

CHAPTER 6

THE AIRCRAFT LAUNCH AND RECOVERY EQUIPMENT MAINTENANCE PROGRAM (ALREMP)

As an ABE, you will find that most of your duties will be performing preventive maintenance, or the supervision of maintenance, on catapults, arresting gear, visual landing aid (VLA) and their associated equipment. At times you may also be assigned to one of the support branches of V-2 division, such as maintenance control, maintenance support, or material control. Regardless of your assignment and specific duties, you will need a working knowledge of the Aircraft Launch and Recovery Equipment Maintenance Program (ALREMP).

The primary objective of the ALREMP is to achieve and sustain maximum operational readiness of aircraft launch and recovery equipment in support of carrier flight operations and to achieve and maintain a zero maintenance error rate through the use of standardized procedures, a dynamic quality assurance program, and analytical review of maintenance documentation and records.

MAINTENANCE, LEVELS, RESPONSIBILITIES, AND TYPES

LEARNING OBJECTIVES: Identify organizational, intermediate, and depot level maintenance. Identify the maintenance concepts peculiar to each of the three levels of maintenance. Recognize upkeep and overhaul maintenance.

The term maintenance has a very general meaning. It could mean maintenance that can be performed in minutes at the work center, or organizational level, or it could mean maintenance that requires months of overhaul in an industrial-type facility at the depot level. We need more than the word maintenance to indicate that a specific type of maintenance must be accomplished.

MAINTENANCE LEVELS

All aircraft launch and recovery equipment (ALRE) maintenance functions are divided into one of three distinct maintenance levels: organizational, intermediate, or depot. To determine at which level

maintenance tasks must be accomplished, you must refer to the appropriate technical manual. Maintenance tasks are assigned according to the complexity, scope, and range of the work to be performed. This allows maintenance to be performed at the lowest practical level in order to maintain required readiness and material condition. The three levels of maintenance are explained in the following paragraphs.

Organizational Maintenance

Organizational or O-level maintenance is the maintenance that is normally done by the catapult and arresting gear crews. In some cases organizational maintenance may be done by intermediate or depot activities. O-level maintenance tasks are grouped under the following categories:

- Inspection, operation, and servicing as defined and required by PMS
- Corrective and preventive maintenance, including on-equipment repair and removal/replacement of defective parts
- Incorporation of technical directives (TDs) within prescribed limitations
- Record keeping and report writing

Intermediate Maintenance

Intermediate or I-level maintenance is done by designated maintenance activities in support of fleet units. The aircraft intermediate maintenance department (AIMD) on aircraft carriers is an example of such activities. I-level maintenance includes the following functions and services:

- Repair, test, inspection, and modification of ALRE components and related equipment
- Manufacture of selected and nonavailable parts
- Incorporation of technical directives within prescribed limitations
- Calibration of designated equipment

Depot Maintenance

Depot or D-level maintenance is maintenance that requires skills and facilities beyond the O- and I-levels of maintenance. It is performed by naval shipyards, commercial shipyards, Naval Ship Repair Facilities, contractor repair, the Naval Air Warfare Center (NAWC), and by voyage repair teams (VRTs) from specified naval aviation depots. D-level maintenance supports the lower I- and O-levels of maintenance by providing engineering assistance and performing maintenance beyond the capability of lower level maintenance activities. D-level maintenance functions are grouped as follows:

- Major overhaul and repair to ALRE
- Modernization, modification, or conversion of system components
- Calibration (type III) by Navy Calibration Laboratories
- Incorporation of TDs and service changes
- Manufacture of parts and/or accessory items
- Technical and engineering assistance

MAINTENANCE TYPES

There are two general types of ALRE maintenance performed without distinction as to levels of maintenance. They are upkeep and overhaul.

Upkeep Maintenance

Upkeep maintenance is preventive, corrective, or additive maintenance performed by catapult and arresting gear crewmembers. It includes servicing, periodic inspection, functional and bench testing, replacement, preservation, and repair of catapult and arresting gear equipment.

Overhaul Maintenance

Overhaul maintenance is the process of disassembly sufficient to inspect all the operating components. It includes the repair, replacement, or servicing as necessary followed by reassembly and functional testing. Upon completion of the overhaul process the equipment will be capable of performing its intended service. Much of this work is normally done at naval overhaul and depot facilities, contractor plants, and other industrial facilities.

REVIEW QUESTIONS

- Q1. List the three levels of maintenance.*
- Q2. What is the concept of each level of maintenance?*
- Q3. What are the general types of maintenance?*

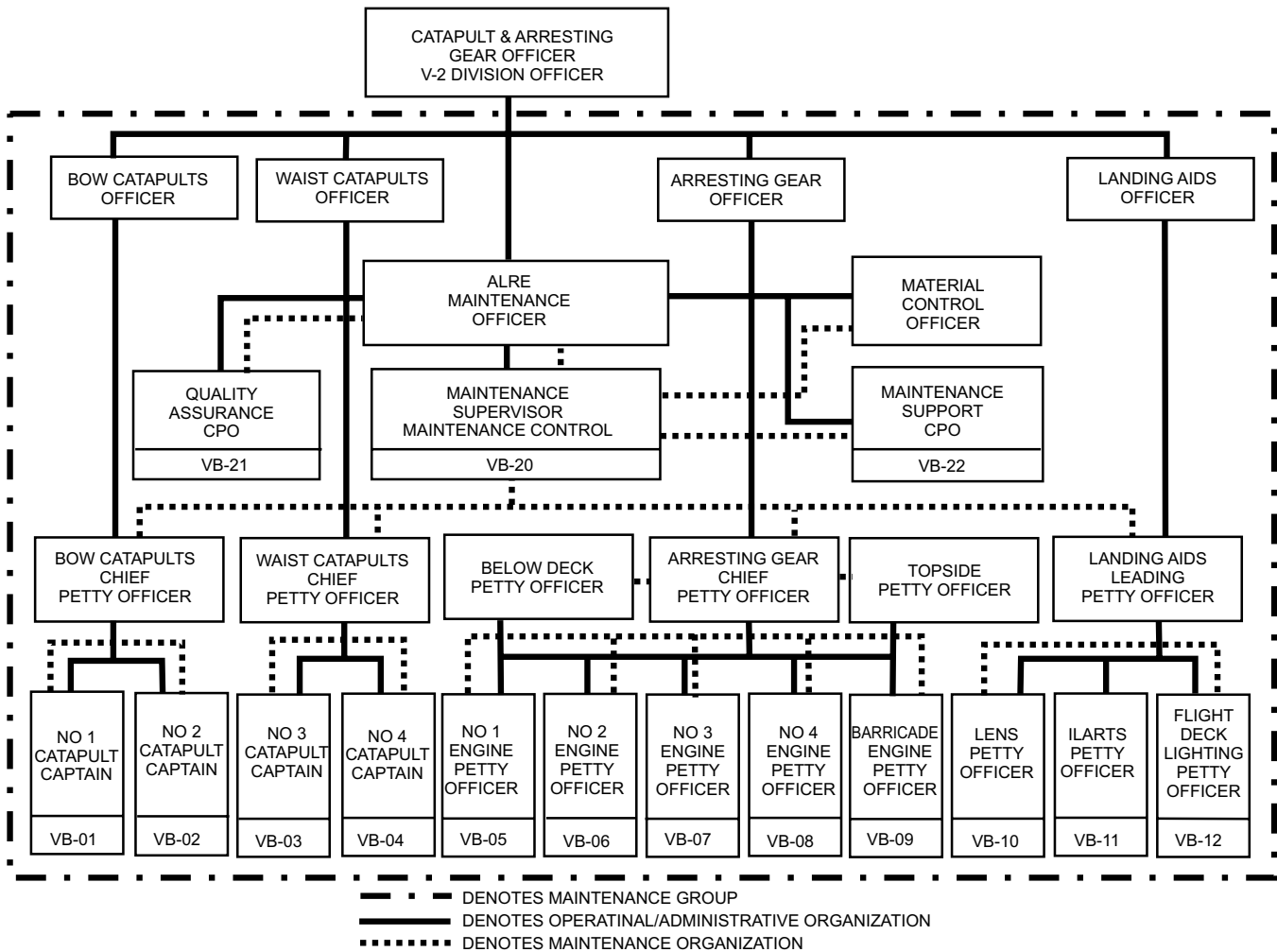
V-2 MAINTENANCE ORGANIZATION STRUCTURE AND RESPONSIBILITY

LEARNING OBJECTIVES: Describe the duties of maintenance control, quality assurance, and maintenance support branches of V-2 division. Describe the procedures used to complete the ALRE maintenance action form (MAF). Describe the operation of the visual information display system (VIDS) board.

Aircraft launch and recovery equipment (ALRE) includes catapults, arresting gear and visual landing aids (VLA). Since ALRE is utilized by high performance aircraft, safety must always be paramount to the personnel who operate and maintain the equipment. A properly implemented maintenance program will improve safety, maintenance integrity, performance, training of personnel, management, and evaluation of maintenance performed. The aircraft launch and recovery maintenance program (ALREMP) is designed to maximize the effective utilization of manpower and material to accomplish this goal.

The ALREMP provides standard maintenance organization and procedures to be used by all V-2 divisions. This standardization relies heavily on the maintenance control (MC), quality assurance (QA), and maintenance support (MS) branches of the division to establish good management practices and prevention of maintenance defects. Figure 6-1 depicts the ALRE maintenance organizations for aircraft carriers. You will notice that in each of the divisions illustrated, three distinct types of organization are identified. They are (1) the operational organization, which depicts the lines of authority delegated in the daily functions of a V-2 division; (2) the maintenance group, which includes the lines of authority to be observed by all personnel involved in the actual performance of any maintenance action; and (3) the maintenance organization.

The maintenance organization has the responsibility of managing the maintenance effort. This includes the planning and performance of maintenance, compliance with all maintenance policies and technical directives, continued training of all maintenance



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Figure 6-1.—ALRE maintenance organization (CV/CVN).

personnel, maintenance administration, and verification of actual maintenance performance.

MAINTENANCE CONTROL (MC)

Maintenance control is the nerve center of V-2 division's maintenance effort. It is the center of all maintenance activity, directing and receiving up-to-date information in order to properly assess courses of action to be taken when any maintenance action is performed. In every situation the maintenance officer, assisted by the maintenance control chief, will be the controlling agent, acting as the event manager in all maintenance actions. Only the ALRE maintenance officer or the maintenance control chief has the authority to certify that maintenance actions have been completed and that equipment can be returned to an operational status.

The maintenance officer, with the assistance of the maintenance control chief, is specifically responsible for the following:

- Upkeep maintenance performed on a day-to-day basis, including scheduled and unscheduled maintenance, on-equipment repair, and the removal/replacement of defective parts and components
- Incorporation of TDs, service changes (SCs), interim rapid action changes (IRACs), rapid action changes (RACs), service bulletins, and repair procedures
- Documentation of all maintenance actions
- Administration of the Maintenance Data System (MDS)

- Maintenance of an active QA program to include the inspection of all critical areas of each maintenance action performed, the availability of qualified quality assurance inspectors (QAIs), work center collateral duty inspectors (CDIs), and when necessary, collateral duty quality assurance inspectors (CDQAIs), and the operation and maintenance of an ALRE technical publications library (TPL) to support all equipment and maintenance in the division
- Ensuring liaison and coordination with and documentation of maintenance from shore intermediate maintenance activities (SIMAs), VRTs, naval shipyards (NSYs), and local maintenance support activities
- Planning and submitting budget requests for the funding of tools, spare parts, and materials necessary for the proper operation and maintenance of ALRE
- Maintaining OPTAR expenditure logs and records
- Requisitioning parts and materials to support ALRE operations and maintenance
- Establishing and maintaining an effective tool control program
- Being knowledgeable of procedures for ordering repair parts, from initial identification through material receipt.
- Being knowledgeable of operating space item (OSI) operations and listings. (Stocking of OSIs is a Supply Department function, but inputs for stocking originate with the work center.)
- Maintaining strict tool control accountability within the work center.
- Recommending qualified and responsible personnel to be CDIs for the work center.
- Ensuring that QAIs/CDQAIs or CDIs are available for all tasks requiring QA inspection.
- Assisting the QA Branch in implementing and maintaining support for the division safety program by conducting safety training in the work center, using and promoting practices to enhance safety, and reporting all accidents and unsafe practices, procedures, or conditions.
- Assisting work center branch officers in maintaining the training program by ensuring optimum use of personnel through job assignments based on prior training and experience, that formal in-service training is conducted, that on-the-job training (OJT) is conducted under the supervision of qualified work center personnel, and that Personnel Qualification Standards are administered according to established procedures.
- Maintaining required reading files and ensuring that all assigned work center personnel read and initial the information contained in them on a monthly basis.
- Ensuring that all work center required publications are available and maintained with current changes.

All personnel in the maintenance organization are subordinate and responsible to the maintenance officer. As work center group supervisors and work center supervisors, they are responsible for the maintenance of all systems and equipment assigned to their work centers. Both the group and the work center supervisors direct and manage the maintenance program in their work centers, supervise the day-to-day ALRE operations, ensure proper documentation of preventive and corrective maintenance, and maintain effective communications between the work centers and MC to ensure an up-to-date maintenance profile of the division. They also direct assigned work center personnel in the performance of their duties and the daily operation of ALRE. Group and work center supervisors are also responsible for the following:

- Keeping MC informed of all problems and equipment status in the work center.
- Updating and validating information on the Visual Information Display System (VIDS) board with MC daily.
- Ensuring that all maintenance documentation is complete and correct.

VISUAL INFORMATION DISPLAY SYSTEM (VIDS)

The division overall maintenance status is provided by a visual display of current maintenance information, located in maintenance control and maintained by the maintenance control chief, through the use of the visual information display system (VIDS) and the maintenance requirement (MR) status boards. These are important management tools in the maintenance

program because they provide a graphic display of vital up-to-date information.

The VIDS board displays all maintenance status information—particularly system problems or failures and supply status—providing the ability to review the overall maintenance situation quickly. This allows the

maintenance officer, maintenance control chief, and group and work center supervisors to carry out their duties more effectively and efficiently.

The maintenance control VIDS board (fig. 6-2) displays maintenance information from all work centers in the division. It and the work center VIDS

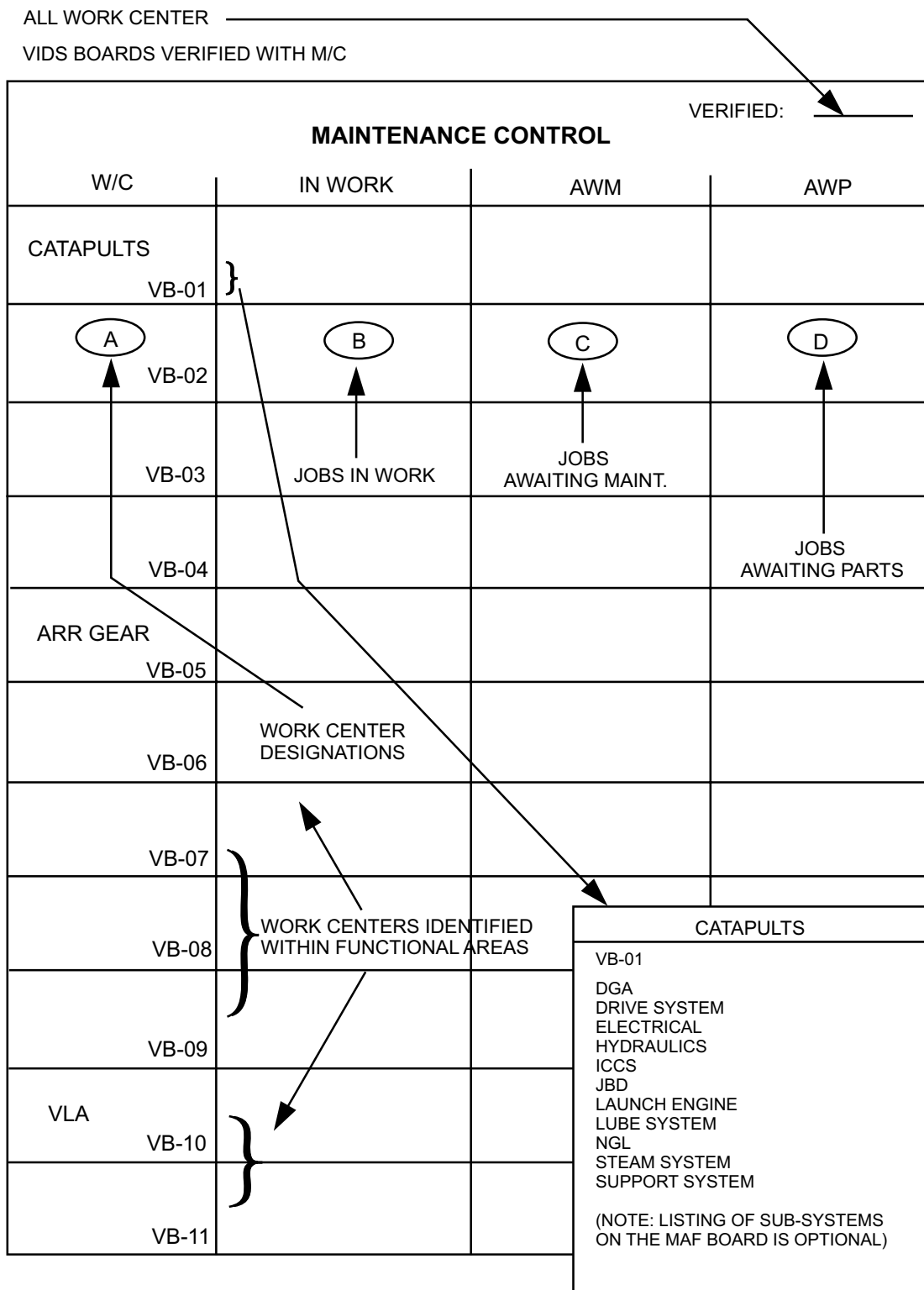


Figure 6-2.—Maintenance control VIDS board.

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boards (fig. 6-3) are divided into sections representing each work center. Each work center section is identified by a standard work center designation, identification of the work center systems within the work center maintenance areas are optional on the maintenance control VIDS board. Four columns are mandatory on the maintenance control and all work center boards. They are (1) the column displaying the work center

designation, as already mentioned; (2) the In-Work column, which is used to display in-progress maintenance actions; (3) the AWM or Awaiting Maintenance column, to display maintenance actions that have been deferred; and (4), the AWP or Awaiting Parts column, to display maintenance actions that cannot be completed because of a lack of parts or material.

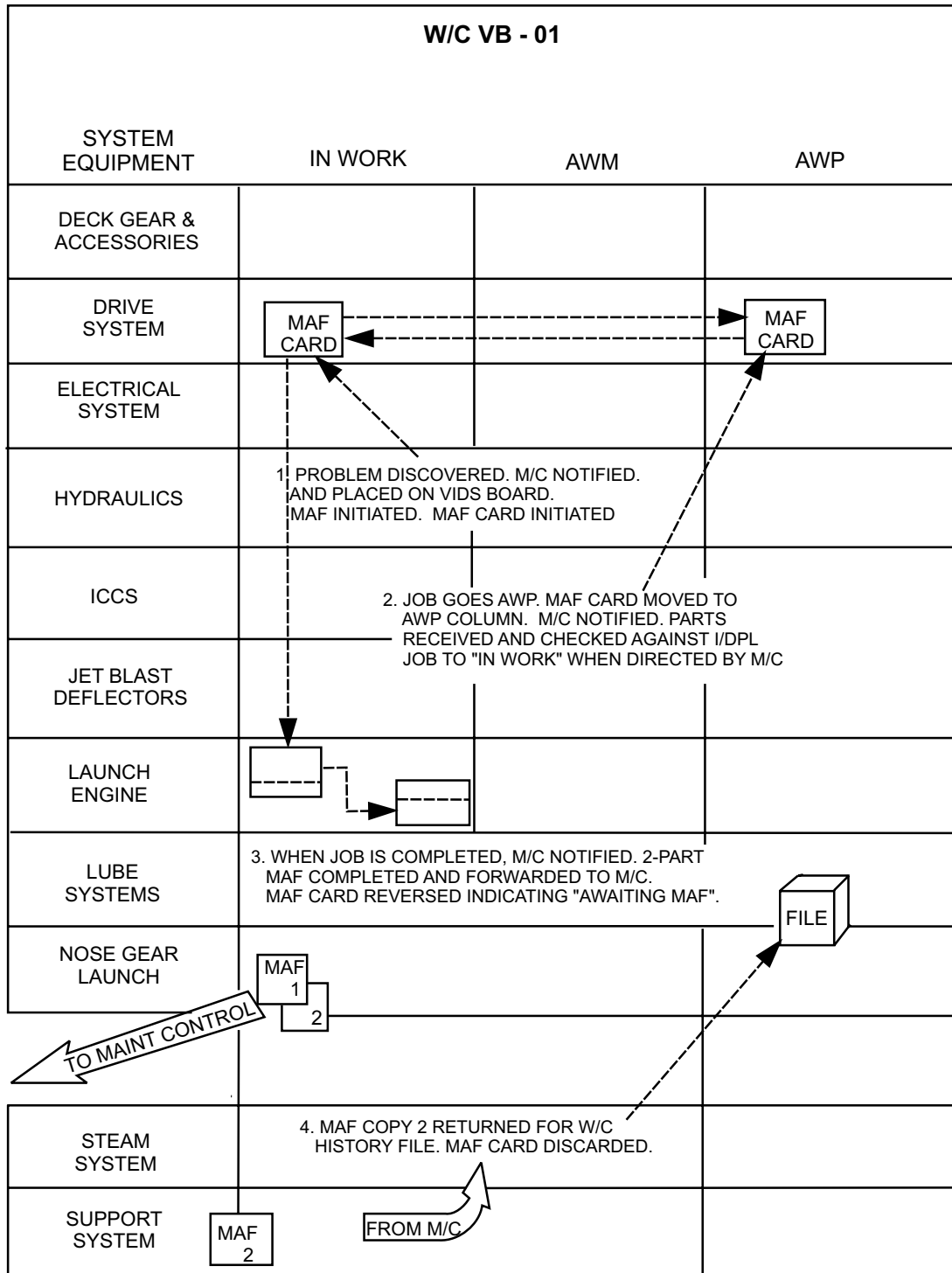


Figure 6-3.—Work center VIDS board.

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Aircraft Launch and Recovery Equipment (ALRE) Maintenance Action Form (MAF) Cards

ALRE MAF cards (fig. 6-4) are used on the VIDS boards to track all outstanding work center maintenance actions, both on the work center and maintenance control VIDS boards. Before any maintenance action is started, the responsible work center must notify maintenance control. At this time, work center and maintenance control MAF cards are initiated, each card will reflect identical information consisting of a job control number (JCN) and a brief description of the maintenance action to be performed; the work center also initiates a MAF at this time. The PRIORITY section of the card will also be color coded, as required, to indicate the system and maintenance status concerning equipment operational capability. These color codes are standardized as follows:

Blue is used in the LIM block to indicate limited capability.

Red is used in the DN block to indicate that the equipment is out of commission.

No Color is used or required if maintenance is routine and does not affect equipment operability.

Black is used when a maintenance action has been completed and inspected at the proper level and only a functional check remains to return the equipment to service; a black line is drawn across all four blocks of the PRIORITY section.

Similarly, the MS and QA blocks are provided on the MAF card to indicate requirements for maintenance support augmentation of the work center and/or QAI/CDQAI (not CDI) level inspection of the job. Jobs requiring QAI/CDQAI (not CDI) inspection will be reflected with a MAF card on the quality assurance (QA) VIDS board and job requiring maintenance support (MS) participation will be reflected on the MS VIDS board.

The MAF card is then placed in the appropriate columns of the maintenance control, quality assurance, maintenance support, and work center VIDS boards, to indicate the maintenance action's current status: in-work, awaiting maintenance, or awaiting parts. Upon completion of the maintenance action, the MAF card is inverted to indicate that maintenance control is now awaiting a completed MAF from the responsible work center.

AWAITING MAF				NSR		M/C	
		JULIAN DATE		JCN			
JCN		JULIAN DATE	DISCREPANCY/PMS	PRIORITY			
W/C	JSN						
			MRG _____	QA	MS	DN	LIM

The MAF Card is locally produced and is used to monitor and manage the workload. Outstanding maintenance actions will be indicated by a MAF Card on both the M/C and w/c VIDS boards, as well as in QA and MS, when applicable. When the job is completed and reported to M/C, the MAF Card is simply reversed on the board to indicate "AWAITING MAF" until the 2-part MAF is completed, delivered to M/C, and signed off by the maintenance officer/maintenance control supervisor. M/C then discards the MAF Card and the w/c discards it upon receipt of the copy 2 MAF from M/C. QA will discard its MAF Card upon receipt of MAF copy 1. MS discards its MAF Card upon job completion and transfer of manhours to summary sheet.

NOTE: The large, unused central portion of the front of the MAF Card may be modified locally to help track supply data, manhours, work start/stop, etc, if desired.

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Figure 6-4.—ALRE MAF card.

Aircraft Launch and Recovery Equipment (ALRE) Maintenance Action Form (MAF)

The ALRE MAF (fig. 6-5) is the major divisional record of all maintenance performed and provides historical data for future references. The ALRE MAF also supplements the OPNAV 4790/2K, Ship's

Maintenance Action Form, used in support of the Current Ships' Maintenance Project (CSMP). All equipment inspections and maintenance actions (scheduled/unscheduled and corrective maintenance) are documented on the ALRE MAF.

The ALRE MAF (see fig. 6-5) is divided into seven areas as follows:

AIRCRAFT LAUNCH AND RECOVERY EQUIPMENT (ALRE) MAINTENANCE ACTION FORM (FOR SNAP I OMMS)

SECTION I INFORMATION											
1. SHIPS UIC	2. W/C	3. JSN	4. APL/AEL	5. EQUIPMENT NOUN NAME			6. WND	7. STAT	8. CAS	9. DFR	10.
11.	12.	13. IDENT/EQUIPMENT SERIAL NUMBER		14. EIC	15. SAFETY HAZARD	16. LOCATION		17. WND DATE			
18. ALTERATIONS (SERVICE CHANGE - SHIPALT)				19. *I	20. INSURV NUMBER	21. SUFFIX	22. U	23. S	24. P/F		
SECTION II DEFERRAL ACTION				25. S/F MHRS EXP.	26. DEFER DATE	27. S/F MHRS REM	28. DEADLINE DATE				
SECTION III COMPLETED ACTION				29. ACTION TKN	30. S/F MHRS	31. COMPLETION DATE	32. ACT MAINT TIME	33. TI	34. METER READING		
	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME	
START											
STOP											
SECTION IV REMARKS/DESCRIPTION											
35. REMARKS/DESCRIPTION										36. CONT. SHEET	
37. CSMP SUMMARY											
38. FIRST CONTACT/MAINT MAN (PRINT/SIGN)			39. RATE	40. SECOND CONTACT/SUPERVISOR (PRINT/SIGN)			41. PRI	42. T/A	43. INTEGR. PRI	44. IUC	45. TYCOM
ADDITIONAL ALREMP INFORMATION											
SUBMIT 4790/CK?		P/C/O	ALRE MALF CODES			CORROSION CODES		SAFETY TAG INFORMATION		RED TAG SER. NO.	SHOT/HIT/LA
YES	NO		WND	EXT DAMAGE	TYPE MALF	TYPE	ACT. TKN.	SAFETY TAGS REQUIRED?			
<input type="checkbox"/>	<input type="checkbox"/>							YES	NO	IF YES, HOW MANY?	
								<input type="checkbox"/>	<input type="checkbox"/>		
COMPONENT PART NUMBER						MIP CONTROL NO. (MIP#)			MRC CODE		
Q	1ST QA INSP. BY (PRINT/SIGN)			2ND QA INSP. BY (PRINT/SIGN)			FINAL QA INSP. BY (PRINT/SIGN)		V-2 MAINT. OFFICER (PRINT/SIGN)		
A											
MATERIAL CONTROL			VIDS/MAF JCN:				VIDS/MAF JCN:				
QTY	NOMENCLATURE		PART NUMBER			CONTRACT NUMBER		ALRE TOOL CONTROL			
								ARE ALL TOOLS ACCOUNTED FOR?			
								YES <input type="checkbox"/> NO <input type="checkbox"/>			
								W/C TOOL PO (PRINT/SIGN)			
								YES <input type="checkbox"/> NO <input type="checkbox"/>			
								CENTRAL TOOL PO (PRINT/SIGN)			
								NOTE: A LOST/MISSING/BROKEN TOOL REPORT MUST ACCOMPANY THIS MAF IF THE "NO" BLOCK IS CHECKED			
								PAGE OF			

Figure 6-5.—Aircraft Launch and Recovery Equipment (ALRE) Maintenance Action Form (MAF).

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1. Information: contains the job control number, consisting of the work center designation and the job sequence number (JSN), equipment configuration data, and discrepancy description codes.
2. Deferral Action: contains deferral dates and manhours expended information (total manhours expended by personnel involved in the maintenance action up to the time of deferral), manhours remaining (estimated number of manhours remaining to complete the maintenance action).
3. Completed Action: contains action taken, completion date and total manhours expended.
4. Remarks/Description: contains a narrative description of the discrepancy and the work done to correct it.
5. Additional ALREMP Information: contains ALRE specific codes, safety tag data, shot/hit/VLA data, PMS data and QA/ALRE MO signatures.
6. Material Control: contains quantity, nomenclature, part number and contract number for requisitioned items also contains two blocks for AIMD-assistance VIDS MAF JCNs.
7. ALRE Tool Control: contains lines for the work center and central tool room Petty Officers signature.

When a maintenance action is completed, the appropriate work center will complete a MAF, this will provide a comprehensive record of the maintenance action performed and establish historical data for future reference. Therefore MAFs will be retained as follows:

- Corrective maintenance action MAFs will be retained for a period of 1 year. The QA branch will retain copy 1. Copy 2 of the MAF will be retained by the maintenance responsible work center.
- Preventive maintenance action MAFs must be retained by QA and the work center for the most recent PMS action performed only.

MAINTENANCE REQUIREMENT STATUS BOARDS

Maintenance requirement (MR) status boards are tools used to track critical scheduled/situational maintenance and inspections required on catapults,

arresting gear, and VLA equipment. These requirements are based on calendar periods (daily, weekly, monthly, and so on) and the total number of catapult shots or arresting gear arrestments (hits) accumulated. Documentation of shots and hits is therefore mandatory to ensure that prescribed maintenance and inspection requirements are performed on time.

Maintenance requirement status boards (figs. 6-6 and 6-7) are locally produced or procured. As a minimum these boards will contain information on each shot- or hit-related maintenance task specified in the PMS system. The minimum information elements required are the following:

- Maintenance requirement periodicity code (M-1R, Q-1R, 24M-2R, and so forth)
- Description of the task and the frequency of requirement
- Shot or hit number that the maintenance requirement is due to be performed on
- Total number of shots or hits to date

As with the maintenance control VIDS board, the maintenance control MR status board will reflect the required maintenance tasks of each work center in the division. The maintenance control MR status board is maintained and updated only by the maintenance officer, the maintenance control chief, or a person specifically designated by the maintenance officer.

Each work center will also have a MR status board that reflects the exact information contained on the maintenance control board. The work center supervisor or his designated assistant will maintain and update the work center's MR status board.

A continuous audit and daily validations of the MR status boards between maintenance control and the work centers are required to ensure accuracy and continuity of shot/hit numbers and inspection requirements.

REVIEW QUESTIONS

- Q4. What is the nerve center of V-2 division maintenance effort?*
- Q5. What are the difference types of distinct organizations within V-2 division?*
- Q6. What are the mandatory columns required on the VIDS board?*

WORK CENTER	PMS MAINTENANCE REQUIREMENT R-2	PMS MAINTENANCE REQUIREMENT R-3	PMS MAINTENANCE REQUIREMENT R-5	PMS MAINTENANCE REQUIREMENT R-6
V B 0 1	REPLACE DRIVE SYSTEM CABLE BETWEEN 3000/3500 SHOTS OR 24 MONTHS SERVICE	REQUEST CYLINDER SLOT MEASUREMENTS FROM TYPE COMMANDER NOTE: ACCOMPLISH THIS MR WHEN DICTATED BY TABLE 1 OF MRC	INSPECT SHUTTLE, CONNECTOR GUIDES, WATERBRAKE AND LAUNCH PISTON ASSEMBLIES FOR ALIGNMENT AFTER EVERY 2600 AND BEFORE 2800 SHOTS, REPLACE CYLINDER GAP SEALS	INSPECT AND LUBRICATE WATERBRAKE AND LAUNCH PISTON ASSEMBLIES. NOTE: ACCOMPLISH BETWEEN 1300-1400, 2500-2800, AND EVERY 500 SHOTS THEREAFTER.
	24 MONTHS CABLE REPLACEMENT			
	DATE OF LAST MR REPLACEMENT DATE MR	DATE OF LAST MR REPLACEMENT DATE MR	DATE OF LAST MR REPLACEMENT DATE MR	DATE OF LAST MR REPLACEMENT DATE MR
	SHOT NO. LAST MR	SHOT NO. LAST MR	SHOT NO. LAST MR	SHOT NO. LAST MR
	SHOT NO. DUE MR	SHOT NO. DUE MR	SHOT NO. DUE MR	SHOT NO. DUE MR
	TOTAL SHOTS TO DATE	TOTAL SHOTS TO DATE	TOTAL SHOTS TO DATE	TOTAL SHOTS TO DATE
	TOTAL SHOTS LEFT TO MR	TOTAL SHOTS LEFT TO MR	TOTAL SHOTS LEFT TO MR	TOTAL SHOTS LEFT TO MR

V B 0 2	24 MONTHS CABLE REPLACEMENT			
	DATE OF LAST MR REPLACEMENT DATE MR	DATE OF LAST MR REPLACEMENT DATE MR	DATE OF LAST MR REPLACEMENT DATE MR	DATE OF LAST MR REPLACEMENT DATE MR
	SHOT NO. LAST MR	SHOT NO. LAST MR	SHOT NO. LAST MR	SHOT NO. LAST MR
	SHOT NO. DUE MR	SHOT NO. DUE MR	SHOT NO. DUE MR	SHOT NO. DUE MR
	TOTAL SHOTS TO DATE	TOTAL SHOTS TO DATE	TOTAL SHOTS TO DATE	TOTAL SHOTS TO DATE
	TOTAL SHOTS LEFT TO MR	TOTAL SHOTS LEFT TO MR	TOTAL SHOTS LEFT TO MR	TOTAL SHOTS LEFT TO MR

V B 0 3	24 MONTHS CABLE REPLACEMENT			
	DATE OF LAST MR REPLACEMENT DATE MR	DATE OF LAST MR REPLACEMENT DATE MR	DATE OF LAST MR REPLACEMENT DATE MR	DATE OF LAST MR REPLACEMENT DATE MR
	SHOT NO. LAST MR	SHOT NO. LAST MR	SHOT NO. LAST MR	SHOT NO. LAST MR
	SHOT NO. DUE MR	SHOT NO. DUE MR	SHOT NO. DUE MR	SHOT NO. DUE MR
	TOTAL SHOTS TO DATE	TOTAL SHOTS TO DATE	TOTAL SHOTS TO DATE	TOTAL SHOTS TO DATE
	TOTAL SHOTS LEFT TO MR	TOTAL SHOTS LEFT TO MR	TOTAL SHOTS LEFT TO MR	TOTAL SHOTS LEFT TO MR

V B 0 4	24 MONTHS CABLE REPLACEMENT			
	DATE OF LAST MR REPLACEMENT DATE MR	DATE OF LAST MR REPLACEMENT DATE MR	DATE OF LAST MR REPLACEMENT DATE MR	DATE OF LAST MR REPLACEMENT DATE MR
	SHOT NO. LAST MR	SHOT NO. LAST MR	SHOT NO. LAST MR	SHOT NO. LAST MR
	SHOT NO. DUE MR	SHOT NO. DUE MR	SHOT NO. DUE MR	SHOT NO. DUE MR
	TOTAL SHOTS TO DATE	TOTAL SHOTS TO DATE	TOTAL SHOTS TO DATE	TOTAL SHOTS TO DATE
	TOTAL SHOTS LEFT TO MR	TOTAL SHOTS LEFT TO MR	TOTAL SHOTS LEFT TO MR	TOTAL SHOTS LEFT TO MR

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Figure 6-6.—Maintenance requirement status board (maintenance control).

PMS MAINTENANCE REQUIREMENT R-2	PMS MAINTENANCE REQUIREMENT R-3	PMS MAINTENANCE REQUIREMENT R-5	PMS MAINTENANCE REQUIREMENT R-6
REPLACE DRIVE SYSTEM CABLE BETWEEN 3000/3500 SHOTS OR 24 MONTHS SERVICE	REQUEST CYLINDER SLOT MEASUREMENTS FROM TYPE COMMANDER NOTE: ACCOMPLISH THIS MR WHEN DICTATED BY TABLE 1 OF MRC	INSPECT SHUTTLE, CONNECTOR GUIDES, WATERBRAKE AND LAUNCH PISTON ASSEMBLIES FOR ALIGNMENT AFTER EVERY 2600 AND BEFORE 2800 SHOTS, REPLACE CYLINDER GAP SEALS	INSPECT AND LUBRICATE WATERBRAKE AND LAUNCH PISTON ASSEMBLIES. NOTE: ACCOMPLISH BETWEEN 1300-1400, 2500-2800, AND EVERY 500 SHOTS THEREAFTER.
24 MONTHS CABLE REPLACEMENT			
DATE OF LAST MR REPLACEMENT DATE MR	DATE OF LAST MR REPLACEMENT DATE MR	DATE OF LAST MR REPLACEMENT DATE MR	DATE OF LAST MR SHOT INSPECTION INTERVAL
SHOT NO. LAST MR	SHOT NO. LAST MR	SHOT NO. LAST MR	SHOT NO. LAST MR
SHOT NO. DUE MR	SHOT NO. DUE MR	SHOT NO. DUE MR	SHOT NO. DUE MR
TOTAL SHOTS TO DATE	TOTAL SHOTS TO DATE	TOTAL SHOTS TO DATE	TOTAL SHOTS TO DATE
TOTAL SHOTS LEFT TO MR	TOTAL SHOTS LEFT TO MR	TOTAL SHOTS LEFT TO MR	TOTAL SHOTS LEFT TO MR
PMS MAINTENANCE REQUIREMENT R-7	PMS MAINTENANCE REQUIREMENT R-11	PMS MAINTENANCE REQUIREMENT R-13	PMS MAINTENANCE REQUIREMENT R-15
IN-PLACE SHUTTLE INSPECTION. INSPECT, LUBRICATE & TEST COMPONENTS IN CATAPULT TROUGH. NOTE: ACCOMPLISH AFTER EVERY 400 AND BEFORE 500 SHOTS.	INSPECT TRAVERSE CARRIAGE SLIPPERS FOR WEAR & SECURITY. NOTE: ACCOMPLISH AFTER EVERY 3000 AND BEFORE 3500 SHOTS.	CLEAN & INSPECT RETRACTION ENGINE HYDRAULIC PIPING STRAINERS & ORIFICES. NOTE: ACCOMPLISH AFTER EVERY 2000 AND BEFORE 2200 SHOTS.	1. LUBRICATE COMPONENTS OF ROTARY RETRACTION ENGINE ASSEMBLY. 2. LUBRICATE ALL RETRACTION ENGINE AND FAIRLEAD SHEAVES. NOTE: ACCOMPLISH AFTER EVERY 100 AND BEFORE 200 SHOTS.
DATE OF LAST MR	DATE OF LAST MR	DATE OF LAST MR	DATE OF LAST MR
SHOT NO. LAST MR	SHOT NO. LAST MR	SHOT NO. LAST MR	SHOT NO. LAST MR
SHOT NO. DUE MR	SHOT NO. DUE MR	SHOT NO. DUE MR	SHOT NO. DUE MR
TOTAL SHOTS TO DATE	TOTAL SHOTS TO DATE	TOTAL SHOTS TO DATE	TOTAL SHOTS TO DATE
TOTAL SHOTS LEFT TO MR	TOTAL SHOTS LEFT TO MR	TOTAL SHOTS LEFT TO MR	TOTAL SHOTS LEFT TO MR

Figure 6-7.—Maintenance requirement status board (catapult).

- Q7. *What is used to track all outstanding maintenance actions?*
- Q8. *How is the priority section of the ALRE MAF card annotated?*
- Q9. *The ALRE MAF is divided into how many areas?*
- Q10. *What copy of the ALRE MAF is retained by QA?*

ALRE MAINTENANCE SUPPORT

LEARNING OBJECTIVE: Describe the role of maintenance support pertaining to maintenance.

The maintenance support branch is a key element in the day-to-day operation of V-2 division; it establishes a single point of maintenance expertise and capability in the division. The maintenance support branch is manned by senior, experienced ABEs and EMs (catapult/arresting gear electricians) whose training and background provide the necessary skills and knowledge to maintain ALRE equipment in a fully operational and safe status.

The primary role of the maintenance support (MS) branch is to assist cognizant operating work centers by providing technical expertise in performing maintenance or repairs on certain critical equipment. The designated critical equipment includes systems, components, assemblies, subassemblies, and parts that the failure or improper operation of can result in aircraft loss, equipment loss, or personnel injury.

Since MS personnel are assigned to assist in maintenance performed by an operating work center, the cognizant work center supervisor, who has the responsibility for the operation and upkeep of the equipment, also retains the overall responsibility for maintenance performed on the critical equipment previously mentioned.

For this reason, the cognizant operating work center must document the maintenance action on the 2-part MAF, including all maintenance support man-hours. In addition to this documentation, the MS supervisor will independently track all man-hours expended by maintenance support personnel on the MAF card placed in the maintenance support VIDS board. Following completion of the maintenance action, the MS supervisor transcribes the number of man-hours expended on a particular job and other pertinent information onto a maintenance summary

sheet, which will be retained for 2 years for local use in manpower accounting. The information on the summary sheet will include, as a minimum, the following:

- JCN
- Equipment/system name
- Description of discrepancy
- Description of corrective action
- Total number of man-hours expended

REVIEW QUESTIONS

- Q11. *What is the primary role of maintenance support?*
- Q12. *How long must the maintenance summary sheet be retained by maintenance support?*

TOOL CONTROL PROGRAM (TCP)

LEARNING OBJECTIVE: Describe some benefits of the tool control program.

The maintenance support supervisor is also responsible for the management of the division's tool control program (TCP), under the direction of the maintenance officer. The TCP was established to reduce the potential of tool-related foreign object damage (FOD) mishaps and to reduce the cost of tool replacement. This program allows you to rapidly account for all tools before, during, and after completing a maintenance task.

The TCP is based on the instant inventory concept through the use of a family of specialized tool containers. All tools have individual silhouetted locations to highlight a missing tool. An inventory list is also included in each container. On containers or tool pouches that cannot be silhouetted, an inventory list is attached, providing a means for the tool room operator and the maintenance man to inventory tools upon issue from and return to the tool room. This inventory system allows you to quickly determine that all tools have been issued to perform a specific maintenance task and all have been returned to the tool room upon completion of the maintenance. Additional benefits of the TCP are the following:

- Reduced initial outfitting and tool replacement costs
- Reduced tool pilferage

- Reduced man-hours required to complete each maintenance task
- Assurance that the proper tools are available to perform specific maintenance tasks

Detailed information concerning the ALRE TCP can be found in NAEC Miscellaneous Report 51/OR 732, the ALRE Tool Control Manual.

REVIEW QUESTIONS

Q13. List benefits of the tool control program?

QUALITY ASSURANCE (QA)

LEARNING OBJECTIVES: Describe the quality assurance branch organization. Describe the quality assurance branch responsibilities. Describe quality assurance audits.

QA is the planned and systematic pattern of actions necessary to prevent defects from occurring from the start of a maintenance operation to its finish. QA is the responsibility of all personnel involved in the operation, upkeep, and maintenance of ALRE.

The achievement of QA depends on prevention, knowledge, and special skills as they are described.

- Prevention is the power to regulate events rather than being regulated by them. This extends to the safety of personnel, the maintenance of equipment, the training of personnel, and all aspects of the total maintenance effort.
- Knowledge is derived from factual information. Knowledge is acquired through data collection and analysis as a means of identifying, tracking, and preventing defects.
- Special skills are those skills possessed by the personnel trained in the technique of data analysis and supervision of the QA program.

The QA program provides an efficient method of gathering and maintaining information on the quality, characteristics of repair parts, maintenance procedures, training, and on the source and nature of defects and their impact. The QA program permits maintenance and operational decisions to be made based on facts rather than intuition or memory, by providing comparative data that is useful long after the details of a particular event has been forgotten.

A properly functioning QA program points out problem areas to maintenance managers so that appropriate action can be taken to accomplish the following:

- Improve the quality, uniformity, and reliability of the total maintenance effort
- Improve the work environment and the tools and equipment used in the performance of maintenance
- Eliminate unnecessary man-hour and dollar expenses
- Improve the training, work habits, and procedures of maintenance personnel
- Increase the accuracy and value of reports and correspondence originated by the division
- Distribute required technical information more effectively
- Establish realistic material and equipment requirements in support of the maintenance effort
- Support safety and FOD prevention and reporting programs

QUALITY ASSURANCE BRANCH ORGANIZATION

The QA branch is comprised of a small group of skilled personnel who are permanently assigned to the branch. The personnel assigned to the QA branch are known as quality assurance inspectors (QAIs). They are responsible for conducting QAI-level inspections and the management and monitoring of QA programs in the division. Additionally, personnel assigned to other branches and work centers will be designated to perform certain inspection functions NOT requiring QAI-level involvement. These personnel are collateral duty inspectors (CDIs), who are assigned to inspect specific steps of a maintenance procedure performed by their respective work center. They are responsible to the QA branch supervisor while performing QA functions. CDIs are NOT permitted to inspect their own work under any circumstance.

It may also be necessary to augment the QA branch with collateral duty quality assurance inspectors (CDQAIs) to temporarily alleviate given skill or manpower shortages. CDQAIs must meet the same criteria as QAIs, including designation in writing by the commanding officer, and will have the same authority

as QAIs but remain part of their respective work centers. Should it become necessary to assign an individual below the paygrade of E-6 as a CDQAI, a letter must be submitted informing the cognizant type commander (TYCOM) of this decision and the assignment must not exceed a period of 90 days without the approval of the cognizant TYCOM. In no case an individual below the paygrade of E-5 be appointed as a CDQAI.

RESPONSIBILITY FOR QUALITY OF MAINTENANCE

To establish a successful QA program, everyone in the maintenance organization must fully support it. It is not the training, maintenance instructions, or other facilities that determine the success or failure of a QA program, it is the frame of mind of all assigned personnel.

Each person must know that quality work is vital to the effective operation of the maintenance organization. Each must know the specifications required to achieve quality work, as well as the purpose of those specifications.

The person most directly concerned with and responsible for quality workmanship is the work center supervisor. This stems from his responsibility for the proper professional performance of assigned personnel. It is the direct responsibility of the work center supervisor to ensure that the proper level of QA inspection is assigned to the job when the job is assigned to maintenance personnel. This procedure allows the inspector to make a progressive inspection as required. This also ensures that an inspector is not confronted with a job that has been completed before he could inspect it.

Direct communication between the QA branch and the maintenance branch is a necessity and must be energetically exercised. Although the maintenance officer is responsible for the overall quality of the maintenance in the division, branch officers, branch supervisors, and work center supervisors are responsible for ensuring that required inspections are conducted and that quality workmanship is attained.

QUALITY ASSURANCE BRANCH RESPONSIBILITIES AND FUNCTIONS

The QA branch is responsible for the implementation, management, and monitoring of specific programs designed to improve the quality of maintenance, the training of personnel, adherence to

general and specific safety rules, and the analysis of maintenance deficiencies, while minimizing man-hour and material expenditures.

To carry out these responsibilities, personnel assigned to the QA branch perform the following duties:

- Maintain the central TPL for the division. Review incoming technical publications and directives to determine their application to individual maintenance branches, and monitor the management of the dispersed TPLs in the maintenance branches.
- Ensure that all work guides, equipment guide lists, and maintenance requirement cards, and other information used to define or control maintenance are complete and current before issuing to work centers.
- Prepare or assist in the preparation of maintenance instructions (MIs) to ensure that QA objectives and requirements are defined.
- Provide a continuous training program in the techniques and procedures used to conduct inspections. Participate as members of task forces to study trouble areas and submit recommendations for corrective action.
- Establish requirements and qualifications for QAI/CDQAIs and CDIs; review the qualifications of personnel nominated for these positions; and develop and administer written examinations to test the knowledge of personnel nominated for QA positions.
- Provide technical assistance to CDIs and periodically accompany CDIs on assigned inspections and evaluate their performance.
- Monitor and review all requests for departures from specifications, requests for engineering information (REIs), hazardous material reports (HMRs), fast-action discrepancy reports (FADR), feedback reports (FBRs), technical publications deficiency reports (TPDRs), quality deficiency reports (QDRs), and technical manual deficiency/evaluation reports (TMDERs) to ensure that they are clear, concise, and comprehensive prior to submission.
- Monitor the use of precision measuring equipment (PME) to ensure compliance with calibration intervals and safety instructions.

- Inspect all maintenance equipment and facilities to ensure compliance with fire and safety regulations and existence of satisfactory environmental conditions.
- Monitor training, qualification, and licensing of equipment operators and drivers.
- Maintain a Trend Analysis Program, either through the periodic review of inspection records, noting any recurring discrepancies requiring special attention, or at the request of the work center supervisor for a particular problem area on a one-time or continuing basis.
- Develop checklists for auditing work centers and specific maintenance programs.

Billet descriptions are to be prepared for QA personnel to ensure that all QA functions and responsibilities are assigned to individual QAIs assigned to the QA branch.

QUALITY ASSURANCE INSPECTOR QUALIFICATIONS

All personnel being considered for selection as a QAI or CDQAI, should meet the following qualifications:

QAI/CDQAIs

1. Be senior in grade and experience. This is defined to mean a first class petty officer or above with a well-rounded maintenance background. It is recognized though, that unusual circumstances may temporarily require the use of other than E-6 or above personnel. Under these circumstances, the most experienced personnel available, as determined by the maintenance officer, may be temporarily designated as a QAI or CDQAI as required.
2. Have fully developed skills and experience related to the technical fields under their cognizance.
3. Be able to research, read, and interpret drawings, technical manuals, and directives.
4. Be able to write with clarity and technical accuracy.
5. Be stable and excellent in performance.
6. Be observant, alert, and inquisitive.

QAI/CDQAIs are designated in writing by the commanding officer after recommendation by the V-2 maintenance officer, the V-2 division officer, and the air department officer on the ALRE Quality Assurance Inspector Recommendation/Designation form (fig. 6-8).

CDIs

As stated earlier in this chapter, CDIs are assigned to the work centers and are to inspect all work and comply with all QA objectives and requirements during all maintenance actions performed by their respective work centers. They will also be familiar with the provisions of the various QA and maintenance management programs managed and monitored by the QA branch.

QA will establish minimum qualifications for personnel recommended for CDI. All CDIs must be PQS qualified on the particular type of equipment that they are assigned to inspect during maintenance. In addition, while CDIs are performing QA duties, they are responsible to the QA branch supervisor, ensuring that all maintenance, safety, and QA requirements are met by the work center by performing spot checks of all in-progress maintenance and work.

CDIs are designated in writing by the air department officer after recommendation by the V-2 maintenance officer and the V-2 division officer (see fig. 6-8).

All QA inspectors (QAI/CDQAIs and CDIs) will be required to demonstrate their knowledge and ability by passing a written test administered by the QA branch. Personnel assigned to perform QA functions (QAI/CDQAIs and CDIs) will receive continuous training in inspecting, testing, and quality control methods specifically applicable to their area of responsibility. They will also receive cross training in the performance of duties outside their area of responsibility. This training will include local training courses, OJT, rotation of assignments, and required formal equipment and QA training schools.

QUALITY ASSURANCE AUDITS

QA audits are essential elements of an effective QA program. They provide an evaluation of performance and program compliance throughout the division by serving in an orderly method of identifying, investigating, and correcting program deficiencies on a regular basis. Audits are used to evaluate specific

ALRE QUALITY ASSURANCE INSPECTOR RECOMMENDATION/DESIGNATION		
CANDIDATE NAME		RATE
I. WORK CENTER SUPERVISOR RECOMMENDATION In accordance with OPNAVINST 4790.15 the above named person is recommended for: <input type="checkbox"/> QAI <input type="checkbox"/> CDQAI <input type="checkbox"/> CDI		
FOR: (SYSTEM/SUBSYSTEM, ETC.)		
W/C SUPERVISOR	SIGNATURE	DATE
II. QUALITY ASSURANCE ENDORSEMENT The candidate has been examined in accordance with OPNAVINST 4790.15 and has passed all requirements satisfactorily. Recommended approval.		
QA SUPERVISOR TYPED NAME AND RANK	SIGNATURE	DATE
III. ALRE MAINTENANCE OFFICER ENDORSEMENT RECOMMENDED <input type="checkbox"/> APPROVAL <input type="checkbox"/> DISAPPROVAL		
MAINTENANCE OFFICER TYPED NAME AND RANK	SIGNATURE	DATE
IV. V-2 DIVISION OFFICER ENDORSEMENT RECOMMENDED <input type="checkbox"/> APPROVAL <input type="checkbox"/> DISAPPROVAL		
V-2 OFFICER TYPED NAME AND RANK	SIGNATURE	DATE
V. AIR OFFICER ENDORSEMENT/ACTION <input type="checkbox"/> APPROVAL <input type="checkbox"/> DISAPPROVAL <input type="checkbox"/> DESIGNATED <input type="checkbox"/> NOT DESIGNATED		
AIR OFFICER TYPED NAME AND RANK	SIGNATURE	DATE
VI. COMMANDING OFFICER ACTION <input type="checkbox"/> DESIGNATED <input type="checkbox"/> NOT DESIGNATED		
COMMANDING OFFICER TYPED NAME AND RANK	SIGNATURE	DATE
VII. DESIGNEE RESPONSIBILITY I understand my responsibility as set forth herein: "When performing inspections, I am considered to be the direct representative of the Commanding Officer for ensuring operational safety of the item concerned. I will not permit factors, such as operational desires, maintenance consideration, personal relations or the approach of liberty to modify my judgement. By signing an inspection report, I am certifying upon my own individual responsibility that the work involved has been personally inspected by me; that it has been properly completed and is in accordance with current instructions and directives; that it is satisfactory; that any related parts or components which may have been removed by the work are properly replaced and all parts are secure; and that the work has been performed in such a manner that the item is completely safe for use."		
CANDIDATE TYPED NAME	SIGNATURE	DATE

ABEf608

Original to: Quality Assurance
 Copy to: Branch Officer

Figure 6-8.—ALRE Quality Assurance Inspector Recommendation/Designation form.

maintenance programs assigned to the QA branch for either management or monitoring.

Audits fall into three categories:

1. Work center audit—These audits are conducted quarterly to evaluate the overall quality performance of each work center. As a minimum the following areas and items will be evaluated:

- Personnel and skills
- Technical publications
- Maintenance instructions
- Adherence to directives, procedures, and inspections
- Adequacy and availability of process, test, and inspection procedures
- Availability and calibration status of PME
- Proper use of PME
- Certification of personnel performing special processes such as welding and operating yellow gear
- Handling, packaging, protecting, and storing of material and parts
- Cleanliness and condition of spaces
- Compliance with fire and safety regulations
- Configuration of components and equipment, and accuracy of associated logs and records
- Equipment logs and records
- Material condition of equipment
- FOD prevention program compliance
- TCP compliance
- Corrosion control program compliance
- Tag-out program compliance
- General and electrical safety programs compliance

2. Special audits—These are conducted to evaluate specific maintenance tasks, processes, procedures, or programs. They provide a systematic, coordinated method of investigating known deficiencies, evaluating the quality of workmanship, and determining the adequacy of and adherence to applicable technical publications/instructions. Special audits are also used by QA to monitor those programs

specifically assigned to the QA branch for monitoring. Special audits are conducted at the direction of the maintenance officer or QA supervisor on an as required basis.

Audit forms, with appropriate checklists, for each work center is developed by QA. Upon completion of an audit, the findings are reviewed with the branch and work center supervisors; and a report of the findings, with recommendations when required, is submitted to the maintenance officer. Records of audits are maintained for 2 years.

Adequate follow-up procedures must also be established to ensure that discrepancies found during a QA audit are resolved. Attention from all levels within the V-2 division organization is essential.

3. Annual type commander audit—The cognizant type commander maintenance management team conducts an annual audit of each carrier's ALRE QA program.

The Aircraft Launch and Recovery Equipment Maintenance Program (ALREMP), OPNAVINST 4790.15, establishes the maintenance policies, procedures, and responsibilities required to provide an integrated system for performing maintenance and supporting related functions on ship's installed aircraft launch and recovery systems and associated support systems and equipment.

To obtain the full benefits of the QA program, teamwork must first be achieved. Blending QA functions with the interests of the entire division creates a more effective program. Every maintenance person and supervisor must be permitted to use an optimum degree of judgment in the course of daily operations and the performance of daily work assignments. A person's judgment plays an important part in the quality of the work he performs. QA techniques supply each person with information on actual quality, which provides a challenge to improve the quality of his work. The resulting knowledge encourages the best efforts of all maintenance personnel.

REVIEW QUESTIONS

- Q14. True or False: CDIs are permanently assigned to the QA branch?*
- Q15. Who is responsible to ensure that the proper level of QA inspection is assigned to a maintenance action?*
- Q16. Who designates QAIs and CDQAIs?*

Q17. *What are the categories of QA audits?*

SUMMARY

You should now know that overhaul maintenance is restorative or additive work on catapults, arresting gear, VLA, and their associated equipment that is usually performed at a naval overhaul and depot facility, contractor plant, or industrial facility.

You should know that maintenance tasks are assigned according to the complexity, scope, and range of the work to be performed. You have read about the duties of the maintenance control, quality assurance, and maintenance support branches of V-2 division. You should now know the purposes of the maintenance action forms and the procedures for their completion.

You should know that V-2 divisions support naval operations through the upkeep and operation of catapult and arresting gear equipment and that the Aircraft Launch and Recovery Equipment Maintenance Program (ALREMP) makes this type of support possible.

You should also know that the ALREMP program depends heavily on the quality assurance concept and that quality assurance in maintenance is a responsibility of all hands.

Should you not fully understand this chapter, you should thoroughly study it again. You, as an ABE, will be responsible for supporting ALREMP through your knowledge and experience.