man-hours recorded on Support Action Forms (SAF) and Visual Information Display System/Maintenance Action Forms (VIDS&MAF). The only portion of MHA currently required (not optional) is the Master Roster (MHA-00). The MHA-00 is essentially a complete listing by organization and work center, of all personnel assigned for the reporting period. Information includes name, grade, code, pay rate, social security number, labor code and assigned hours.

4. Aircraft Inventory Reporting

The Aircraft Inventory Reporting system provides the reporting custodian (usually a squadron) with a list of assets on hand and a ready reference of which aircraft require Subsystem Capability Impact Reporting (SCIR). An Equipment Master Roster (E-00) is a serialized listing, by reporting custodian, of all assets on hand that require SCIR reporting. Losses and gains in inventory are reported by submission of VIDS/MAFs.

5. Subsystem Capability and Impact Reporting

Subsystem performance is reported by the Subsystem Capability and Impact Reporting (SCIR) system. SCIR data is generated by copy 1 of the VIDS/MAF and represents factual information generated at the lowest level of maintenance as a result of actual subsystem performance. SCIR provides specific aircraft or equipment mission capability and uniquely defines the categories of Full Mission Capabilities (FMC) and Partial Mission Capabilities (PMC) for specific type and model of aircraft or equipment.

6. Maintenance Data Reporting

As indicated above, Maintenance Data Reporting (MDR) includes the most complex and varied types of information involved in the management information system. The basic source documents for the MDR system are the Support Action Form (SAF) and the VIDS/MAF.

a. Support Action Form

Support Action Forms, which are standard Electronic Accounting Machine (EAM) cards, are used for reporting time expended in performing repetitive tasks which consume many man-hours but do not involve malfunctions or repairs. Duties such as aircraft servicing, aircraft handling and Foreign Object Damage (FOD) walkdown are documented on SAFs. Support Action Codes identify the specific category of support work accomplished. They are initiated in the work center at the completion of the support action and, after being verified by the supervisor, are forwarded to the Analysis Section for further processing by the Data Services Facility (DSF). After keypunching by DSF the SAFs are returned to the supervisor for verification of the data product, the SAF Daily Audit Report.

Since the repetitive, service type of tasks have little significance from an Engineering or Supply Analyst's viewpoint, the SAF information requires less depth of coverage than does the expended hours recorded in repair and corrective maintenance actions.

b. Visual Information Display System/Maintenance Action Form

The Visual Information Display System/Maintenance Action Form (VIDS/MAF) is the other major source document used in the MDR system. The portion of the maintenance organization's workload devoted to repair, Technical Directive Compliance, and inspection is the area in which greater depth of information is required. The information is required for the immediate management needs of the local command and of higher management. The VIDS/MAF is the document which is used to meet these requirements. Some of the important data items recorded on the VIDS/MAF are: [2]

- A Job Control Number and date.
- Identity of the organization and work center performing the work and the type of equipment, system, subsystem and component being worked on.
- How the malfunction, discrepancy, or failure occurred, when it was discovered and action taken to correct it.
- Identification of parts/components removed and replaced.
- Cause and duration of certain types of work stoppages.
- Total man-hours expended on the job.
- Signatures of individuals performing inspections and supervisory personnel.
- Identification of, and compliance with a Technical Directive.

c. Local Level Information

The MDR data, when summarized, will provide the local level managers with assistance in identifying important problem areas. Some of them are listed below.

- High man-hour per operating hour equipment.
- Man-hours lost to cannibalization and removal of items to facilitate maintenance.
- Items with high failure rates.
- Reasons for ground and in-flight aborts.

- High usage items.

d. Higher Level Command Information

Some of the more important uses of the generated information at higher levels of command are:

- Establish realistic manning factors
- Determine or revise inspection requirements and time change requirements.
- Determine and/or justify the need for modifications and engineering changes.
- Establish equipment reliability factors.
- Determine tooling and equipment requirements.
- Predict probable failures through trend analysis.
- Determine status of compliance with mission readiness type technical directives.

7. O Level Document and Information Flow Procedures

An important consideration at this point is how the process actually operates that is, the flow of the source documents and information. Figure 2-8 illustrates the data cycle for Aviation 3-M and Figure 2-9 depicts the source document information flow. Detailed organizational (O) level documentation procedures are contained in Paragraph 4405 of Volume II of OPNAVINST 4790.2B and detailed intermediate (I) level procedures are contained in Paragraph 6404 of Volume III of the same instruction.

The following scenario will provide the reader with the essential information required to understand the document flow process of the two and five part VIDS/MAF at both O and I level.

a. Five Part VIDS/MAF

The five part VIDS/MAF is orginated by Maintenance Control or the aircrew. Pertinent data such as Job Control Number, type equipment and system code, when and how the discrepancy was discovered, and a narrative description of the problem are recorded on the form. Copy 2 of the five part form is forwarded to Quality Assurance while copy 4 is placed into the Aircraft Discrepancy Book. Copies 1 and 5 are forwarded to the appropriate work center. Copy 3 is retained by Maintenance Control (MC) for VIDS board

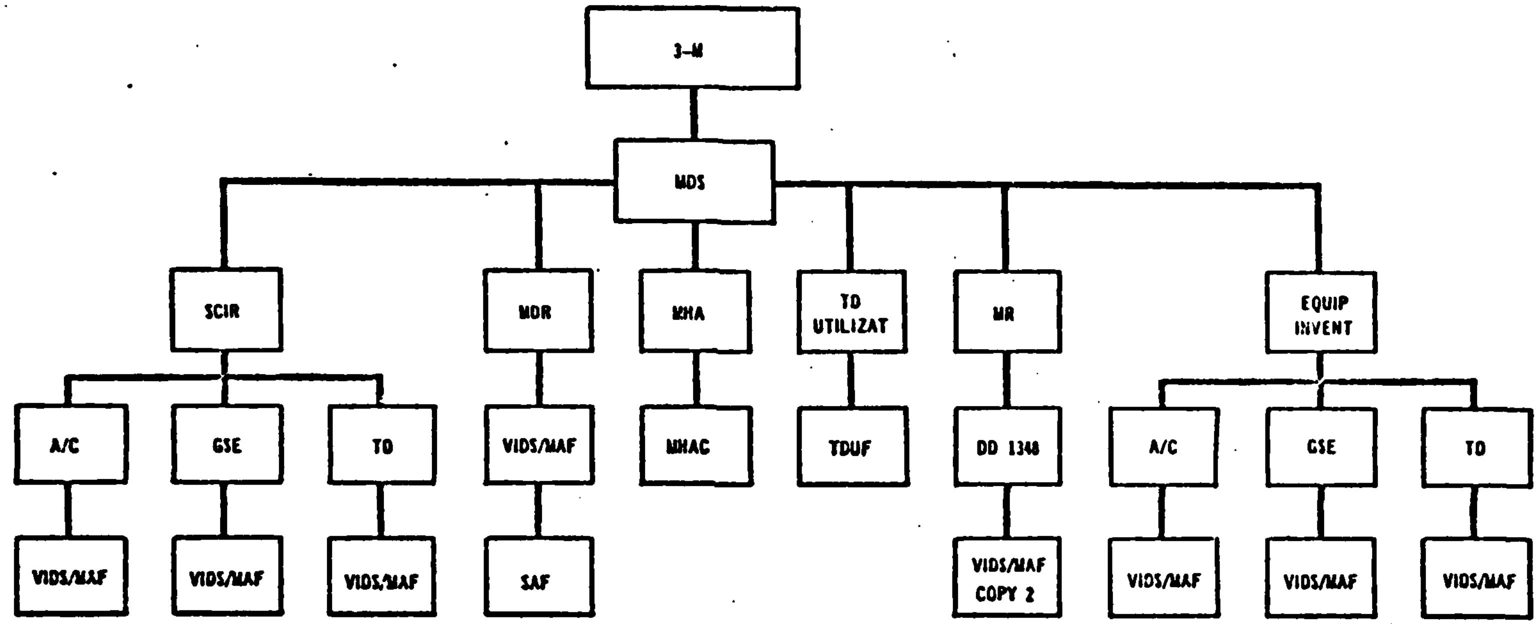


Figure 2-9 Source Documents

display. The Work Center Supervisor screens the document, enters applicable data, inserts the document on the VIDS board, and assigns a worker or workers to the tasks. If parts are required, the Material Control Center (MCC) requisitions the necessary material after assignment of a priority by MC. Applicable data is entered on the document which is then returned to the work center. Supply status is forwarded to the work center by the MCC when received. Upon completion of the assigned task, the worker enters applicable data, signs and submits the VIDS/MAF to the supervisor. After screening the documents for completeness and accuracy, the supervisor computes and enters the applicable work status data, enters the transaction code, signs, removes and retains the MDR verification copy (copy 5), and forwards the original document to MC.

Maintenance Control the screens the document, enters appropriate controlling blocks and forwards the original documents to the Analysis Section. That document and others, completed in a similar manner, are collected by the Analysis Section and forwarded with a document control form to the Data Services Facility. Figure 2-10 depicts the five part VIDS/MAF document flow.

In the event that a repairable, faulty (NON-RFI) component is removed from the aircraft, the work center initiates an additional five part VIDS/MAF, enters applicable data, attaches the document to the component and notifies the MCC that the component is ready for turn in.

b. Two Part VIDS/MAF

The two part VIDS/MAF is used primarily by O level activities where the physical arrangement of spaces and procedures prohibit use of the five part form. Use of an Organization Register (3 part) or a five part VIDS/MAF is required for use by MC when a two part VIDS/MAF is utilized. The following briefly describes the document flow process.

Maintenance Control (MC) or the aircrew originates the Organization Register Card with appropriate data including a narrative description of the malfunction. MC communicates necessary information to the work center. The Work Center Supervisor prepares a two part VIDS/MAF by entering the exact information communicated by MC and

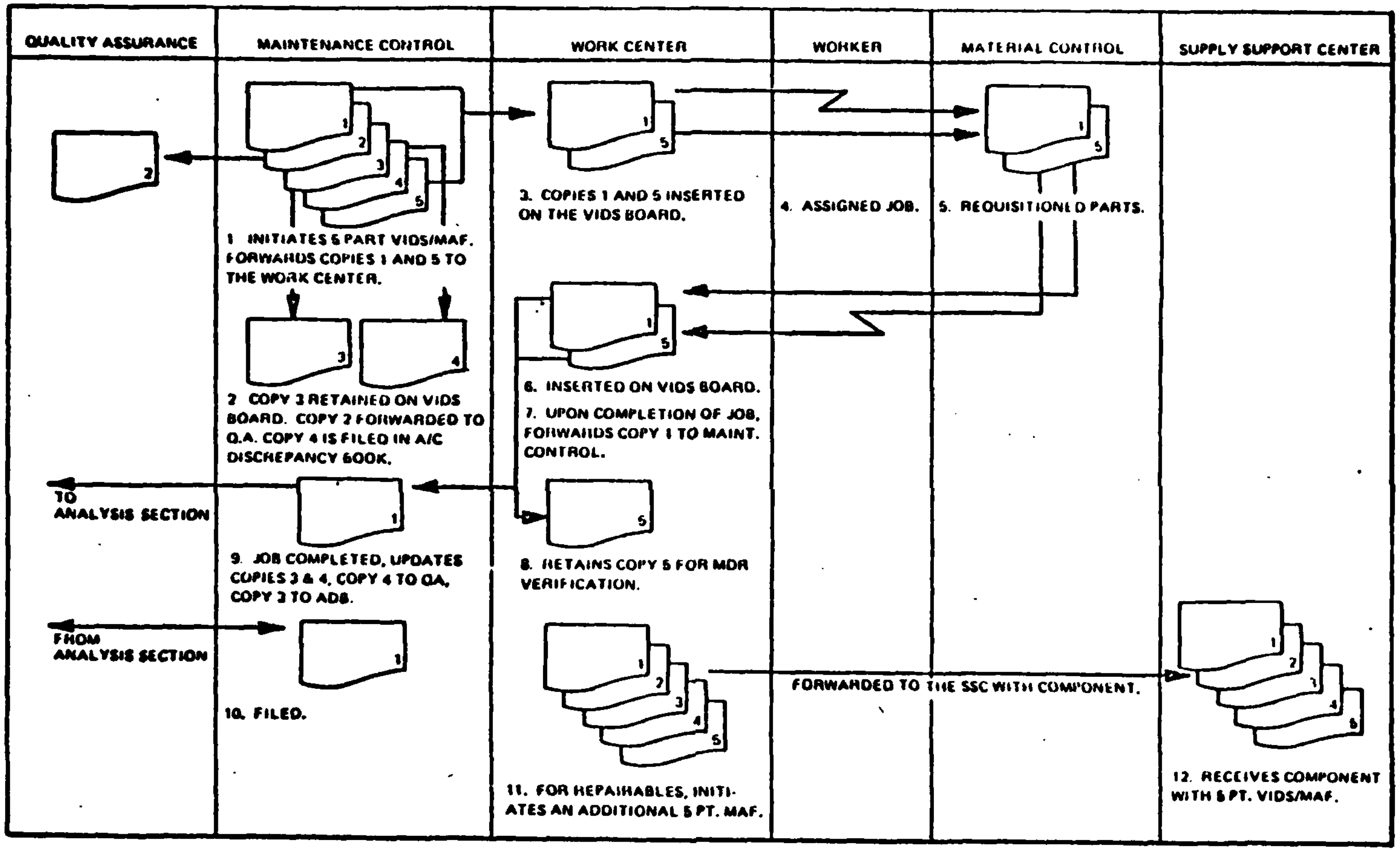


Figure 2-10 Organizational Maintenance VIDS/MAF (5 Part) (OPNAV Form 4790/60) Document Flow Chart

then inserts the document on the VIDS board and assigns a worker to the task. The remainder of the process is identical to the five part VIDS/MAF process except that tracking and control of the discrepancy/malfunction to completion by MC is dones by use of the Organization Register. Figure 2-11 depicts the two part VIDS/MAF document flow. Data Collection Source Document flow at the Intermediate (I) level is similar to that of the O level and is also depicted by Figure 2-8.

8. <u>I Level Document and Information Flow Procedures</u>

The Material Control Administration Screening Unit receives the defective component with copies 1 through 5 attached, from the O level activity via the Supply Support Center (SSC). After entry of applicable data, copy 2 is removed, signed, and returned to SSC. Copy 3 is removed and forwarded to Production Control while copies 1, 4, and 5 remain with the component for delivery to the applicable work center.

Production Control schedules the component, enters applicable data and inserts the register copy (copy 3) on the VIDS board. It is used to provide job status and production control information until the maintenance action is completed.

The Work Center Supervisor receives the component, screens the document, enters appropriate data, inserts the document on the VIDS board and assigns a worker to the maintenance action. In the event that parts are required, the MCC requisitions the necessary material, enters applicable data on the document and returns it to the work center. The worker performs technical screening and commences repair action. At completion of the repair action, the worker enters applicable data, attaches a condition tag to the component, and submits the VIDS/MAF to the supervisor. After screening the document for accuracy and completeness, the supervisor notifies Production Control of work completion and status of the component, signs the VIDS/MAF, removes and retains the MDR verification copy (copy 5). The component and paperwork will be held for pickup by the MCC.

The Material Control Center notifies the Component Control Section (CCS) of SSC that the component is ready for turn in, delivers the component to the CCS, obtains a receipt signature, and returns copy 1 to Production Control. The Production Control

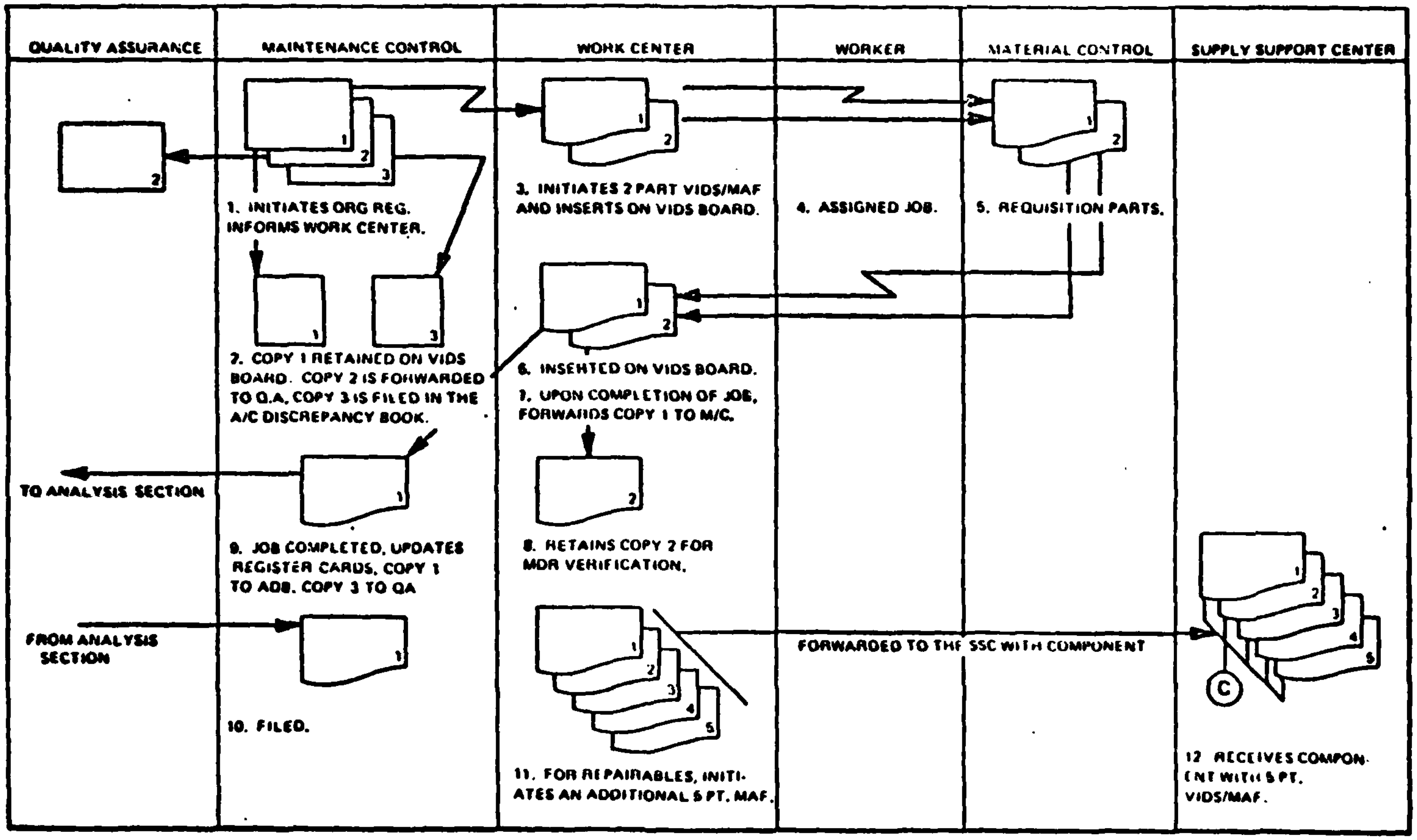


Figure 2-11 Organizational Maintenance VIDS/MAF (2 Part) (OPNAV Form 4790/59) And Organizational Register (OPNAV 4790/1) Document Flow Chart

Supervisor receives that document, verifies registers, files the register card (copy 3), and forwards the completed document to the Analysis Section for forwarding to the Data Services Facility.

The previous paragraphs have described the internal flow of information and documents (SAFs and VIDS/MAFs) at both the O and I levels of maintenance. The presentation has illustrated a very general scenario which does not truly reflect all the communications and considerations necessary to meet operational requirements, but should give the reader comprehensive knowledge of how the process of maintenance data collection and processing works.

9. MDS Output Reports

A wide range of machine produced readouts are prescribed by the NAMP Manual for use at the local level of maintenance and material management. Daily Audit Reports (MHA, SAF, and VIDS/MAF) are prepared from data submitted daily on applicable source documents and may be used by the Analyst and supervisors to monitor documentation accuracy. Monthly reports reflect all transactions submitted during the accounting period (month) and are received by activities based on their selection as reflected in the submitted Monthly Reports Request Form. Two MHA, four SCIR, and four MR reports are available as well as twenty three MDR reports. Duplicate data/information are forwarded to a central data base in machine readable form (tape) for use in reporting to higher level commands.

The Maintenance Data System provides a valuable tool for use by maintenance management, meant to assist in management and supervision not replace it. The key to an effective Management Information System (MIS) is well trained and conscientious workers and supervisors who understand the proper procedures for using source documents and provided complete and accurate documentation. Command attention, support and use is also required if the system is to be effective in maintenance management.

K. CHAPTER SUMMARY

The Naval Aviation Maintenance Program is a complex, integrated program which promulgates maintenance policies, procedures and responsibilities. It was established and has been continuously updated in order to provide a program which would achieve maximum aircraft availability and readiness with optimum utilization of manpower, material, facilities and funds. Integral to the program is the Navy Aviation Maintenance and Material Management System which provides for maintenance data collection and analysis through the Maintenance Data System (MDS). The MDS, although providing data for the MIS, employs procedures and capabilities characteristic of the 1960's. Many of the functions require time-consuming and error-prone manual processes and those functions which are automated produce historical information of limited value to base level managers. The complex, sophisticated, expensive aircraft weapons systems in the current Navy inventory and those planned for the future dictate that further improvements be made in the NAMP, especially in the area of maintenance data collection and reporting. NALCOMIS MODULE I has the potential for providing the improvements required for the 1980's and is discussed in the next chapter.

III. NALCOMIS

The Naval Aviation Logistics Command Management Information System (NALCOMIS) is currently a program (project) which is sponsored by the Chief of Naval Operations (CNO Codes OP-51 and OP-52) and is under the direction of the Naval Air Systems Command. NALCOMIS is essentially a logical improvement to the NAMP which has resulted from technological improvements which have taken place in the Automated Data Processing field. Conceptually, one strength of NALCOMIS is the fact that it is basically an extension of a 20 year old MIS which has evolved over the years as aviation weapons systems have become more sophisticated and complex.

A. NALCOMIS BROAD OBJECTIVE

The broad objective of NALCOMIS is to provide a modern Management Information (MIS) which will assist the workers, supervisors, and managers at the Organizational Maintenance Activity (OMA), Intermediate Maintenance Activity (IMA) and Supply Support Center (SSC) levels to effectively and efficiently carry out the requirements of the Naval Aviaton Maintenance Program.

B. HISTORY OF NALCOMIS

NALCOMIS is the culmination of an evolutionary process which has taken place in the naval aviation community. Several projects and programs have been conducted over the past decade in an attempt to improve aircraft readiness and availability. The following describes the major projects/programs which have resulted in the NALCOMIS Project.

The Carrier Aircraft Maintenance Support Improvement (CAMSI) Project was established by the Chief of Naval Operations in 1970 with the purpose of identifying priority actions which would improve carrier aircraft readiness. Two of the important findings of that project were:

1. Improved readiness could be achieved through increased efficiency in management of functions associated with shipboard aircraft maintenance and support.

2. The most practical and cost effective means of attaining an essential level of efficiency in those functions would be through improved use of Automated Data Processing Equipment (ADPE).

In 1972 the Shipboard Aviation Command Management Information System (SACOMIS) was initiated as a project. SACOMIS was supported jointly by the Naval Air Systems Command and the Naval Supply Systems Command with regard to ADP policy and procedures and respective maintenance and supply policies and procedures, with HQMC representation for Marine aviation matters. Experience derived from a joint research, development, test and evaluation (RDT&E) project conducted by the Third Marine Air Wing and the Naval Manpower and Material Analysis Center, Pacific, (Source Data Automation Concept Evaluation) at MCAS Santa Ana provided insight and technical knowledge for the SACOMIS Project. A System Concept and Design Criteria Memorandum was developed and after generally favorable comments from Commanders, Naval Air Forces, Atlantic (CNAL) and Pacific (CNAP), and Headquarters Marine Corps (HQMC), an Automated Data Systems (ADS) Development Plan was prepared and submitted to Chief of Naval Operations via Chief of Naval Material in August of 1973. CNO (OP-91) gave concept approval of the SACOMIS ADS Plan in March of 1974. Direction to expand the SACOMIS Program was then given by CNO (OP-51) with the goal of including Naval Air stations (NASs) Marine Aircraft Groups (MAGs) LPHs, LHAs, and Marine Corps Air Stations (MCASs) in a new program to be called the Naval Aviation Logistics Command Management Information System (NALCOMIS). A draft of the NALCOMIS ADS Plan was completed in September 1975 and as a result of review by appropriate Navy Headquarters Components staffs, a decision was made to limit the scope of the initial endeavor to support of OMA, IMA, and SSC functions. By memorandum from Vice Chief of Naval Operations (VCNO) on 10 June 1976, the CNO designated NALCOMIS a program (project) in accordance with OPNAVINST 5000.42A.

C. NALCOMIS DEFINED

NALCOMIS is defined as "an automated management information system which will provide aviation maintenance and material managers with timely, accurate and complete information on which to base day-to-day decisions through: a single, integrated, real-time automated system to provide timely support to aviation maintenance and supply workers, supervisors and managers, and automated source data entry devices for simplifying and improving data collection." In addition it will also furnish "a means to satisfy the Naval Aviation Maintenance Program requirements, and data inputs to, and or interface with, other major Integrated Logistics Support (ILS) Systems in the Naval Aviation Logistics Community"[8]. As indicated above NALCOMIS will be limited in scope to provide direct service to the organizational and intermediate maintenance activities and the supply support center at both ship and shore sites. The initial effort has been identified specifically as NALCOMIS Module I. The expression "NALCOMIS" will used in this paper to mean NALCOMIS Module I. Other modules, when and if defined, can be expected to expand the scope of NALCOMIS.

D. EXISTING SYSTEM PROBLEMS

The existing MIS (baseline) system has characteristics which diminish its usefulness for maintenance and material managers. In general, the problem with the baseline system is that the procedures for recording and extracting management information data at the aircraft squadron, intermediate maintenance and supply support center levels are time-consuming, error-prone and are unresponsive to the needs of the local aviation maintenance and supply workers, supervisors, and managers.

Three specific problems with the baseline system have been identified[7]. The system lacks:

- A single, integrated, real-time, automated MIS to support aviation maintenance and supply.
- Automated source data entry techniques for data input by aviation maintenance and supply personnel.
- Adequate data to meet requirements of certain Navy and DoD programs.

The specific problems identified above result in an MIS which fails to:

- Satisfy the information requirements of its base level users.
- Provide adequate collection, transmission and display of data/information regarding the status and commitment of maintenance resources and on the status, potential availability and commitment of material.

- Provide rapid and accurate supply responses to maintenance queries and requisitions on repairables and consumables.
- Provide the information necessary for identifying and analyzing critical parts shortages which delay repair of aircraft components.
- Provide visibility of rotatable pool items and critical items by serial number tracking.

NALCOMIS will modernize the aircraft maintenance and material information system and provide base level maintenance and material managers with the capability to ensure that the maximum number of aircraft in the inventory are in a satisfactory material ready condition to safely perform required missions.

E. NALCOMIS CAPABILITIES/BENEFITS

Scheduled to be implemented at a total of 94 sites, NALCOMIS is designed to establish and maintain an integrated data base for use at the local site user level. As indicated previously, the data base will serve the maintenance activities at the organizational and intermediate levels as well as the associated supply support center. Outputs from the system will assist managers in planning and executing their assigned functions in a more efficient and expeditious manner. It will also assist maintenance and supply management by furnishing current and accurate information upon which to base decisions. Figure 3-1 lists the maintenance and material functions which fall within the scope of NALCOMIS.

1. Automated Source Data Entry

According to the Automated Data System (ADS) Development Plan, [7] the automated source data entry (SDE) system will utilize preposted data in pre-formatted displays to eliminate entry of redundant data and permit editing and validation of added data. Use of site oriented centralized integrated data base (SOCIDAB) will minimize the use of costly manual records. Management by expection and on-line real-time access to the stored data will be provided by NALCOMIS. Figure 3-2 provides a schematic of general data flow. Data may be extracted from the data base by using NALCOMIS supplied programs or by using local programs to satisfy local management. The system will also provide a report generator and an interactive query capability.

FUNCTIONS WITHIN PLANNED SCOPE

AVIATION ORGANIZATIONAL MAINTENANCE

Aircraft Inventory
- Gains/Losses
- In/Out ARS
- Location

Readiness Status
- ASD/ESD
- AOC

Serial # Tracking
- Selected Components Location/ Status

Personnel Management
- Master Roster

3-M Reporting
O&S Cost Reporting

Maintenance/ Material Control
- Planned/Phased Scheduling
- Unscheduled Maintenance
- Work-in-Process Tracking

Material Requirements
- Forecast Schedule Removal Requirements
- Tech Directive Change Kit Requirements

Maintenance Supp't
- Reliability/ Maintainability Analysis
- Equipment Asset Management (MRL)

Configuration Management
- Engines
- Components

AVIATION INTERMEDIATE MAINTENANCE

Production/ Material Control
- Repair capability
- Planned/Phased

Maintenance
  Engines
  GSE
- Work-in-Process Tracking

Material Requirements
- Tech Directive Change Kit Requirements
- Bit and Piece Data Supporting Repair of Repairables

3-M Reporting
O&S Cost Reporting
Personnel Management
- Master Roster

Maintenance Supp't
- Serialized Component Location/ Status
- Reliability/ Maintainability Analysis
- Equipment Asset Management
  VAST
  GSE
  PME
  IMRL

Configuration Management
- VAST
- GSE
- PME
- Engines
- Components

AVIATION SUPPLY SUPPORT MANAGEMENT

Supply Support Center
- Rotatable Pool
- AWP Components
- Pre-expended Bins
- Demand Processing
- Repairables
- Receipts From AIMD
- 3-M Material Reporting (Aviation)
- ANORS/ANFE Requisitions

Requisition Management
- Status
- Follow-Up

O&S Cost Reporting

Figure 3-1 NALCOMIS Module 1 Scope

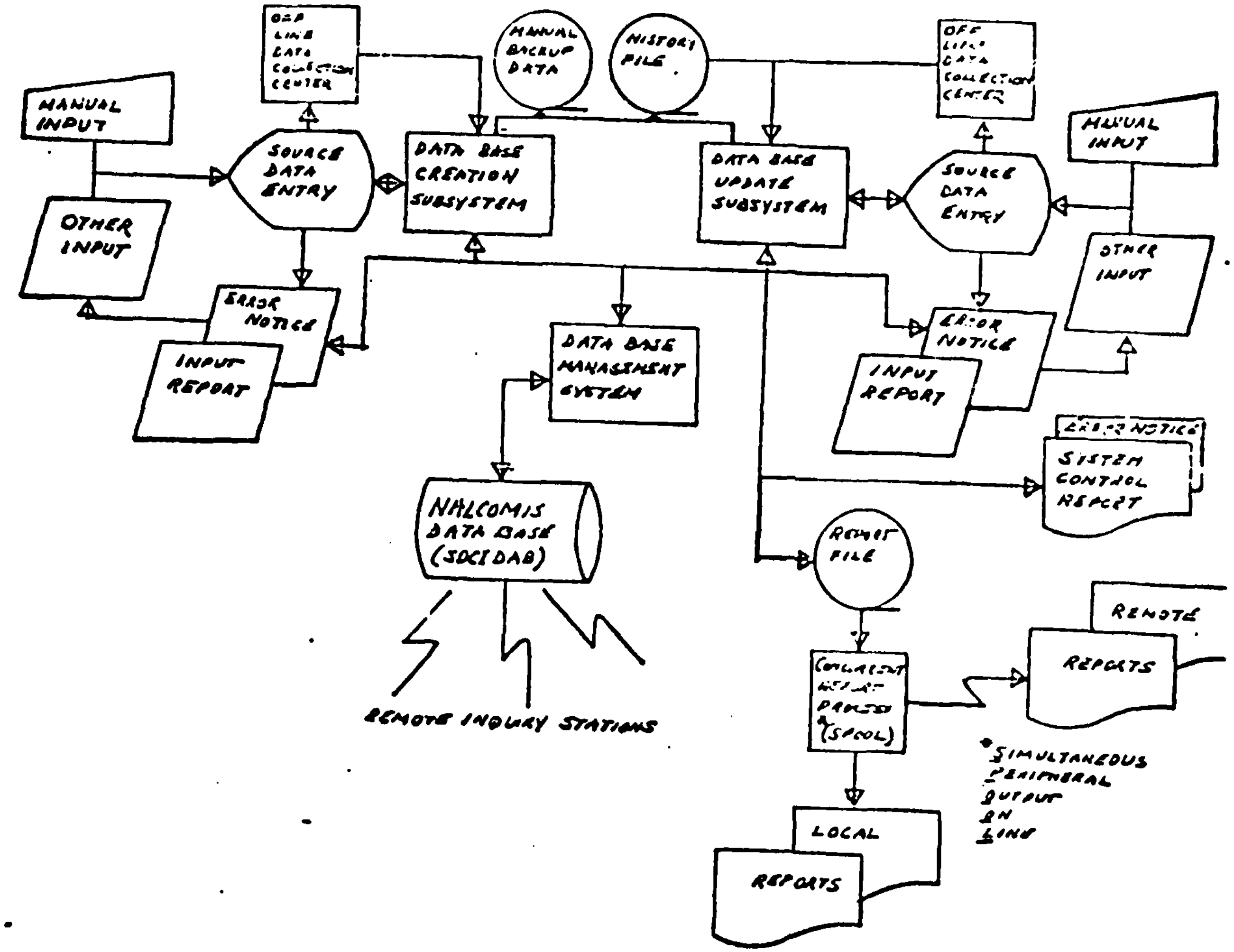


Figure 3-2 NALCOMIS System Schematic (Generalized Data Flow)

2. <u>System Generated Schedules and Reports</u>

Maintenance schedules and supply requirements may be generated by the system based on work on hand, scheduled maintenance requirements, technical data information, worker population and particular skills limitations information, configuration management, availability of parts, priorities, and funds status. Actual values can be tracked against forecasts and appropriate adjustments made.

3. <u>Information Availability</u>

Further capability of the system will allow for tracking of maintenance actions as they occur. Required cost and statistical information can be accumulated as it occurs and in the detail desired by management. Accumulated costs and statistcs will permit local management to analyze trends during the reporting period and shorten the time between the end of the reporting period and the availability of information to up-line users.

4. <u>Interface With Other Systems</u>

In addition to the previously mentioned benefits, NALCOMIS will interface with and/or provide data inputs to other major *Integrated Logistic Support* (ILS) systems in the Naval Aviation Logistics Community. Some of the specific systems with which NALCOMIS will interface are listed below.

- Aeronautical Repairables Management Systems (ARMS)
- Improved Repairable Asset Management (IRAM) includes:
  - Closed Loop Aeronautical Management Program (CLAMP)
  - Serialized High Cost Asset Reporting Program (SHARP)
  - Fleet Intensified Repairables Management (FIRM)
- Maintenance Data System (MDS)
- Subsystem Capability Impact Reporting (SCIR)
- Naval Aviation Logistics Data Analysis System (NALDA)
- Flight Readiness Evaluation Data System (FREDS)
- NORS Improvement Program (NIP)
- Analytical Maintenance Program (AMP)
- Fixed Allowance Management/Monitoring System (FAMMS)

- Shipboard Uniform Automated Data Processing System-End Use (SUADPS-EU)
- Uniform Automated Data Processing System for Stock Points (UADPS-SP)
- MSDO Level II Supply System for NAS

Output from the new MIS will directly interface with several other systems also. Figure 3-3 illustrates the major interfaces between NALCOMIS and other systems.

Since the system is a totally integrated, interactive system, users will have access to all data residing in the central data base which is controlled by the data base management system. Each organization's data will be uniquely identified to that organization, ensuring data integrity and security. The technique used will also provide for expeditious system output of all of the organization's data in the event of deployment away from the NALCOMIS site.

F. USER ORIENTED SYSTEM

One of the system design objectives was to provide a user oriented system. This will be accomplished in several ways. Preformatted displays will assist in data entry while system generation of data resulting from input of certain data will expedite maintenance and material transactions. For instance, entry of a specific three digit aircraft side number (MODEX) will generate the appropriate type/model/series, type equipment code, aircraft bureau number, organizational unit, etc., in the format displayed on the visual dispaly terminal (source data entry device). Ouput from the system will provide managers with information which will allow them to accomplish assigned mission requirements. Local products (outputs) will be provided in one of three ways: by source data entry (SDE) visual display device, SDE device terminal printer or a high speed printer, depending on the specific product to be produced. Up-line reporting requirements will be satisfied by either a machine readable medium (tape) or hard copy printout.

G. SYSTEM SCENARIO

The following scenario is presented in order to provide the reader with a comprehensive idea of how the system will operate.

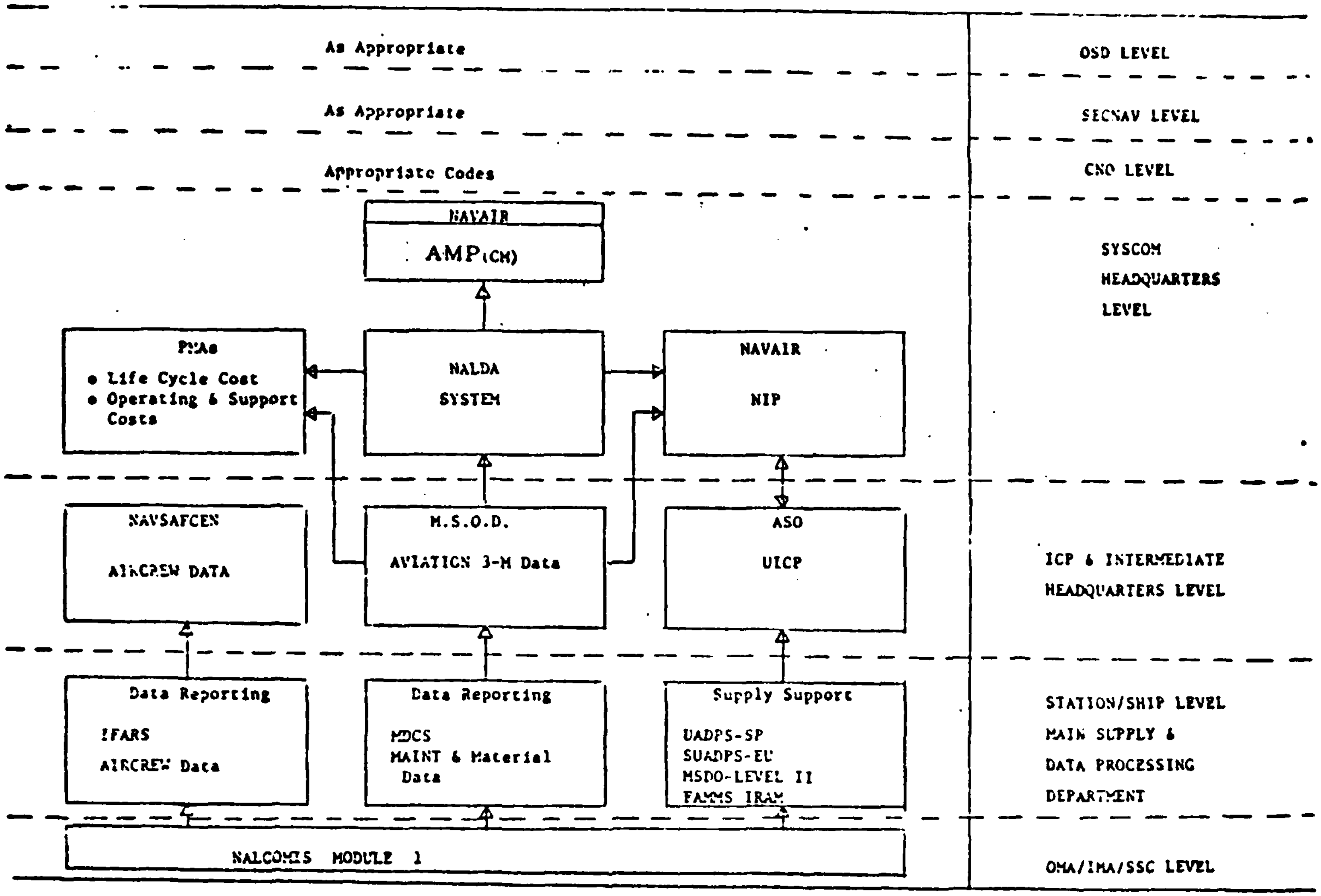


Figure 3-3 Naval Aviation ILS Community (Interfaces with Other Systems)

On completion of a flight, necessary flight and discrepancy data will be extracted from the Naval Aircraft Flight Record "Yellow Sheet" or the USMC Flight Readiness Evaluation Data System (FREDS) "Yellow Sheet." The data will be entered into the system through conveniently located SDE equipment. Flight data will be used to update the specific aircraft and personnel records. Discrepancy data will be used to initialize a Maintenance Action Record (MAR). Upon entry of aircraft identification data, associated data such as type/model/series (T/M/S) and squadron designation, will be retrieved from the data base. Maintenance Control (MC) would be notified immediately of any discrepancies not originated by that office.

Maintenance Control would be advised of any maintenance or inspection action required because of some sensitive element such as flight hours, number of shipboard landings or number of sorties, which has been monitored by the system. Other notices could be initiated because of flight or discrepancy data entered into the system. All newly recorded data would be available for query along with previously recorded data.

After Maintenance Control is alerted to a discrepancy, a Job Control Number will automatically be assigned. Based on information concerning work center (WC) backlog, priorities, personnel status, etc., available to him from the system, the supervisor can schedule the repair action and simultaneously advise the work center supervisor of the priority assigned. The system, effectively, provides a common Visual Information Display System (VIDS) board with all users having access to all applicable information through the SDE equipment.

Upon assignment of a worker to a maintenance action, the WC supervisor enters the information into the system and simultaneously, "everybody's VIDS board" is updated from awaiting maintenance (AWM) to In-work. Statistics are also updated which would indicate that the number of aircraft in-work was increased by one while the number of AWM aircraft would be reduced by one. If, during the maintenance action, it is determined that a part is required, the worker would record the requirement through conveniently located SDE equipment. Maintenance Control would be made aware of the part requirement and a requisition would transmitted to the SSC. The stock position of the requested part could be displayed at the SSC. Activation of a single key could provide a picking ticket in a warehouse, decrease that asset inventory position, advise the WC and MC offices of the part availability.

After receipt of the required part, the maintenance action would be completed and the completion recorded through the SDE equipment. All affected records, statistics and up-line data requirements would be updated and the completed record would be moved from the in-work file to the history file. Delay in the supply action could change the aircraft status from Not Mission Capable Maintenance (NMCM) to Not Mission Capable Supply (NMCS) - formerly Not Operationally Ready Maintenance (NORM) and Not Operationally Ready Supply (NORS). Other delays in maintenance, such as might be caused by unavailability of work benches, tools, ground support equipment, technical descriptive data (manuals) or other causes would be captured by the system and be available for later query and analysis. According to the ADS Development Plan there is almost no limit to the data which may be extracted and the formats that can be prepared by the system. As mentioned previously, the system will have both interactive query and report generator features. Summary reports will be produced at specified times as described in the user requirements.

H. RECORDING AND RETENTION OF DATA

Overall, NALCOMIS will provide for the recording and retention of data relative to:

- Aircraft (including engines and components)/GSE utilization and inventory
- Maintenance personnel management
- Scheduled and unscheduled maintenance requirements
- Material requirements
- Support functions

Through the data base thus established, the system will provide information to satisfy management requirements for accomplishing assigned missions at local and up-line levels of responsibility.

I. SUBSYSTEMS OF NALCOMIS

The NALCOMIS design provides for division of the system into subsystems. The subsystems which provide modularity within the OMA, IMA, and SSC are identified as follows: [7]

1. Flight Activity Primarily a data collection function for flight data in support of scheduled maintenance requirements; preparation of reports for aircraft log books and Aeronautical Equipment Service Records (AESR); information needs of Navy Maintenance Support Office (NAMSO); and the requirements of the Individual Flight Activity Reporting System (IFARS) and the Flight Readiness Evaluation Data System (FREDS).

2. Maintenance Activity To serve the OMA and IMA by providing data on the identification and approval of a maintenance requirement; operational status of assigned aircraft, engines, and items of ground support equipment (GSE), identification of all outstanding maintenance against aircraft, engines, GSE and repairable components; current workload of each maintenance work center; the status of each maintenance action; alerts of scheduled maintenance actions; and establishing and maintaining the Individual Component Repair Listing (ICRL).

3. Configuration Management To serve the OMA and IMA by maintaining the current configuration of the aircraft, engines, GSE, and components; track configured items; and to maintain a current record of incorporated and not incorporated technical directives.

4. Maintenance Personnel Management To maintain the maintenance personnel roster; and to track personnel availability for local and specific assignments; personnel qualifications and requalification requirements and dates; on-board versus personnel allowances; replacement personnel by skills and reporting dates; and to project maintenance personnel losses.

5. Asset Management To serve OMA and IMA by providing systematic inventory and location accountability of assigned aircraft, GSE and test benches to include gain/loss transactions, inventory status change, and GSE utilization data and subcustody actions.

6. Supply Support Center To process demands for repairables, repair parts and consumables for maintenance actions. The supply management of the repairables will satisfy OMA and IMA interface requirements.

7. Local/Up-line Reporting To summarize, format and transmit up-line data including Aviation 3-M and NALCOMIS Operating and Support (O&S) data.

8. System Support To generate and monitor system support programs which are commercially procured, i.e., DBMS, Operating systems, etc.

Figure 3-4 depicts the relationships between the above subsystems and the OMA, IMA, and SSC organizations.

J. CHAPTER SUMMARY

The Naval Aviation Logistics Command Management Information System will provide an effective and efficient information system which will respond to the requirement for a modern, standardized MIS to support U.S. Navy and Marine Corps aviation squadrons. NALCOMIS Module 1 will initially be limited in scope to the service of Organizational Maintenance Activities, Intermediate Maintenance Activities and the Support Center. By overcoming the major problems inherent in the existing MIS, NALCOMIS should meet the objective of providing accurate and timely management information to allow managers at all levels of responsibility to meet those responsibilities. NALCOMIS, by providing a single, integrated, real-time automated MIS to support the base level (OMA, IMA, SSC) management of aviation maintenance and material, source data collection, intra-base data communication and up-line reporting functions, should result in improved aircraft availability and mission readiness. NALCOMIS is an essential step toward upgrading the NAMP and the logistics support posture of the Department of the Navy.

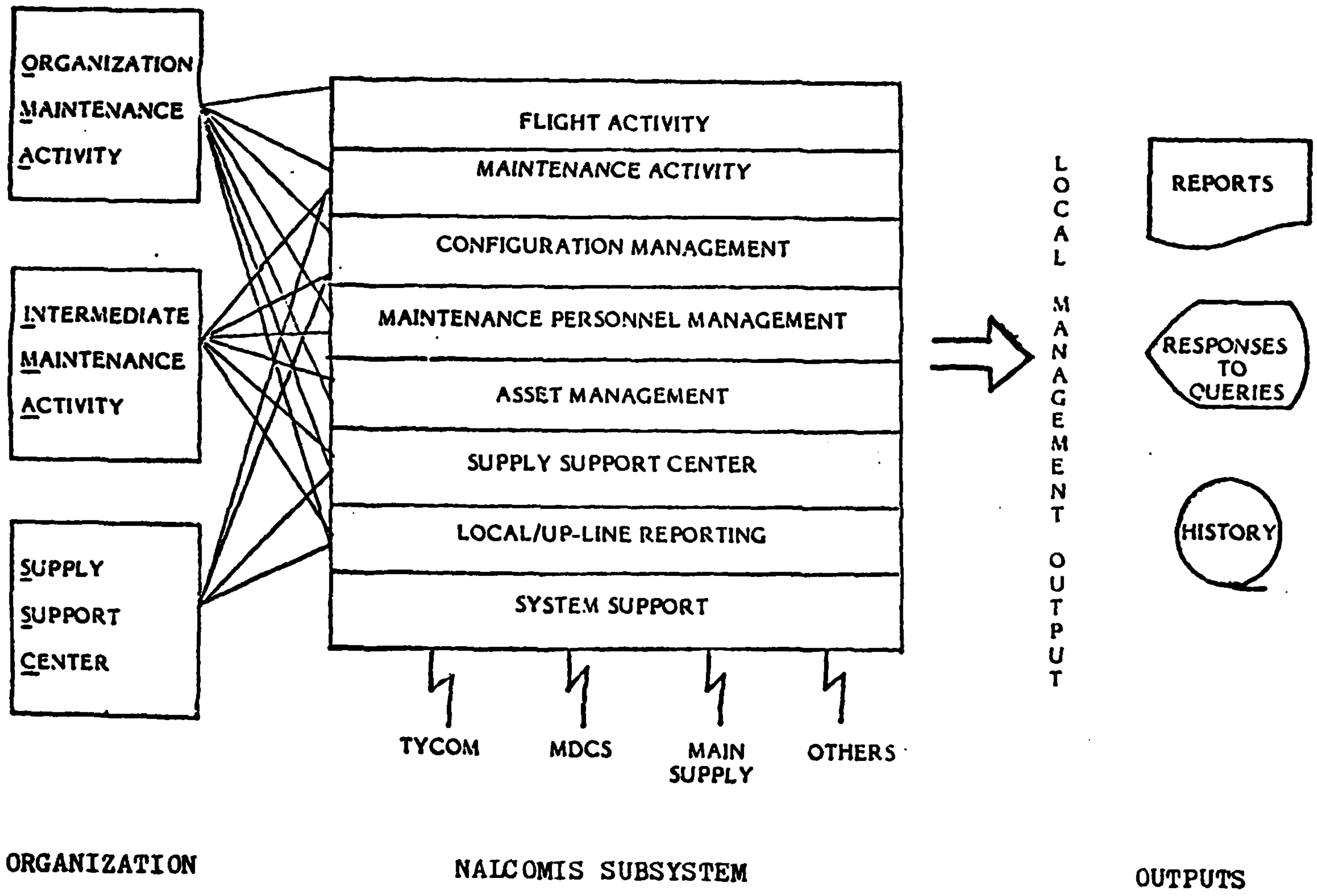


Figure 3-4 NALCOMIS Organization/Subsystem Relationships

IV. DATA ANALYSIS UNDER EXISTING SYSTEM

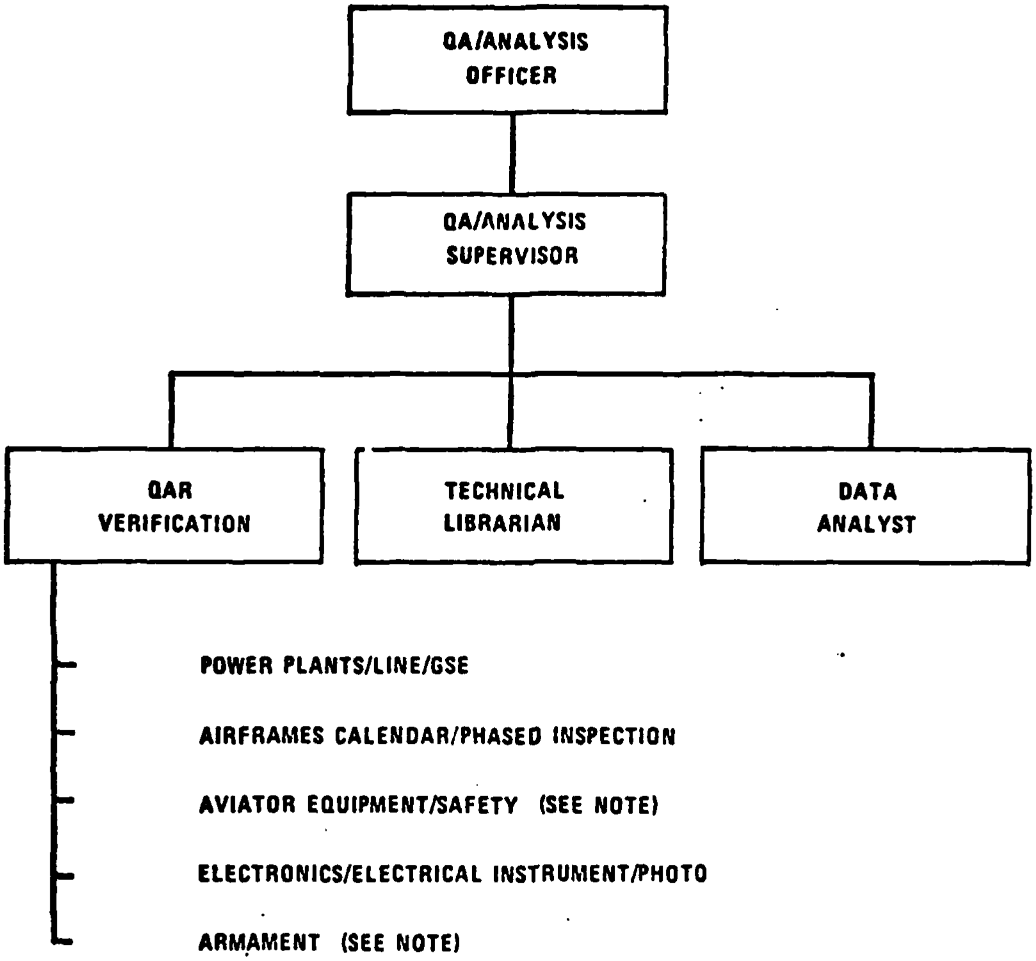
The Naval Aviation Maintenance Program (NAMP) outlines command, administrative, and management relationships and establishes policies for assignment of responsibilities for carrying out the NAMP. Collection and reporting of maintenance and material data is an important part of the program. Analysis and use of accumulated data is essential for effective maintenance and material management of Naval Aviation Maintenance.

A. GENERAL DATA ANALYSIS PROCESS

The process of data collection and machine processing provides a mass record of maintenance actions. The process of data analysis sorts from the mass data the significant events that require corrective action or merit command management attention. The time and expense required to collect and machine process maintenance data can only be justified if the data is continuously and constructively analyzed and used at all levels of command. This chapter will address the analysis function at the Organizational and Intermediate levels, as established by OPNAVINST 4790.2B.

B. QUALITY ASSURANCE/ANALYSIS DIVISION

The Quality Assurance/Analysis Division is a staff division of the Maintenance Department (both O and I level) with responsibilities for, among others, providing qualitative and quantative analytical information to the Maintenance Officer, enabling him to continually review the management practices within his organization. The division has a wide variety of responsibilities which include various types of inspections, maintenance of the department technical library, establishment of Quality Assurance Representative and Collateral Duty Inspector qualification requirements, and utilization of information from the Maintenance Data System within the activity is also assigned to the QA/Analysis Division. The Analysis Section of the division has that responsibility and is also the contact point between the work centers and the Data Services Facility. Figures 4-1, 4-2, and 4-3 depict the organizational, structure of the QA/Analysis Divisions at the Organizational, Intermediate levels and



1. Organizational Maintenance Activities which do not have ejection seats may designate a permanent CDQAR for the Aviator Equipment/Safety Billet.

2. Organizational Maintenance Activities which have minimal ordnance delivery in their assigned mission may designate a permanent armament CDQAR.

Figure 4-1 Organizational Level Maintenance

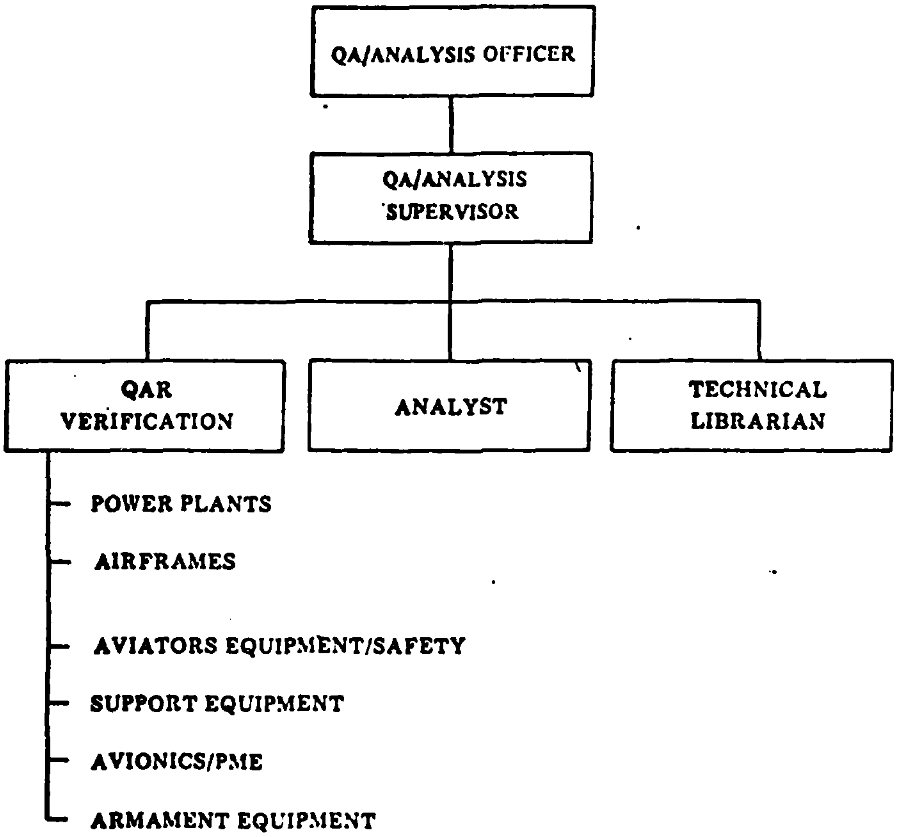


Figure 4-2 Intermediate Level Maintenance

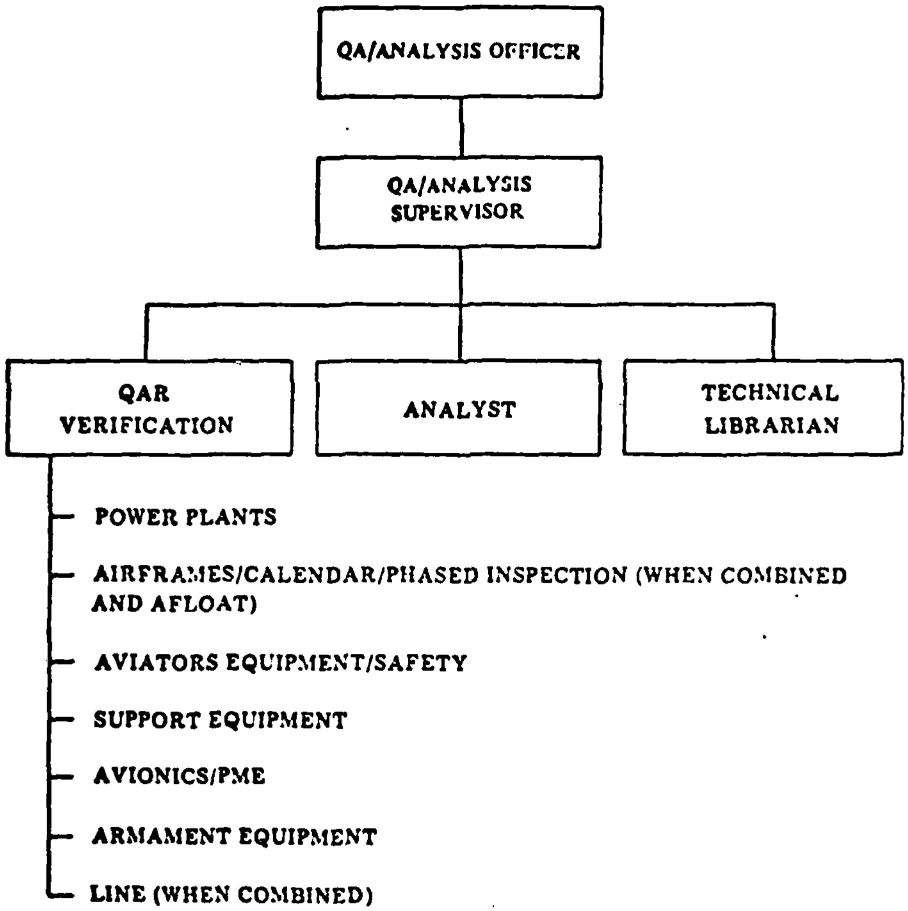


Figure 4-3 Afloat AIMD and Combined AIMD/OMD

the afloat AIMD, respectively. Chapters 2-4 of Volume II and 2-5 of Volume III of the NAMP Manual provide detailed information on the functions and responsibilities of the QA/ Analysis Division.

C. ANALYST'S MAJOR ROLE AND RESPONSIBILITIES

The Analyst plays an essential role in the management of all aspects of the MDS at the activity level as indicated in the NAMP Manual:

> "The Analyst is the leading figure in the operation of the MDS of any activity. To enable the Analyst to perform this function, he must be a senior petty officer/ non-commissioned officer, formally trained in MDS procedures, data processing capabilities and the techniques of statistical analysis. In addition, the Analyst must be aggressive in maintaining a high quality of input data and imagination in applying analysis techniques to provide useful data for maintenance management purposes.

The Analyst's major responsibilities and functions are enumerated below.[2]

- Provide management with analytical reports and recommendations with regard to aircraft material condition and utilizaton, maintenance workload, manpower utilization, failure trends, etc.
- Collection, screening, review, and delivery of source documents to the DSF for processing. Ensure completed data reports are picked up and disseminated throughout the organization.
- Screening, distribution and analytical examination of machine reports.
- Preparation of graphic and narrative presentations.
- MDS training of Maintenance Department personnel.
- Close coordination with work centers and Data Services Facility (DSF) to resolve routine problem areas.
- Ensure that adequate supplies of source documents are on hand within the Maintenance Department for continuity of the MDS.
- Establish source document pickup and delivery points, and designated times for delivery and pickup of source documents.
- Categorize all MDS source documents utilizing the Document Control Form (DCF) prior to delivery to the DSF for key punching of the documents. Documents should be delivered at least once daily to maintain an even key punch work load.

NOTE: Marine Corps activity flow of data goes from the Squadron Analysis Section for key punch and is then delivered to the Wing Analysis Section for input to the DSF. The Wing Analyst is the functional manager for the MDS between the Analyst and DSF.

The NAMP Manual further specifies technical functions for which the analyst is responsible.

- Coordination and Monitoring of the MDS for the department (or division).
- Reviewing MDRs to discover and point out discrepancy trends.
- Maintain the master copy of the Master Roster Listing (MHA-00) for the activity. Maintain the MHA-00 for Work Center "XXO."
- Monitor the assignment of sublabor codes within the organization.
- Monitor the assignment of the third position numeric character of work center codes.
- Collect, maintain, and distribute in narrative, tabular, chart or graph form the data required to monitor, plan, schedule and control the Maintenance effort.
- Develop charts, graphs, and displays for command presentation.
- Assist the Maintenance Officer and other supervisory personnel in determining the specific requirements for new types of data reports deemed necessary for management of the maintenance effort.
- Identify and apply analytical techniques to areas of material deficiencies, high man-hour consumption, or other trends.
- Provide assistance to Maintenance/Material Control in relating contents of monthly MDS reports to material consumption and project material usage.
- Coordinate routine maintenance data reporting matters with the DSF.

In addition to the general and technical functions and responsibilities listed above, the Analyst is also responsible for conducting and coordinating MDS training for all personnel assigned to the Maintenance Department which should include the content and use of the available data products. By utilizing the MDS, the Analyst should assist in identifying possible deficiencies of technical training or documentation procedures also.

D. ACCURATE DOCUMENTATION

Accurate documentation throughout the MDS is extremely important and should be the subject of continuing concern. Erroneous documents that are not corrected result in a loss of effectiveness of the submitted data and of the system overall. The importance of complete and accurate data can be seen when large-scale, Navy-wide use of the data is considered. Some uses of the information generated from the accumulated data by higher level Navy managers are:

- Analysis of high system failures and high man-hour consumers by specific weapons system.
- Justification of product improvement actions.
- Analysis of inspection requirements and as a basis for adjusting inspection criteria and intervals.
- Improvement of intermediate level repair capabilities, where possible.

In light of the above uses of information, it is apparent that accurate documentation is of utmost importance. Work Center Supervisors, with the guidance of the Analyst should strive for absolute accuracy. Where recurring documentation errors are consistently made, the Analyst must conduct training in order to eliminate those errors.

E. DATA SERVICES FACILITY

In considering the data that are documented, collected, summarized and reported by the MDS, it is important to be aware of the part that the Data Services Facility (DSF) plays in the overall process. Essentially, the DSF receives all source documents from the O and I level maintenance activities and the supporting supply activity and converts extracted data to machine (computer) records utilizing key punch or optical scan typewriter techniques. The DSF then uses the machine records to produce periodic report listings summarizing the submitted data. These reports are supplied to maintenance supervisors to provide assistance in planning and directing the maintenance effort. The machine record information is periodically forwarded to a central processing facility where data is made available to Aircraft Controlling Custodians, Technical Commands and other managers.

F. SPECIFIC FUNCTIONS OF ANALYSTS

The remainder of this chapter will present some of the specific functions which must be carried out by the Analyst. The presentation is not intended to be exhaustive but should convey to the reader the wide variety of responsibilities assigned to the Analyst and the importance of his functions to the overall Aviation Maintenance Programs. Where possible, for the sake of brevity, examples of data reports and analysis products will be given, with only passing mention of the range of these reports and products that are involved.

1. Source Document Processing

As mentioned above, the Analyst is responsible for collecting, screening and delivering source documents to the DSF and for receiving and distributing machine reports within his unit. This activity generally consumes a large percentage of his time and effort. Maintenance of the Man-hour Accounting and Equipment Master Rosters (MHA-00 and E-00) also consumes additional effort and time. The Analyst is also responsible for data transferred from one supporting DSF to another as a mobile unit (squadron) changes operating bases. The data transfer involves obtaining the data in machine sensible form (80 column EAM cards or magnetic tape) from the supporting DSF and delivering it to the new supporting DSF.

2. Machine Reports

Machine reports provided by the Data Services Facility are received by the Analyst for distribution to applicable work centers. In addition to their use by the supervisors, the reports form the basis of the analysis products which are produced by the Analyst. Only those reports specifically requested by the Analyst utilizing a Monthly Report Request Form are produced. There are approximately 35 monthly reports available, any or all of which may be requested depending on the desires of the customer activity. Figure 4-4 is a sample of the Monthly Report Request Form and details the reports which are available from the system. A few specific reports will be considered below with the intention of illustrating the types and uses of the reports which are typical. It should be noted at this point that some of the reports are applicable only to O level activities while others are applicable only to I level activities.

a. Monthly Production Report

The Monthly Production Report is a summation, by work center, of all maintenance actions, support actions and technical directive compliances submitted during the month. Prepared for the Work Center Supervisor, typical uses might be to assist the supervisor in obtaining maximum utilization of his direct labor force and comparing the productivity of the work center to a set of desired standards.

MONTHLY REPORTS REQUESTS FORM

Monthly Flight Report	AU-2	____(1)
User Monthly Utilization Report	TDU-2	____(2)
Monthly Training Device Utilization Report	TDU-3	____(3)
Monthly Production Report	MDR-2	____(4)
JCN Consolidation Report	MDR-3	____(5)
Technical Directive Compliance Report	MDR-4-1	____(6)
Technical Directive Compliance Report	MDR-4-2	____(7)
System and Component Maintenance Report	MDR-5	____(8)
When Malfunction Was Discovered Report	MDR-6	____(9)
Maintenance Action By Individual Item Report	MDR-7	____(10)
Beyond Capability of Maintenance and Repair Report	MDR-8-2	____(11)
Beyond Capability of Maintenance and Repair Report	MDR-8-3	____(12)
Beyond Capability of Maintenance and Repair Report	MDR-8-4	____(13)
Failed Parts Report	MDR-9	____(14)
Repair Cycle Data Report	MDR-10	____(15)
No Defect Report	MDR-11	____(16)
No Defect Report	MDR-S-2	____(17)
Foreign Object Damage Report	MDR-S-3	____(18)
Corrosion Control/Treatment Report	MDR-S-4	____(19)
Maintenance Action by Bureau Number Report	MDR-S-5	____(20)
Organizational Maintenance Action by Work Center Report	MDR-S-6	____(21)
Organizational Maintenance Action by Component Report	MDR-S-7	____(22)
Component Repair/Repair Cycle Report	MDR-S-8	____(23)
Maintenance Action/Beyond Capability of Maintenance Report	MDR-S-9	____(24)
Failed Parts/Parts Required Report	MDR-S-10	____(25)
Training Device Maintenance Report	MDR-TD	____(26)
Monthly Work Center Utilization Report	MHA-2	____(27)
Monthly Grade Code Utilization Report	MHA-3	____(28)
Monthly Equipment Awaiting Maintenance Reason Summary	SCIR-2	____(29)
Monthly Equipment Discrepancy and Utilization Report	SCIR-3	____(30)
Monthly Equipment Capability Report	SCIR-4	____(31)
Repairable Management Data Report From ____ To ____ Part I ________ Part II ________	MR-1-1	____(32)
Repairable Management Data Report From ____ To ____ Part I ________ Part II ________	MR-1-2	____(33)
Expense Item Management Data Report From ____ To ____ Part I ________ Part II ________	MR-2-1	____(34)
Expense Item Management Data Report From ____ To ____	MR-2-2	____(35)

Requesting Organizational Code ____________

Figure 4-4 Monthly Reports Request Form

b. Technical Directive Compliance Report

The Technical Directive Compliance Report provides a detailed list, by organization, of Technical Directive (TDC) during the reporting period. Designed for the Maintenance Control Officer, it aids in scheduling and maintaining positive control of Technical Directives. It can be used to identify total man-hours used for TDC, or in all TDCs combined and also identifies TDCs that did not apply or had been previously incorporated.

c. Monthly Equipment Discrepancy and Utilization Report

The Monthly Equipment Discrepancy and Utilization Report is designed to show, by equipment Bureau/Serial Number, the total number of discrepancy hours limiting the equipment from performing its assigned primary mission or function during the reporting period. The report is designed for use by the Maintenance Officer to determine the impact of maintenance/supply upon the mission capability of the equipment.

d. Maintenance Action by Bureau Number Report

A final example to be considered is the Maintenance Action by the Bureau Number Report. This report consolidates all maintenance actions in Bureau/Serial Number sequence including support equipment, TDC, and component repair at the I level activity. The report is designed to provide a history of aircraft maintenance actions by Bureau Number and is intended for the organizational maintenance managers and Analysis Section. It can be used to disclose troublesome subsystems, repeat discrepancies, unusual expenditures of man-hours within a subsystem of any specific aircraft and the man-hours required to perform periodoic maintenance for each aircraft.

3. Analysis Process

The reports mentioned above as well as others which may be desired by the activity's Analyst, provide the data with which the Anayst works in producing what might be called analysis products. Analysis techniques may be tailored to provide specific information required to answer questions relevant to any aspect of the maintenance function. Paragraphs 2449 and 2547 of Volume II and III, respectively, of the NAMP Manual, provide general guidance for basic analysis techniques. The techniques include extraction, examination and presentation of pertinent data which, when properly used, will result in analysis products beneficial for assisting management in attaining effective and economical utilization of personnel and material resources.

To accomplish required analyses, the Analyst must have a thorough knowledge of the contents of each MDS report and complete understanding of the analysis techniques outlined in the NAMP Manual. The Analyst must select data which are pertinent to the analysis being conducted and he must know where it may be found. Extraction of data is usually a very laborious, manual process wherein columns and line of reports must be carefully screened to identify and select the desired data. After selection and extraction, the data must be translated from code form into meaningful terms before it can be analyzed. Examination of the accumulated data follows and is the critical stage of the analysis process. The intent of the detail examination is to:

- Determine if a problem actually exists.
- Identify the factors contributing to the problem.
- List possible conclusions.
- Suggest possible alternative courses of action.

The final step in the process is the method of presentation. Generally, presentation of the analysis results will be done orally to the individual or group of persons who need to know the findings. The advantage of an in-person oral brief is that such a presentation allows for questions and clarification of any points or other assistance. Visual aids such as graphs and tables should be used with oral presentations where applicable.

4. Analysis Products

A number of analysis products may be generated from MDS reports. A few will be mentioned below which represent typical analysis applciations but other products could be generated, contingent on the desires of management and the ability of the Analyst.

a. High Man-hour, Maintenance Action and Failure Rate Items

Identification of high man-hour, maintenance action and failure rate items may be made by utilizing data available from the MDR reports. Items or components that consume the most man-hours, account for the highest number of maintenance actions, or have the highest failure rate may be singled out for further analysis. Existance of improper maintenance practices, material deficiencies, lack of technical proficiency or similar conditions may be indicated. Action taken as a result of any findings is a function and responsibility of management.

b. Cannibalization Trend Chart and Summary

A Cannibalization Trend Chart and Summary is designed to inform the Maintenance Officer of the extent of cannibalizations within his activity and the indentity of the items involved. A high cannibalization rate indicates a parts shortage and an added man-hour expenditure incurred in removing and replacing cannibalized items. Comparison of cannibalization man-hours and Direct Maintenance Man-hours per Flight Hour would indicate the additional cost in man-hours attributed to cannibalization.

c. Abort Malfunctions Chart

An Abort Malfunctions Chart can inform management of which malfunctioning equipments have caused the failure of assigned aircraft to fulfill their scheduled missions. Data contained in the MDR system can provide identification of system/components causing aborts, the number of items involved, when the abort malfunctions occurred (before or during flight) and similar information. This data may be employed to initiate an investigation of the circumstances leading to the aborts.

d. Maintenance Man-hours Per Flying Hour and Sortie Chart

A Maintenance Man-hours Per Flying Hour and Sorties Chart may be developed to identify the number of maintenance man-hours required to produce a single flying hour or sorties for a given type of aircraft. The man-hour figures may be developed for individual work centers or for an entire squadron maintenance department. Such a figure is useful as an index of the cost, in terms of maintenance, of supporting an hour of aircraft flight.

e. Monthly Maintenance Summary

In addition to the analysis products mentioned above and others which might be generated from available MDS data, the most widely accepted method of publishing the results of r ntenance analysis is through the use of maintenance summaries. Guidelines regarding content, format and distribution of maintenance summaries is presented in the

NAMP Manual. The Monthly Maintenance Summary can be an excellent management tool if properly utilized and applied in the decision making environment.

The summary content and format, in general, should be based on the concept of what management wants to know. The Maintenance Officer should prescribe the scope of information required and will include the following areas: [2]

- Utilization and productivity of the labor force.
- Efficiency of the entire maintenance operation.
- Direct support cost per flying hour, per sorties or per departure as applicable.
- High man-hour consumers.
- High failure rate components.

Additional subject areas may be considered for inclusion in the summary also. Some of them are listed below.

- Cannibalization of components.
- Malfunctions causing aborts.
- Shop repair capability.
- Distribution of maintenance man-hours.
- Technical directive compliance program.
- Distribution of possessed aircraft hours.

The monthly Maintenance Summary, as well as other analysis products which are available, should provide answers to management's questions. Several examples of pertinent questions are listed below.

- What are the causes of maintenance work stoppages? (i.e., lack of supervision, skills, facilities, equipment, tools, etc.)
- What are the specific causes of low aircraft readiness in the unit? What system components or parts chronically fail?
- How much unnecessary maintenance is being performed?

The summary is primarily a local (within the organization) document for use by local managers. Distribution of maintenance summaries should be made to all work centers in the preparing activity and to other interested parties as requested. Higher commands may also desire to receive subordinate commands' summaries for the purpose of monitoring performance and problem areas.

The process of developing the Monthly Maintenance Summary, that is selection, extraction, translation, examination and presentation of data, consumes approximately 25 percent of the average Analyst's time, based on a survey conducted by the Naval Personnel Research Activity (NPRA) in August 1969. This expenditure of time is usually concentrated within a five or six day period commencing around the tenth day of the month, after all source documents have been processed and necessary corrections made. Production and distribution of the Summary is usually completed by mid-month and, essentially, completes the data cycle for the previous reporting period (month).

The foregoing sections of this chapter have briefly described the functions and responsibilities of the O and I level Analysts based on the requirements and recommendations of OPNAVINST 4790.2B. It has also described some of the machine reports which the Analyst utilizes in preparing the Monthly Maintenance Summary and other analysis products. In the remaining sections of this chapter, a brief description will be given of what Analysts actually do, where it differs from the NAMP directive. Some of the problems encountered with the actual Maintenance Data System and analysis will also be mentioned. The intention of this portion of the presentation is to provide the reader with the flavor of the actual data analysis operation but is not intended to be exhaustive in exploring all the considerations or problems involved.

G. DATA ANALYSTS

Essentially, all organizational and intermediate maintenance activities have a qualified Data Analyst assigned to them. The expression qualified Data Analyst in this context means an individual who has been specifically trained and designated to perform the tasks which have been described earlier. A Navy Enlisted Classification (NEC) code or Marine Occupational Standard (MOS) code are assigned to personnel so designated: NEC AZ-6313 and MOS-6083 respectively. Formal training for Analysts is conducted at a Class C Data Analysis Course (DAC-C) by the Naval Air Technical Training Command. The course includes:

- 3-M System Documentation.
- Data extraction.
- Graphic presentation.

- Job standards and work sampling.
- Monthly Maintenance Summary preparation.
- Statistical analysis.

Statistical analysis techniques include consideration of:

- Time series analysis.
- Measures of central tendency.
- Measures of dispersion.
- Statistical inference.
- Hypothesis testing.
- Control charts.
- Linear correlation.

The need for Data Analysts has frequently been questioned since incorporation of the 3-M System into the NAMP. The major question concerning requirement for a statistically oriented/trained individual to be assigned to each I and O level activity usually centers around how he is actually utilized. Maintenance management in an average squadron or small AIMD is of such a small scale that analytical methods infrequently reveal facts which are not already common knowledge. The analysis products usually only confirm or quantify problems which are intuitively obvious from observation. Because of the historical nature of the analysis information, many of the problems have long since been resolved. Additionally, the data base is frequently so small that statistical techniques can not be applied with acceptable validity.

Experience over the years indicates that Maintenance Officer (MO) rarely task the Analyst to furnish analytical information other than is required for the Montly Maintenance Summary. Lack of demand is usally attributed to the fact that MOs are very busy with higher priority considerations or that they are unfamilar with statistical methods and therefore obtain minimal benefit from such information.

In nearly all activities, the Analyst devotes a large majority of his time to collecting and screening source documents (SAFs and VIDS/MAFs), checking and correcting daily machine reports, resolving problems with the DSF and preparing the monthly summary. Very little time is left for meaningful, in-depth investigations even if they were desired by the MO.

H. FLEET-WIDE SURVEY RESULTS AND RECOMMENDATIONS

The Navy Manpower and Material Analysis Center, Atlantic (NAVMACLANT) conducted a Fleet-wide survey of the Aviation 3-M System for the Chief of Naval Material in 1972 and 1973. The survey was conducted among Naval aviation operating and support activities for the purpose of determining Fleet needs for aircraft maintenance management data and the general effectiveness of the 3-M System at Fleet levels. The final report [9] disclosed some findings which are of interest here.

One of the primary findings was that Data Analysts are not generally being utilized in the functions for which they are trained. The survey provided considerable evidence that the statistics training received in the Data Analysis Course was rarely, if ever, used by the majority of the Analysts assigned to Fleet units. This finding tends to support the idea that Data Analysts, as such, might not really be needed at O and I level activities.

The survey also disclosed that, based on comments from respondents, most Analysts viewed themselves less as statisticians than as 3-M specialists. The report suggests that although in the original concept, Analysts were expected to be both 3-M specialists and statisticians, that the statistical aspects of the billet were generally subordinated. The need for a Data Analyst in Fleet activities then, actually meant a need for a 3-M System expert - a 3-M coordinator.

Among the many conclusions and recommendations resulting from the survey, several are important in considering what the role of the Analyst should be, especially with the advent of NALCOMIS.

Based on the survey, it was determined that the 3-M coordinator function was particularly important to O level and I level activities and that the value of having a resident specialist in each activity to manage the data system and conduct liaison with the DSF was considered to be significant.

That study concluded that the average squadron and small AIMD does not productively employ an Analyst in the role of statistician and therefore the statistical portion of the DAC-C was largely inappropriate to the majority of analyst billets. As mentioned above, it also found that the role of 3-M coordinator was an important one which should be recognized and upgraded with appropriate training. It further concluded that statistics-oriented Analysts could be more productively utilized by staffs or in larger activities.

Several recommendations which resulted from the study are significant relative to data analysis and are listed below.

- Establish a new AZ series NEC and Marine Corps MOS, to be titled "3-M Coordinator.
- Delete the billets for AZ-6313/MOS 6083 in all squadrons and AIMDS, replacing these with the new 3-M Coordinator NEC/MOS.
- Increase the allowance of AZ 6313/MOS 6083 Analysts at Wing, Group, and Type Command staffs, and establish an Analysts office as part of the standard organizations of those staffs. In Wing and Group levels those offices should serve as a pool of analysis talent available to squadrons on request.

The above recommendations have not been implemented.

I. ANALYST'S REAL ROLE

The actual functions for which Analysts are utilized is different from that envisioned in establishing the speciality and as set forth in the NAMP Manual. Analysts are, in most cases, being employed as 3-M Coordinators while they are ostensibly being trained as statisticians. Other changes in the role of the Analyst must be expected as NALCOMIS is installed at O and I level sites upon completion of the prototype evaluation which could occur as early as 1981. That role will be considered in Chapter V.

V. DATA ANALYSIS UNDER NALCOMIS

Previous chapters of this paper have described the Naval Aviation Maintenance Program (NAMP), the Naval Aviation Logistics Command Management Information System (NALCOMIS) and the functions and responsibilities of the Data Analyst under the existing system. Consideration of the role of the Analyst after NALCOMIS is implemented will be accomplished in this chapter. The following discussion is based on a major assumption, specifically, that the NALCOMIS Program will progress through the Prototype Evaluation successfully and be approved for implementation.

A. LIMITATION OF DISCUSSION

The discussion will generally be limited to the functions and responsibilities of the Data Analyst at the Organizational (O) and Intermediate (I) levels of aviation maintenance, since those are the levels of maintenance directly impacted by NALCOMIS. Little direct effect is anticipated for the higher commands' analysts except that after implementation, specific information which might be required at a higher level on a priority basis should be more readily available from subordinate activities. Summary information should also be available to higher commands more quickly after the end of the reporting period.

As indicated in Chapter III, the Supply Support Center will be impacted by implementation of NALCOMIS but consideration of any analysis requirements for the supply function is beyond the scope of this paper.

B. NALCOMIS PROGRESS

The NALCOMIS Program has progressed satisfactorily from Concept Certification in 1977, through Detailed Functional Specifications in 1978, through two Fleet Reviews (1977 and 1978) to Design Certification in January 1979. Program Specification was completed in September 1979, and the Program Development/Test is scheduled for completion by mid-1980. The Prototype Evaluation, originally scheduled for October 1980, may be delayed as a result of slippage in acquisition of the NALCOMIS Automated Data Processing Equipment (ADPE). Procurement of the NALCOMIS ADP hardware and software is being conducted by Commander, Naval Sea Systems Command under the Shipboard Non-Tactical Automated Data Processing (SNAP) Phase 2 Program. Inability to specify exactly how the system will be configured results in some ambiguity as to precisely how the functions of the Data Analyst will be affected after implementation of NALCOMIS. A general description of required capabilities has been developed and it is based on that description that the role of the Analyst will be examined.

C. TASKS DELETED

Under NALCOMIS, maintenance and material data will be captured at the lowest level by man-machine interface - that is the worker will enter specific information into the information system through a conveniently located Source Data Entry (SDE) device - Cathode Ray Tube (CRT) terminal. Changes in status of the maintenance/material situation are entered into the system in the same manner. This process virtually eliminates one of the tasks which consumes a very large percentage of the Analyst's time and effort - that of collecting and screening all source doucments and delivery of the documents to the Data Services Facility (DSF) as well as pickup and distribution of the machine (computer) audit reports. Editing and validation (screening) of input will be done automatically by the computer system.

The design of the system will provide for the accumulation of all data required to periodically summarize all the actions reported during a specific period. Automated production of the Monthly Maintenance Summary can easily be accomplished by the system. An almost infinite number and variety of summary reports could be available based on data which has been accumulated in the Site-Oriented Centralized and Integrated Data Base (SOCIDAB). Automation of the monthly summary would result in elimination of another of the most time consuming tasks the Analyst is currently resonsible for.

NOTE: A NAVMACLANT Report of 1973 referred to in the previous chapter[9] was the result of a study conducted preparatory to making a major change in the Aviation 3-M system. One of the objectives of the design change was to modify local data presentation methods in order to provide a standard mechanized (computer-produced) monthly maintenance data summary to replace the existing family of machine reports and manually-prepared summaries. Although that concept was determined to be desirable and feasible no change was made in the method of producing the Monthly Maintenance Summary.

Some of the responsibilities and functions of the Data Analyst could be accomplished by the NALCOMIS system with only limited Analyst intervention. Use of the interactive and *ad hoc* capability could provide supervisors and other local managers with a wide variety of information on a real-time basis, allowing them to improve utilization of personnel and to control the maintenance workload more effectively.

D. NEED FOR ANALYSIS FUNCTION

At this point in the discussion, consideration will be given to several pertinent questions which might be asked. In light of the tasks that would be deleted under NALCOMIS, will the Analysis function actually be required? Will there be a real demand for this billet or will it remain just because it is there? Under what conditions will the Analyst be properly utilized?

The answers to the above questions may be somewhat evasive. There appears to be little in current literature which addresses this type of situation but there is adequate evidence that management information systems (MIS) frequently are not utilized effectively even when well designed. In an article written by two well qualified marketing information systems consultants, the authors discussed factors which would enahnce MIS user satisfaction. Drs. Schewe and Wiek [10] cited cases in food-processing companies and the pharmaceutical industry where managers with sophisticated, interactive information systems available to them have used them only sparingly. They also noted that previous research had indicated that infrequent system usage was tied heavily to the lack of sufficient skills and knowledge of the capabilities and limitations of the computer system. Improved skills and knowledge of the system would then, appear to be part of the answer to the problem of system utilization. Using a marketing function approach, they point out that the "price" of system usage must be low as perceived by the user. Cost to the user is considered in terms of time and effort. They cite time spent in using the system as an important cost to the user but consider the cost in terms of energy expended in using the system as being the major MIS behavior determinant. They conclude that: "Apparently, to get managers to use the MIS, it must be made relatively effortless." Data Analysts have the skills and knowledge necessary to make MIS relatively effortless to maintenance managers and supervisors.

With the interactive and *ad hoc* query capability of the NALCOMIS system as a tool, the Data Analyst is in an ideal position to provide appropriate information to all levels of management. In a recent Journal of Systems Management article, [5] Mehra, Director of Corporate Systems for Energy Reserve Groups, Inc., described how the confidence and respect of systems users could be gained. Although addressing credibility in MIS departments, Mr. Mehra's observations are applicable to the analysis function in aviation maintenance. One of the points made was that "Management personnel in all organizations make decisions based on the available information at any given point of time, their judgment and value systems." The key impact that the Analyst can have on management is ". . .to provide meaningful information to management for proper decision making at all levels." The acknowledged importance of pertinent information to decision making and the ability of the Analyst to provide that information support the real and on-going requirement for the analysis function.

There may not be a pat answer or recipe for ensuring that the Data Analyst will be properly utilized. Utilization of the Analyst, as with the use of any other management tool, is the responsibility of management. Dr. Munro, a researcher in information analysis techniques, in discussing the manager's need for information, [6] acknowledges the generally accepted idea that most managers are incapable of articulating their information needs. That incapability may be the greatest obstacle to ensuring proper Analyst utilization. Although the manager may seldom have the luxury of quiet reflection on the nature of his information inadequacies, he cannot avoid the responsibility of establishing some definition of what his information needs are. It is through conscious consideration and determination on the part of the decision maker, as to his information needs, that the analysis function will be effectively utilized.

Schewe and Wiek [10], in their marketing function approach to MIS user satisfaction, concluded that:

> "The most influential personal communicator would be the systems coordinator or staff individual between line managers and the system itself. Like a broker, he can bring the user and the system. . .together for the mutual benefit of both."

They further conclude:

> "Probably the most important transaction activity is the provision of a staff person who will serve as a consultant during actual use of the system. This "system expert" should be available to assist managers in the use of the computer. Many users often are eager to use the system but lack the skill or initiative but will if someone knowledgeable and trusted is available."

It seems evident that the analysis function will still be required under NALCOMIS, in spite of the deletion of several of the Analyst's responsibilities. Some of the previously assigned tasks will continue as requirements and new tasks will be generated which dictate continuation of the Analyst billet.

E. PREVIOUS TASKS CONTINUED

Some of the Analyst's functions enumerated in Chapter IV would still remain substantially the same as under the present system. Some of the more important functions are repeated below for the convenience of the reader.

- Provide management with analytical reports and recommendations in regard to aircraft material conditions and utilization and failure trends.
- Preparation of graphic and narrative presentations.
- Conduct and coordinate MDS training for personnel assigned to the maintenance department.
- Assist the Maintenance Officer and other supervisory personnel in determining specific requirements for new types of data reports deemed necessary for management of the overall maintenance effort.
- Provide assistance to Maintenance/Material Control in relating contents of Monthly MDS reports to material consumption and projected material usage.

The above functions are those which require a thorough knowledge of MDS procedures and, in most cases, also requries some expertise in the use of analysis techniques.

F. NEW FUNCTIONS

With the implementation of NALCOMIS, new functions and responsibilities will develop which could reasonably be assigned to the individual responsible for the analysis function - the Analyst.

The following discussion represents the writer's assessment of additional or modified functions which may be generated as a result of NALCOMIS implementation and some consideration of how those functions could be accommodated by the NAMP.

The change of procedures required under NALCOMIS will, predictably, create some confusion and resistance to that change. If appropriate training is conducted prior to implementation, resistance and confusion can be minimized. In addition to training for the workers, supervisors and managers, one of the key elements to successful implementation will be the presence of at least one individual who is exceptionally knowledgeable of NAMP procedures, especially the Maintenance Data System and who has a thorough knowledge of the NALCOMIS hardware and system operation. The activity Data Analyst is the individual who is best qualified to meet that requirement from the standpoint of his previous training and experience.

As the local "system expert," the Analyst would serve as the central point of contact for all problems related to operation under NALCOMIS. In addition to being familiar with the hardware (visual display devices, terminal controller and temporary storage devices) the Analyst would need to have an operating knowledge of the real-time data base system and a general understanding of the overall system to allow for good communications with the site Data Base Manager in case of problems.

Some of the routine functions which might properly become the Analyst's responsibility are discussed below.

1. Master Roster Listing

The encumbent would be responsible for maintaining the data base Master Roster Listing (MHA-00) in an up-to-date status. The procedure would be similar to the existing one except that instead of EAM card submission, the appropriate information concerning personnel would be entered directly into the data base through a conveniently located remote terminal (CRT terminal) by the Analyst. Control and update of the MHA-00 by the encumbent is the recommended procedures, to be accomplished from information furnished by Work Center Supervisors. Centralization of this function as indicated would serve as a check and balance system, ensuring an accurate Master Roster. Hard copy Master Roster Listings produced monthly by the high speed printer would be distributed to the appropriate work centers by the Analyst.

2. Trend Analysis

The Analyst would become more actively involved in trend analysis in conjunction with the Quality Assurance Representatives assigned to the QA/Analysis Division. The Trend Analysis Program is designed to enable managers to determine the frequencies and types of discrepancies being generated so that proper corrective action can be determined and implemented as quickly as possible. Changes in discrepancy trends could provide a preliminary indication that detailed investigation and research are warranted to isolate possible causes. The Analysts' increased involvement could be expected to result from the reassignment of the analysis function to the Quality Assurance Divisioı by the recent change to the NAMP Manual and his knowledge of how to obtain specific information from the data base (*ad hoc* query) upon implementation of NALCOMIS.

3. Local Training

Although the Analyst is currently charged with the responsibility for training maintenance personnel in MDS procedures, he would be further tasked, as the system expert, to provide ongoing training in the use of the NALCOMIS hardware (CRT and key board). Initial training of personnel would probably be conducted by a formal training organization but follow-on, remedial training could be the responsibility of the Analyst. In this role the Analyst could be expected to provide tailored training for maintenance personnel which could result in high system confidence for those personnel. Training of managers and supervisors in regard to the interactive or *ad hoc* query capability of the system could be done by the Analyst also. The *ad hoc* function can be one of the more important capabilities of the system. Properly used, it can provide information from the data base which will improve the effectiveness of maintenance actions and personnel utilization.

4. Analyst as System Specialist

With his knowledge of the data base system and his familiarity with the system [illegible] the Analyst would be the individual who should be responsible at the local (O and [illegible] for all operating requirements of the system. He should know the system thoroughly enough to perform initial problem isolation procedures and to be able to intelligently communicate the exact nature of the problem in the event a problem occurs which requires additional assistance. He would also have cognizance of all local data storage media (tape cassettes, disk packs or floppy disks) utilized by the system. In connection with storage media cognizance, the Analyst of mobile activities (squadrons) would be responsible for ensuring data transfer from one support site to the next. Transfer media would probably be magnetic tape which would include all of the units' data residing in the data base at the time of transfer.

5. Improved Analysis

Although not a new function or responsibility, analysis would become one of the primary responsibilities of the Analyst. Improved analysis should result from the change of two factors.

Time is the first factor. The Analyst should have more time to devote to analysis based on the fact that source data input will be done directly by the workers and supervisors through Source Data Entry equipment (CRT terminals) rather than through manually prepared source documents (SAFs and VIDS/MAFs). No collection or screening of documents will be required. With automated production of the Monthly Maintenance Summary, time previously spent preparing summaries (approximately 25 percent of available time) would be available for analysis.

The second factor is that with the interactive query capability, data or information required to conduct various analyses will be readily available on a real-time basis. The system will provide a means of selecting, sorting and otherwise manipulating data resident in the data base in virtually any manner desired, to accomplish a wide variety of analyses. In essence, the NALCOMIS system will provide the tools that the Analyst needs in order to satisfy the information requirements of management. It duplicates all the existing systems and, primarily because of the interactive and *ad hoc* query capability, it enhances the Analysts ability to meet his functional responsibilities. In conjunction with enlightened, conscientious management, the two factors mentioned above could put real analysis back into the functional responsibilities of the Analyst.

G. CHANGING ROLE OF ANALYST

Because the hardware suite has not yet been selected, greater detail of specific functions to be accomplished by the Analyst would be too speculative. The important point is that the Data Analyst's role would change from one of clerk-document handler under the existing circumstances to one of data system specialist.

H. PERSONAL CHARACTERISTICS

Since the hardware suite for NALCOMIS has not yet been selected, and therefore exact system procedures are not known, detailed definition of specific functions to be accomplished by the Analyst under NALCOMIS would be very speculative. Some consideration can be given to what personal characteristics would be important for the encumbent to the billet though. Foreseeably, the characteristics required for the changed role would be similar to those currently required of the Analyst. As indicated in Chapter IV, the Analyst is the leading figure in the Maintenance Data System (MDS) and as such, should be a <u>senior</u> petty officer or non-commissioned officer who is formally trained in MDS procedures, data processing capabilities and the techniques of statistical analysis. He must be articulate in order to clearly communicate decision information to managers. He must be intelligently aggressive. As the MDS and analysis expert he must have the confidence of management personnel and he must "sell" his services to them, e.g., convince them that his service and products will enhance their decision making ability. Although he must respond to management requests for information, he must also be alert to potential problems and ensure that appropriate decision makers are properly informed of possible problems. Finally, he must have sufficient knowledge of the total operating environment to provide assistance to the diverse groups which make up the organization. Interface between those groups and the system is an extremely important function. While there would be no major change in the personal qualifications required of the Analyst under NALCOMIS, care must be exercised to ensure that personnel assigned as Analysts actually possess those characteristics.

I. REDEFINITION OF REQUIREMENT

Consideration should be given to a new definition of the Data Analyst's function. One of the recommendations resulting from the previously mentioned NAVMACLANT Study [9] was that Analysis billets (NEC 6313 and MOS 6083) be deleted from O and I level organizations and that staffs be assigned more of them to form a sort of pool to assist lower levels as required. That study also recommended that a new specialty, 3-M Coordinator, be established. 3-M Coordinators would receive less statistical training and would not be tasked to do in depth analysis of maintenance data.

With the advent of NALCOMIS, a change similar to the one recommended by NAVMACLANT would seem reasonable. In line with his total responsibilities, including the additional responsibilities he would assume concerning the NALCOMIS system, the Analyst might properly be considered a data system specialist. Establishment of a new NEC/MOS might be in order and would allow for appropriate assignment control of these specialists as well as provide the visibility required to ensure that appropriate training would be accomplished.

J. TRAINING AND QUALIFICATION OF THE ANALYST

If a new NEC/MOS was established to designate a Data System Specialist (or Data System Manager), training would become very important. Training for encumbents to the new speciality would have to be considered very carefully to ensure that a satisfactory number of these individuals, properly trained, were available to meet the implementation requirements of NALCOMIS. Actually, the same training requirement would obtain whether a new specialty was established or not since the additional knowledge required by the change would be equally applicable to all encumbents.

As mentioned above, the requisite training is very important and should receive in-depth study. Specific training requirements for use and operation of the NALCOMIS hardware may have to be determined after selection of the actual system hardware has been made. On the other hand, systems similar to NALCOMIS are currently in operation and the hardware (computer and peripheral equipment) utilized in those systems and other hardware available on the market could be used as a basis for developing an appropriate training program without waiting for formal hardware selection.

Information obtained during informal discussions with NALCOMIS Project personnel indicates that additional training of analysis personnel is considered absolutely essential. Of particular importance is the need for the encumbent to understand the data base network design and how to use it. Familiarity with the system hardware is another area of concern which needs to be addressed also. One possible method of obtaining the additional training felt to be required would be to substitute data base network design and system hardware training for the portion of the existing Data Analysis Course (DAC) allocated for the Senior Supervisors Course. That two week segment of DAC is currently used to train Analysts in validation and editing, how to use reports, and how to screen source documents. Such a substitution would be a cost effective way of accomplishing the necessary training for personnel who attend the DAC. Training for previously qualified Analysts in the new area could be accomplished in the field by Naval Air Maintenance Training Detachments.

1. Timely Training Essential

The most essential consideration in regard to the training discussed above is that it be available early enough to allow for completion of training prior to NALCOMIS implementation at any given site. Completion of appropriate training for encumbents to the Data Analyst (Data System Specialist/Manager) billet before NALCOMIS implementation cannot be over-emphasized. While worker and supervisor training could be conducted at the organizational site coincident to installation of NALCOMIS hardware, the Analyst training must be complete so that the individuals assigned those responsibilities are thoroughly competent. A self-assured, well trained, competent individual in the Data Analyst billet could be the single most important element in the successful implementation of this modern management information system.

2. Training Support Essential

In order to accomplish the Analyst training as discussed above, each level of command involved with training must be keenly aware of the importance of the training to the success of the program. The Project Manager (PMA 270) should make this requirement a high priority item among the many complex and difficult tasks which must be accomplished in implementing NALCOMIS. The Naval Aviation Logistics Center, as the Leading Field Activity (LFA) for Integrated Logistics and Support Planning and Implementation, should also give this training requirement a high priority. Determination of the specific requirements must be carefully researched to ensure that the recommended training will accomplish the desired purpose. Higher levels of command, including Commander, Naval Air Systems Command, Chief of Naval Material, Chief of Naval Education and Training, and Chief of Naval Operations, must ensure that the Project Manager is provided with sufficient support by their staff training personnel to ensure accomplishment of the required training.

Due to the time element which will be involved in determining the appropriate Analyst training for NALCOMIS operation, approval by various echelons of command and establishment of the specific training program, it is imperative that the process be commenced soon.

K. CHAPTER SUMMARY

Implementation of NALCOMIS at O and I levels of maintenance will eliminate some of the most time and effort consuming tasks now being done by the Data Analyst. In spite of the deleted tasks, the requirement for the Analyst billet will still exist. Some tasks will continue virtually unchanged and some new tasks would be created which could reasonably become the Analyst's responsibility. The Analyst would become the NALCOMIS data system specialist with expanded responsibilities. Possibly a new NEC/MOS specialty should be established for this billet to reflect the redefined requirements. One of the key elements in successful NALCOMIS implementation will be having an individual well trained and knowledgeable in both NAMP and NALCOMIS procedures in each maintenance activity. Appropriate training must be determined, established and conducted prior to NALCOMIS implementation. All levels of command should be concerned that the Project Manager be given adequate support in ensuring that well trained and qualified personnel are available to activities before the NALCOMIS system is installed.

VI. SUMMARY AND CONCLUSIONS

Naval aviation maintenance is a complex system of inter-related functions which involves thousands of people and millions of dollars in annual support. Good management at all levels of command is absolutely essential if the Navy is to meet its commitment to national defense in an efficient and effective manner.

As aircraft have become more complex and their weapons systems more sophisticated, better management techniques have been required. The Naval Aviation Maintenance Program (NAMP) promulgated by OPNAVINST 4790.2B, sets forth the maintenance policies, procedures and responsibilities for conducting Naval aviation maintenance. That instruction is the basic document and authority governing the management of that complex system. The NAMP Manual (OPNAVINST 4790.2B) has been periodically revised to incorporate improved methods and techniques of management. In spite of those periodic updates the NAMP has failed to keep pace with the real requirements of maintenance managers. Some problems exist with the current NAMP which result in inefficient management of manpower and material assets. Untimely and erroneous information frequently prevents effective decisions and results in degraded aircraft readiness.

The Naval Aviation Logistics Command Management Information System (NALCOMIS) is in the development stage now and implementation is projected to begin in fiscal year 1981. NALCOMIS will upgrade the NAMP by utilizing recent, industry proven cost effective developments in computer science to meet the information needs of managers. The system will feature automated data processing terminals for entry of source data, instant data retrieval from the data base network and electronic display of data at system terminal. Use of an integrated capability and on-line, real-time operation. In short, NALCOMIS will provide aviation maintenance managers with timely, accurate and complete information upon which to base their decisions.

Data analysis is a very important aspect of aviation maintenance. It is bascially a process of selecting from the mass of data which is collected, the significant events that require corrective action or merit command management attention. The Data Analyst is the key figure in the analysis process. Formally trained in Maintenance Data System procedures and analysis techniques, the Analyst has overall responsibility for providing maintenance managers with analytical reports and other information required for effective decision making. Under the current system, much of the Analyst's time is consumed in screening source documents and preparing Monthly Maintenance Summaries. Frequently, in actual practice, time constraints limit the amount of analysis conducted by the Analyst. Other conditions such as lack of demand, erroneous data and delayed access to data also limit the meaningful analysis which is accomplished.

With the implementation of NALCOMIS, source data will be entered directly into the data base by workers and supervisors, relieving the Analyst of source document screening and handling chores. The system could automatically produce Monthly Maintenance Summaries, eliminating that very time consuming task from his responsibilities. Thus, under NALCOMIS, the Data Analyst would have more time to apply to trend analysis and other analysis procedures. In addition to increased analysis, the Analyst would become the NALCOMIS system specialist. Extending his responsibilities to include thorough knowledge of the NALCOMIS data base matrix and hardware operation would be reasonable since he has been formally trained and understands the MDS and the overall NAMP. Such a modification of responsibilities might logically lead to a change of billet title such as Data Systems Specialist or Data System Manager. Establishment of a new NEC/MOS for the billet would enhance visibility and control of designated personnel. The exact training that would be required must be determined but the primary consideration concerning the Data Analyst (Data Systems Specialist) billet is that the encumbent receive appropriate, in-depth training <u>before</u> implementation of NALCOMIS at his activity. The point of having a well qualified individual assigned to that billet cannot be over-emphasized. The Analyst's performance during and after NALCOMIS implementation could be one of the key factors in a successful MIS.

Based on the foregoing discussion of the current NAMP and the potential benefits of NALCOMIS in improving the NAMP, NALCOMIS should continue to receive the interest and support of all cognizant commands. NALCOMIS is essential for improving aircraft readiness. The Data Analyst will be one of the key individuals in the implementation and operation of NALCOMIS. It is therefore imperative that exact requirements for the redefined billet be determined as soon as possible. Training to meet that requirement must be completed <u>prior</u> to NALCOMIS implementation. The NALCOMIS Project Manager should receive all possible assistance by all cognizant commands involved in preparing encumbents for the increased responsibilities entailed in updating the NAMP by implementation of NALCOMIS. Data analysis by a knowledgeable, well qualified individual, in conjunction with NALCOMIS is essential to improved aircraft availability and readiness and to Naval Aviation's continued contribution to national defense.

APPENDIX A

GLOSSARY OF ACRONYMS

ADP	Automatic Data Processing
ADPE	Automatic Data Processing Equipment
ADS	Automatic Data System
AIMD	Aircraft Intermediate Maintenance Department
AMO	Aircraft Maintenance Officer
AWM	Awaiting Maintenance
AWP	Awaiting Parts
BUNO	Bureau Number
CCS	Component Control Section
CCU	Component Control Unit
CLAMP	Closed Loop Aeronautical Management Program
CNM	Chief of Naval Material
CNO	Chief of Naval Operations
CO	Commanding Officer
CRT	Cathode-Ray Tube
CVW	Carrier Air Wing
DBMS	Data Base Management System
DCU	Document Control Unit
DOD	Department of Defense
DOP	Designated Overhaul Point
DSF	Data Services Facility
FAMMS	Fixed Allowance Management and Monitoring System
FMC	Full Mission Capable
FOD	Foreign Object Damage
FREDS	Flight Readiness Evaluation Data System

GSE	Ground Support Equipment
ICRL	Individual Component Repair List
IFARS	Individual Flight Acitivity Reporting System
ILS	Integrated Logistic Support
IMA	Intermediate Maintenance Activity
IMRL	Individual Material Readiness List
IRAM	Improved Repairables Asset Management
JCN	Job Control Number
LHA	Helicopter Assault Landing Ship
LPH	Amphibious Assault Ship
LRCA	Local Repair Cycle Asset
MAG	Marine Air Group
MCAS	Marine Corps Air Station
MCC	Material Control Center.
MDR	Maintenance Data Report/reporting
MDS	Maintenance Data System
MHA	Manhour Accounting
MIS	Management Information System
MO	Maintenance Officer
MOS	Marine Occupational Standard
NALC	Naval Aviation Logistics Center
NALCOMIS	Naval Aviation Logistics Command Management Information System
NALDA	Naval Aviation Logistics Data Analysis
NAMP	Naval Aviation Maintenance Program
NAMSO	Navy Maintenance Support Office
NAS	Naval Air Station
NEC	Navy Enlisted Classification
NMC	Not Mission Capable

NMCM	Not Mission Capable-Maintenance
NMCS	Not Mission Capable-Supply
OCR	Optical Character Reader
OMA	Organizational Maintenance Activity
OPNAV	Office of the Chief of Naval Operations
PEB	Pre-Expended Bin
PM	Project Manager
PMC	Partial Mission Capable
PMS	Planned Maintenance System
QA	Quality Assurance
QAR	Quality Assurance Representative
RDT&E	Research, Development, Test and Evaluation
RFI	Ready for Issue
SAF	Support Action Form
SCIR	Subsystem Capability and Impact Reporting
SDE	Source Data Entry
SHARP	Serialized Hi-cost Asset Reporting Program
SOCIDAB	Site Oriented Centralized Integrated Data Base
SRS	Supply Response Section
SSC	Supply Support Center
SUADPS	Shipboard Automated Data Processing System
TCP	Tool Control Program
TDC	Technical Directive Compliance
T/m/s	Type/Model/Series
UADPS	Uniform Automatic Data Processing System
VIDS/MAF	Visual Information Display System/Maintenance Action Form
WC	Work Center

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