FIELD MANUAL
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ARMY AVIATION MAINTENANCE

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PREFACE

Aviation maintenance activities are organized to provide the battlefield commander with the maximum number of safe, mission-capable aircraft. These activities must be dedicated to fast, continuous, and reliable aviation maintenance support in the highly mobile, integrated battlefield expected in future combat.

Each aviation unit is responsible for performing aviation unit maintenance (AVUM) on its assigned aircraft. Divisional and nondivisional aviation intermediate maintenance (AVIM) units provide a single level of support maintenance between unit and depot levels. Divisional AVIM units provide support for aircraft assigned to the division. Nondivisional AVIM units are deployed on an area basis and assigned to the corps support command (COSCOM) or the theater army area command (TAACOM), based on aircraft density.

This manual provides doctrinal guidance concerning aviation maintenance organizations and functions. It is designed for use by commanders and their staffs, small-unit leaders, and technicians who have an aviation maintenance responsibility. For simplicity, forward support battalions and main support battalions are referred to throughout the manual. Supply and transportation battalions in the air assault and airborne divisions operate similarly unless otherwise stated.

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Unless this publication states otherwise, masculine nouns and pronouns refer to both men and women.

CHAPTER 1

THE BATTLEFIELD

Aviation maintenance is unlike any other type of combat service support (CSS) organization. Aviation maintainers must be able to support the aviation force as it is designed to fight, not as it is organized for command and control (c^2). To accomplish this, AVIM units must be modular in design. For aviation maintenance applications, modularity is intended to facilitate, at the tactical level, the task organization of logistics to support a designated aviation task force and to effectively implement "fix forward" aviation maintenance doctrine. The AVIM force structure and organizational design must be "tailorable" to the specific requirements of the supported force.

FM 100-5 is the Army's keystone doctrinal manual. It outlines how the Army will fight with CONUS-based contingency forces.

The dramatically changing world environment during the past several years has lead to significant planned reductions in the Department of Defense budgets and service force structures over the next 5 years. These reductions, anticipated to be at least 25 percent, along with the evolving worldwide threats facing the United States, have caused a revision of the national military strategy that calls for fewer less forward deployed forces and greater reliance on CONUS-based contingency forces. Indeed, by 1995, 16 of the 20 Army divisions will be based in CONUS. Hence, the centerpiece for this new strategy is rapid power projection to meet growing regional threats and crises. The credibility of our new strategy depends on our ability to deploy, in a timely manner, an appropriate military force that is versatile, lethal, and sustainable. The Army must be prepared to rapidly deploy up to a five division contingency force in support of national military objectives. The Army has responded to this mission with a program that will support this new mobility-oriented strategy. This program, called the Army Strategic Mobility Program (ASMP), is designed to lead to the development of a total fort-to-foxhole system that provides the necessary capability to meet the deployment goals of the CONUS-based contingency force.

SUSTAINMENT IMPERATIVES

Sustaining the battle will require aviation commanders and staffs to adhere to what are termed the sustainment imperatives. These are–

Anticipation

Integration

Continuity

Responsiveness

Improvisation

These imperatives apply to war and to operations other than war (OOTW) and are discussed in detail in FM 100-5 and FM 100-10.

Aviation logisticians must anticipate future events and requirements by understanding the aviation commander's plan and by foreseeing events as operations develop. While continuing to support current operations, they must plan for future operations and attempt to foresee unexpected changes in the course of the battle. Corps aviation logisticians must focus on a period at least 48 to 72 hours in the future. They must also anticipate events by ensuring that the aviation logistics structure retains the flexibility to respond quickly to change.

Aviation logistics is an integral part of aviation operations at all echelons. Proper integration of sustainment operations with the operations of the aviation force is critical. Aviation logistical units must be organized to execute "fix forward" doctrine while providing the aviation commander the greatest possible freedom of action.

Continuity of logistics sustainment is paramount to the continued success of the combat force. Pauses for rebuilding impede momentum and rob the commander of the initiative. Continuity implies the responsibility to ensure operations are not affected by a lapse in support or by unforeseen events. Continuity of support lends depth to the aviation commander's operations and contributes to his retention of momentum and the initiative.

Responsiveness is the ability to meet changing requirements on short notice. Military operational doctrine relies on the ability of the combat force to seize fleeting opportunities. Sustainment elements of the command must be as opportunistic as the maneuver elements. Sustainment planners and commanders must respond to the situation quickly so that operational momentum is retained. To be responsive to changes, bold and innovative methods of support may be required.

Improvisation must be a hallmark of aviation logistics. Aviation logisticians must seek new or imaginative solutions to problems. Routine or traditional solutions that do not solve problems must be discarded. Extraordinary methods may be necessary to get things done.

COMBAT SERVICE SUPPORT OF AVIATION OPERATIONS

Planning

The battlefields of all potential theaters of operation pose great and varied challenges, not only to the combat force that may fight on them, but also to the combat service support (CSS) units that will sustain the combat force. US forces must make the most of what is available to them wherever they are fighting. They must take advantage of host nation resources through formal agreements and pursue ad hoc measures during operations, as well as forage and use captured materiel. These factors are essential to the success of any sustained operation.

The fluid conditions of future battlefields will require that logistics supporters be responsive and flexible– to take the initiative and anticipate needs. Aviation logistics commanders must understand the aviation commanders' operational plans to perform responsively and must accept deviation from these plans as routine. Aviation logistics commanders may, at times, need to devise innovative ways to support the tactical plan and lessen the risks. Flexibility is the key to maintenance operations, and it allows commanders to be responsive and flexible by providing mission-ready aircraft for combat operations.

Military operations doctrine requires that all leaders understand the concepts and requirements of any operation. FM 100-5 is the keystone manual that fully explains military operations doctrine. FM 100-10 is the Army's keystone manual for combat service support. FM 1-100 is the principal manual for combat aviation operations. Aviation logisticians must understand the doctrine laid out in these manuals as thoroughly as they understand the technical aspects of their jobs.

Condition

Effective communications must be maintained between aviation units, the supporting staffs, and AVIM units to determine CSS requirements and to coordinate support activities. Priorities for CSS must be established based on the tactical plan. Close coordination is also necessary to ensure that the units with the highest tactical priority receive their support first. Effective communications and coordination will enable the support commander to emphasize the flow of supplies rather than the buildup of stocks. Stockage of critical supplies near points of anticipated consumption may be necessary to permit continued operations in case the CSS system is disrupted, but such action should not impede the mobility of the maneuver battalions. Constant and complete coordination is necessary to ensure effective and integrated transportation support.

The combat mission of aviation units must remain the foremost consideration in the functions of AVUM and AVIM units. Resources and priorities must be tailorable to changing combat situations. Units must be flexible enough to support from any base arrangement and be able to survive and to accomplish the mission. Maintenance, supply, and other support elements must be far enough forward to be instantly responsive to the requirements of aviation units.

Offensive Operations

The primary purpose of maintenance support of offensive operations is to maintain the momentum of the attack. Maintenance managers must prepare and organize for offensive operations based on the particular type of tactical operations to be supported, the nature of the battlefield, and the need for flexibility. To make these judgments, maintenance managers need to weigh many considerations. Offensive operations must provide for–

- Forward positioning of essential maintenance repair parts and supplies.
- Maximum use of maintenance support teams (MST) in forward areas.
- Increased use of airlift and airdrop for resupply of essential repair parts and supplies.

- Adequate communications between the supported and the supporting unit.
- Proper means to ensure that maintenance preparations for the offense do not interfere with tactical plans and operations.

Defensive Operations

Defensive operations are aimed at creating opportunities to go to the offense. The defense can be static or dynamic. The objective is to cause the enemy attack to fail or to break the momentum of the attack and to provide opportunities to initiate an offensive operation. Maintenance managers work with tactical commanders to ensure they can effectively support the wide range of operations available to the tactical commander. Maintenance managers should make maximum use of support teams to repair equipment as far forward as possible. They should stockpile limited amounts of essential repair parts and supplies in the forward main battle area. They must keep their units mobile.

Retrograde Operations

Retrograde operations serve to gain time, avoid combat under adverse conditions, or draw the enemy into unfavorable positions. Movement to the rear or away from the enemy can be difficult and risky and must be well-organized and well-executed. Support may be provided to units involved in defending, delaying, attacking, or withdrawing. Efforts should be made to establish maintenance elements in depth and rearward, to limit the flow of maintenance repair parts and supplies forward to only the most combat-essential elements, and to keep supply and evacuation routes open. Evacuation of supplies and equipment to planned fallback points along withdrawal routes is important. Also important is providing supplies and evacuation at night and during periods of limited visibility.

Operations Other Than War (OOTW)

OOTW will be the most challenging operation for aviation maintenance managers to support. OOTW can range from support to US, state, and local governments; disaster relief; nation assistance; and drug interdiction to peacekeeping; support for insurgencies and counterinsurgencies; noncombatant evacuation; and peace enforcement. Maintenance managers may conceivably be supporting two or more of these operations simultaneously. This will require maintenance managers to be more flexible and innovative in their means of support.

Aviation units may be staged into and fight in an area of operation on a varying time schedule. Depending on the type of operation, the configuration of the aviation task force may vary from a company to a "provisional" aviation brigade. Units may deploy into areas where there may not be US or allied bases. The local population attitudes may vary from friendly acceptance to open hostility toward the presence of US forces. This factor will influence the composition of the aviation force, which in turn will dictate the composition of the aviation maintenance package. To support these types of operations, maintenance managers will need to provide maintenance modules (groups of selected MOSS, repair parts, and equipment) to support a particular operation. If the operation escalates or the mission changes, the remaining aviation assets may be employed in the areas of operation.

MODULARIZATION

The Army must be prepared to fight the "high intensity" general war yet have the "flexibility" in force structure and organizational design to support limited war and OOTW. The aviation brigade is the aviation "general war" force configuration that the aviation maintenance force structure and organizational designs must be specifically tailored to support. "Modular" maintenance unit designs will allow reconfiguration of the general war AVIM design to support the aviation task force designed for the conduct of limited war. For OOTW, the maintenance organization design must contain sufficient redundancies in personnel and equipment to allow adjustment to implement "fix forward" doctrine as discussed in Appendix N.

RECONSTITUTION

Reconstitution is covered in Appendix M.

During protracted conflicts, units will need to be reconstituted from remaining assets in the field as well as with replacement personnel and equipment. In the same way, AVUM and AVIM units will need to be reconstituted from existing assets. This will best be done using the modularity concept.

As operational aviation companies are reconstituted, the maintenance module to support that force will be built to match the maintenance need. As aviation brigades are reconstituted, the necessary maintenance company must be available to support this task force.

CHAPTER 2

AVIATION MAINTENANCE OPERATIONS

Aviation maintenance operations are vital to the sustainment of an aviation force. The needs of all aviation units must be met. Aviation maintenance services must be coordinated from the customer or unit level up the chain of command to theater level. The relationship of aviation maintenance activities to other activities, such as supply, is interdependent. Readiness requires the proper mix of equipment at the right place and at the right time. Failure to keep equipment operational has the same effect as combat losses: both remove equipment from the hands of the user, which impacts on the outcome of the operation.

Aviation maintenance and supply (both technical and unit supply) must work together to return the maximum amount of equipment to the using unit. Transportation– whether air or ground-must also be closely coordinated with aviation maintenance and supply support. Supply locations must be considered when planning aviation maintenance support sites. The transportation system, air and ground, is tasked to deliver repair parts, evacuate unserviceable materiel, deploy aviation maintenance units, recover downed aircraft, and sometimes to help move ORF items. Aviation maintenance support units have limited organic transportation capabilities; they rely on transportation support from other units. These requirements must be considered when allocating transportation assets and assigning priorities.

AVIATION MAINTENANCE OPERATIONS

As discussed in FM 100-5, the US seeks to achieve its strategic objectives in three diverse environments, using all elements of national power. The environments that aviation maintenance must be able to operate in are peacetime, conflict, and war. Peacetime operations and conflicts are classified as operations other than war. Although the mission of aviation will change depending on the environment, the role of aviation maintenance will remain somewhat constant although the means of employment may change.

During the early hours and days of an operation when aviation assets are in the most demand, the aircraft maintenance system becomes increasingly important. Maintenance organizations at the AVUM, AVIM, and depot levels must plan to meet wartime requirements.

Army aviation maintenance operations and assets are integral to EAC, corps, and division aviation sustainment. The mission and focus of aviation maintenance units are oriented and functionally organized to provide AVUM and AVIM for the aviation force. Aviation maintenance units and organizations are staffed predominately by Aviation Branch personnel; they provide a one-of-a-kind maintenance and supply support to aviation forces and organizations. Maneuver force commanders can maximize combat potential if they understand that the aviation maintenance force is essential to the success of aviation operations. The aviation maintenance system is structured for operational and sustainment maintenance as outlined in FM 1-100 (refer to Figure 2-l).

Aviation operational maintenance is handled by AVUM platoons/companies. Operational maintenance is accomplished by a repair-by-replacement system. This system permits rapid return of aviation systems and weapons to combat forces. These platoons/companies are organic to aviation organizations at all levels. An AVIM company/battalion from the DISCOM provides AVIM for division-level aviation assets. AVIM for EAC and corps aviation assets is provided by the EAC and corps support command's AMB. Aviation sustainment maintenance requirements are those maintenance and supply functions that feed and support operational maintenance requirements from a logistics base. These are usually associated with theater army or depot maintenance operations, whether in the theater or CONUS. Sustainment maintenance primarily supports and sustains the operational maintenance of the aviation force.

AVIATION UNIT MAINTENANCE

Aviation unit maintenance (AVUM) functions are generally characterized as high frequency, "on-aircraft" maintenance tasks that generate minimal aircraft downtime. These functions are frequently limited by the amount and complexity of required ground support equipment, skills required

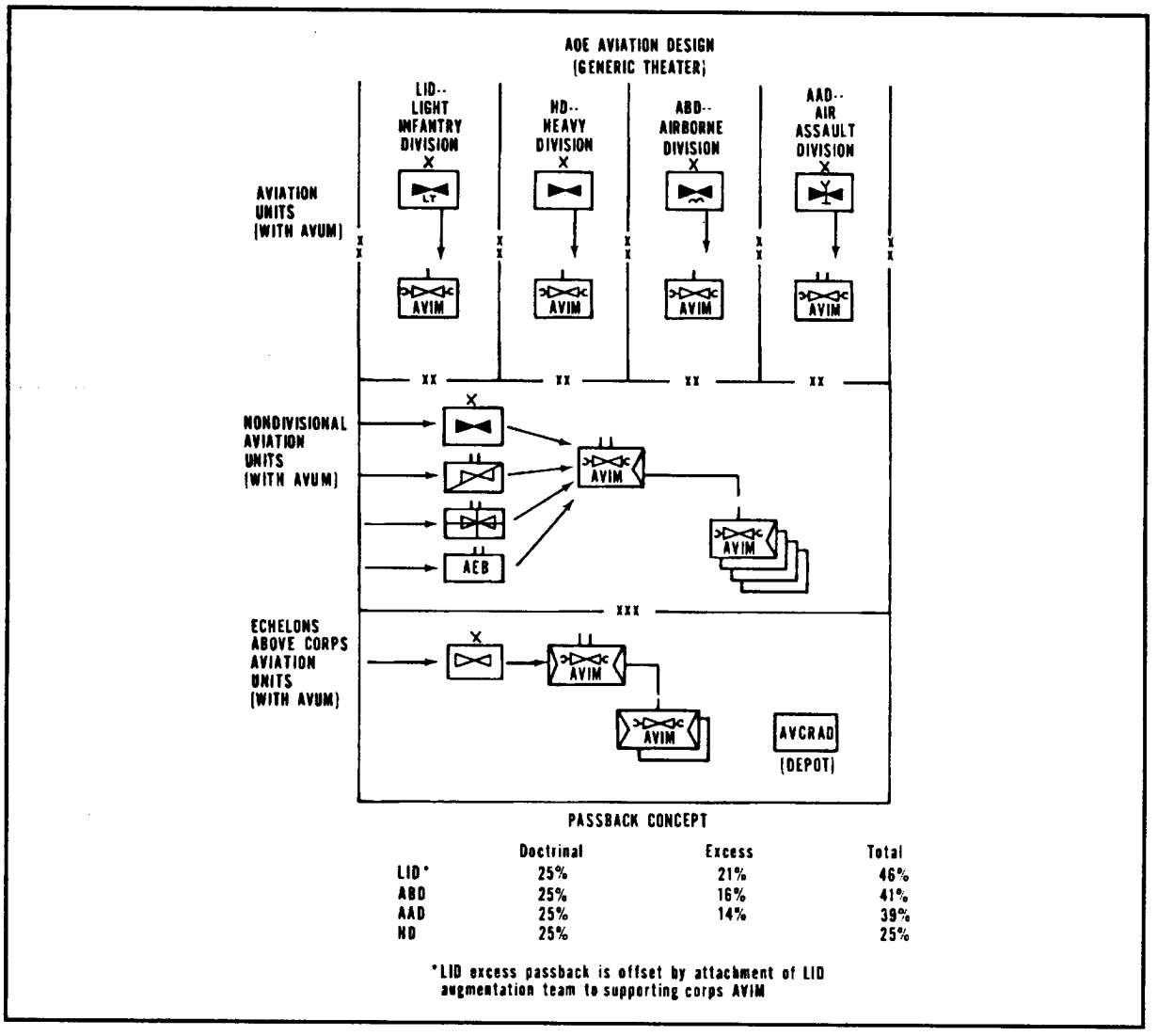


Figure 2-1. AOE Aviation design (generic theater)

to execute the repair, and sophistication of repair facilities. The goal, to provide maintenance support as far forward on the battlefield as possible, must be balanced by the need of the AVUM to maintain sufficient mobility to keep pace with the operating units it supports.

AVUM provides quick turnaround through repair by replacement, minor repairs, adjustments, cleaning, lubricating and servicing. It provides mobile responsive support through maintenance support teams (MST). The general concept is for crew chiefs assigned to specific aircraft to perform daily servicing, daily inspection, and high-frequency, remove-and-replace-type aircraft repairs. scheduled maintenance (other than daily inspections) and the more time-consuming operator-type repairs are normally performed by an AVUM maintenance element within the organization.

The AVUM level maintains a combat-prescribed load list (PLL) which consists of demand-supported items. It performs preventive maintenance repair and replacement associated with a high level of operational readiness. Maintenance inspections and services include daily, phase, progressive phase, and special inspections as authorized by the maintenance allocation chart or by higher headquarters. Phase maintenance is essential to maintain a high state of readiness in both combat and peacetime, and

commanders may tailor it to accommodate combat operations or emergencies. These inspections identify equipment or system malfunctions by using built-in test equipment (BITE) or easy-to-use diagnostic and fault-isolation devices.

Worn or damaged modules or components which do not require complex adjustments or system alignment are replaced using available skills, tools, and equipment. BDAR repair procedures are limited to repairs that can be made with BDAR kits. Recoverable unserviceable modules or components, as well as end items beyond the unit's repair or manpower capability, are evacuated to the supporting AVIM activity.

Maintenance Considerations

Some major considerations for aircraft maintenance at the AVUM unit location are—

- Maintaining the highest degree of mobility. (This includes preparing load plans and practicing convoys and deployment procedures.)
- Completing all imminent scheduled maintenance before deployment or entry into surge operations to avoid the potential of grounding aircraft or overflying scheduled maintenance events during critical battlefield situations. The intervals stated in the aircraft technical manuals are maximum intervals that will not be exceeded except during emergency or critical combat operations when authorized by the unit commander. (Refer to TM 1-1500-328-23.)
- Close coordination with AVIM support is continuous and essential.
- Evaluating each major repair for evacuation to AVIM based on work load and mobility. During periods when movement is likely, aircraft requiring major maintenance or repairs that cannot be completed in a timely fashion may be considered for evacuation to AVIM. (Aircraft evacuation must remain at the discretion of the AVUM commander based on mission requirements.)
- Setting priorities (unit commander) for repairs based on the type of aircraft and aircraft requirements for the battlefield.
- Basing quality control and technical inspection requirements on achieving the standards in the appropriate technical manual rather than "like new" repairs.
- Because aviation combat operations result in shortages of personnel, repair parts, and aircraft, intensive maintenance management is mandatory. (MSTs and BDAR teams must be predesignated and trained so that minimal time and resources are expended during critical periods.)
- Controlled exchange is a key element in maintaining maximum numbers of mission-capable aircraft for the battlefield commander, but it must be IAW the appropriate ARs and be firmly controlled by SOP.

Maintenance Support Teams

In addition to AVUM support teams from the rear area, available AVIM support teams can also be used. The AVUM commander coordinates and schedules maintenance at the forward location of the AVUM unit. For this reason, the members of the forward element must be able to diagnose aircraft damage or serviceability rapidly and accurately. MST operations follow these principles:

- Teams are used to the maximum extent possible.
- Teams may be used for aircraft, component, avionics, or armament repair.
- When the time and situation allow, aircraft is repaired by the team on-site rather than being evacuated.
- Teams must be 100 percent mobile and transported by the fastest organic means available (normally aircraft).
- Teams sent forward from the AVUM support unit must be oriented and equipped for special tasks.

Aircraft Recovery

In combat, there will be a great increase in flying hours and a great demand for operational aircraft. These increased requirements will be complicatedly higher attrition and battle damage rates, which create shortages of repair parts and replacement aircraft. To offset these shortages and maintain an effective combat aviation force, rapid and responsive recovery of Army aircraft systems and components is essential. Aircraft recovery operations are those that result in movement of an aircraft system or component from the battlefield to a maintenance facility. Recovery

may require on-site repair of an aircraft for a onetime flight, or it may prepare an aircraft for movement directly to the first appropriate maintenance activity, using another aircraft or surface vehicle. In extreme circumstances, only portions of inoperative aircraft may be recovered. An aircraft will be cannibalized at a field site only when the combat situation and aircraft condition are such that the aircraft would otherwise be lost to approaching enemy forces.

Aircraft recovery is the responsibility of the owning aviation unit. The unit should use its AVUM assets within the limits of its organic capability. A successful recovery operation is a highly coordinated effort between the owning organization, its AVIM support, and the ground element where the operation is to take place. The operation should also be coordinated with any organization that may provide aircraft or vehicle assets to complete the recovery. The AVUM organization will have organic rigging equipment for recovery of assigned aircraft. The maintenance and recovery team must be trained in rigging a damaged aircraft and in conducting recovery operations. If the recovery is beyond the AVUM team's capability, AVIM support is requested. Divisional and nondivisional AVIM units will have organic rigging equipment for supported aircraft.

Each AVUM organization should provide contact teams for maintenance and recovery. The team will usually include an aircraft maintenance officer (qualified maintenance test pilot), a forward repair and recovery team chief, a technical inspector and damage assessor, and a trained aircraft recovery crew. This recovery team will consist of personnel from the AVUM unit's location at the combat trains or forward area rearm/refuel point (FARP). Recovery aircraft will come from organic aircraft, the supporting AVIM, or be requested from higher echelons. These aircraft should be equipped with rigging equipment for each type aircraft in the unit and with quick-fro battle damage repair kits (tools, hardware, POL products, required repair parts, and technical manuals). When the aviation brigade is the headquarters for covering force or economy-of-force missions and a BSA is constituted to support the effort, the supporting AVIM provide battle damage assessment teams. These will be MSTs and aircraft recovery and evacuation teams when repairs are not within the capability of the AVUM unit. Figures 2-2 and 2-3

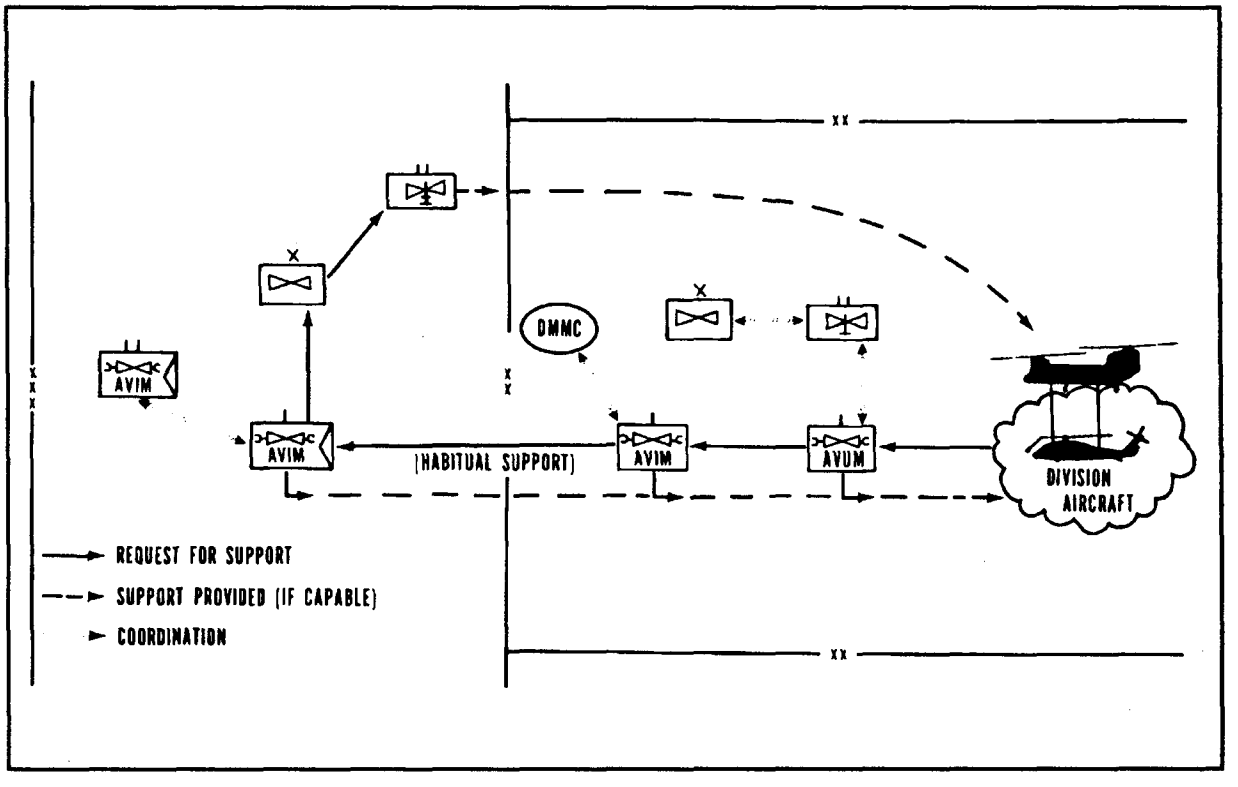


Figure 2-2. Example of aerial recovery of division aircraft

provide examples of aircraft recoveries. Other ways may be employed. (See Appendix F for sample aircraft recovery and evacuation SOP.)

The maintenance and recovery team must consider these factors to select the best course of action:

- Location of downed aircraft.
- Types of special equipment packages installed on the aircraft (Appendix G).
- Amount of damage to aircraft.
- Tactical situation and proximity to enemy.
- Time available (planning time for AVUM preparation and rigging: 30 to 60 minutes, which may vary based on METT-T).
- Weather.
- Assets available.

After evaluating the above factors, the team will determine a proper course of action–

- To make combat repairs, defer further maintenance, or return aircraft to service.
- To make repairs for onetime flight and fly the aircraft to an appropriate maintenance area.
- To rig the aircraft for recovery.
- To arrange for motor transport.
- To selectively cannibalize, destroy, or abandon the aircraft according to SOP.

(Also see Appendix F for additional information.)

Aircraft Repair Parts (Class IX)

The AVIM unit maintains both shop stock and bench stock for all supported aircraft systems and subsystems repair. An ASL of CL IX for the AVUM/AVIM PLL and AVIM shop stock is maintained in the SSA. See Figure 2-4 for Class IXA repair parts flow.

Requisition

Aviation elements submit their requests to the supporting AVIM units. Normally, all aviation PLLs and records for the maneuver companies are kept with the rear AVUM section/company, who forwards requisitions to the supporting AVIM. When deployed in front of the division, units may be unable to echelon

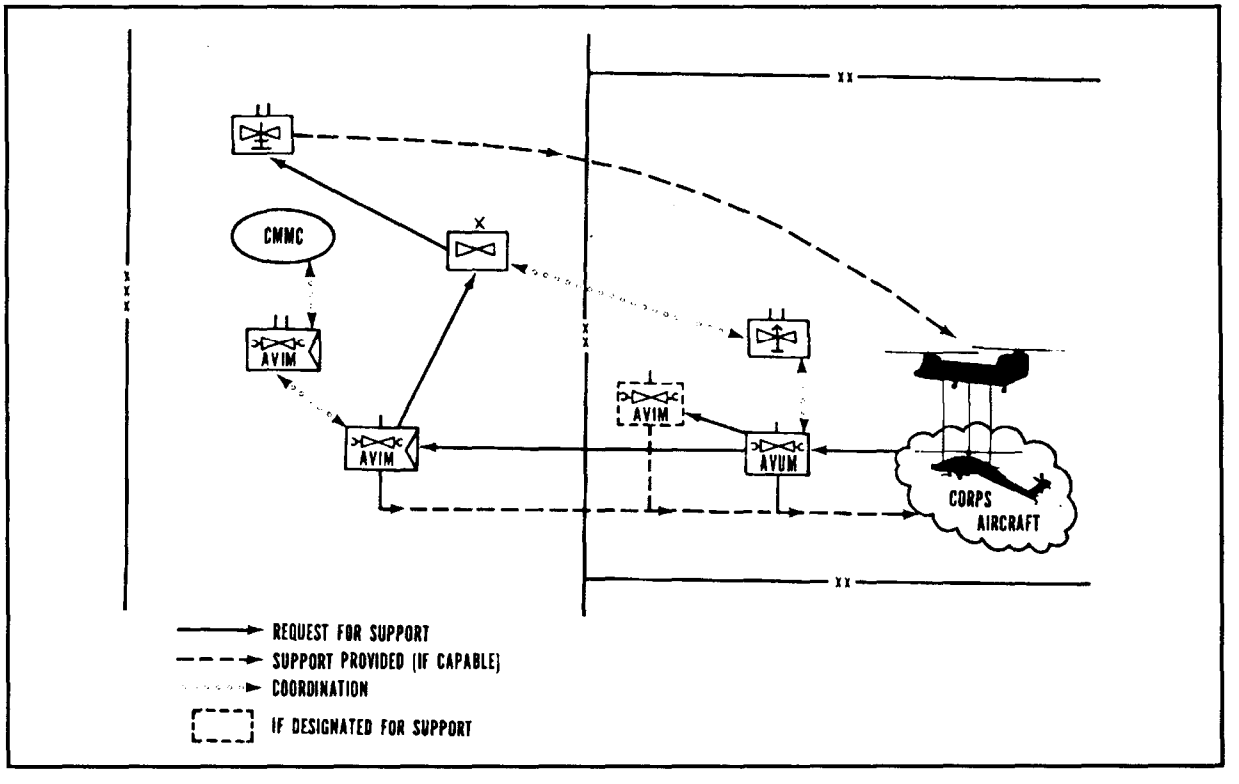


Figure 2-3. Example of aerial recovery of corps aircraft

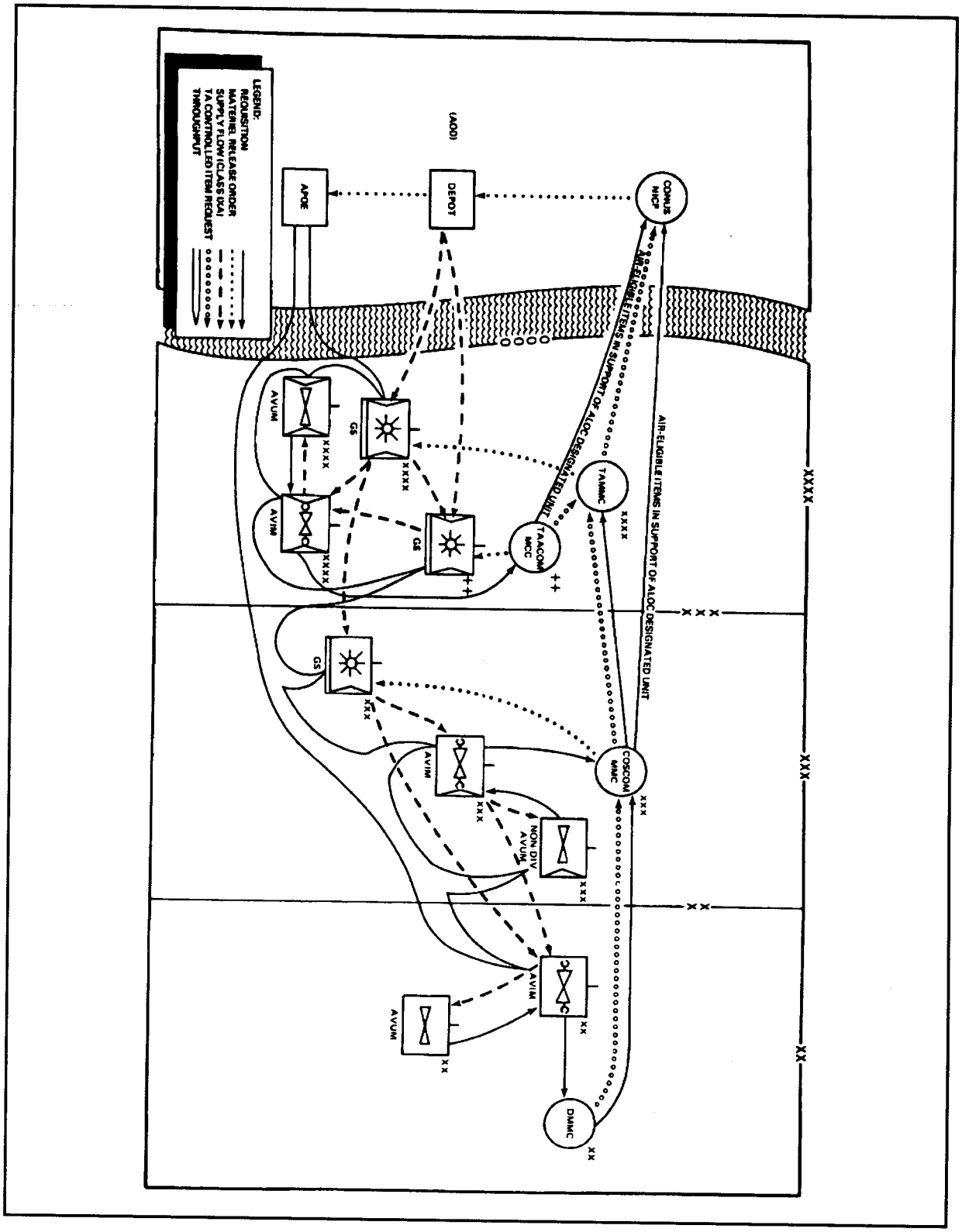


Figure 2-4. Requisition and materiel flow of aircraft repair parts

the train elements so the AVUM commander will coordinate with the brigade S4 to receive parts and AVIM support.

Distribution

The AVUM commander or the production control officer will have selective PLL items at the combat trains or FARP for quick-fro repairs. Use of these items must be reported to the PLL clerk so that the items can be replenished. Replenishment of items required forward that are in the unit's PLL or items that are AIMI will be reported to the brigade rear for ground transportation forward. Air lines of communication (ALOC) must be established to provide repair parts for not mission-capable, supply (NMCS) aircraft. This aerial resupply will "push" critical parts from corps and division direct support units (DSU) forward to AVUM elements. At least one aircraft must be in direct support of the brigade S4 for emergency resupply of NMCS aircraft.

Controlled Exchange

Shortages of repair parts, particularly AIMI, will require the AVUM unit commander or platoon leader to use battle-damaged or unserviceable aircraft as a source for repair parts during combat operations. The intensity of combat, the need for operational aircraft, and the availability of the repair parts requesting system will dictate the extent to which controlled exchange will be necessary.

(Refer to TM 1-1500-328-23 for additional information.)

Mobility

The AVUM unit must be 100 percent mobile with the capability of transporting 100 percent of the unit in one lift, using organic vehicles. It is essential for AVUM operations to keep pace with the operational tempo (OTEMPO) of aviation in any combat operation. AVUM units will move as frequently as every 12 hours.

DIVISIONAL MAINTENANCE COMPANY (AVIM) OPERATIONS

Mission

The mission of the divisional AMCO is to provide–

- AVIM and backup AVUM support to divisional assigned aircraft.
- Aviation repair parts supply support to division aviation units, including aircraft armament, avionics, and aircraft survivability equipment.
- Reparable exchange support for selected parts to divisional AVUM units.

Employment

The company is normally located in the vicinity of the DISCOM area either at or adjacent to an instrumented landing facility, depending on METT-T. The AMCO is designed to provide responsive one-stop aircraft intermediate maintenance and supply support from its base location while also providing maintenance support forward to aircraft operating units. Support forward is normally provided by three forward support helicopter repair/recovery teams. These teams are staffed with aircraft repairers; they provide personnel on a mission basis. When required, additional aircraft component repairers are drawn from company resources and attached as needed to complete a specific mission.

Repair of equipment for return to the user will dictate the maintenance practices and policies of the company. Maintenance accomplished by the company is governed by the maintenance allocation charts and is balanced against time and resources available to complete specific maintenance requirements. Authorized maintenance includes repair and replacement of modules/components and end items which can be made efficiently with available skills, tools, and equipment. The company also inspects, troubleshoots, tests, diagnoses, repairs, adjusts, calibrates, and aligns aircraft systems modules and components. It has the capability to determine serviceability of specified components that are removed before expiration of the time between overhaul (TBO) or of finite life. A limited module/component repair service will support division aircraft maintenance RX but generally is restricted to functions that are not overly time-consuming. Airframe repair and fabrication of parts will be performed with available tools and personnel. The company performs aircraft weight and balance inspections and other special inspections which exceed AVUM capability. The company assists the divisional operating units in preparing damaged and unserviceable aircraft for evacuation. If the evacuation is to be by external airlift, outside support must be obtained as the division aviation companies do not have the necessary airlift capabilities for evacuating some of the AH and UH airframe.

The company maintains an authorized operational readiness float of selected items such as radios and aircraft armament systems. Operational readiness float aircraft are normally maintained at the nondivisional AVIM units. Command, technical supervisory, and mission coordination relationships involving this service support unit are somewhat unique. The AMCO commander answers to the DISCOM commander (in the ASB AMCO the commander answers via the ASB commander), who in turn is responsible to the division commander for all AVIM in the division. The aircraft maintenance management operations function is performed at company level by the production control element. This section performs many analytical actions including planning, reporting, compiling, and interpreting data as a basis for management decisions. It provides the planning level interface with the division materiel management center (DMMC). Routine daily supply and maintenance actions are coordinated directly between the AMCO and DMMC. The maintenance operations officer also services as the aircraft recovery officer to obtain the tactical, maintenance, and lift assets required for the recovery.

The company establishes, controls, and operates a supply function to receive, store, issue, inventory, and replenish stock based on computed requisition order quantity and requisition order point established by the appropriate supply class manager in the DMMC. Internally, the company establishes procedures for receiving materiel requests and issuing and replenishing stock based on the requirements generated by the RX program. It provides "umbrella" stockages reflecting AVUM PLL accounts and maintains specific items in operational readiness float accounts.

During the early stages of a conflict, heavy requirements are placed on all aviation assets. Aircraft readiness, and the ability to support that readiness, must be assured. This requires extensive use of AVIM maintenance support teams providing forward support at the AVUM site where the major thrust is remove-and-replace maintenance. Adequate available stocks of components and the capability to repair them at AVIM is essential. As the battle continues, extensive aircraft maintenance, whether done by AVIM contact teams or AVUM, will be performed in the division rear area. An aggressive controlled exchange policy, the rapid recover of damaged aircraft, and a flexible system of cross-leveling spares will be required. Implicit in the remove-and-replace maintenance approach is the deferment of phased maintenance tasks not related to safety-of-flight and an almost total shift to on-condition maintenance during actual combat operations or emergencies.

Maintenance organizations should plan to use existing facilities such as barns, warehouses, and garages in urban areas. Emphasis should be on reducing detection and providing shelter, both day and night. Extensive night maintenance will require white light to obtain maximum efficiency and rapid return of the aircraft. Night vision devices, however, could be used in the forward areas for limited maintenance by forward support maintenance assistance teams or forward AVUM units.

During operations other than war (OOTW) the AVIM may not be in the same area of operations as the maneuver aviation unit. This, however, does not significantly alter the mission/operation of the AVIM. The amount of support required for OOTW will vary from mission to mission. MSTs may have to be deployed to support OOTW, but the same procedures that apply during war operations would apply.

Aircraft Recovery

See discussion of AVUM functions in this chapter.

Aircraft Repair Parts

Repair parts supply procedures for the AVIM unit are in ARs 710-2 and 725-50 and DA Pamphlets 710-2-1 and 710-2-2. The type of loads managed at the AVIM level are Class IX, operational, quick supply store (QSS), and ASL. Operational load items are repair parts stocked at the AVIM unit for use in maintenance operations (commonly referred to as shop stock). These supplies are issued; they are not part of the ASL. They are similar in purpose to Class IX operational loads in units having AVIM capability. Shop stocks may have two elements: a bench stock and a demand-supported stock. Bench stocks consist of low-cost consumable items, such as wire, common hardware, and O-rings. Locator cards are required, but record of demands are not. Demand-supported stocks will have a record of demands and will be maintained according to AR 710-2 and DA Pam 710-2-2.

Mobility

The doctrinal mobility goal for the divisional AMCO is 100 percent mobility with the capability of transporting 50 percent of the unit in one lift, using its organic vehicles. Mobility is limited by the number of organic vehicles, the requirement to transport large quantities of Class IX, ASL, TMDE, and special tools. Much of this is stored in vans, crates, containers, shelters, or improved open storage areas. In addition, the unit has numerous airmobile shelters and containers and dozens of items of heavy, bulky ground support and materiels-handling equipment which must, for the most part, be moved by division or area transportation units. The divisional AMCO is normally located in the DSA with the DISCOM due to the administrative support it receives. This also requires the unit to move with the same frequency as the DISCOM-every 3 to 7 days.

DIVISION HHD, AMB/ASB (AVIM)

Similar to corps HHD, AMB (AVIM) discussed later in this chapter.

CORPS AMCO (AVIM) OPERATIONS

Mission

The mission of the corps AMCO is to provide–

- AVIM and backup AVUM support to corps assigned aircraft.
- Aviation repair parts supply support to corps aviation units, including aircraft armament, aircraft survivability equipment, and avionics.
- Reparable exchange (RX) parts support for divisional AVIM units.

Employment

Four corps AMCOs are normally assigned to an aviation maintenance battalion (AVIM), which is organic to the corps support command. The employment of the companies is the same as for the division AMCO except–

- They are located in the vicinity of the corps support command (COSCOM) area, either in or adjacent to an instrumented landing facility, depending on METT-T.
- The module/component repair service will support aircraft maintenance RX but is generally restricted to functions that are not overly time-consuming.
- The company performs aircraft weight and balance inspections and other special inspections which exceed AVUM or divisional AVIM capability.
- The company assists the corps and divisional operating units in preparing damaged and unserviceable aircraft for evacuation.
- The AMCO commander answers to the corps AMB who in turn is responsible to the COSCOM commander for all AVIM in the corps.
- The production control element performs many analytical actions including planning, reporting, compiling, and interpreting data as a basis for management decisions. It provides the planning level interface with the AMB maintenance and supply operations section. Routine daily supply and maintenance actions are coordinated directly between the AMCO and the corps materiel management center (CMMC).

Aircraft Recovery

See AVUM Aircraft Recovery.

Aircraft Repair Parts

Same as divisional AMCO.

Mobility

The doctrinal mobility goal for the corps AMCO is 100 percent mobility with the capability of transporting 50 percent of the unit in one lift, using its organic vehicles. The commander must determine which external transportation assets must be requested to move the remainder of the unit. The corps AMCO has the same reason for limited mobility that the divisional AMCO has–limited number of vehicles, large quantities of class IX, ASL, TMDE, and special tools. The corps AMCO is normally located in the COSCOM support area and will probably move once every 8 to 17 days.

Passback Maintenance

A breakdown of the different types and percentages of AVIM passback maintenance is shown in Figure 2-1. Doctrinal passback maintenance is characteristic of the Army of Excellence (AOE) designed L-series AVIM TOES. While generally

acknowledged as 25 percent of the divisional work load that is "passed back to the supporting corps AVIM battalion, it is actually computed as 15 percent systems repair, 25 percent technical inspection, and 30 percent avionics repair during TOE development. All divisional TOES are decremented to compensate for doctrinal maintenance passback. The corps AVIM battalions are designed to accommodate it. (Passback maintenance should be eliminated with the introduction of the Army restructure initiative.)

Excess passback maintenance is also characteristic of the AOE-designed AVIM TOES. In simple terms, it is AVIM passback maintenance "in excess" of the 25 percent doctrinal passback that results from the AOE-designed divisional AVIM being insufficiently staffed to perform its TOE/MTOE mission. It is characteristic of the light, airborne, and air assault division but only the light divisions with augmentation teams support the excess passback.

Displaced maintenance should also be addressed. This category of passback maintenance is primarily AVUM maintenance that cannot be performed at the unit level because of AOE personnel constraints. Operationally, the unresourced AVUM work load falls to the supporting AVIM as backup maintenance. However, it differs from true backup maintenance.

- AVIM units are not resourced to perform AVUM backup maintenance. Consequently, the AVIM unit must preempt its intermediate maintenance mission in order to perform backup maintenance work load. The requirement for backup maintenance is generated by an "exceptional and temporary" event, i.e., surge conditions (extraordinarily high flying hour rate) or catastrophic event (high combat damage or severe maintenance personnel losses), etc. There is no way to accurately assess how frequently these "events" will occur, how long they will last, or how intense they will be. Because the work load associated with these events cannot be measured, it cannot be documented and cannot compete for resourcing. AVIM units must perform backup maintenance on an exception basis and at the expense of the AVIM mission.
- Displaced maintenance is the result of the AVUM unit being inadequately staffed to perform its doctrinal mission. While unresourced AVUM maintenance falls to the supporting AVIM as backup maintenance, it is not truly backup maintenance.
  - It is not generated by an "exceptional and temporary event."
  - It can be measured, documented, and consequently should be able to compete for resourcing.

AOE constraints are not "temporary" in nature. When AVIM units perform AVUM maintenance generated by inadequate AVUM staffing, it permanently displaces an equivalent amount of AVIM work load. The impact of this fact is not appreciated because the AOE personnel constrained L-series AVUM and AVIM TOES are able to accommodate the work load generated by peacetime flying hour rates. This will not be true with wartime flying hour rates.

CORPS HHD, AMB (AVIM) OPERATIONS

Mission

The mission of this HHD is to provide AVIM support to corps aviation assets by commanding and controlling assigned or attached aviation companies (AVIM). The HHD is organic to the aviation battalion (AVIM) of the corps and assigned or normally attached to the HHC, corps support command, or corps support group.

Employment

The HHD is deployed in the corps support area, normally near the aviation brigade HHC and one or more of the subordinate AVIM companies. It provides command and control staff supervision of aviation and aviation-related repair activities. The staff elements of the battalion ensure the capability to plan for and implement all aspects of the battalion commander's tactical plan. The maintenance and supply operations element ensures the timely execution of the logistics support plan developed by the commander and input to the COSCOM logistical support plan. Other elements of the detachment provide the nucleus for establishing the battalion wire and communications nets and perform unit maintenance for organic equipment.

The battalion commander is assisted by the staff in executing the mission. The staff officers acquire,

analyze, and coordinate information and present essential elements to the commander. Upon the commander's approval, this information is used to develop detailed operational plans for the battalion. The technical aspects of the mission are controlled and directed by the maintenance and supply operations section. The personnel in this section, in close coordination with the aviation maintenance company commanders and the personnel of the COSCOM HHC and MMC aircraft materiel management element, develop the logistical support plan by a method similar to that used for the tactical plan. The battalion commander is responsible to the COSCOM/CSG commander for the adequacy and timeliness of the aviation maintenance mission. He uses these inputs to best accomplish the tactical and technical missions of the battalion. These plans will normally be based upon a habitual support relationship between the supporting and supported units.

Mobility

The doctrinal mobility goal for the corps HHD, AMB (AVIM) is 100 percent mobility with the capability of transporting 50 percent of the unit in one lift using organic vehicles. This unit is normally located in the COSCOM support area. It has a requirement to move once every 8 to 17 days.

ECHELONS ABOVE CORPS AMCO (AVIM) OPERATIONS (TAACOM)

Mission

The purpose of the EAC AMCO is to provide–

- AVIM and backup AVUM support to EAC assigned aircraft.
- Aviation repair parts supply support to EAC aviation units including aircraft armament and avionics.
- Selected repair parts RX support for corps AVIM units.

It provides AVIM overflow maintenance support to corps assigned or under the operational control of the theater to which assigned. It also establishes and operates an aircraft RX repair parts supply program.

Employment

Two EAC AMCOs are assigned to an aviation maintenance battalion (AVIM), which is organic to a theater area support group of the TAACOM. The EAC AMCO is employed in the theater support area. More specifically, it would be part of an area support group, TAACOM, and be located in the vicinity of an instrumented landing facility. This depends on METT-T. The remainder of the employment is basically the same as described for the divisional and corps AMCOs.

Aircraft Recovery

See AVIM functions, this chapter.

Aircraft Repair Parts

See discussion of aircraft repair parts under Divisional AMCO (AVIM) Operations above.

Mobility

The doctrinal mobility goal for the EAC AMCO is 100 percent mobility with the capability of transporting 50 percent of its unit in one lift using organic vehicles. The commander must determine which external transportation assets must be requested to move the remainder of the unit. The EAC AMCO is normally located in the theater area support group. It is expected to move at least once every 30 days.

ECHELONS ABOVE CORPS HHD, AMB (AVIM) OPERATIONS (TAACOM)

Mission

The mission of this HHD is to provide command and control for assigned or attached aviation maintenance companies (AVIM). It is organic to the EAC aviation maintenance battalion (AVIM) and assigned or normally attached to the HHC, theater area support group.

Employment

(See Corps HHD, AMB [AVIM] Operations Employment, this chapter.) The major difference between EAC operations and the HHD, AMB (AVIM) is that the HHD is employed in the theater support area, and the battalion commander is responsible to the area support group commander for the adequacy and timeliness of the aviation maintenance mission.

Mobility

The doctrinal mobility goal for the EAC HHC, AMB (AVIM) is 100 percent mobile with the capability to transport 50 percent of the unit in one lift using organic vehicles. It will probably move at least once every 30 days.

AVIATION DEPOT MAINTENANCE ROUND-OUT UNIT (ADMRU) PROGRAM

Mission

The mobilization mission of the ADMRU program and CONUS-based AVCRADs is–

- To support deploying FORSCOM aviation Units.
- To expand the mobilization capability of the CONUS-based aviation depot system.
- To provide OCONUS capability for Army aviation depot maintenance in contingency operations.
- To identify and classify aviation depot receipts and stocks in storage.

Employment

Upon mobilization, the ADMRU program rounds out the Industrial Operations Command (IOC) in AMC with the mobilization AVCRAD control element (MACE) and four aviation classification repair activity depot (AVCRAD) units. The four AVCRADs located in Connecticut, Missouri, Mississippi, and California mobilize in place, initially providing backup AVIM and limited depot support to the deploying FORSCOM aviation units within CONUS. As required, they shift to fully expand the IOC aviation capability in order to provide depot-level maintenance on critical aviation materiel for AMC.

When necessary, the readiness division (RD) of the logistics support element (I-SE), composed of elements of both the MACE and the AVCRADs, can be deployed to a theater of operation to provide depot-level aviation maintenance.

When the LSE deploys CONUS, the ADMRU element of the RD operates the theater aviation maintenance program. As aviation materiel is retrograded from the battle, the LSE classifies and repairs critical aviation commponents before they enter the CONUS depot pipeline.

Mobility

The AVCRADs are fixed-base, CONUS-depot facilities that mobilize in place. The ADMRU element of the LSE mobilizes and deploys a tailored contingent of soldiers and equipment to staff and operate one or more in-theater aviation maintenance facilities. Once mobilized and deployed, the LSE provides support from a fixed base. From this deployed facility, the LSE would project limited task-organized support forward through the use of classification and maintenance support teams. Long air transportation within the theater is provided by ADMRU organic C-23 freed-wing assets.

AVIATION DEPOT MAINTENANCE

Mission

The mission of the Corpus Christi Army Depot (CCAD) is-

- To overhaul, repair, modify, retrofit, and modernize aircraft systems and other systems as assigned.
- To maintain a mobilization and training base to provide capability for mission support during any contingency.
- To receive, store, inventory, preserve, package, issue, and ship depot and mission supplies associated with the total CCAD aeronautical depot maintenance mission.
- To provide maintenance support services for aeronautical equipment worldwide.
- To provide project development and design service for special projects as assigned.
- To exercise command control over assigned activities.
- To provide worldwide telephone hot line and on-site technical assistance in the inspection, maintenance, and repair of customer aircraft and engines.
- To provide integrated logistic support for aeronautical weapons systems through development and maintenance of technical publications.

Employment

Depot maintenance is employed primarily in CONUS. However, it projects itself worldwide through maintenance support teams using organic assets, through contract programs, and through the ADMRU program.

Mobility

The depot is a freed-base facility but can project itself as described above.

THEATER AVIATION MAINTENANCE PROGRAM (TAMP)

Under the Army Materiel Command (AMC), two major subordinate commands, Aviation Troop Command (ATCOM) and the Depot Systems Command (DESCOM), developed the Theater Aviation Maintenance Program (TAMP) to accomplish the following missions:

- Assist units in development and redeployment.
- Provide technical assistance.
- Support increased operational tempo.
- Sustain Army aviation across the entire spectrum of operations.

The TAMP as an organization has many assets which include, but are not limited to, the Aviation Depot Maintenance Round-Out Unit (ADMRU) Program, which includes the National Guard mobilization AVCRAD control element forward (MACE-FWD) and the LSD, contract field service representatives, logistics assistance representatives, special repair activities, contractor logistics support, engine repair facility, and a TA national inventory control point. These are all placed in the theater's area of operation.

CHAPTER 3

COMMAND, CONTROL, AND COMMUNICATIONS

Aviation elements can fight and operate like other maneuver elements. In most cases, they will be required to operate with their forces spread laterally and in depth throughout the battlefield. Communications requirements will exceed 300 kilometers in some theaters of operations and will encompass secure voice and data transmissions. Therefore, aviation commanders and aviation maintenance commanders and their staffs must focus on detailed planning to employ and sustain aviation units. Planning and supporting elements will need to identify current and future operations in order to coordinate maneuver and support.

COMMAND AND CONTROL (C^2)

Command and control links the efforts of all subordinate units, from the forward deployed fighting units to the rear areas or, in some cases, CONUS via TACSAT-COM, The C^2 system relays the commander's intent and tactical guidance to fighting and supporting forces. To achieve the intended goal, there must be unity of effort. There must also be continuity and division of work. At any level of command, the C^2 system provides the commander with the structure and means to make and convey decisions and to evaluate them continuously. Those decisions and the higher-level intent must then be translated into productive action. For aviation personnel to carry out their own decision-making cycle, decisions at division and corps level must be made fast enough to keep ahead of the battle. Planning, conducting, and sustaining the fight is critical to effective performance of aviation maintenance. These functions are interrelated, equally important, and cyclical.

STANDING OPERATING PROCEDURES (SOP)

Requirements for establishing, recording, displaying, coordinating, and exchanging information throughout aviation units must be detailed in SOPs. Staffs should tailor their requirements to reduce the collecting and processing of extraneous data. Automated information management systems will make these tasks easier for the commander.

PLANNING

A staff that is trained to plan and execute combat operations is critical to successful sustainment of aviation assets. To accomplish the mission, the staff plans operations for all air and ground assets. Planning addresses corps and division requirements and contingency plans and concerns specified by the aviation commander.

When possible, each successive level of command should have adequate time to digest the plans of higher headquarters and then to complete its own plans. Planning is a continuous process that includes such details as unit status, enemy locations, and a report-by-exception measure of combat power.

Frequent personal contact among the commander, staff, and liaison personnel is essential to coordinate and produce plans and orders. Four primary results of a sound plan are–

- Synchronized resources and minimized risks.
- Understanding of the intent by subordinate units, who can visualize what to do in the absence of instruction.
- A unified effort due to clear statements of the mission, commander's intent, and concept of operation.
- A plan that can be accomplished even under extremely stressful situations because it is sufficiently detailed, yet simple.

AVIATION BRIGADE/BATTALION STAFF

The aviation brigade/battalion staff is composed basically like any other brigade/battalion with personnel specifically ordered or detailed to assist the commander in the exercise of command. Figure 3-1 shows the staff structure, which consists of personal, Coordinating, and special staffs (the special staff applies primarily to the brigade). Staff member skills and roles are detailed in FM 101-5. Key functions of S3 and S4 sections are briefly discussed below. The

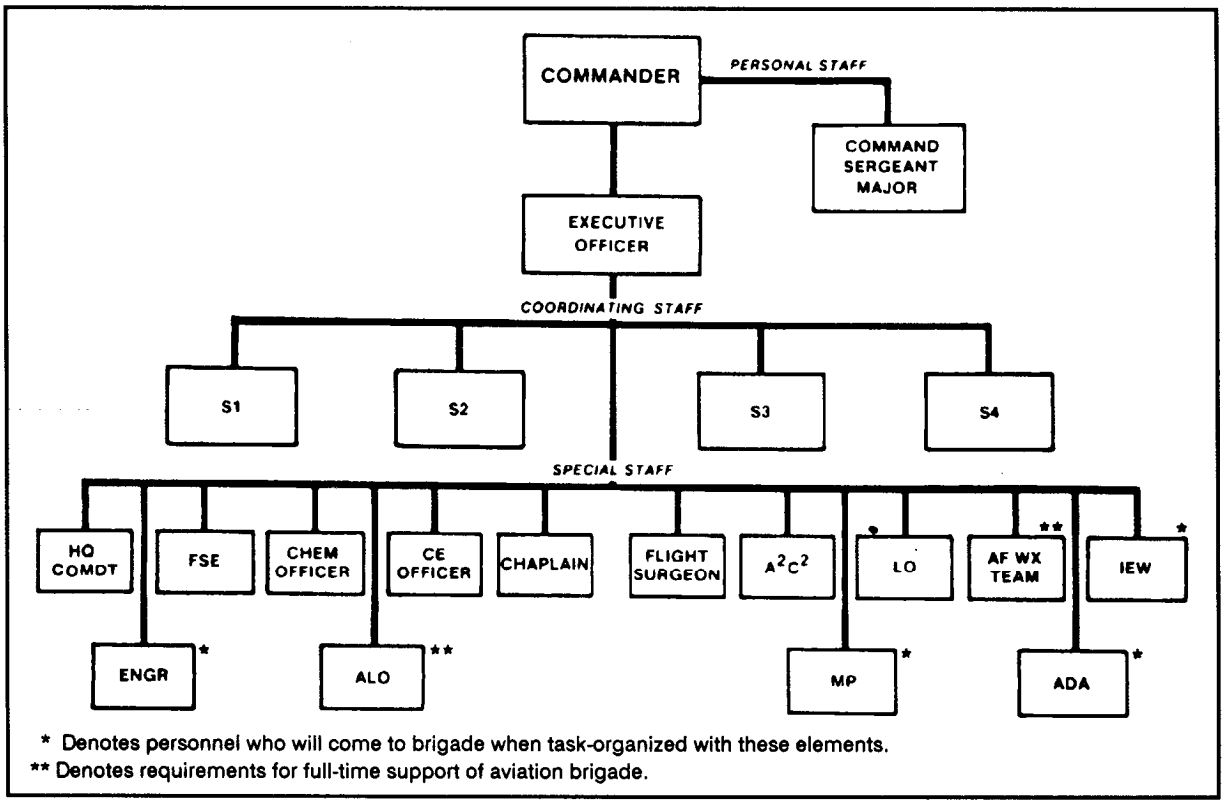


Figure 3-1. Aviation brigade/battalion staff structure

coordination between these sections is critical to aviation maintenance operations.

S3 Section

The S3 section is the commander's principal section for matters that pertain to organizing employing, training, and operating brigade/battalion and supporting elements. It locates in the brigade/battalion tactical CP (command post) and assists the commander in fighting the ongoing battle. When not deployed forward, the S3 serves as the officer-in-charge of the tactical CP. He supervises the tactical CP to control the battle and provide the commander with combat-critical information. The NBC and CE officers normally work directly for the S3. The S3 must maintain close coordination with the S4 to keep abreast of the CSS status. The S3 ensures his personnel are trained, and his equipment is maintained to support the brigade executive officer (XO) in the tactical operations center (TOC). The S3 will–

- Integrate fire support.
- Establish communications priorities.
- Maintain the troops list (FM 101-5).
- Monitor and control tactical operations.
- Coordinate and supervise operations security (OPSEC) (FM 63-l).
- Plan and supervise EW activities (FM 34-10).
- Develop and supervise training programs (FM 101-5).
- Plan and supervise psychological operations (FM 63-l).
- Develop and supervise deception requirements (FM 34-10).
- Predict fallout from nuclear weapons (FM 3-3).
- Select the general location for the TOC or command post.
- Prepare the tactical movement plan and supervise movements.
- Coordinate and supervise the rear operations area (FM 90-14).
- Prepare operation estimates (FM 101-5, Chapter 5, and Appendix E).

- Coordinate unit replacements, attachments, or detachments (FM 101-5).
- Coordinate and control civil-military operations (FM 41-10 and FM 101-5, Appendix A).
- Coordinate and publish OPLANs, OPORDs, and FRAGOs (FM 101-5, Chapters 6 and 7, and Appendix G).
- Advise the commander on combat and combat support matters and on organization and training (FM 101-5).

S4 Section

The S4 section must thoroughly understand the commander's intent and initiate timely actions to support that intent. The brigade/battalion S4 section provides the commander with information on all logistical matters. It coordinates with the battalion S4s and unit aircraft maintenance officers about the status of equipment and supplies, particularly Classes I, III, V, and IX, and the capabilities of the trains. The S4 is responsible for operating the train elements and the rear CP and for directing their displacement. The S4 works in the main support area and, in conjunction with the S1, runs the general-purpose net. The division aviation brigade S4 coordinates support with the main support battalion S4 or the DISCOM support operations officer. The corps aviation brigade S4 coordinates support with the support operations officer of the corps support group or the support operations officer of the corps support battalion operating in the division area. The S4 will–

- Plan support services.
- Maintain supply status.
- Plan supply requirements.
- Recommend main supply route.
- Plan and control administrative moves.
- Maintain maintenance status (FM 29-12).
- Plan maintenance requirements (FM 63-3).
- Plan transportation requirements (FM 63-3).
- Prepare logistics estimate (FM 101-5, Appendix E).
- Determine civilian labor requirements for logistical support (FM 101-5).
- Collect and dispose of excess property, salvage, and captured material (FM 101-5).
- Prepare logistical orders, plans, annexes, and paragraph 4 of OPORDs or OPLANs (FM 101-5, Chapters 6 and 7, and Appendix G).

Command Posts

Aviation logisticians must know the organization and structure of aviation command posts, especially the rear command post. Figure 3-2 shows a typical command and control network for the aviation brigade. The network will be modified to meet the situation. The brigade rear CP coordinates the combat service support required to sustain the brigade. It may be located within the corps/division support area or at a separate location in the rear area of the corps/division area of operation (AO).

The brigade/battalion XO controls the operations of the rear area. The S4 maintains continuous contact with the assistant S4 in the main CP to coordinate required support. It also coordinates extensively with the support commands, BNCs, AMCO/AMB, and personnel services for their respective functions. The S4 is also responsible for the security of rear area units of the aviation brigade/battalion and will ensure they are integrated into the base clusters of the corps/division support areas for mutual security. Refer to Figure 3-2 for a typical arrangement of the rear area.

RESPONSIBILITIES, FUNCTIONS, AND RELATIONSHIPS

The responsibilities, functions, and relationships of support commanders, their staffs, and subordinate commanders are discussed in general in the following paragraphs. More specific details are provided in appropriate chapters of this manual or in other doctrinal field manuals identified in this manual.

Support Commanders

Support commanders (DISCOMs, COSCOMs, TAACOMs) have both command and CSS responsibilities. In meeting these responsibilities, they will find it useful to view their duties from three perspectives. First, they must look forward at the units they support with a view toward improving that support; for example, the quality of AVIM and DS-level maintenance and their effect on the readiness of division units. Second, they must look within their command and become involved in standard command and administrative matters; for example,

troop morale, personnel management, unit supply, and similar functions. Third, they must look back at the higher echelon support provided to them by other support activities and ensure that appropriate interfaces exist between them and backup support units.

Support commanders command and control organic and attached units of their commands. They organize the movement and direct the deposition of subordinate units within the support areas in accordance with the current tactical plan. They must also direct and coordinate the location and displacement of lower-echelon units and elements (for example, the AMB and other AVIM units) employed in the forward areas. This duty requires coordination with the Gl, G3, G4, and aviation brigade commanders concerning current and proposed locations and movement of all support units.

Support commanders recommend priorities for air defense of CSS facilities. They coordinate and implement plans for assigned rear-battle officer responsibilities

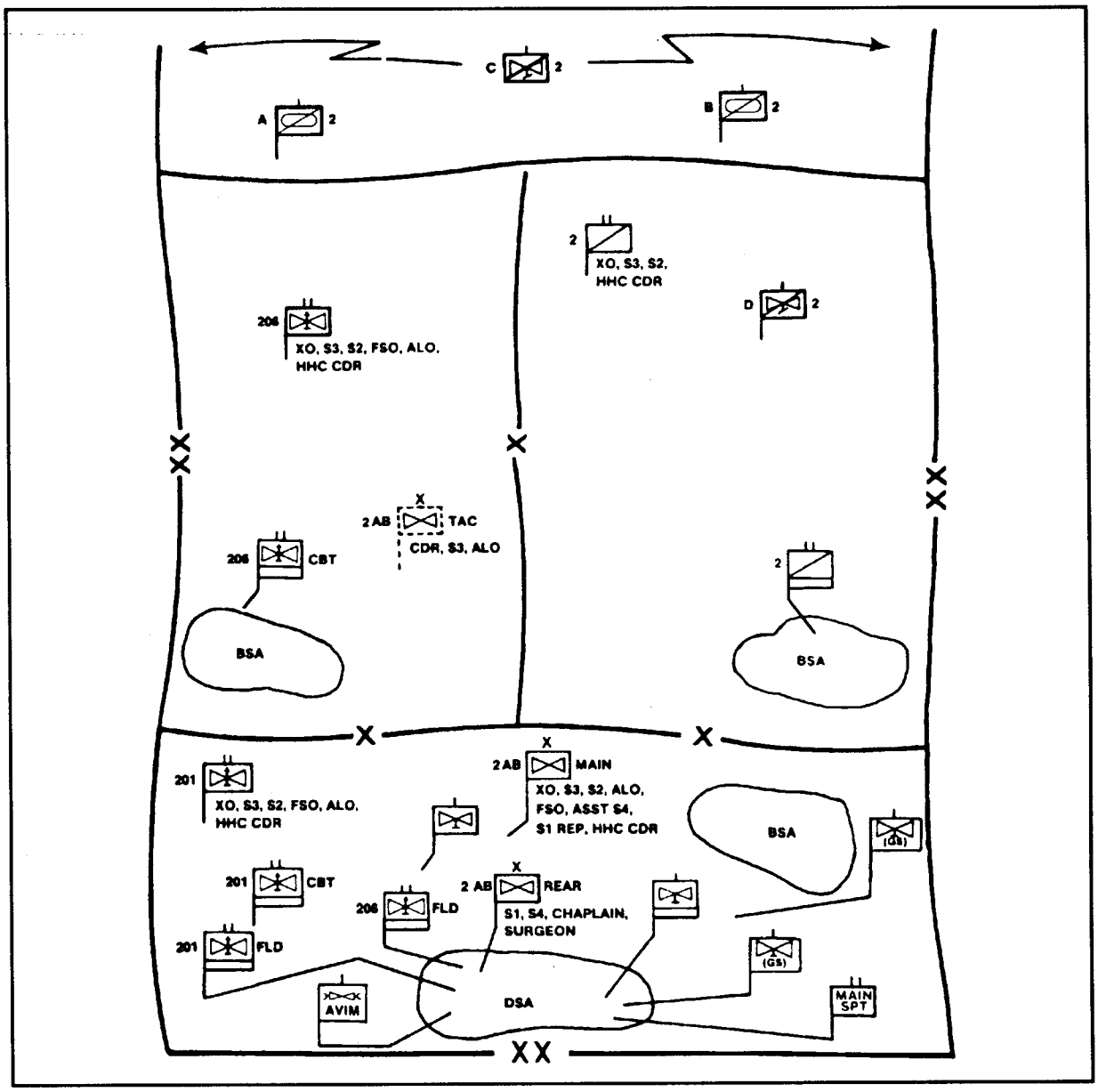


Figure 3-2. Typical command and control network for the aviation brigade

in the support areas. They also coordinate with the G1 support team and the G2 for threat data in proposed areas for CSS operations.

In fulfilling their CSS responsibilities, support commanders–

- Advise commanders and staffs concerning supply, maintenance, and services (less exceptions) and the conduct of these CSS functions throughout their echelon.
- Supervise and control logistics support operations of the echelon.
- Conduct inspections to determine the ability of the support commands and attached logistics units to function in the field.
- Ensure that in a NATO or allied environment, support command operations agree with all applicable STANAGs and HNS commitments.

Formal administrative and logistics orders normally are not issued at brigade and lower echelons. Support commanders furnish CSS information to the G1/G4 for inclusion in plans or orders. They publish instructions to their commands, using standard operation order or plan techniques. Matters that may be reduced to routine are included in SOPs.

Aviation Maintenance Battalion/Company Commander (AVIM)

The aviation maintenance battalion/company commander –

- Advises and assists the support commander and staff in AVIM matters.
- Assists the support commander with technical supervision of AVIM and training throughout the echelon.
- Advises and assists the support commander and staff in determining requirements for AVIM. AVIM material management is coordinated with the HHC/DMMC.
- Provides a liaison element to the support command staff when required.
- Represents, when directed or authorized, the support commander by providing advice and assistance to the echelon commander and staff on AVIM operations that the battalion/company is responsible for.

On routine matters, this officer maybe authorized to provide advice, information, and assistance to the G4. However, in cases having significant impact on the ability of the support commander to accomplish his mission, the support commander normally retains authority for approval before action. The battalion/company commander must inform the support commander of all commitments made.

See Appendix I for aviation maintenance commander's checklist.

RELATIONSHIP OF SUPPORT COMMANDS, AMCO/AMB, AND AB

While the AMCO/AMB provides AVIM support to the aviation brigade, it remains under the command of the support commander (Figure 3-3). It gives priority to AVIM support required by the AB. In this role the AMCO/AMB–

- Responds directly to AB AVIM work load requirements.
- Has the same zone of action as the AB, although its base of operations may not lie within it.
- Furnishes liaison to the AB and receives AVIM priorities from the AB.
- Establishes communications with the AB.
- Operates from positions within reasonable response time to the AB.
- Provides technical advice and assistance to the AB.

Support Commander and Aviation Brigade Commander

The AB commander and the support commander work together to ensure recognition of the brigade's logistics needs. One of the primary concerns of the support commander for the AB is aviation intermediate maintenance.

The support commander provides the AB commander with AVIM support through the AMCO/AMB (AVIM). This includes aircraft armament and avionics repair, aircraft repair parts supply, and aircraft recovery and evacuation. The AMCO/AMB (AVIM) also operates an aviation repairable exchange and maintains operational readiness floats for selected aviation items.

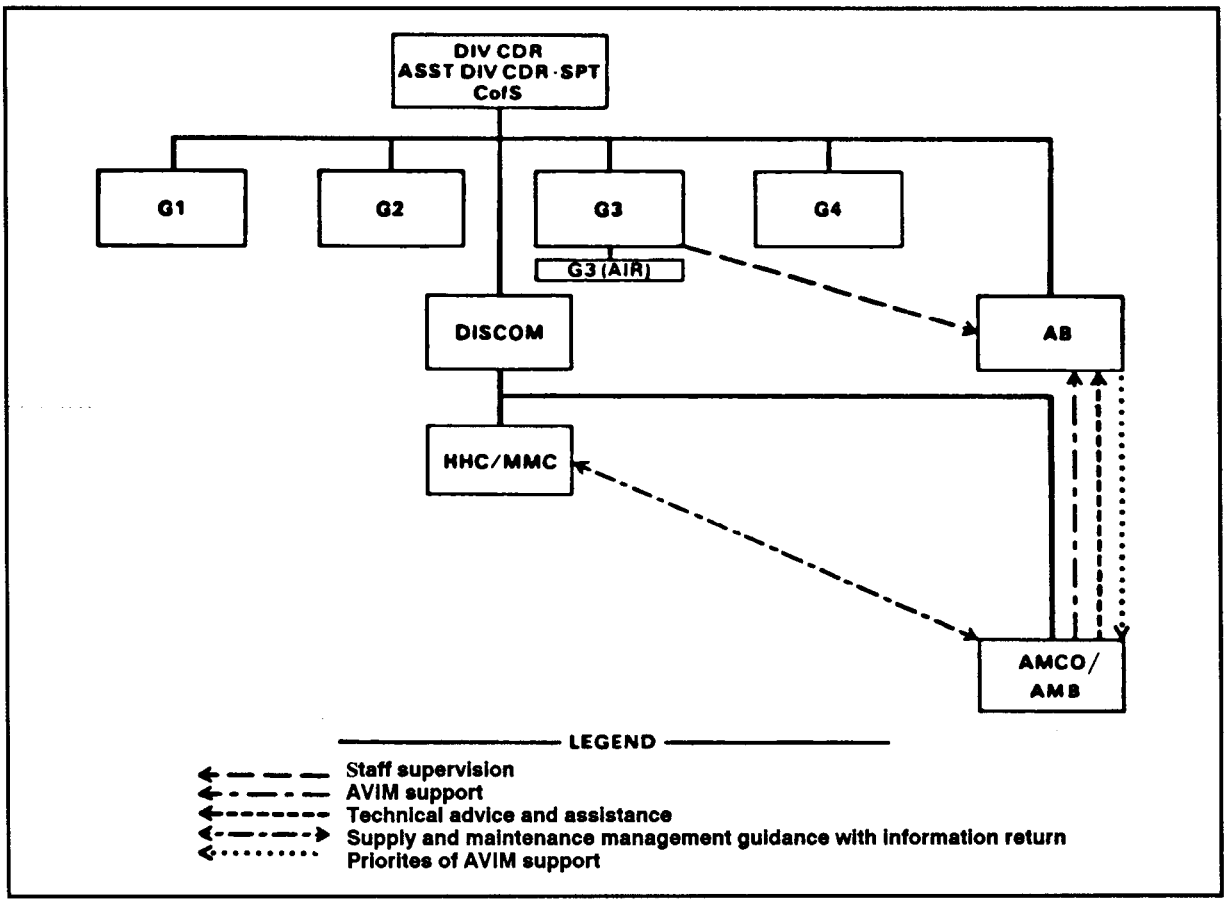


Figure 3-3. Support command, AMCO/AMB, AB relationships

The AB S4 is the principal staff officer for the AB commander in matters of aircraft maintenance. AMCO/AMB (AVIM) aviation maintenance technicians and production control officers routinely provide advice and assistance to the AB S4. As the aircraft maintenance planner, the AB S4 maintains close, continuous coordination with AMCO/AMB (AVIM) aviation maintenance technicians and production control officers.

The AB S4 is the focal point for planning and coordinating aircraft maintenance support for the AB within the AB commander priorities and allocation of support. The AMCO/AMB provides AVIM in accordance with priorities set by the AB commander.

The AB commander must ensure that the AB S4 works closely with support command's support operations for AVIM planning. The AB commander must also ensure that the AB S4 works closely with the support command S2/S3 (or equivalent) for the execution of AVIM support.

Technical advice and assistance are available to the AB S4 from the AMCO/AMB (AVIM) and support command staff to plan AB aircraft maintenance operations. Similarly, AVUM units can obtain technical advice and assistance from the AMCO/AMB (AVIM) to execute plans developed by the AB S4.

AB AVUM units have a day-to-day working relationship with the AMCO/AMB (AVIM). They routinely keep the AB S4 informed of their respective AVUM status. In this manner, the AB S4 always knows the aircraft maintenance posture of the AB.

The AB operational area includes the entire echelon. This means that the AB employs its aviation assets throughout the entire echelon sector. AB elements, therefore, require area support of logistics and medical functions while supporting the echelon scheme of maneuver. This area support

requires close coordination between the support command and the AB. For example, the division AB HHC and aviation companies receive their CSS support from the main support battalion (MSB) in the DSA, The attack battalion receives CSS from the MSB (DSA) or from a forward support battalion (FSB) in a nearby BSA. Its AVIM support comes from an AMCO normally located in the DSA. The cavalry squadron usually receives its support from the closest FSB. Its AVIM support comes from an AMCO normally located in the corps rear area or from MSTs tailored to meet its needs in the forward areas.

The AB executive officer or S4 usually coordinates with the support command S2/S3 (or equivalent) for the logistics support required,

When possible, the support command S2/S3 establishes an element to coordinate directly and consistently with the AB S4 to expedite CSS for the brigade. The most critical logistical functions for the AB are resupply of Classes III and V, aircraft maintenance, and aircraft recovery and evacuation.

COMMUNICATIONS

The mobility and flexibility of aviation units place increasing demands on reliable, timely, secure, and long-range communications. Radio is a primary means of communication for aviation assets. Other means include multichannel radio, satellite, messenger, wire, sound, and visual communications. Although all of these maybe used extensively in combat operations, they will normally complement radio or provide an alternate means of communication. Aviation units maintain both external communications with their echelon and internal communications with their subordinate units for command and control. External communication ranges may exceed 300 KM in some theaters of operations. Key communication nets for aviation, aviation maintenance, and supporting units are illustrated in Appendix J. Nets will vary with unit missions and tables of organization and equipment.

Nets

Effective, reliable communications are essential for commanders and their staffs to command and control their assets. Communications are composed of external nets and internal nets, including telephone systems.

External

Personnel with aviation logistics responsibilities and functions access the communications system through–

- Multichannel radio.
- Single-channel radio, including AM, FM, and RATT.
- NRI.
- Messenger.

Command/Operations FM

Commanders and operations personnel are required to monitor this FM net. The net is normally established first for tactical control and combat coordination. It is also used to report tactical data of immediate command and operational value.

Administrative/Logistics (ADMIN/LOG)

Logistics and administrative personnel monitor this FM net. This net should only be used for sending short messages because of the radio signature that is emitted. (Normally controlled by the s4.)

Intelligence FM

The G2s and S2s enter this FM net; it is controlled by the echelon G2. The net is used for passing intelligence data and as a backup for the command net.

Operations HF (Voice)

The S2s and S3s enter this HF (voice) net; it is controlled by the echelon G3. The net maybe interfaced with the echelon's multichannel system if the radio is changed to the NRI frequency. It provides long-range communications for critical operational information.

General-Purpose HF RATT

The S1s and S4s enter this HF RATT net. It is used for passing administrative and logistics information to the support commands.

Operations FM or IHFR

This net is used to pass orders and information to control rear operations. The net control station (NCS) of this net is the rear area operations center. This net structure will extend from existing nets below brigade level.

Internal

Radio

Internal radio nets are established and controlled by the parent element (battalion controls companies; company controls platoons). They meet command, control, and logistical requirements within the organization and its subordinate units.

Command/Operations FM

The S3 enters this FM net. The NCS is normally located at the main CP. This net is reserved for the commander and subordinate unit commanders who report directly to him.

Administrative/Logistics

The S1s, S4s, CEOs, and AMCOs enter this FM net. The net is used to exchange administrative or logistics requests with subordinate units.

Telephone

Aviation units also establish and control telephone nets. Wire communications allow internal communications with all sections of the company. Wire connection to the nearest tie-into the area common user system (multichannel) provides necessary communications from the AMCO to the DISCOM and AB switchboards.

ADP CONTINUITY-OF-OPERATIONS PLAN

Specific guidance for each functional computer system is in the user's manual for the system. These manuals require the development of continuity-of-operations plans (COOP). The developer of a COOP will usually consider –

- Threat and risk analysis. This analysis should identify and evaluate the major threats to the division's CSS computer systems. It should measure the risk the commander is prepared to accept for each threat. Action can then be taken to reduce the risk related to each threat. Continued ADP functions in emergency or wartime conditions are equal in importance to the supported users' roles.
- Work load priorities. Users should work together to determine the priority of the systems which the CSS computer system supports. This effort must recognize that under emergency conditions CSS computers might not be able to continue their usual level of support to all users.
- Also note that turnaround time will be longer and that user missions may change.
- Protection of files, programs, and documentation. There should beat least two copies of each major file, program, or procedure. If one is damaged or destroyed, the second can be used to continue the ADP functions. For best protection, the second copy should be stored at a separate location fairly close to its host computer. The storage site, however, should not be so close that it renders both sites vulnerable to the same threat. Procedures must be established to update the material stored at separate locations.
- Alternate-site operation. The use of compatible ADPE is usually the best backup solution, especially for long outages. The COOP should identify one or more alternate sites. First thought should be given to other CSS computers with similar equipment and missions. This will take advantage of similar equipment, software, and personnel skills. Selection of an alternate site depends on a number of factors. One factor is the compatibility of equipment with software. Another is the convenience of the potential site for the communication and transportation of inputs and outputs. Another factor is the vulnerability of the alternate site to the same threats as the supported site.

Once the COOP has been developed, it should be reviewed and updated at least annually. This review should include testing portions of the COOP. If possible, these tests should provide for actual movement to the alternate site and should test the use of backup materials. CSS computer systems should be moved periodically to ensure their mobile performance.

Regardless of the cause or duration of an ADP outage, continuity-of-operations procedures can lessen the impact of the outage and ensure that critical CSS functions are accomplished.

CHAPTER 4

MAINTENANCE MANAGEMENT

Army aviation gives battlefield commanders the ability to conduct combat operations wherever and whenever they choose to engage the enemy. The ability to land troops and supplies at pinpoint locations or to leapfrog all types of obstacles has been commonplace since the early 1960s–made possible by the vertical-lift helicopter. The right aviation assets are critical to the Army's ability to maintain battlefield mobility. Especially important are the maintenance and repair of highly complex aircraft. To ensure that vital assets remain ready to fight, a highly developed maintenance system has evolved from years of peacetime and combat operational experience. Experience has shown that an effective maintenance program must be operated by experienced managers who understand the complexities of the Army's aviation assets and the value of these assets to battlefield mobility.

Working in any type of aviation environment is challenging. Maintenance is certainly a requirement for all mechanical ground equipment, trucks, ground support equipment, and so forth, but there is a critical difference between maintaining equipment and maintaining aircraft. Disastrous results can occur from any failure of an aircraft system at a critical phase of flight. For rotary-wing aircraft with their many highly balanced, moving, and rotating parts, maintenance requirements are even more intense. Therefore, the challenge for the aviation maintenance manager is to ensure that the maintenance program provides the assets the commander needs, without compromising established safe maintenance standards. The key to the manager's success is to consistently make the right decisions that will result in successful mission accomplishment.

OBJECTIVES

The primary objective of Army aviation maintenance is to provide safe, mission-capable aircraft to satisfy all mission requirements. In time of war, Army aviation missions primarily involve combat and combat support. In peacetime, the primary mission is training for combat. In many instances, peacetime training requirements for aircraft are almost as stringent as wartime combat requirements. The maintenance manager must realize the significance of aircraft availability if the unit is to accomplish its mission in both war and peace.

Attaining the maintenance objective becomes much more challenging when resources are limited. This creates a secondary objective of making aircraft available in an economical and timely manner using available resources.

CONCEPTS

A maintenance concept is a general expression of intent; for instance, how to maintain and support the weapons system. Concepts provide overall guidance while policies provide specific guidance. Examples of aviation maintenance concepts follow:

- Each commander is responsible for the maintenance of equipment issued to the unit.
- Maintenance proceeds according to maintenance allocation charts (MAC) and technical manuals published at the lowest level consistent with the tactical situation, skill, time, repair parts, tools, and test equipment authorized or available.
- Repairs are made on site, whenever possible.
- Unserviceable material beyond the maintenance authority or capability of a unit is promptly reported or delivered to the next higher maintenance level.
- All authorized maintenance within the capability of an organization is done, if possible, before evacuation of economically repairable items to the next higher maintenance level. When required, higher levels perform the maintenance of lower levels (displaced and pass-back maintenance).
- Controlled exchange is used as a last resort to obtain repair parts and assemblies to support maintenance of equipment. Controlled exchange is taking serviceable parts from one unserviceable repairable end item to put on another unserviceable repairable end item in order to return the gaining end item to serviceable condition.

- Repairs are made under the on-condition maintenance (OCM) concept at all categories of maintenance: AVIM and depot maintenance return an item to the user or to the supply system according to maintenance standards established for each item of equipment.
- Quality maintenance depends on preventive maintenance services and inspections.
- Aircraft maintenance inspections are oriented to the early detection of faults affecting safety of flight. All levels will make maximum use of test equipment for diagnostic testing and fault isolation.
- Operator (crew chief) maintenance is constantly emphasized throughout the chain of command because it is key to the operational readiness of Army aircraft.
- Work will be completed by the smallest possible number of personnel.
- Maintenance managers should establish standard procedures for doing jobs. As a result, soldiers will need to consult supervisors only in unusual situations.
- Time standards are determined by averaging the amount of time required to perform identical tasks. Time standards should be reviewed regularly and revised as needed.

POLICIES

TM 1-1500-328-23 and DA Pam 738-751 contain specific maintenance policies that apply to all Army aircraft. Aviation maintenance managers at all levels should know and understand these policies.

METHODS OF PERFORMING MAINTENANCE

Crew Chief

This is the primary method of performing maintenance on Army aircraft. It is accomplished by a crew chief assigned to the aircraft, who becomes the primary maintenance person for that aircraft. If the aircraft should require extensive maintenance, the crew chief will request and receive assistance from AVUM maintenance personnel.

Dock

This method is for aircraft undergoing extensive repairs or lengthy inspections. It uses a fixed maintenance dock or bay. The dock could be a location in a hangar or shop, a parking spot on the flight line, or any prearranged location. The aircraft normally remains in the maintenance dock until all maintenance is complete. Maintenance crews or teams rotate to and from the aircraft. The dock method is normally used at AVUM units, AVIM units, and depots.

Production Line

This method is routinely used for aircraft undergoing extensive modifications or complete overhaul such as at an Army depot or contractor facility. It is similar to an automobile production line, except that the aircraft or components can be disassembled or assembled using this system. Examples of the production line method can be seen at any airline overhaul facility. The basic characteristic of this method is that the aircraft moves through the disassembly or assembly area as maintenance crews or teams perform their respective tasks at a freed location.

MAINTENANCE MANAGEMENT FUNCTIONS

Production Control

The PC section manages the aircraft maintenance and supply functions of the aviation unit. The organization of PC sections varies depending on the number and type of aircraft assigned to the unit; whether the unit's level of maintenance is AVUM, AVIM, or depot; the unit's mission; the space available; the terrain; and the environment. A typical production control section will–

- Act as single point of contact for supported units.
- Monitor and maintain records of daily flying hours and condition of assigned aircraft.
- Inform the commander of the status and availability of the aircraft and of the flying hours available.
- Schedule aircraft, in coordination with the flight companies/platoons, to meet mission and training requirements.
- Monitor the progress of work in the various maintenance sections to ensure a balanced work load.
- Prepare and submit status reports of maintenance in progress to the commander and higher headquarters.
- Coordinate and schedule requirements with the next higher level of maintenance for all work beyond the unit's capability.

- Coordinate work input to the maintenance sections.
- Coordinate activities of the quality control elements.
- Monitor management of the aircraft PLL.
- Monitor the operation and maintenance of power generation and ground support equipment.
- Monitor aircraft time-change component schedule to ensure replacement components are ordered in accord with flying-hour requirements.
- Supervise the controlled exchange program (Note: The commander or his designated representatives are the only individuals authorized to approve controlled exchanges). All controlled exchange actions must be documented on DA Form 1352 (Army Aircraft Inventory, Status, and Flying Time).
- Coordinate all test flights.
- Coordinate transportation for the aircraft recovery teams and aircraft to be recovered or evacuated.
- Maintain DA Form 2405 (Maintenance Request Register) and the in-process file.
- Maintain the production control board according to the unit's procedures. (See Appendix D for additional information on the production control board.)
- Supervise the cross training of personnel with aviation maintenance occupational skills. Aircraft repairers in one type of aircraft should be cross-trained in other types of aircraft whenever feasible.

Quality Control

Quality control activities complement those of production control. Quality control management is coordinated with all phases of production control management to ensure maximum productivity. Properly designed quality control procedures can ensure an acceptable level of quality while reducing inspection requirements and management efforts. However, quality control standards must never be sacrificed to increase production. To ensure complete objectivity, QC personnel are directly responsible to the unit commander.

The major functions and responsibilities of the quality control element are–

- To establish and maintain a complete technical reference library for assigned or supported aircraft and systems.
- To ensure all maintenance sections maintain a technical data familiarization chart for their section's maintenance personnel.
- To inspect the accuracy of equipment records required by DA Pam 738-751. This responsibility includes the proper use, preparation, and disposition of these records.
- To ensure full participation in the quality deficiency report (QDR) program.
- To monitor the application of modification work orders (MWO).
- To ensure compliance with the Army Oil Analysis Program (AOAP).
- To monitor and maintain the aircraft time-change component schedule and ensure that production control is given adequate notice (100 flight hours for time change, 2 months for calendar change) of upcoming component-change requirements.
- To review and update all shop standard inspection procedures files to incorporate new inspection techniques and to establish procedures for new equipment.
- To monitor and perform as necessary nondestructive inspections of aircraft components and airframe structural members as described in TM 55-1500-335-23.
- To establish and maintain calibration schedules for TMDE. (See Appendix K.)
- To perform required technical inspections of aircraft, components, and related systems.
- To inspect all areas where aircraft maintenance is performed to ensure that maintenance operations are completed in a safe manner.

Technical inspection of aircraft maintenance assures adherence to the standards and practices established by applicable publications. Inspections ensure that all applicable technical requirements are followed. They also ensure that the maintenance shop is organized and performing quality work efficiently. Before performing an inspection, QC personnel will review

all the latest applicable reference material to make sure that the inspection meets current requirements. (See Chapter 8 for additional details.)

Aircraft Maintenance Elements

The aircraft maintenance elements of AVIM and AVUM units are responsible for unit-level maintenance of aircraft that is beyond the capability or responsibility of the crew chief.

Scheduled Maintenance

To effectively perform its mission, the aircraft maintenance section must perform the following scheduled maintenance tasks:

- Make scheduled phase maintenance inspections assisted by the crew chief and aircraft component repair section personnel.
- Comply with safety-of-flight or unit-level technical bulletins requiring onetime or recurring inspections of aircraft in coordination with the quality control element.
- Perform operator maintenance on GSE assigned to the section.

Unscheduled Maintenance

The aircraft maintenance section will often have to perform unscheduled maintenance. This requirement normally results from the replacement of a component; for example, the crew chief needs help with replacement of a flight control hydraulic cylinder. The crew chief or other personnel will handle the majority of unscheduled maintenance actions, as determined by the maintenance officer, in coordination with the appropriate company commander/platoon leader.

Deferred Maintenance

Minor faults noted during daily inspections that do not affect mission readiness or the safe operation of the aircraft maybe deferred until the next scheduled inspection. The more faults deferred, however, the more delays when the aircraft receives scheduled maintenance. Minor faults that qualify for deferred maintenance will be reentered from DA Form 2408-13-1 to DA Form 2408-14 only after a valid requisition document number or work order number has been received. The entries will be reentered back to DA Form 2408 -13-1 and signed off when corrected. To ensure flight safety, the following factors must be considered before classifying a deficiency for deferred maintenance:

- No flight safety faults are considered for deferred maintenance.
- Aircraft must be grounded for maintenance if there is a reasonable doubt about flight safety.
- A large number of deferred faults that do not present SOF problems on an individual basis may degrade aircraft reliability when considered collectively.

Other Duties

Aircraft maintenance element personnel may also provide–

- Maintenance support teams as required.
- Assistance in maintaining GSE.

Shop Section/Component Repair

The shop section/component repair element performs repair and preventive maintenance of aircraft components and structures that require a high degree of specialized technical skills. The general areas of responsibility include–

- Power plants.
- Airframe structures.
- Pneudraulics.
- Aviation electronics.
- Electrical systems.
- Armament systems.
- Power trains.

Power Plant Section

MOS 68B personnel in this section service and repair power plants. They-

- Remove, replace, service, prepare, preserve, clean, and store engine assemblies or components.
- Disassemble, repair, reassemble, adjust, and diagnostically test turbine engine systems, subsystems, and components according to directives, technical manuals, and safety procedures.

- Assist in troubleshooting engines and rigging engine controls.
- Perform limited maintenance operational checks.

Structural Repair Section

MOS 68G personnel in this section repair and maintain airframes. They-

- Apply overlay and flush patches on stressed aircraft skin.
- Remove and install mechanical-lock blind rivets, solid-shank rivets, lock-bolt rivets, nut plates, turn-lock fasteners, threaded-pin fasteners, other special-purpose fasteners, and rivets.
- Repair honeycomb structural panels such as floor panels, work decks, and avionics shelves.
- Mix and apply fiberglass materials.
- Make emergency and permanent repairs to transparent plastic windows and enclosures.
- Remove, repair, and replace aircraft pneumatic deicing boots.
- Perform structural and honeycomb repair of helicopter rotor blades.
- Replace and repair stringers, longerons, bulkheads, and beams according to directives, technical manuals, and safety procedures.
- Use common measuring tools, precision measuring gauges, and alignment fixtures to perform structural repairs.
- Mix and apply primers and paints to aircraft surfaces, to include the layout and painting of aircraft markings.
- Perform corrosion-control treatment on aircraft metals.
- Fabricate structural parts and forming blocks, and shape metal using stretching shrinking, and other metal-forming techniques.

Pneudraulic Section

MOS 68H personnel in this section maintain, repair, and troubleshoot pneudraulic systems. They–

- Disassemble, repair, reassemble, install, adjust, and test hydraulic systems, subsystems, and components according to directives, technical manuals, and safety procedures.
- Flush and bleed pneudraulic systems.
- Fabricate tubes and hoses.
- Diagnose, localize, and troubleshoot malfunctions to a specific pneudraulic system, subsystem, or component.

Avionics Section

MOS 68L, N, P, Q, and R personnel in this section service and maintain avionic systems. They–

- Make operational checks and adjust avionic equipment.
- Troubleshoot equipment to localize, diagnose, and replace malfunctioning components.
- Exchange readily replaceable components and make minor repairs and adjustments.
- Replace fuses, indicator lamps, microphones, headsets, antennas, impedance pads, cords, cables, and relays.
- Trace aircraft wiring harness to make repairs as required.
- Adjust receivers, transmitters, intercommunications system (ICS), and antennas.
- Use portable and shop equipment for installation, radio-frequency power output measurements, alignment, and adjustment.

Electrical Section

MOS 68F personnel in this section maintain, repair, and troubleshoot aircraft electrical systems. They-

- Diagnose, localize, and troubleshoot malfunctions to specific electrical and electronic components, including solid-state and transistorized subsystems.
- Repair aircraft instrument systems.
- Apply principles of electricity, electronics, hydrostatic motion, pneumatics, and hydraulics applicable to repairing aircraft instrument systems.
- Clean, preserve, and store electrical and electronic components and aircraft instruments.
- Remove, install, service, repair, and troubleshoot nickel-cadmium batteries.

Armament Section

MOS 68J personnel in this section maintain and service armament systems. They—

- Ensure that weapons are rendered safe.
- Remove, install, disassemble, and assemble fire-control system electrical and electronic components and subsystems according to technical manuals, directives, and safety procedures.
- Set up boresighting procedures for aircraft fire-control systems.
- Perform maintenance on fire-control units, including alignment of weapons with associated sighting elements, electronic or mechanical devices.
- Perform authorized modifications to fire control and supporting systems.
- Check, remove, disassemble, repair, assemble, install, service, test, and adjust tire-control electrical and electronic systems and supporting armament components.
- Troubleshoot, isolate, and correct malfunctions in aircraft armament electrical and electronic components.
- Test, troubleshoot, and repair system-peculiar test sets and diagnostic equipment.
- Remove, disassemble, repair, assemble, install, test, and adjust mechanical, electrical, and hydraulic components of weapons systems according to directives, technical manuals, and safety procedures.
- Perform maintenance and authorized modifications on aircraft weapons components, including mechanical boresighting and alignment.
- Perform cleaning, servicing, ammunition loading and unloading, and weapons subsystems configuration changes.
- Set up boresighting procedures for aircraft weapon systems.
- Perform operational checks, including built-in tests on aircraft weapon systems.
- Troubleshoot weapon systems for mechanical, electrical, and hydraulic functions using system test sets and equipment.

Power Train Section

MOS (68D personnel in this section repair and maintain power train and rotor systems. They–

- Remove and replace power train quills, transmissions adapting parts, and rotary-wing hub oil tanks.
- Disassemble friction dampers and hanger assemblies.
- Disassemble, repair, reassemble, and adjust power train components, systems, and subsystems according to technical manuals, directives, and safety procedures.
- Apply corrosion preventive procedures.
- Clean, preserve, and store power train components.
- Disassemble, repair, reassemble, balance, and align main and tail rotor hub assemblies.
- Perform nondestructive inspections on aircraft components and related items.

AVUM OPERATIONS

Any Army aviation unit authorized to perform unit maintenance is responsible for keeping its aircraft mission-capable. Such maintenance is usually done by the aircraft crew chief, with the assistance of the AVUM company's or platoon's aircraft maintenance, armament, aviation electronics, and aircraft component repair sections.

Preventive Maintenance

Preventive maintenance is the first priority of AVUM units. The prime mission will be replacing parts and assemblies and making minor repairs, as authorized by the pertinent MAC. To attain high aircraft availability, all aviation logisticians should ensure that aircraft not flying are undergoing maintenance. They also ensure that—

- When the aircraft is shut down, it is serviced immediately for fuel and oil.
- Maintenance personnel diagnose a suspected problem before the crew shuts down. This will save numerous man-hours.
- A thorough postflight check or inspection is done by the pilot and crew chief according to the operator's manual (TM -10) and

operator's and crew member's checklist (TM -CL).

- The crew chief checks the pilot's remarks on DA Form 2408-13-1 for any faults found during flight and corrects them on the spot, if practicable.
- DA Form 2408-14 is checked for delayed faults that can be corrected during the available downtime.
- DA Form 2408-18 is checked for any inspections or services that are due.
- A technical supply check is conducted to determine the status of parts on request.

If DA Forms 2408-13-1,-2,-3, and 2408-14 contain no faults which can be corrected, the crew chief or repairer should use available time to visually inspect those parts of the aircraft likely to cause trouble. Faults are determined from aircraft maintenance manuals and experience based on a knowledge of the existing mission, terrain, and climatic conditions.

Careful inspection of the aircraft at every opportunity simplifies preventive maintenance. During downtime, the crew chief or repairer should determine when the next scheduled phase inspection is due. If it is due within two or three hours, portions of the inspection that do not require teardown of a component may be completed. The aircraft, however, should remain available for flight on short notice.

The crew chief must be completely familiar with aircraft technical manuals and with The Army Maintenance Management System-Aviation (TAMMS-A) as described in DA Pam 738-751. The crew chief's ability, knowledge, and maintenance efforts are vital to the ongoing, mission-capable performance of the aircraft.

TM 1-1500-328-23 prescribes the authorized inspection procedures for individuals and activities operating and maintaining Army aircraft. It describes each type of inspection and prescribes the intervals at which they will be performed. These intervals should not be exceeded. Under unusual conditions of environment, utilization, mission, and so forth, the maintenance officer may increase the scope or frequency of inspections. The maintenance officer is not authorized to increase the interval between inspections or to decrease their scope except under emergency conditions by authority of the commanding officer.

Maintenance Records

Operational units must properly use, prepare, and submit the forms identified in DA Pam 738-751. This is the key to the entire integrated Army maintenance management system. The commander and the maintenance officer use these forms to check operational status, trouble spots, equipment use, and performance.

Other maintenance forms used but not listed in DA Pam 738-751 are DA Forms 1352 and 1352-1 (Daily Aircraft Status Record). These forms provide information concerning inventory, assignment, status, and operational data on Army aircraft. AR 700-138 includes instructions for their use, preparation, and disposition.

Publication and Regulations

Technical publications provide guidance on use and operation of equipment and accessories. These publications include technical manuals, technical bulletins, lubrication orders, and MWOs. They have specific instructions on the operation, maintenance, repair, modification, serviceability standards, testing storage, issue, and inspection of equipment. The quality control section maintains a master reference library of these publications, which are listed in DA Pam 25-30. The 750 series of Army regulations governs maintenance of supplies and equipment. The quality control section should obtain and use those regulations that pertain to maintenance operations. DA Pam 25-30 lists all applicable regulations.

AVIM OPERATIONS

If the work load in an AVUM shop becomes greater than the unit can handle, the unit must request help. AVUM units ask for help from their supporting AVIM company. AVIM units are responsible for providing back-up maintenance and technical assistance on the proper procedures for performing preventive and unit maintenance during surge activity. The supported unit (AVUM) depends on the supporting unit (AVIM) for help as well as guidance in aviation maintenance matters.

Coordination

Close coordination between supported and supporting units will eliminate many problems and result in a smooth, well-organized maintenance operation.

Supported units can help make the maintenance operation easier by correctly preparing maintenance requests and completing all unit maintenance before moving equipment to the supporting maintenance activity. Another way to expedite maintenance and provide AVIM-level training for unit personnel is to let the assigned crew chief accompany the aircraft to the AVIM unit. The commanders of the supported unit and the supporting maintenance company should jointly determine requirements for maintenance and repair parts supply. They should establish a mutually acceptable schedule of equipment for turn-in to the supporting activity. If either commander foresees a possible deviation from the established plan, he should immediately inform the other so that necessary adjustments can be made. This procedure helps ensure that equipment is repaired and returned as fast as possible. It also enables–

- The supported unit commander to better plan and manage unit maintenance.
- The supporting unit commander to program and manage the support work load, anticipate repair parts requirements, and request assistance when needed.
- The supported unit commander to predict more accurately the availability of operational equipment over a sustained period.

Time Limitations

The extent of maintenance performed on specific items is often restricted by time limitations. Limitations are normally stated in number of days allowed to repair a certain item and are subject to fluctuation. Availability of repair parts and shop work loads are considerations in determining whether time limitations will be exceeded. Various headquarters may establish time repair limitations for their units based on local conditions and on TB 43-0002-3.

Man-Hours

Before an unserviceable item is repaired, maintenance man-hour repairability must be determined. The service life of the aircraft or component must be considered (how many hours left before rebuild). If repair man-hours exceed maintenance man-hour limitations, the unserviceable item is cannibalized (only ATCOM can authorize cannibalization) or disposed of, unless circumstances or local policy dictates otherwise. In some cases, the critical need for the item and the difficulty of replacing it may dictate repair, regardless of the man-hours required. Component service life is addressed in the overhaul and retirement schedule of the applicable aircraft maintenance manual.

The classification inspection should not be confused with the initial technical inspection. Classification inspections are not made when the material is obviously repairable. They are made when the preliminary diagnosis or the initial inspection indicates that the number of repair man-hours is likely to exceed repair limits.

Criteria have been established governing inspection and classification of material to determine man-hour maintenance requirements. Maintenance man-hour limitations are in TB 43-0002-3, in other technical bulletins developed by the federal supply classification (FSC) group for end items and selected repair parts and assemblies, and in pertinent supply bulletins dealing with repair and serviceability criteria. Maintenance standards are also in technical publications pertinent to the items of equipment involved. For additional details on man-hour determination and application of repair limits, refer to AR 750-1.

Shop Operations

The term maintenance shop in an AVIM company is all-inclusive. All company facilities used directly in controlling and maintaining aircraft are located in the maintenance shop. Platoons and sections in the shop are needed to operate GSE, maintain ORF equipment, repair unserviceable equipment, evaluate the quality of work performed, and administer, plan, and control the maintenance work load.

Operational Readiness Float (ORF) Aircraft

The purpose of having ORF aircraft is to replace unserviceable aircraft that cannot be readily repaired in response to the user's needs. If ORF aircraft are authorized the AMC will maintain them. They will be issued to MACOMs and maintained at corps- or division-level AVIM units. Specially equipped and special-mission aircraft will not be floated, but will be repaired for return to the user. ORF aircraft will be exchanged on an item-for-item basis within the basic mission, design, and series. Property accountability will be maintained per AR 710-2 and AR 750-1. All equipment not included on the aircraft BIIL is maintained by separate accountability. TOE weapons systems and COMSEC equipment will be removed before exchange.

The MACOM commander will establish criteria for providing an ORF aircraft to a unit. All aircraft involved in operational plans for which identical mission, design, and series exchanges are not available will not be exchanged for ORF aircraft; they will be repaired on a return-to-user basis.

Production Methods

In an AVIM shop, the production methods include bay shop or dock (job shop) and bench shop repair. The type of material to be repaired, the personnel, the facilities, and the time available determine the type of production method.

Bay shops or docks

This production method is used when various jobs are performed in the shop or when the item being repaired is difficult to move. In bay shop operations, the aircraft to be repaired remains in one shop location until the work is completed. The personnel and facilities needed to do the work move to the equipment. In a modified bay shop or dock operation, the equipment to be repaired is moved from one section to another at irregular intervals until the work is completed. Assemblies, components, and items of on-equipment material may be removed from an end item in a bay shop and sent to other shops, such as the electrical shop, for repair.

Bench shops

These shops are used for repairing small items whose repair requires high technical skills and items whose repair requires the use of equipment mounted in a shop or vehicle. Work performed at stands or benches under maintenance shelters or within shop vehicles is considered to be bench shop repair. Items repaired by this method include aircraft components and assemblies, instruments, fuel and electrical system components, electric motors, and communications-electronics items that must be repaired under controlled conditions.

Weight and Balance

The unit's weight and balance technician (on unit orders) is responsible for maintaining the aircraft's weight and balance records. Technical inspectors must coordinate with the technician any time maintenance performed on an aircraft could change its weight and balance. Refer to AR 95-3, TM 55-1500-342-23, the aircraft operator's manual, and the aircraft maintenance manual for information. Specific weight and balance data is contained in the -10 operator's manual for each aircraft. The unit's organic aircraft weighing equipment must be calibrated according to TM 55-1500-342-23 and TB 43-180.

SCHEDULED AIRCRAFT MAINTENANCE

Scheduled aircraft maintenance includes preventive maintenance checks and services (PMCS), which cover scheduled inspections, services, testing classification, and special scheduled inspections. (See TM 1-1500-328-23 for specific details on the preventive maintenance system.) The primary objective of performing maintenance on Army aircraft under the preventive maintenance system is to predict, prevent, detect, and correct maintenance problems before they happen.

AVUM units perform most scheduled inspections under the preventive maintenance system, although some are performed at the AVIM level. With these inspections equipment is systematically examined at predetermined intervals. The intervals are usually specified in aircraft flight hours.

Preventive Maintenance Periodic (PMP) Inspection System

This is a thorough inspection of items to detect failure or other faults. The removal of access plates, panels, and screens is required; partial disassembly of equipment may be necessary. The PMP includes all requirements prescribed for daily and intermediate inspections listed in the applicable aircraft periodic inspection checklist. All PMP inspections are done from a single PMP checklist and require looking at all of the same areas on every PMP inspection.

Phase Maintenance (PM) Inspection System

The PM inspection system resulted from a study performed in the early 1970s using a computer model and historical maintenance data accumulated on operational Army aircraft over a period of many years. The phase maintenance (PM) inspection system is the most utilized maintenance inspection system.

Each phase inspection is a part of a total phase cycle, and each phase maintenance inspection cycle is a major scheduled maintenance service. During each PM cycle, all parts and systems of the aircraft requiring evaluation are inspected at least once. When all numbered phase inspections are done, a cycle is completed and the sequence is repeated. Examples of phase maintenance inspection cycles are shown in

Figure 4-1. (See the applicable technical manual for current cycles.)

Planning

The AVUM production control officer determines which aircraft will be scheduled into phase next. He establishes a work flow based on known phase maintenance inspection tasks at about 30 flying hours in advance and identifies tasks requiring resources. This lead time may be longer or shorter depending on the flying hour program and combat operations. He must therefore develop an organized method for planning and conducting each phase and periodic maintenance inspection to ensure equipment readiness.

During stabilized operations, with programmed flying hours, the AVUM PC officer must determine how many phase and periodic inspections must be performed each year. To do this, he divides the unit's annual flying-hour program (FHP) for each specific type of aircraft assigned by the aircraft phases or periodic inspection interval. Example: UH-60 FHP = 6000. 6000 divided by 500 equals 12 periodic inspections. Without preplanning, simple tasks can delay availability. Six general reasons normally contribute to long phase maintenance inspection cycles–

- Deferred maintenance. AVUM units often postpone time-consuming minor repairs until phase. For example, they defer sheet metal repairs that are not critical to flight safety. While there is no hard, fast rule as to which deferred maintenance should be done during phase, work should be accomplished to make the best use of facilities and personnel.
- Nonrelated duties. Crew chiefs and repairers must maintain proficiency in common and collective soldier tasks.
- Fault detection. Inspection faults (corrosion, a crack in the airframe, worn parts, play in rod end bearings, and so forth) take time to repair or replace. If not discovered until the final inspection, they could cause unanticipated delays.
- Supply delays. Delay of requisitioned parts produces unwarranted supply delays and unacceptably low readiness levels.
- Scheduling. Problems of resource scheduling vary in kind and severity, depending on METT-T and the organizational setting. In some cases, just one key resource (an overhead hoist or a test set) may bottleneck a phase inspection. At the other extreme,

Type of Aircraft	Number of Phases Per Cycle	Time Between Phases (Flight Hours)	Total Time of Cycle
AH-1E/F/P/S	4	150	600
AH-64	4	250	1000
CH-47C/D	4	200	800
CH-54A/B	5	100	500
OH-58A/C	4	300	1200
OH-58D		PPD*	
UH-1H/V	6	150	900
UH-60A**	NA	500	NA

* OH-58D is on the Progressive Phase Maintenance (PPM) Inspection System.

** UH-60A is on an extended periodic inspection schedule.

Figure 4-1. Examples of phase maintenance inspection cycles

completing deferred maintenance may require many resources, most of which are available in freed, limited amounts. Scheduling activities so that resource availabilities are not exceeded and priorities are not violated is exceedingly difficult for most PM inspections.

- Resources. The AVUM PC officer should make advance arrangements for all required resources for the phase maintenance inspection. Such resources include MOS 67 or 68 repairers, facilities, components, and test and GSE. Items not on hand should be hand-receipted from the supporting AVIM unit as necessary, or prior arrangements should be made for concurrent AVUM support to perform phase maintenance inspection.

During combat operations, the unit commander has the option of completing a combat phase maintenance (CPM) inspection in lieu of a phase maintenance (PM) inspection. The combat phase maintenance inspection requirements are considered the minimum requirements to ensure continued safe combat operation. Under no circumstances will two combat phases be performed consecutively, and they will be performed IAW TM 1-1500-328-23.

Preparation

After prephase test flight is performed, the following must be done regardless of the maintenance level performing the test flight:

- Take component oil samples.
- Flush engine.
- Clear inside of the aircraft of passenger seats, books, and soundproofing.

The aircraft is now ready for phase inspection. The production control officer should have all necessary test and GSE available.

Coordination

Maintenance personnel must understand the commander's aircraft maintenance philosophy. They need to work together to have maximum aircraft availability.

Personnel

The general concept is for crew chiefs assigned to specific aircraft to perform daily servicing, daily inspections, and some remove-and-replace, on-aircraft repairs. An AVUM maintenance element within the organization does phase maintenance and other more time-consuming operator-level repairs. Normally the phase team leader is in charge of the repairers. There may be times, however, when the crew chief has the most experience and, depending on the circumstances, is the best person to take charge.

The size of each phase inspection team varies depending on the following

- Complexity of deferred maintenance.
- Time-change component replacement due.
- Equipment location.
- Facility availability.
- Tools and diagnostic equipment required.
- Special equipment package needs. (See Appendix G.)

Subsystems repair personnel must be scheduled for optimum use. During the phase maintenance inspection, MOS 68 repairers complete separate work requests. A technical inspector inspects repairs while work is in progress.

Work-Load Options

When a phase maintenance inspection falls behind, several options are available to help remedy the situation–

- Evaluate resources available (people, parts, tools, and time); adjust them accordingly.
- Seek help. The supporting AVIM company can augment unit maintenance personnel during surge activity. AVIM repairers can perform inspection, repair, and replacement operations at the AVUM location. Borrowing AVIM personnel to perform AVUM-level work, however, may cause a backlog of the AVIM work load.
- Reduce nonproductive time. Exempt phase team members from other duties during the inspection. Reduce maintenance distractors such as equipment shortages or insufficient publications.
- Reverse the work schedule to perform night maintenance.
- Reduce the mission load. Slow daily missions to allow time for corrective maintenance.

This is often done after major exercises involving extensive aircraft flying.

Perform a combat phase maintenance inspection during combat operations.

Initial Inspection (In-Processing)

Only those panels necessary to complete the inspection should be removed. The crew chief inspects the aircraft, using the current phase checklist, and enters all faults identified in the phase book. This process may take several hours to complete, after which fault correction begins. Panels are replaced after the inspection is completed. In the event of a discrepancy requiring repair or replacement, a technical inspection is required.

In-Progress Inspection

During the phase, work requiring technical inspections should be inspected following work completion.

Final Inspection

Once the phase is completed, a final inspection will be performed. This process can be lengthy. However, once the final inspection is complete, the logbook is closed out, historical records updated, and the aircraft made ready for a test flight. If possible, the same test pilot who performed the prephase test flight should perform the postphase test flight.

Progressive Phase Maintenance (PPM) Inspection System

Progressive phase maintenance is a scheduled maintenance system that consolidates and replaces daily, phase, and special inspections. Its purpose is to minimize inspection requirements for increased mission flexibility and aircraft availability. An automated aircraft maintenance management system complements the effectiveness of PPM.

Aircraft checklist inspection requirements are distributed into equalized checklist sections, which together constitute a complete PPM cycle. The inspection checklist must be accomplished at intervals of 20 flight hours. These intervals are computed from the beginning of the PPM cycle, not from the last inspection completed. Specifics of checklist use, completion, and disposition are in the applicable aircraft PPM technical manuals.

PREVENTIVE MAINTENANCE DAILY (PMD)/ PREVENTIVE MAINTENANCE SERVICES (PMS)

Preventive Maintenance Daily

The daily inspection ensures continuing safe operation of aircraft through visual and operational checks. The crew chief makes the inspection after the last flight of the mission day or before the first flight of the next mission day. Keeping aircraft in a fully mission-ready status is extremely important. To that end, the crew chief should make the inspection as soon as practicable after the flight crew makes its postflight inspection.

A daily inspection must be performed on aircraft that have not flown in a specified number of days. The number of days specified varies with different aircraft. The exact interval for such inspections is found in the applicable -23 technical manual.

The removal of cowling and inspection plates should be minimal. Disassembly of components is not recommended unless faults found during the inspection make it necessary. The daily inspection includes checking for obvious damage, security of equipment installation and mountings, leaks, compliance with lubrication requirements, completeness of equipment, equipment operation, and availability of current forms. Aircraft are not considered airworthy until this inspection is completed and noted on DA Form 2408-13-1.

Preventive Maintenance Services

This inspection is due when the specified number of flight hours or calendar days elapses. The complete requirements for this inspection are in the applicable aircraft PMS technical manual.

Scheduled Special Inspections

A scheduled special inspection occurs at a specific aircraft hour and/or calendar date. Items such as safety belts, first aid kits, weight and balance records, and aircraft inventories are included in this category. Also included are specific inspections on aircraft engines based solely on engine-operating time. These special inspections become due at the time or date specified in the applicable aircraft -23 technical manual. They are written up as due and signed off on DA Form 2408-13-1. After completion, DA Form 2408-18 in the individual aircraft logbook is updated with the next due time or date.

UNSCHEDULED AIRCRAFT MAINTENANCE

Unscheduled aircraft maintenance includes unscheduled special inspections and unforeseen work requirements.

Special Inspections

These inspections are required due to specific incidents such as hard landings, overspeeds, sudden stoppage, or safety of flight (SOF) messages. These special inspections are required by the aircraft -23 technical manual or by teletypewriter exchange (TWX) notification. Normally, these inspections ground an aircraft and must be performed before the next flight.

Unforeseen Work Requirements

These requirements are due to specific incidents or conditions such as in-flight system malfunctions, premature material failure, and additional or unexpected faults discovered during scheduled inspections. These requirements represent a major portion of the maintenance work load. When planning a maintenance task, the maintenance officer and production control personnel must realize that these requirements are difficult to control. Flexibility in response is the key to achieving unforeseen requirements effectively.

REPORTS AND ESTIMATES

Maintenance reports provide information for identifying readiness deficiencies, fixing those deficiencies, and sustaining readiness improvement. Performance estimates aid in planning to meet future maintenance requirements.

Scheduling Aircraft for Missions

A close working relationship between maintenance, operations personnel, and flight company commanders is essential to aviation units. Maintenance will furnish operations/flight company commanders with the tail numbers of mission-capable aircraft to be used each day to complete assigned missions, or the maintenance officer will give the flight company commander block times (hours) to be flown on assigned aircraft and let the commander assign tail number to missions. The PC officer, operations officer, and flight company commanders work together in resolving problems that arise in meeting daily mission requirements. Aircraft requiring BDAR may cause fluctuations in availability. However, frequent updating will help to smooth scheduling and ensure support of maneuver elements.

Local Unit Daily Aircraft Status Report

Functions

The unit daily aircraft status report is a locally designed and produced work sheet intended to serve several functions. First, the PC officer may use the form to determine daily work priorities by identifying aircraft on red-X status and with other critical requirements such as part shortages or time constraints. Second, PC personnel may use the report for information, together with the phase inspection flowchart, to provide aircraft for missions and to plan inspection schedules. In addition, the PC officer will use the report as a means of informing the unit commander and higher headquarters of aircraft status on a daily basis and as a summary source for completing DA Form 1352-1.

Preparation

Procedures for completing the unit daily aircraft status report vary from unit to unit. The key factor in making it a useful management tool is that the report contain only timely information needed for making decisions. See Figure 4-2 for a sample of a typical unit daily aircraft status report.

DAILY AIRCRAFT STATUS REPORT
12 NOV DATE 1ST PLATOON

TAIL NUMBER	TOTAL ACFT HRS	STAT	HRS TO SERVICES	HRS TO PHASE	REMARKS
001	2400	X	—	—	IN PHASE 46% COMPLETE
556	2140	/	15	140	
927	3200	/	17	117	
343	1870	⊗	14	114	REST FROM NIGHT FLT
195	2950	X	2	77	25 HR SERVICES IN PROGRESS, AM
888	2200	X	19	69	GRP SCALS LEAKING AWAITING TEST
901	2243	/	18	18	
737	2750	X	17	17	HOLE BOTTOM OF ACFT
283	2647	/	3	3	
872	1827	/	23	73	
					SAMPLE
008	1463	X	2	27	25 HR SERVICES IN PROGRESS, AM

Figure 4-2. Sample daily aircraft status

Aircraft Material Readiness

The general objective of aircraft readiness is to achieve a 75 percent fully mission-capable (FMC) goal at all times. There is, however, a wide divergence in complexity and logistic supportability of aircraft systems by mission, design, and series (MDS) and by priorities given to units. As a result, certain readiness goals are not prescribed at 75 percent FMC. As a general guide, partially mission-capable (PMC) time should not exceed 5 percent for any aircraft system. Commanders must make every effort to meet FMC goals shown in Table 3-3, AR 700-138.

Organizations and activities having responsibility for reporting aircraft will record daily aircraft status and flying time on DA Form 1352-1. At the end of the reporting period, totals on DA Form 1352-1 for assigned aircraft will be transferred to DA Form 1352. The monthly reporting period is from the 16th of each month through the 15th of the following month. Most units will forward completed DA Form 1352 through local command channels. Detailed procedures for preparing DA Forms 1352 and 1352-1 are in Chapter 4, AR 700-138.

Missile Material Readiness

Units owning tactical weapons systems, such as missiles, must record material condition status daily on these items to ensure maximum system readiness. Units will prepare DA Form 3266-2-R (Missile Material Condition Status Report Worksheet) for systems having not mission-capable time during each reporting period. The daily missile material condition status report work sheet is used–

- To track missile system availability on a daily basis.
- To prepare DA Form 3266-1 (Army Missile Material Readiness Report) at the end of the report period.

Per AR 220-1, DA Form 3266-1 and DA Form 1352 serve as the basis for calculating the equipment status (ES) and equipment readiness (ER) ratings reported for missile and aircraft systems on DA Form 2715-R (Unit Status Report). Detailed procedures for preparing missile status forms are in Chapter 4, AR 700-138.

Performance Estimates

The maintenance officer must be able to project unit man-hour availability to determine maintenance capability. To do this, he must make valid approximations based on past performance. By using the following tracking systems, programs, and computations, the maintenance officer can make sound estimates.

Unit Manpower

One of the most significant areas that unit maintenance managers at all levels face is use of manpower. Maintenance managers must devise a simple yet informative means of tracking unit manpower with minimum assistance. Figure 4-3 shows one way management personnel can track unit man-hours.

Flying-Hour Program

The Department of the Army has developed a worldwide flying-hour program for preparing budgets and planning aircraft logistical support.

Maintenance Man-Hour-to-Flight-Hour Ratio

In AR 570-2, the given number of direct man-hours required to support one hour of flying represents a worldwide average. To get an accurate number of required maintenance man-hours, each unit must compute its man-hour-to-flying-hour ratio by using the man-hours expended and hours flown by the unit. By dividing the total direct productive man-hours expended by the total hours flown (over the same period of time), each unit can determine its man-hour-to-flight-hour ratio. The figure for hours flown can be taken from the unit's monthly Army aircraft inventory, status, and flying-time report (DA Form 1352). Direct productive man-hours must be accounted for by whatever data-collecting means the unit devises.

Assigned Man-Hours

Assigned man-hours equal the number of people on the unit strength report in a single MOS times the number of hours in the duty day times the number of days in a given period (normally, 5 days per week or 22 days per month). See Figure 4-4 for computation formulas. Assigned man-hours excludes supervisory personnel. The total number of assigned man-hours can be broken down into one or more of the following four categories.

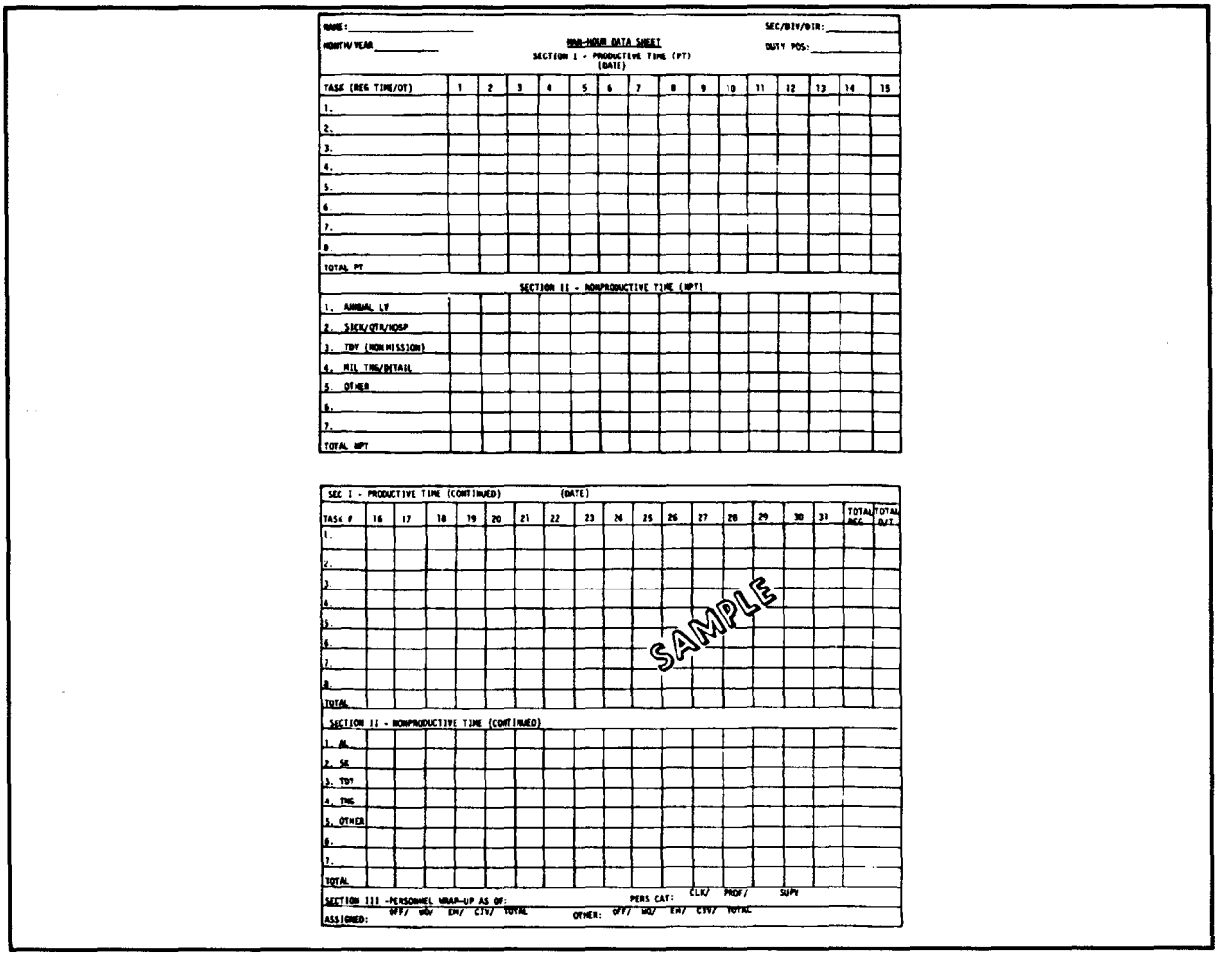


Figure 4-3. Sample for tracking unit

Direct Productive. These are man-hours used on one or more of the direct productive maintenance tasks for maintenance of an item of equipment, sometimes referred to as wrench-turning time or hands-on time. Hands-on time also includes productive time expenditure that can be identified and assessed either against a particular work unit, work-load factor, and so forth, or against a group of products without undue effort or expense.

Indirect Productive. These are man-hours used for the normal performance of maintenance tasks that do not add to the total time required to complete any one direct productive task. Examples are maintenance of tools and equipment, requisitioning replacement bench stock, and hangar and flight line CLEAN UP. These man-hours cannot be credited against a particular work unit without undue effort or expense.

Nonproductive Available. These are man-hours that are available for productive work but are used in other than primary MOS duties. Examples are details, security, and special duty. These man-hours could be redirected to productive work.

Nonproductive Nonavailable. These are man-hours that are assigned to a unit but are not available. This time is commonly called absent time. Examples are personnel who are on leave, TDY, or AWOL. These man-hours are part of a unit's assigned man-hours, but they cannot be redirected to productive work.

Direct Productivity

When direct productivity is computed, the direct productive man-hours are measured against the total assigned man-hours. This must be done within a given MOS. Do not mix 67-series and 68-series personnel together. Likewise, do not mix one 68-series

ASSIGNED MAN-HOURS

A x H x D = assigned man-hours

A = Assigned personnel in one MOS

H = Hours in the duty day

D = Duty days in a given period, week, or month

CATEGORIES OF MAN-HOURS

Direct productive + indirect productive + nonproductive available + nonproductive nonavailable = assigned man-hours

RATIO OF DIRECT VERSUS INDIRECT MAN-HOURS

$$\frac{\text{Indirect productive man-hours}}{\text{Direct productive man-hours}} = \text{unit efficiency}$$

An efficiently managed unit should reflect .4 or less indirect man-hours.

DIRECT PRODUCTIVITY

$$\frac{\text{Direct productive man-hours}}{\text{Assigned man-hours}} = \text{direct productivity}$$

PRODUCTIVE EFFECTIVENESS

$$\frac{\text{Direct productive man-hours}}{\text{Available man-hours}} = \text{productive effectiveness}$$

MAN-HOUR CAPABILITY

A x H x D x P x E = C

A = Assigned personnel in one MOS

H = Hours in the duty day

D = Duty days in a given period, week, or month

P = Percentage of time personnel are available (available man-hours as a percentage of assigned man-hours)

E = Percentage of productive effectiveness

C = Capability

Figure 4-4. Computation formulas

MOS with another 68-series MOS. This type of breakdown can be seen in AR 570-2, Table 12-7. It is also important to remember that supervisory personnel are not counted when computing man-hours.

Productive Effectiveness

To more accurately portray the effectiveness of those available for work, subtract the nonproductive, non-available, or absent time from the assigned man-hours.

The resulting figure is called available man-hours. When available man-hours are computed against direct productive man-hours, a more accurate picture of unit effectiveness results.

The percent of direct productivity indicates the productivity of assigned workers, while the percent of productive effectiveness indicates the productiveness of those available for work.

Maintenance Man-Hour Requirement

To determine the number of maintenance man-hours needed to support a given flying-hour program, multiply the number of aircraft by MDS times the average monthly flying-hour rate per aircraft times the man-hour-to-flight-hour ratio. This will determine requirements, based on past performance, for one month. If the flying-hour program is for more than one month, multiply that figure times the number of months. It is imperative to use like periods of time due to seasonal flying requirements. For example, don't use man-hours expended during the winter when computing a summer flight program. Also, man-hours expended in the field will differ from those expended in garrison or at a freed facility.

Maintenance Man-Hour Capability

To compute a unit's capability, use the following steps. First, compute the assigned man-hours for a given period of time. Second, factor out absent time to obtain available man-hours. Third, multiply available man-hours by the percent of productive effectiveness to obtain the number of direct productive man-hours for the given period of time.

With both man-hour requirement and man-capability computed, the requirement should be subtracted from the capability. If the result is a negative number, the number of additional personnel needed to meet the requirement under present conditions can be computed, using the following steps. First, divide the number of workers into the capability to obtain the capability of one individual. Second, divide the capability of one individual into the deficit obtained by subtracting the total requirement from the total capability. The result will be the number of personnel needed to meet the requirement under present conditions. If the number is not a whole number, round it up (example: 15.2 = 16 personnel).

When the capability and the maintenance man-hour-to-flying-hour ratio are known, divide the capability by the man-hour-to-flying-hour ratio for the number of flying hours that can be supported. When given a flying-hour program, the unit will find that comparing requirements against capability will result in a surplus or a deficit man-hour situation.

If a man-hour deficit is revealed and additional personnel cannot be obtained, the maintenance officer has certain options with which to correct the deficit:

- Defer minor maintenance.
- Consolidate maintenance resources–personnel, equipment, facilities, and so forth.
- Reduce nonproductive time of assigned maintenance personnel.
- Obtain maintenance assistance from other available sources.
- Consolidate missions to limit the number of flights.
- Schedule flights to provide more time for maintenance between flights.
- Use maintenance operational readiness float aircraft when appropriate.
- Increase work schedule.
- Increase personnel to authorized strength or request an overstrength.

  Schedule maintenance stand-downs.

LOGISTICS PREPARATION OF THE BATTLEFIELD

The logistics preparation of the battlefield is a detailed plan that lists maintenance considerations and how the maintenance manager plans to operate. The maintenance manager studies the tactical situation/mission and makes mental preparations and when possible physical preparations in order to be prepared for any maintenance situation that may affect his unit's maintenance posture. Areas that should always be addressed are-

- Aircraft recovery. It is essential that maintenance managers prepare for aircraft maintenance failures during operations and battle damage severe enough to prohibit an aircraft from being flown. This is why a recovery team should be assembled, briefed and on close hold. Personnel should be well trained in aircraft recovery techniques and have all the required equipment easily available to them.

Transportation should also have been prearranged for the recovery team and for the recovered aircraft, either by ground or preferable by air. (Annex F of this manual and FM 1-513 further discuss recovery operations).

- Aircraft maintenance collection points (AMCP). A maintenance collection point is a point established to collect equipment awaiting repair, controlled exchange, cannibalization, or evacuation. The lowest level that an aviation collection point should be established is the AVIM level. Aircraft that cannot be fixed forward by the AVUM or the AVIM MST are evacuated to the AMCP. Here they are evaluated and repaired or evacuated to another maintenance facility for repair. AVUMs must ensure they know where their support maintenance is located, and that they are very familiar with their support external SOP. AVIMs must consider accessibility to their supported units when selecting a tactical site.
- CL IX resupply. This item is critical if you are going to maintain a viable maintenance program. It is also tied very closely to site selection. Maintenance units need to have easy access to vital transportation arteries. Most of the large CL IX parts will be transported by 5-ton vehicle and sometimes by tractor trailer. You must consider maneuver space for these vehicles when choosing your site and when choosing the tactical layout of your field site.
- Battlefield damage assessment and repair (BDAR). BDAR can be divided into two separate but mutually supporting functions: battlefield damage assessment (BDA) and — battle damage repair (BDR).

BDA involves inspecting damaged equipment to determine the extent of damage, classifying the equipment according to the type of repairs required, and developing a plan of action for each item. BDA begins with the initial assessment by the crew chief/operator and continues through the various stages of repair, recovery, and evacuation.

BDR uses emergency expedient repairs to return the system to a fully or partial mission-capable status. Priorities for repair of the battle damaged systems are usually–

- Most essential to completion of the immediate mission.
- Repairable in the least amount of time.
- Repairable, but not in time to continue the immediate mission.
- Damaged beyond capability of repair; possible candidate for recovery.

BDAR teams must be trained, equipped, and organized prior to the start of any aircraft mission.

The S4 is the primary logistic manager for an organization. For this reason, close coordination must be maintained with the S4. But the maintenance officer is responsible for the aircraft maintenance program and needs to ensure that all aspects of aviation maintenance have been considered prior to any operation.

CHAPTER 5

MAINTENANCE ACTIVITIES

Various maintenance functions take place in an aviation maintenance unit. Their performance has a direct influence on the unit's ability to maintain equipment in ready status. This chapter deals with the procedures and responsibilities of various unit maintenance activities.

ARMY WARRANTY PROGRAM

The Army Warranty Program covers all items procured for Army use under warranty. The Army has traditionally purchased warranties on items like trucks, tractors, engines, transmissions, construction equipment, and so forth. The list has been expanded by law to include weapon systems, aircraft, and some components. Three categories of warranties are: warranties, special warranties, and subordinate warranties. All new equipment and components should be checked for warranties. Warranty control and logistics assistance offices provide information and assistance concerning the program; these offices are listed in Table 3-1 of DA Pam 738-751. Tables 3-3 and 3-4 of DA Pam 738-751 provide a partial listing of specific items under warranty. Chapter 3, DA Pam 738-751, provides instructions for completing DA Form 2407/5504 and DA Form 2407- 1-5504-1 (Maintenance Request Continuation Sheet) to file warranty claim actions. AR 700-139 governs the warranty program.

Aviation components covered by the Army Warranty Program require special handling during the warranty period in order not to invalidate the warranty. Details concerning warranty provisions are published in supply letters. The warranty control office (WARCO) or logistics assistance office (LAO) will have a copy of the warranty supply letter on items within their area of support. It should be understood that warranties will increase the time required to perform maintenance.

ARMY OIL ANALYSIS PROGRAM

The AOAP is an Armywide coordinated program to check oil condition and to detect impending equipment component failure by analyzing oil samples. The AOAP applies to all units that operate and maintain aeronautical equipment. The program's objectives, policies, and responsibilities are defined in AR 750-1 and TB 43-0106. Aircraft maintenance officers must be familiar with these references and with the AOAP forms discussed in DA Pam 738-751. Maintenance officers must ensure that the AOAP in each unit complies with all requirements. The AOAP monitor is a unit orders position. The quality control section normally oversees day-to-day operations of the program.

LOGISTICS ASSISTANCE PROGRAM

The Logistics Assistance Program (LAP), which is detailed in AR 700-4, AR 700-138, and AR 750-1, helps commanders develop their units' capabilities to resolve materiel-readiness problems. Logistics assistance covers many kinds of assistance activities, including field training in maintenance and supply and in administrative and technical procedures. The program emphasizes the word "assistance." Whatever the reason for the need, technical assistance personnel may be called on for help.

The Logistics Assistance Program does not relieve commanders of logistics-readiness responsibilities or functions. Commanders are responsible for developing a self-sustaining capability. The LAP is not intended to be a permanent augmentation to the commander's staff; instead, it is limited to the amount of time necessary to solve specific problems and train assigned personnel.

Commanders may be confronted with real or potential logistics problems that are either beyond their resource capability to identify or resolve or are clearly not their responsibility. In these cases, the program helps commanders analyze readiness, identify problems, and determine responsibility for resolving problems. When appropriate, it also assists with the resolution (normally on new equipment).

Logistics assistance is the advice, assistance, and training provided by qualified logisticians. They may be military or civilian employees of the Army or employees of industrial or commercial companies serving the Army under contract. New and complex equipment must be introduced into the Army system as rapidly as possible, and military personnel are

constantly rotating. As a result, maintenance activities often need assistance to keep current. The Logistics Assistance Program provides solutions to problems of supply and equipment installation, operation, and maintenance. The program provides a pool of knowledge and skill from which all levels may draw aid. Logistics assistance personnel will coordinate actions with the commander and keep him fully informed of their findings and recommendations. Some functions of logistics assistance personnel are–

- To perform the work to show units how it is done.
- To advise both technical and nontechnical personnel.
- To help users evacuate and replace unserviceable equipment that cannot be repaired.
- To visit AVUM and AVIM activities to help improve supply, repair parts, and maintenance support for using organizations.
- To help units locate deficiencies in supply and maintenance capabilities.
- To collect, evaluate, and exchange technical information.
- To instruct units in records management and in preparing unit supply records, PLLs, and authorized stockage lists.
- To instruct units in preparing equipment for field exercises and overseas deployment.
- To provide assistance on the care and preservation of stored material.

Personnel and Services

Logistics Assistance Program personnel are primarily Army military and civilian. They are highly trained, experienced, physically qualified, and well versed in the missions, equipment, and procedures of the providing and supported commands. These personnel are mobile and available for worldwide assignments. They will be assigned or attached to the appropriate geographical logistics assistance office (AR 700-4) when deployed to the field command areas. Logistics assistance personnel are employed by, or under contract to, one of the major subordinate commands under the Army Materiel Command.

Contract Plant Services

These services are provided in the plants and facilities of the manufacturer by trained and qualified engineers or technicians employed by the manufacturer. Through contract plant services, Army personnel are taught to install, operate, and maintain the manufacturer's equipment.

Contract Field Services

These services are provided on site by qualified contractor personnel. Normally, they provide DA personnel with information on the installation, operation, and maintenance of new DA weapons, equipment, and systems.

Field Service Representative Services

Field service representatives are employees of manufacturers of military equipment or components. They provide liaison or advisory service between their company and military users of its products. Known in the field as a "tech reps," they transmit information from the manufacturer needed to update the Army's equipment capabilities. Also, they solve technical problems.

Field service representatives are important as technical communication channels between manufacturers and military users.

US Army Aviation and Troop Command

The Aviation and Troop Command (ATCOM) is one of seven major subordinate commands of the Army Materiel Command. It is responsible for commodity management of aeronautical equipment, including–

- Design, research, and development.
- Maintenance engineering.
- Supply and stock control.
- Logistics assistance for all Army aviation and aerial delivery equipment.

The Logistics Assistance and New Equipment Training (NET) Division is one of the subordinate divisions of the Directorate for Readiness. Its mission is staff supervision and operational control of worldwide logistics assistance programs for Army aircraft and related support equipment. The division also provides representatives to make command staff visits and to manage all aspects of the new equipment training and support services. An Army aircraft mobile training team is made up of either specialists or contract

technical services personnel trained in the support of a particular aircraft. These teams are controlled by ATCOM and designed to assist the commander in improving the proficiency of maintenance personnel at AVUM and AVIM levels. When the team completes a job, it prepares and forwards a detailed report to ATCOM.

Maintenance Assistance and Instruction Team

The maintenance assistance and instruction team (MAIT) is a program developed under DCSLOG designed to complement the LAP. It provides technical assistance to help unit commanders identify and solve continuing problems that contribute to less than acceptable materiel readiness. The MAIT does not negate the commander's right to conduct formal or informal evaluations; it simply provides the unit commander with a list of problem areas and recommended actions. The MAIT will not score the unit or provide a rating. Emphasis is on assistance and instruction. MAITs have replaced the former command maintenance management inspection (CENI) teams. Specific guidance on the MAIT program is in AR 750-1, which complements ARs 350-35, 700-4, and 700-138.

MAIT assistance may be asked for by anyone at any time, but normally AVIM assistance should be sought first.

AVIM Assistance

One capability of AVIM units is informal technical and training assistance through the use of mobile maintenance/supply contact teams. Supporting maintenance activities must maintain a proactive liaison to assist using activities. These teams–

- Assist in resolving problems identified by liaison visits.
- Instruct and advise on maintenance and repair parts procedures.
- Perform on-site maintenance when requested.
- Assist the MAIT when requested.

REQUESTS FOR LOGISTICS ASSISTANCE

DA has provided commanders with the organic capability to accomplish their logistics mission. Commanders at each level will use that capability to achieve and sustain their authorized level of organization. However, DA will furnish commanders with assistance to identify and resolve logistics problems that are beyond their responsibilities or authority. Before requesting logistics assistance, commanders must use their own capabilities and whatever AVIM support is available to them.

A unit commander obtains logistics assistance for sup ply or rnaintenance by submitting a request through proper channels to the servicing MAIT or LAO. The Chief, MAIT or LAO, determines whether the need can be met from resources within his geographical area of responsibility. If resources are not available, the request is forwarded through channels to the commanding general of the commodity command responsible for that particular field of logistics assistance.

A request may be submitted by the most expeditious means, in any form (normally on a memorandum), at any time. It must identify the nature of the problem in enough detail to enable the source to provide a quick, effective response. AR 700-4 lists information that should be addressed in a request.

GROUND SUPPORT EQUIPMENT

The objective of Army aviation maintenance can be reached only if the unit's GSE is properly maintained in a safe, reliable, fully mission-capable manner. The aircraft operational readiness rate is affected by the GSE operational readiness rate. GSE includes all equipment and special tools required to maintain aircraft and associated equipment. Support equip ment (whose complexity in some instances approaches the aircraft's) is needed to properly maintain and operate aircraft. No MOS exists in which a soldier is trained only on GSE. The aircraft repairer receives only nominal training on GSE, and the unit must pick up the training through an on-the-job program.

Authorization

The primary documents allocating GSE are TOEs and TDAs. A TOE lists equipment authorized and required for each section by paragraph and line item number (LIN). A recapitulation table shows totals of equipment listed in the TOE by type. Components of sets, kits, and outfits are not reflected in these totals but are shown in supply catalogs prepared for each shop set authorized by the TOE. Some GSE is peculiar to only one type of aircraft or mission (special purpose). The authorization for this type of equipment is contained in the repair parts technical manual for that aircraft. For a complete authorization of GSE, one must consult the unit's TOE and all applicable supply catalogs for sets, kits,

and outfits authorized and repair parts manuals for aircraft supported. The assignment of GSE will be consistent with the mobility requirements dictated by the air mobility concept.

Accountability

AR 710-2 states that, as a minimum, all property will be inventoried annually. Accountability will include procedures from the Standard Property Book System-Revised (SPBS-R). Inventories should be conducted periodically. Mechanics or supervisors will inventory sensitive items and tool boxes at least monthly using the property book or hand receipts and appropriate supply catalogs. Mechanics' toolboxes should be spot-checked after each maintenance task to help control FOD.

Forms and Publications

DA Pams 738-750 and 738-751 contain lists of support equipment and specify the DA forms on which data are to be recorded and maintained. Equipment requiring DA forms is listed by equipment category code (ECC)–

- p = materials-handling equipment.
- Q = support equipment.
- AX = ancillary equipment.
- AZ = tools, test, and measuring equipment.

Technical publications must be on hand to ensure that GSE is properly operated and maintained. DA Pam 25-30 lists required publications, including LOS, MWOs, technical bulletins, technical manuals, and supply catalogs.

Repair Parts and Supply

Units must maintain a PLL for GSE as specified in the appropriate technical manuals. Each unit is responsible for preparing its PLL and providing a copy to the supporting activity.

The combination of a lack of parts manuals, unreported part purchases on the economy, makeshift repairs, controlled substitution, and parts ordered on an as-needed basis has created a false history for GSE repair parts. Since unit PLLs for GSE are virtually nonexistent, there sometimes appears to be a lack of demand for GSE repair parts. As a result, some manufacturers have halted production of outdated equipment and its repair parts. The many different makes and models of one type of equipment further frustrate the problem of identifying repair parts. Contacting manufacturers directly is sometimes helpful in obtaining support for older pieces of GSE.

Storage

Frequently, equipment excess to immediate needs is on hand in storage. GSE should be stored in buildings, under cover and off the floor. It should be kept as dry as possible and be accessible for inspection and servicing during the time it is in storage. Items to be stored for over 90 days must be processed for storage, then reprocessed when removed from storage. (See TM 55-1500-204-23-9.)

Maintenance

Most GSE failures can be traced directly to poor maintenance practices. Establishing a sound unit maintenance SOP for GSE is the maintenance officer's responsibility. Ground power units, compressors, heaters, towing vehicles, fueling vehicles, test stands, and electronic test equipment are examples of GSE that must be maintained and ready to function whenever needed. GSE must be checked frequently for preventive maintenance and scheduled maintenance services. TM 55-1500 -204-23-9 provides criteria and technical data for serviceability inspections, storage and shipment, and general maintenance procedures. Specific technical manuals contain operator and support maintenance procedures. Maintenance beyond the operator level will depend on which agency is the proponent for the item and on the availability of maintenance capability. However, most ordnance and engineer equipment can often be repaired in unit motor pools. To ensure GSE availability, managers will–

- Evaluate the operational status of GSE.
- Emphasize individual responsibility by insisting that all operators be trained and licensed.
- Ensure that all appropriate e publications are current, on hand, and used.
- Ensure that pre- and post-operation checks and services are always done.
- Allot time for preventive maintenance checks and services and scheduled maintenance, (A good time to perform these checks is during your normal vehicle maintenance times.)
- Conduct periodic inspections and inventories.

- Ensure GSE operation and maintenance standards are detailed in unit SOP.

Requests for Additional Equipment

Sometimes aviation units require GSE other than that authorized by TOE, MTOE, and TDA. Tropic, desert, or arctic environments often require additional equipment to supplement that authorized in the TOE. The unit needing the extra equipment should submit a request in letter form through command channels. The request should include the following

- Identification of the specific requesting unit.
- Number of applicable TOE, MTOE, or TDA.
- Complete nomenclature, stock number, and quantity of needed items.
- Justification for each item, including a statement that the item can be maintained.
- If the item is nonstandard, the reason for not using a standard item.
- Statement as to whether the additional equipment should be included in the TOE, MTOE, or TDA.

The repair parts manual lists the GSE needed for the aircraft. If an item is listed, it can be requested, even if it is not included in the unit's TOE, MTOE, or TDA.

CHAPTER 6

SUPPLY AND MATERIEL OPERATIONS

Repair parts are the lifeblood of aviation maintenance operations. To ensure complementary operations, maintenance and supply personnel should maintain good working relationships. The AVUM maintenance officer and AVIM supply platoon leader are responsible for managing PLL and ASL Class IX repair parts respectively. All supply procedures and policies are in the semiannual unit supply UPDATES. Refer to the UPDATES for current guidance.

RELATIONSHIP BETWEEN MAINTENANCE AND SUPPLY PLL SECTIONS

Sound supply management has a positive impact on maintenance operations. It helps ensure their success. The PLL section, production control, and flight operations need to coordinate efforts when making supply management decisions. Following are some questions to answer when figuring the total supply requirement for a unit's mission:

- What is the total flying-hour program for the unit?
- What are the training requirements for the unit, for both aircraft and personnel?
- What time-change components are coming due?
- What is the overall condition of FMC aircraft?
- Are repair parts needed to correct discrepancies noted on DA Forms 2408-13-1 and 2408-14 on order?
- What is the status of parts on order that are needed to correct outstanding discrepancies noted on the aircraft logbooks and to replace time-change components?
- Has a coordinated effort been made to schedule aircraft flight hours to match scheduled maintenance and supply delivery dates?
- Is all required hardware in stock or on order for a scheduled major item change; for example, a main transmission, engine, and so forth?

TYPES OF SUPPLY

For accountability purposes, all Army property (except real property) is classified as expendable, nonexpendable, and durable.

Expendable

These items are identified by an "X" in the accounting requirements code (ARC) column of the Army master data file (AMDF). This category includes all Class IX repair parts and all items which are consumed in use, regardless of price.

Nonexpendable

These items are identified by an "N" in the ARC column of the AMDF. Nonexpendable supplies include all Class VII items, all items assigned a line item number in SB 700-20, and selected Class II, IV, and X end items.

Durable

These items are identified by a "D" in the ARC column of the AMDF. The property book officer (PBO) at the appropriate level of command will designate the level of responsibility that will maintain the durable document register.

ADMINISTRATION

Standing Operating Procedures

The Class IX repair parts PLL section SOP must be written and kept updated to incorporate the latest changes. Normally, the PLL section of a command will be under one supply system. The SOP will reflect the system the command uses. The procedures specified in the SOP must conform to all applicable guidance in governing regulations, directives, and policies. The SOP should be a day-to-day management tool used by all personnel affiliated with the maintenance operation. Table 1-1 in AR 710-2 is helpful when writing an SOP.

Publications

Supply publications are a must when editing requests for repair parts. As a minimum, the following publications should be available in the supply section of the unit:

- Master cross-reference lists (MCRL) 1 and 2. Identification lists (IL).
- Current Unit Supply UPDATE.
- AR 700-120.
- ADSM-1-18-L3N-AWA-ZTH-EUM, ULLS END USERS MANUAL.
- AR 725-50.
- SB 700-20, SB 708-41, SB 708-42/43.
- Commercial and government entity (CAGE) codes.
- AMDF.
- CDA Pamphlet 18-1, included in every AMDF, Section I.

Identification List (IL)

The IL for a particular item has a narrative, illustrative description of that item. The IL for an item can be found by locating its federal supply classification (FSC) in SB 708-21 or SB 708-22. The FSC is the first four digits of the NSN. All ILs are listed in numerical order by FSC in DA Pam 25-30 and are ordered by FSC.

Army Master Data File Retrieval Microform System (ARMS) Monthly AMDF

Data from the arms monthly AMDF is used to process and edit requests, update stock records, receive inventory, ship supplies, and process reconciliation. CDA Pam 18-1 explains the codes on the tile. Copies of this reference guide are contained in Section I of each AMDF. Remote terminal access is available through your computer terminal or personal computer. The Remote Terminal AMDF Inquiry System (RTAIS) is available free of charge. It could reduce your research time by as much as 75 percent. If you wish to receive more information on the RTAIS, contact Commander, USAMC Catalog Data Activity, ATTN: AMXCA (ISS0), New Cumberland, PA 17070-5010, or see CDA Pam 18-5.

Document Register

DA Form 2064 (Document Register for Supply Actions) is used to record supply transactions. Quantities requested, received, adjusted, turned in, or due in are entered on one of three types of document registers: nonexpendable, durable, and expendable. The expendable register is used only by units authorized to submit supply requests to a DSU. The PBO designates by a memorandum for record (MFR) those elements within a unit authorized to request expendable supplies. The MFR will specify the class of supply, the DOD activity address code (DODAAC), and the block of document serial numbers the element will use. Policies and procedures for maintaining the document register are detailed in Chapter 2 of DA Pam 710-2-1.

Authorization to Request and Sign for Supplies

The office management tiles must have a copy of the assumption of command orders or the appointing MFR. Copies must be sent to each DSU from which supplies are drawn with an accompanying DA Form 1687 (Notice of Delegation of Authority-Receipt) for request and sign for supplies. A minimum of three copies is needed. The office retains one copy and sends two to the DSU (one each for the editing and issuing/receiving sections). If possible, different persons should be designated to perform these actions. This reduces the potential for fraud, waste, and abuse. DA Pam 710-2-1 and AR 725-50 outline procedures.

Units must submit all requests for supplies, regardless of source, to the specific DSU that supports the unit for the class of supply requested.

Before repair parts are requested, the Uniform Materiel Movement and Issue Priority System (UMNIPS) must be determined. The unit's force activity designator (found in the permanent orders activating the unit) and the urgency of need (UND) then determine the importance of the request. The tables in Chapter 2 of DA Pam 710-2-1 should be used.

Supply Status

Supply status informs the requester of the supplier's decision on a specific supply request. Supply status is received from the DSU on status cards or listings. Supply status is given in the form of status codes. These codes are in Appendix C of DA Pam 710-2-1.

Keep a due-in status file for each document register. When status is received for open part requests, file the cards in document number sequence. Destroy the status cards when the total quantity due in is received, canceled, or rejected. For further information concerning policies and procedures, refer to DA Pam 710-2-1.

PROCEDURES

Screening Authority

The unit commander must delegate the authority in writing to screen repair-part requests in the section. The individual on orders for processing requests for accuracy and authorization should first check the request for correct priority designators. All high-priority (01-08) requests must be approved by the authorized individual, who initials the DA Form 2064 and the request itself (DA Form 2765 or 2765-1, Request for Issue or Turn-In). During the screening process, commanders must first ensure that the correct UND is used to meet the maintenance requirement, that is, not mission-capable, supply; anticipated not mission-capable, supply (ANMCS); or routine. They must also ensure that the PLL clerks have reviewed the I&S file of the AMDF for interchangeable or substitute repair parts. This can often prevent needless aircraft downtime because interchangeable or substitute repair parts may be on hand in the command. Next, commanders must closely monitor the records section of the PLL section to ensure that all demands are posted on DA Form 3318 (Records of Demands-Title Insert). This will ensure that the correct repair parts are on hand to support the maintenance mission. Demand will determine the authorization for initial stockage of PLL and the increase or decrease of PLL already on hand. The criteria for increase, decrease, and initial stockage of PLL are explained in detail in DA Pam 710-2-1. Last, commanders must ensure that all requests for repair parts are posted on the document register (DA Form 2064).

Prescribed Load List/Shop Stock List Management

Although DS4 supports PLL/SSL management, it does not replace all forms and records that are used in PLL/SSL management. Therefore, each unit must manage its own PLL/SSL.

Automated Records

Although DS4 supports PLL maintenance, it does not eliminate the need for unit management (accountability), as stated below.

DA Form 2063-R(PLL) has been replaced by the Prescribed Load List, PCN AGL-C34. This list provides space for entering on-hand (OH) balances, storage locations, reviews, and inventories. This list also contains much of the catalog data found on DA Form 3318.

DA Form 2064 must be maintained manually if your unit's document register is not automated when using ULLS or SAMS. DA Form 3318 has been replaced by the Unit Demand Summary List, PCN AGL-C39.

Unit Demand Summary List, PCN AGL-C39

DS4 provides this list monthly to each unit. The list shows your unit's demands for PLL and non-PLL items. It also provides detailed demand data for review of the unit's demand history when considering changes to your PLL/SSL.

PLL Change List, PCN AGL-C35

Each quarter the PLL computation subproess of the demand analysis process generates a PLL change list for each unit. This list identifies all items recommended for addition, deletion, or change in authorized stockage levels. Two copies of the list are furnished to each unit. National stock numbers and management control numbers (MCN) are in national item identification number (NIIN) sequence. MPNs are in full stock number sequence.

Command Decisions

For recommended additions, deletions, and changes to PLL stockage levels, unit commanders have three choices: approve, disapprove, or modify the recommendations.

Bench Stock/Shop Stock

Bench stock is composed of low-cost, consumable items such as common hardware, which are stored near the work area. Maintenance activities with a collocated SAA stock 15 days' supply of bench stock. Those without a collocated SSA or DSU system stock a 30 days' supply. (DA Pam 710-2-2 contains additional information.)

Toolroom

Tool sets, kits, or outfits (SKO) not issued to using individuals are stored in, and issued from, a toolroom or tool crib. Toolroom keys must be controlled and toolroom access restricted to essential supervisory and operating personnel, one of whom will accompany visitors in the toolroom. The toolroom custodian is responsible for all tools in the toolroom. Those who sign tools out are personally responsible for them. Only authorized personnel are allowed to sign for tools, and they will sign for all tools they receive, including expendable tools. The responsible officer will provide a list of personnel authorized to

draw tools from the toolroom. The toolroom custodian will keep a copy of the list and confirm the identity of personnel requesting tools by checking the identification cards of unfamiliar persons. AR 710-2 and DA Pam 710-2-1 contain further guidance and policies.

When an individual admits liability for loss of a unit hand tool, he may voluntarily, or in response to a request, offer payment of the value of the hand tool in cash or by check. If hand tools are not stocked in the self-service supply center (SSSC), or if the SSSC advises that the specific hand tool required is not available for sale, DD Form 1131 (Cash Collection Voucher) or DD Form 362 (Statement of Charges for Government Property Lost, Damaged, or Destroyed) will be prepared and processed according to AR 735-5. Necessary hand receipt adjustments must be made.

EXCHANGE SYSTEMS

Reparable Exchange (RX)

RX is a supply system maintained at AVIM level. It is designed to speed up the available repair parts system with repair recoverable items on hand for issue on a one-for-one basis. RX eliminates the need to request issue or turn-in. DA Form 2765 (AOA) and DA Form 2765-1 (D6Z) are prepared and hand-carried, along with the unserviceable items, to the AVIM RX section for exchange for a serviceable item.

> NOTE: For more detailed information, see TM 38-L32-11 and TM 38-L32-12.

An RX listing containing the NSN, item description, end-item application, and authorization will be distributed to all units supported by the AVIM. RX items are not normally authorized on the unit PLL. All RX stocks should be located and maintained at the AVIM level.

Controlled Substitution or Exchange

Controlled substitution or exchange is the removal of serviceable parts from an unserviceable item of equipment for installation on another item to make it serviceable. According to AR 750-1, repair parts and components may be removed from aircraft that are classified as not mission capable, supply (NMCS); not mission capable, maintenance (NMCM); or partially mission capable (PMC). However, an aircraft or major component will not be stripped to the point where it is used primarily as a source of parts and becomes uneconomical to repair. All parts removed from crash-damaged aircraft must be inspected before being used on serviceable aircraft. Controlled exchange should be approved only when the following criteria are met:

- The aircraft on which the exchanged parts will be used is currently grounded and awaiting repair parts.
- Needed repair parts are on order-and in good status before the controlled substitution or exchange.
- Exchanging repair parts will return the aircraft to a fully mission capable status.
- All possible alternatives (lateral supply search, local procurement, local manufacturer) have been tried without success.
- A complete check of the PLL section suspense tile has been made to ensure that parts for the aircraft from which the exchange will be made are not due in shortly.
- The contributing aircraft is NMCM, NMCS, or PMC.
- The contributing aircraft will be returned to serviceability within its established maintenance priority.

A record of removed parts must be maintained and aircraft records annotated for each item removed. The commander (must be in the rank of major or above) or his designated representative is the approving authority. The exchange decision should be a maintenance team effort involving the production control officer, quality control officer, and PLL section officer in charge. This will help ensure that all personnel involved can take appropriate action in their sections for record management and control. Controlled substitution or exchange is a last resort method for maintaining a flyable fleet. Keeping this in mind will help to control abuses. Local SOPs must contain polices and procedures to control the controlled substitution or exchange program.

Maintenance Float

The maintenance float program is designed to assist in maintaining the readiness posture of units during peacetime. It is a quantity of selected end items authorized for stockage at a depot or MACOM stock record account. It will be used for the replacement

of like items turned in by using units for which an immediate replacement is required to maintain an acceptable level of materiel readiness during peacetime. There are two types of float: repair cycle float (RCF) and operational readiness float (ORF).

- RCF is that quantity of items authorized in the wholesale supply system to replace like items of equipment withdrawn from using activities for scheduled depot maintenance without decreasing the materiel readiness of the user. Procedures to account, manage, and issue RCF items will be included in AR 710-1. Changes in planned program repair will be the basis for asset change. The materiel proponent will change, add, or delete RCF factors accordingly. The NICP may issue RCF assets to till MTOE/MTDA or RCF shortages when other assets are not available.
- ORF is that quantity of items authorized for issue to MACOMs for use by DS maintenance units in exchanging with supported units if a like item cannot be repaired in a timely manner.

PARTS

Supply and maintenance activities consume 10 percent of the Army's annual budget. A reduction in these areas means an increase in available resources to support force structure, training, and other high priority needs. Accomplishing training and mission objectives within available resources will be dependent upon reducing dollars spent on replacement of reparable parts. This requires that unserviceable, economically reparable parts be repaired at the lowest possible level, if not precluded by policy or capability. Local repair should be the primary source of repair whenever possible. All diagnostics equipment available should be used to determine the reasons for malfunctions prior to replacement of parts. This will minimize the use of component replacement for troubleshooting purposes.

Stock Funding of Depot-Level Repairable (SFDLR)

The Army was directed by the Department of Defense, through Defense Management Review Decision (DMRD) 904C, to implement the SFDLR program that converts depot-level repairable (DLR) from direct appropriation funding to stock funding through the Army stock fund (ASF). The ASF is a revolving capital fund designed to finance the supply pipelines between the user and the vendor. This will require that units forecast their DLR requirements, include them in their budget planning, and fund them using unit funds. The objective of SFDLR is–

- To improve discipline and visibility on managing DLRs.
- To allow programming and adjusting of available funds to meet changing demands.
- To identify the most cost associated with weapons systems more easily.

Army Intensively Managed Items

The AIMI program was developed to intensively manage selected aviation items which are determined to be in critical supply status due to procurement value, cost of overhaul, or criticality in source of supply. The objective of the AIMI program is to maintain visibility of and to manage a selected group of aviation items.

Major commands will establish levels of AIMI items through negotiations on a semiamual basis. Those AIMI items for which negotiated levels are not fully supportable will be designated NMCS support only. NMCS systems and equipment are not capable of performing all of their assigned missions because of maintenance work stoppage due to a supply shortage. NMCS exists when the part is needed for immediate installation on or repair of primary weapons and equipment under the conditions below:

- Equipment is deadlined for parts.
- Aircraft is out of commission for parts.
- Engine is out of commission for parts, etc.

ASL Stockage Selection

Stockage selection at the supply activities is the decision to place an item in stock. Demand history files will be maintained to reflect the most recent 12-month period and as an objective for automation, a 24-month period will be maintained and be stratified to the end item code (EIC). At the supply activity, demand frequency tiles will be maintained for each item issued to user customers for Classes II, III (packaged), IV and IX. Items selected for stockage will make up the ASL.

Essentiality is a primary consideration when determining the range of items for the ASL. The essentiality code (EC) for each NSN can be found in the AMDF.

Repair parts selected for stockage will be restricted to essentiality codes C, D, E, and J. Where a quick supply store is established, E, C, and G items are authorized for stockage.

DIRECT SUPPORT UNIT STANDARD SUPPLY SYSTEM (DS4)

DS4 is an automated supply management system designed to be the standard Army supply system for managing Class II, III (packaged), IV, VIII, and IX supplies at the direct support level. It automates, as much as is feasible, the routine supply management functions of supply and stock control. Supply control is controlling materiel and documentation. Stock control is maintaining current asset and transaction data for accountability and visibility. DS4 also provides an interim automated supply capability for Health Services Command's medical logistics (MEDLOG) battalion units until the Theater Army Medical Management Information System (TAMMIS) is available. DS4 has the capability of interfacing with other systems. Below is a brief description of DS4. For more information see TM 38-L32-11, -12, and -14.

Divisional/Nondivisional Application

DS4 is designed to operate in a multi-DSU or single-DSU environment as an aid to the supply manager. Centralized management and "umbrella" stockage concepts characterize multi-DSU systems. Decentralized, autonomous concepts characterize single-DSU systems.

System Interfaces

DS4 has the capability to interface with the following systems:

a. Tactical Unit Financial Management Information System (TUFMIS). Copies of DS4 input and output transactions are provided for TUFMIS processing. TUFMIS extracts transactions pertinent to financial management. It provides various reports and listings that enable commanders and managers to make sound decisions on financial resources and supply requirements. Due to the nature of the interface, it can readily be withdrawn during wartime.

b. Selected-Item Management System–Expanded (SIMS-X). DS4 produces asset balance documents (DIC DZA) and listings for reporting RICC 8 assets on a daily and periodic basis.

c. Standard Army Intermediate-Level Supply System (SAILS). SAILS is the technical and functional interface between DS-level and wholesale-level supply support. The DS4-SAILS interface is achieved with standard MILSTRIP transactions. DS4 output transactions to the higher supply source are directly accepted by SAILS for processing. The reverse is also true in that SAILS output transactions to the DS level are directly input to DS4. In addition to the MILSTRIP interface, a unique DS4-SAILS interface exists which allows DS4 to request and receive tailored catalog data directly from SAILS.

d. Catalog Inquiry-Response System. DS4 extracts information concerning stock numbers on the availability balance tile (ABF) for transmission to CDA or the supporting SAILS activity for catalog support. The information extracted is acceptable to either system. The catalog data response from CDA or SAILS is acceptable to DS4.

e. Standard Army Retail Supply System.

(1) When DSUs or GSUs use SARSS at their. supply support activities, the DS4 system provides them with down loads on magnetic media or by electronic communications. These communications opcrate on Tactical Army Combat Service Support Computer System (TACCS) hardware under the SARSS-1 (interim) configuration. SARSS-1 (interim) on TACCS interfaces with Defense Automatic Addressing System (DAAS), Standard Army Maintenance System (SAMS-1), and Unit-Level Logistics System (ULLS), as well as with DS4. This includes all divisional and nondivisional AVIM units that are assigned TACCS devices to automate the Class IX aircraft repair parts DSU supply support mission. SARSS provides applicable ABF activity file records, and other required files on a periodic basis. It provides transactions on a daily basis for use in supporting customer units. In a similar way, the DSUs using SARSS provide input to DS4 on magnetic media daily.

(2) SARSS will totally replace DS4 once it is fully implemented on TACCS at division level and on CTASC-II hardware at corps and theater army levels. SARSS-1 will operate on TACCS in all DSU and GSU organizations that provide Class II, III

(packaged), IV, VII, or IX supply support. It will use electronic communications or magnetic media to interface with SARSS-2A operating at the DMMC, CMMC, TAAM, TAMMC, or TDA installation supply support activity. In addition to SARSS-2A all DSUs and GSUs with an external supply support mission, including AVIM units, can interface with USS, SPBS-R, SAMS-1, DAMNS-R, DAAS, CSSCS, and PWIS.

f. Standard Army Maintenance System (SAMS-1 and SAMS-2). DS4 interfaces with SAMS-1 during the initial extension or conversion of SAMS-1, down-loading demand data from the DS4 demand history master file by DODAAC to the SAMS-1 TACCS device. The output from DS4 is the SAMS-1 demand down-load record (DIC-XNH). DS4 interfaces with SAMS-2 by accepting SAMS-2 follow-up records (DIC-XNF) and comparing them to the DS4 activity file. This process provides response records (DIC-YSR) to validate the latest status of NMCS requisitions to maintenance management personnel.

g. Unit-Level Logistics System. DS4 interfaces with ULLS by providing initial down-load information of the customer's demand history, PLL, and activity records. ULLS customers receive information on transaction updates, changed activity records, and status from DS4 daily cycles. This customer output is provided by disk or tape. DS4 also provides catalog information on a monthly basis to ULLS customers by disk or tape. When TACCS is implemented and DS4 is eliminated, ULLS interface will be to SARSS-1 on TACCS, via electronic communications or magnetic media.

h. Objective Supply Capability (OSC). OSC is the computer and communication network interaction that allows total asset visibility for repair parts within a geographic area. OSC shortens the time units wait for parts by directly transmitting parts request from unit or support maintenance shop to a central computer. This central computer, known as the OSC gateway, maintains constantly updated files of the on-hand assets available to all support activities in a geographic area. The objectives of OSC are–

- To provide same-day processing of requisitions.
- To provide visibility of assets within a geographical area.
- To provide for lateral distribution of assets.
- To provide for near real-time status to the user.
- To reduce the order segment of the order ship time.
- To optimize automation and communications.
- To create the image of a single seamless supply system.

(See your ULLS-A operator's manual for operating instructions.)

SUPPLY SUPPORT

Each customer requests supplies from an assigned supporting DSU. Direct support may include Class II (general supplies), Class III (packaged petroleum products), Class IV (construction material), Class VII (ORF), and Class IX (repair parts).

Divisional Units

Divisions operate with several DSUs under the umbrella concept. This means the main DSUs carry backup stocks for all forward support DSUs and replenish those forward DSU stocks as needed. The divisional element that performs the materiel management and stock control function is the materiel management center.

Nondivisional Units

Nondivisional DSUs are normally single, stand-alone support activities. In nondivisional units, the organization for supply support consists of one company or platoon. The company includes a section devoted to stock control and elements that operate the storage activity. The automated data processing equipment is operated by personnel from the stock control section.

SYSTEM COORDINATION, REVIEW, AND INPUT

The effectiveness of system operations depends on timely, accurate processing of transactions and issuing of repair parts. Figure 6-1 provides an example of requisition and materiel flow of aircraft repair parts. Airlines of communication (ALOC) should be established to increase combat readiness.

Customer

Customers originate requests for issue, document modifiers, follow-ups, cancellations, and turn-ins. Customers review and respond to system-generated

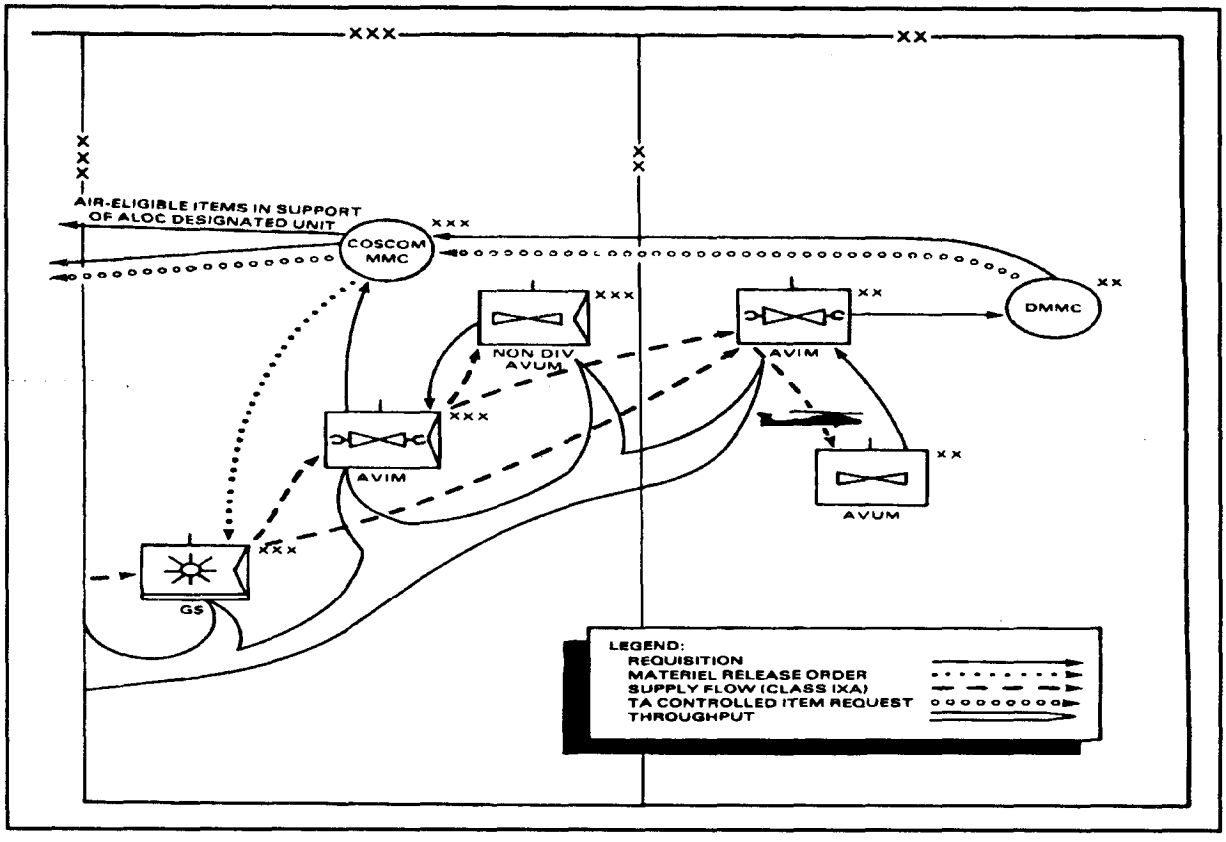


Figure 6-1. Example of ALOC requisition and materiel flow of aircraft repair parts

listings and reports to improve accuracy and compatibility of unit and system files.

DSU

To increase supply responsiveness, DSU personnel review customer input transactions for clarity and completeness while the customer's representative is present.

Storage Activity

Personnel at the warehouse storage activity ensure that transactions are correct and agree with the actual quantity of materiel received, issued, or recorded at storage locations. Adjustments are made using DS4 file maintenance procedures.

MMC/SCA

The manager controls DS4 processes by scheduling, by selecting parameters, and by input transactions. Input transactions must be controlled to ensure they are processed correctly. The manager must also review DS4 stockage recommendations and automatic stockage adjustments. PLL and ASL items may be delivered by ALOC due to cost or criticality of maintaining combat effectiveness.

SUPPLY MANAGEMENT

Management Controls

Automation does not replace sound managerial principles and techniques. It does, however, provide tools to control and operate the supply system more effectively.

ASL Management

The ASL identifies authorized items to be stocked in the DSU to support customer demands. Parameters allow the manager control over ASL add-retain criteria by supply class for main and forward DSUs.

Although an item may qualify as an ASL item, the manager may or may not add the item to the ASL due to stockage and funding constraints of the DSU. DS4 considers an item qualified for stockage when it is—

- Demand-supported.
- An ORF item specifically authorized for incorporation.
- An initial provisioning item.
- Mission-essential or mandatory stockage.

DS4 considers ASL items not receiving sufficient demands during a 180-day period for a stockage list code (SLC) change or for deletion from the ASL.

The manager is responsible for managing the ASL. Demand-supported stockage levels are automatically adjusted based on the quantity demanded. Stockage levels for other than demand-supported lines are recommended. To control stockage levels for selected items, the manager—

- Sets minimum requisitioning objective (RO) and reorder point (ROP) quantities. Stockage levels do not adjust below the set minimums.
- Establishes ROs at specific levels.
- Establishes days of supply values to compute stockage levels.
- Determines the method for computation of order-to-ship time (OST) and controls system OST deviations.

PLL Management

Based on accumulation of demand history, DS4 generates a PLL change list for each customer. This list shows proposed additions, changes, and deletions to a unit's PLL.

PLL add-and-retain criteria are controlled by manager parameters. Each proposed addition, deletion, and stockage level change requires subsequent action by the customer and the DS4 manager. The customer annotates the list to show desired action on proposed changes and sends the annotated list to the manager. Using the annotated lists, the manager sends change cards for processing in the PLL update process. An updated PLL is provided to each customer. Preprinted requests are also provided to nonautomated customers.

Reparable Items Management

Commanders assign responsibility for managing reparable items to an accountable officer. The items required at the direct support maintenance facility are called DSU-reparable items. Items selected for repair above the DS level are called non-DSU-reparable items.

DSU-reparable items are selected for stockage by a coordinated effort between maintenance and supply personnel. For automated processing and accounting visibility, these items are identified with an SLC of Q and a distribution of stockage code (DSC) of 3.

Items selected for addition or retention as DSU-reparable items must—

- Be repairable by the DSU maintenance shop.
- Use days-of-supply (DOS) procedures to compute stockage levels (procedures contained in DA Pam 710-2-2, paragraph 4-9).

QSS Management

A QSS may be operated in each Class IX main DSU. The manager establishes a QSS by converting ABF lines that meet QSS criteria.

The ASL change list from the demand analysis process is reviewed by the manager to identify those items which are recommended for addition to or deletion from QSS stockage. DSUs are then notified of the changes, and an effective date of change is established. The manager then submits the change cards for processing to update relevant files.

A QSS catalog is prepared once a quarter. This catalog is sequenced by stock number and lists the preferred stock number, unit of issue, nomenclature, unit price, and the DSU that stocks the item. The manager adds the QSS location and hours of operation on the first page of the catalog printout and reproduces the catalog in sufficient copies for distribution to customers supported by the DSU operating the QSS facility.

Reconciliation

Reconciliation enables the manager to verify due-ins from the higher source of supply and due-outs to supported customers. Twice a month the FNC or SCA provides a list of all open requests to its customers. This list also identifies requests that were satisfied or canceled during the report period. Customers review the list, identify discrepancies, request cancellation for those requests that are no longer required, validate the continued need for requested items, and modify requests as required. A

copy of the annotated list is returned to the FNC/SCA to update DSU ACT files.

PERFORMANCE INDICATORS

Proper use and control of DS4 will enhance its capability to support its customers. Commanders at all levels should review the—

- Total time for customers to receive items after a request has been submitted.
- Percentage of PLL limes at zero balance.
- Accuracy of readiness reports.
- Accuracy of reconciliation procedures.
- Requirement for repair parts needed for an item with an NMCS or ANMCS status or needed for normal replacement. Document registers should also be checked to see if needed items are on order.
- Number of items that are above the authorized retention level (excess). Excess items increase cost and reduce storage space.

At the unit level–

- Document register entries should be compared with the latest customer due-out reconciliation list to ensure the request is valid.
- DA Forms 2406 (Materiel Condition Status Report [MCSR]) and 2715 (Unit Status Report) should be checked to ensure accurate data is provided so that proper attention can be drawn to critically required items for intensive management.

At the MMC a number of output listings indicate the efficiency and effectiveness of the supply system. These listings are—

- DSU ASL lines with dues-out.
- Controlled item requisition verification list.
- Cyclic input transaction statistics. Delinquent count card list.
- Periodic materiel release order (MRO) statistics list.
- Daily input-output statistics.
- Financial stockage list.
- Input transaction and error list.
- Receipt-not-due-in list.
- MRO list.
- Stock status report.
- Supply performance report.
- Transaction register.
- ASL status review list.
- Excess report.

STANDARDIZED ARMY MAINTENANCE SYSTEM

SAMS-1 is used at the intermediate levels of maintenance. The intermediate-level maintenance company is found in the division, corps, and echelons above corps.

SAMS-1 is an automated maintenance management system. It operates on TACCS hardware. It processes maintenance data to improve control of work load, manpower, and supply. For more details refer to ADSM 18-L21-AHN-BUR-UM.

The SAMS-1 system–

- Improves visibility of equipment status. Reduces Class IX management problems.
- Reduces human error.
- Increases accuracy of reporting.
- Improves use of contact, maintenance assistance, and instruction teams.
- Allows on-line inquiry, with rapid response.
- Tailors reports.
- Eliminates DA Form 3318.
- Responds to needs of the commander.
- Automates reporting to higher levels.
- Reduces data-gathering burden on customer units.
- Simplifies and standardizes training.
- Eliminates shop-supply deficiencies.
- Automates materiel condition status reporting.
- Tracks cost and labor use.
- Compares data on turnaround time (days) and mean time to repair (hours).

Environment

TACCS hardware is located in the maintenance control section of the maintenance company. Each site has two keyboard video display terminals (KVDT)

wired to a logic module (LM). One terminal is used to enter work order data, the other to enter supply data. Both occupy the same facility or are positioned near the LM and printer.

Input is entered by keyboard and diskettes. Output is in hard copy and diskettes. The work order clerk and shop supply clerk, both in MOS 76C, operate the system. No additional personnel are required. Users include—

- Customer units of the AVIM.
- Intermediate maintenance units.
- Maintenance battalions.
- DMMC/BMMA.
- CMNC.
- TAACOM MMC.
- TAMMC.

Data Base

Only information necessary for effective management or reporting is entered into the data base. Data is then passed to each successive management level on an exception or summary basis. The management level has direct access to detailed data in the data base that it has primary responsibility for. For example, if the MNC requires SAMS-1 detailed data, it requests it from the shop officer instead of taking it from the SAMS-2 data base. There are two general types of information flowing through the system: equipment performance and maintenance performance.

Data for maintenance managers is limited to their needs. Equipment performance data is sent as directly as possible via SAMS-2 to the wholesale level. Maintenance performance data passes up through the maintenance system in consolidated form.

Structure

SAMS is divided into three management levels: SAMS-1, SAMS-2, and SAMS-3. For application of SAMS see Figures 6-2, 6-3, 6-4, and 6-5. The functions at the SAMS-1 level are—

- Identifying the customer's unit requirements.
- Managing the work load and repair parts supply.
- Performing maintenance.
- Programming and budgeting resources (funds, personnel, facilities).

Expectations

Many maintenance problems are traceable to inexperience, lack of training poor personal attitudes, oversights, and various other reasons. Commanders can expect the following improvements to result from implementation of SAMS:

- Less errors in parts requisitioning. SAMS-1 contains MILSTRIP information. It generates the requisition from the latest information and part-requirement data and considers substitute items before a requisition is made.
- Accurate, timely use of excess repair parts. In SAMS-1, the excess part must be canceled before the job is closed out. SAMS-l generates the appropriate supply transaction code and cancels the excess. Of course, if the part is needed for a new work order requirement or for shop stock, the due-in can be transferred to take advantage of the days already elapsed in the requisition cycle.

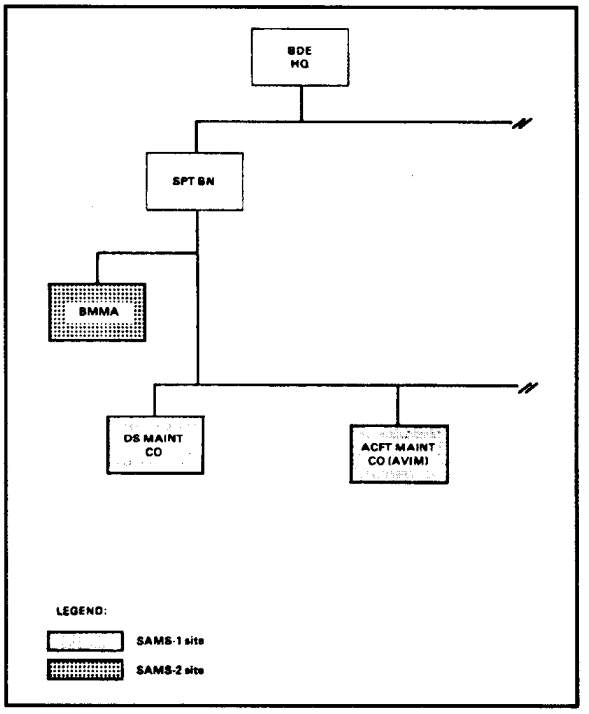


Figure 6-2. SAMS Application in a separate brigade (J-series)

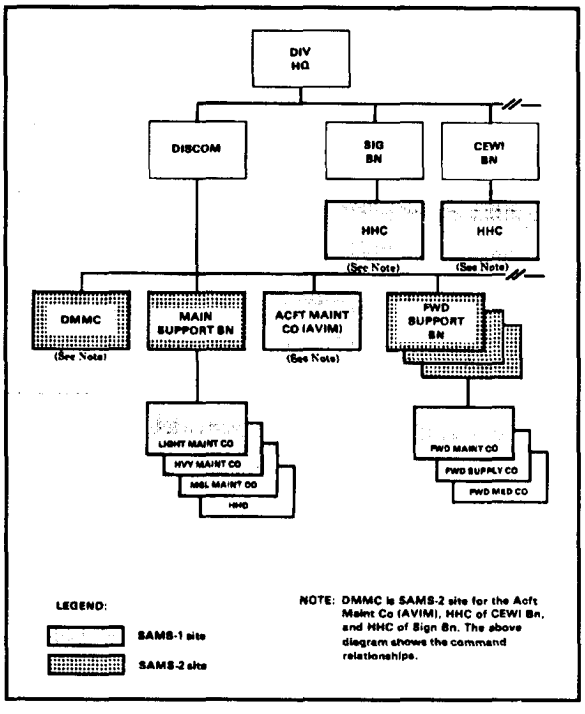


Figure 6-3. SAMS Application in a heavy division

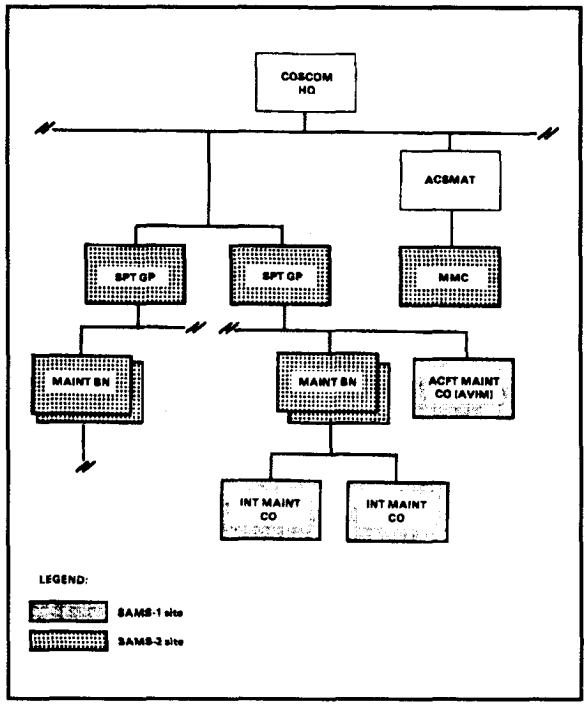


Figure 6-5. SAMS Application in a COSCOM (J-series TOE)

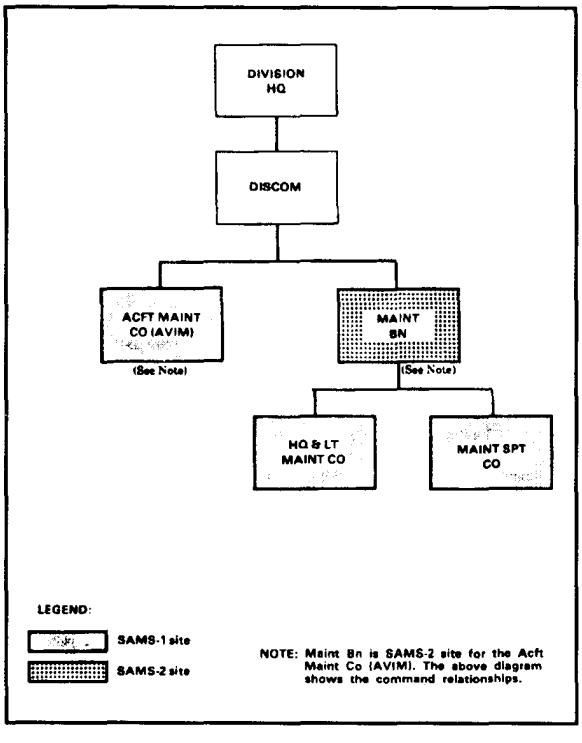


Figure 6-4. SAMS Application in a light division (J-series)

Accurate, timely follow-up on requisitions and cancellations. In SAMS-1, follow-ups are made as often as desired. However, semi-monthly is recommended because a complete reconciliation is run monthly. The system handles the follow-up and reconciliation and then updates the document register.

Accurate transfer of repair parts or dues-in between work orders and shop stock. SAMS-1 handles this transaction accurately and rapidly. It documents the action for both work orders.

Accurate accounting for nonstocked items ordered but not used due to untimely issue or alternate source of supply, such as a receipt from a cannibalization point. SAMS-1 provides for pickup of nonstocked items on the shop stock list when use can reasonably be expected within 90 days. If not issued within 90 days, the item will be turned into the supply support activity.

Accurate, timely reconciliation of dues-in. SAMS-1 provides a monthly bottoms-up reconciliation. This ensures that all requisitions are followed up.

- Accurate, timely maintenance of SSL records. SAMS-1 captures and records at least three order and ship times for each item. The OSTs are then averaged for the period to compute RO and ROP. The proper OST is computed separately for every SSL item.
- Accurate, timely posting of the document register for supply actions. SAMS-1 has an automated document register and updates the status daily.
- Accurate, timely replenishment of shop stock. SAMS-1 replenishes stock automatically when the on-hand balance plus the quantity due in is at or below the reorder point. Replenishment can be run daily.
- Accurate, timely recording of quantities demanded. SAMS-1 totals the number of parts issued. At the end of each month, the total is averaged to determine the monthly consumption. The RO/ROP is then computed from a 15-or 30-day table, as appropriate.
- Control of funds for expendable. SAMS-1 has the flexibility to cut requisitions off or on, depending upon the fund position of the command. An automatic report is printed to keep the manager informed. Later, when funds are restored, the requisitions are released.

Readiness and Asset Management

Materiel readiness and command assets are managed by the MMC in some instances and by the maintenance battalion in others. (See Figure 6-6.)

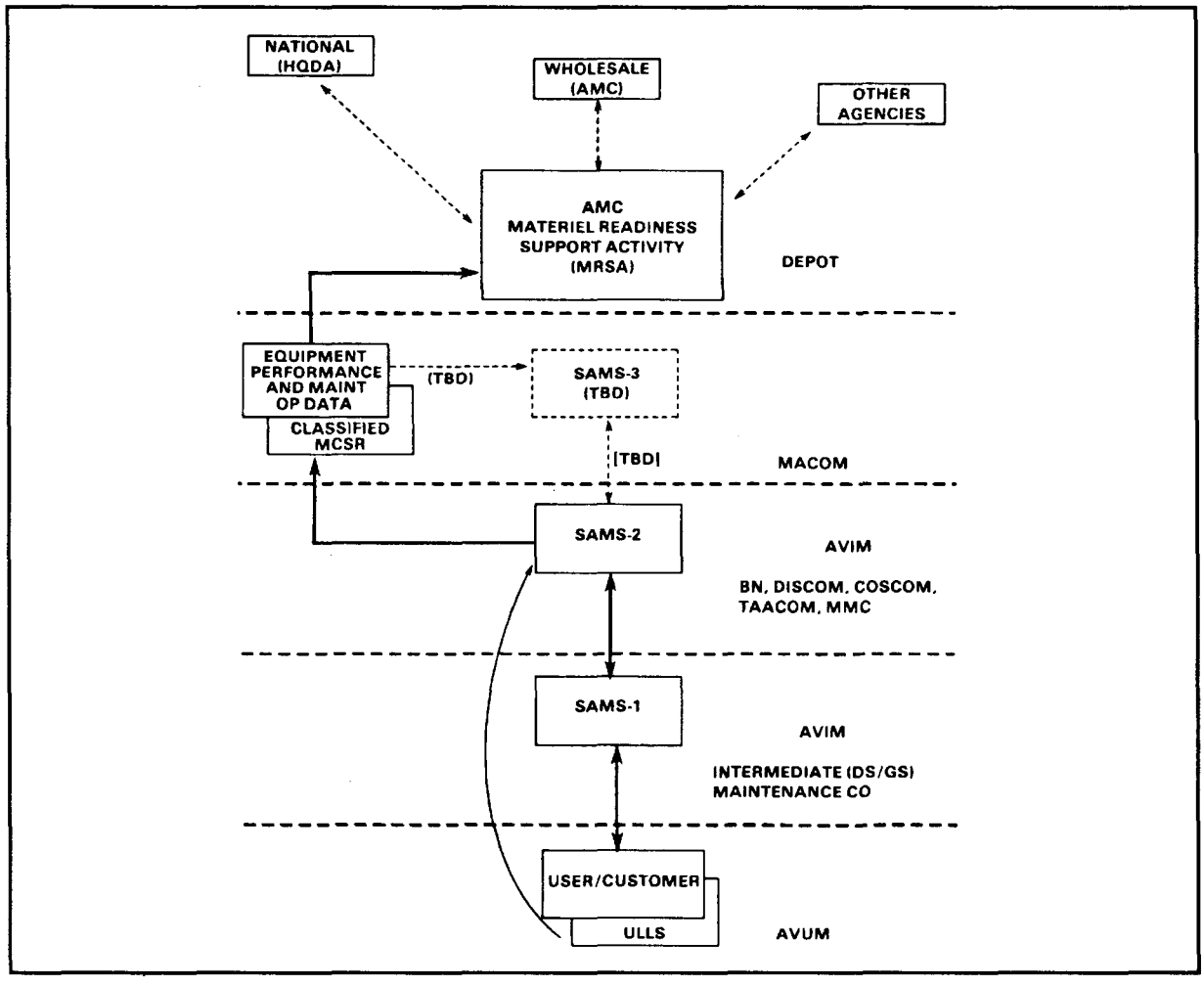


Figure 6-6. Relationship of SAMS to level of management

To assist the materiel readiness officer SAMS-1 provides inoperative data daily, from both customer units and the support unit, to inform the command of—

- Equipment that is inoperable.
- Parts that are required to return the equipment to fully mission-capable status.

SAMS-ldata, when input at SAMS-2, are feeder data for the machine preparation of the monthly materiel condition status report (MCSR). They also—

- Provide feedback information to the SAMS-1 site and its customer units.
- Notify the MRO of the problems that require action.

Work order data from each SAMS-1 site is forwarded to the SAMS-2 site weekly. This data is used by commodity managers to—

- Pinpoint equipment and parts affecting the readiness of units.
- Advise and assist in cross-leveling repair parts to improve materiel readiness.

Command Management

Managers at the company level use SAMS-1 reports to tell them how well they are managing. The manager can make adjustments to bring undesirable conditions back within parameters or guidelines established by command. The command also requests feedback reports from the SAMS-2 site. The command then manages in the broad view, or by functions. Conversely, shop officers manage by processes that affect work orders and shop stock.

Preformatted Reports

There are three types of these reports—

- Automatic reports are generated without being requested.
- Special category reports list records purged from either the document register (closed records) or the SSL audit file and retained as a record.
- By-request reports are optional, a manager must request the reports in order to receive them.

MATERIEL MANAGEMENT CENTERS

Division Materiel Management Center

The DMMC provides materiel management for the division. DMMC is the division's logistics coordinating and control element. It provides materiel management for weapon systems and controls maintenance priorities. It also coordinates and controls supply functions to meet the operational needs of the division.

The DMMC (Figure 6-7) is an element of the DISCOM HHC/MMC. The DMMC chief is directly subordinate to, and receives policy and operational guidance from, the DISCOM commander. The DMMC chief serves as the division materiel management officer. He implements the division and DISCOM commanders' policies.

The DMMC manages division supply and maintenance. A technical supply officer assigned to the MSB is the interface between the MSB and the Class IX supply section of the DMMC. He has frequent contact with the Class IX warehouses and the DMMC. The DMMC also coordinates maintenance and supply of division aircraft resources through its aviation branch. The DISCOM AMCO/AMB also has Class IX support responsibilities similar to the MSB's. See FM 63-2 for more information on the DMMC.

Aviation Branch

The aviation branch performs materiel management for aeronautical and airdrop equipment and test equipment that is used with assigned materiel. Equipment includes materiel for aircraft and airdrop, avionics, aircraft armament, and related test equipment. This branch is typically staffed with an aviation materiel officer and an aircraft maintenance manager.

Aviation Materiel Officer

The aviation materiel officer is responsible for exercising staff supervision over aviation maintenance activities. These include classification and diagnosis of malfunctions, repair and replacement of parts, overhaul of components, and testing and final inspection of equipment. In the event of an AVIM work

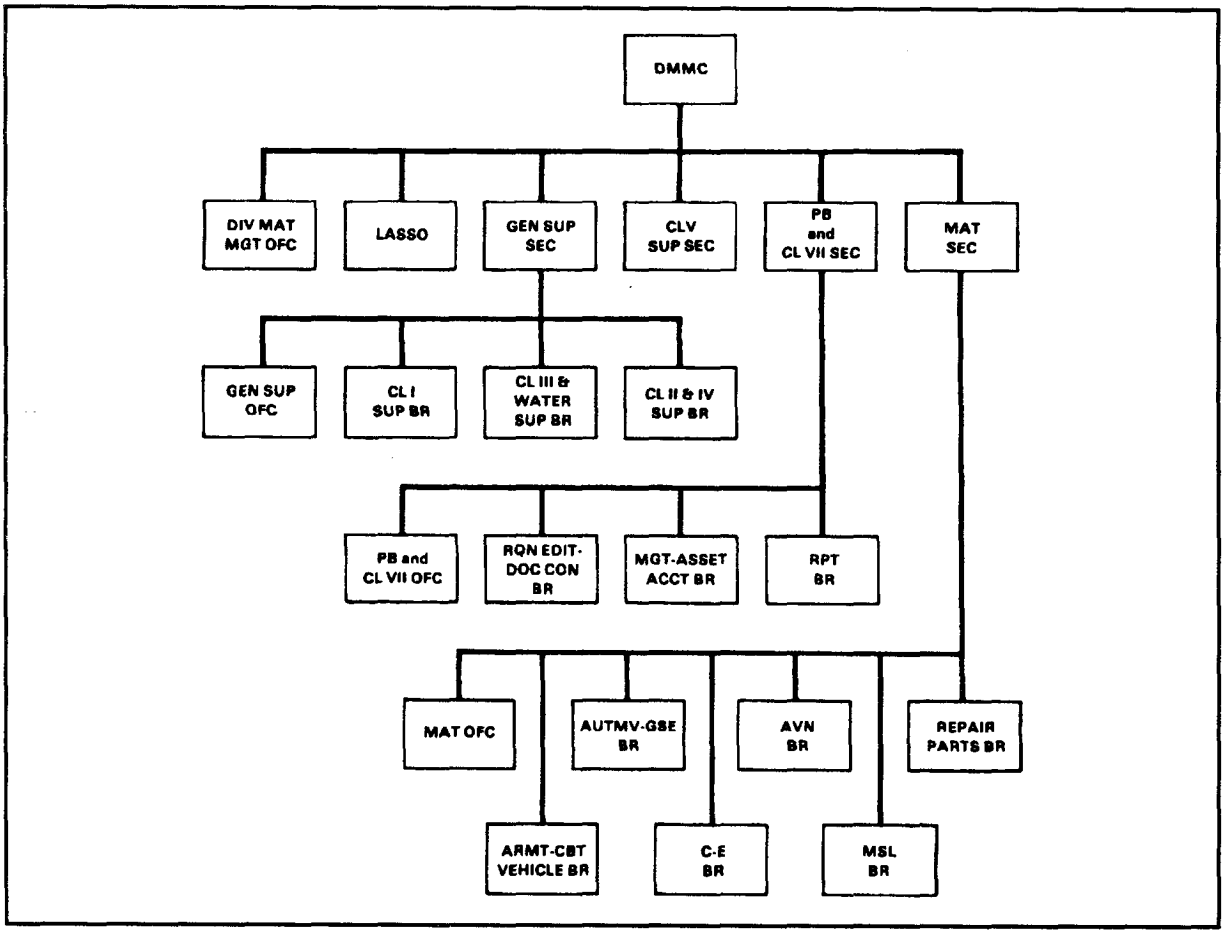


Figure 6-7. Division materiel management center

overload, this officer coordinates passback to the corps MNC.

Aircraft Maintenance Manager

The aircraft maintenance manager supervises aircraft maintenance. He also applies production control principles and procedures to AVIM procedures, using reports generated from SARSS and SAMS.

Supply Procedures

The job of Class IX supply in the division is shared by the DSU/AMCO and the DMMC. The DSU/AMCO receives, stores, issues, and turns in the parts. Supply personnel in the materiel section of the DMMC manage and account for the Class IX inventory. They use demand history and command-directed actions to help them do this.

To prevent overstockage in the DSU/AMCO, forward stockage points for class IX are restricted to 10 days of supply. The DMMC decides the type of items that are physically located in the forward area. Selection is coordinated with the ASL platoon leader and the AMCO commander. It is based on the PLLs of the units to be supported from the forward locations and on the immediate mobility needs of forward support maintenance units.

For most Class IX supplies, using units submit their requests (usually DA Form 2765) to their designated DS activity. Reparable exchange for selected reparable items (including components and subassemblies) is handled on the basis of simple exchange of the unserviceable item for a serviceable item. If the unit does not have an unserviceable item to exchange, it must submit a request (DA Form 2765-1) for the item. In somecases, controlled exchange and cannibalization may be required to obtain Class IX supplies.

Customers in the BSA submit their requests to the maintenance company in the aircraft support element. Customers in the DSA submit their requests directly to the specified maintenance operating unit (light maintenance company, AMCO/AMB, or missile support company). The supporting maintenance operating unit in the BSA or DSA will usually pass requests directly to the DMMC. This permits the DMMC to update required records, cross-level stocks, and process requests to the COSCOM MMC.

Class IX items arriving in the division are received by appropriate maintenance operating units in the DSA and reported to the DMMC. Nonstocked items are forwarded directly to the user in the DSA or to users located in the BSA. Maintenance operating units employed in the BSA and in the DSA store Class IX items and issue them to their customers. All issues are reported to the DMMC for updating of records. Turn-ins are handled in the same manner as receipts; they are also reported to the DMMC.

Class IX items stocked by maintenance operating units located in the DSA are distributed–

- To customers located in the DSA by any combination of unit pickup.
- To forward support maintenance elements located in the BSA by division or nondivision aircraft in emergencies. (ALOC must be established for NMCS repair parts.)

Class IX items stocked by forward support maintenance elements in the BSA are distributed to their supported customers by unit pickup and by DISCOM or nondivision transportation.

Corps Support Command Materiel Management Center

The COSCOM MMC is the heart of the corps-level supply and maintenance management system (Figure 6-8). It performs integrated supply and AVIM maintenance management for all classes of supply (except maps, medical, and COMSEC) for which the COSCOM has jurisdiction and responsibility. The MMC acts on the requirements of supported forces.

The MMC consists of materiel management divisions which are aligned with those of the TAACOM MMC, the TAMMC, and the AMC NICPs. The center functions under the operational control of the COSCOM ACofS, Materiel, and is commanded by the center commander, who also serves as the COSCOM deputy ACofS, Materiel. Each division exercises total day-to-day integrated materiel management of assigned commodities. The aviation division handles

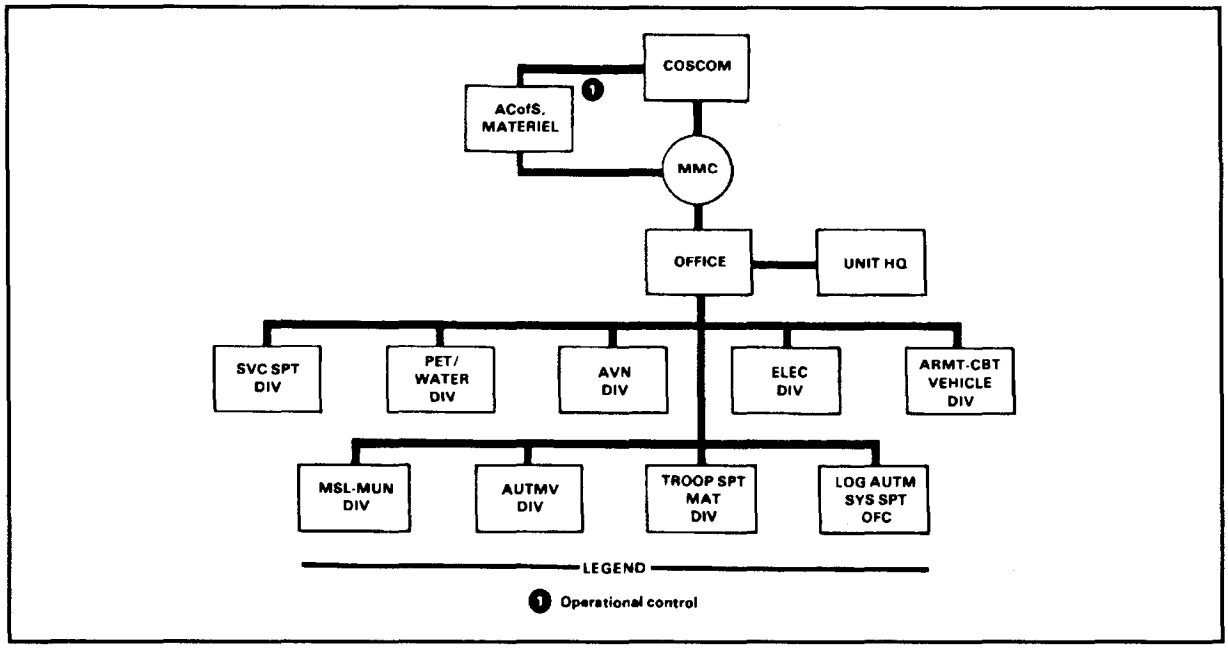


Figure 6-8. COSCOM MMC

aviation materiel management. See FM 54-23 for additional information on the corps MMC.

Aviation Division

This division performs integrated materiel management for aeronautical and airdrop equipment and test equipment that is part of or used with assigned materiel. The division manages MATCAT H items and provides guidance and monitors corps stockage of AIMI. Materiel managers of this division are responsible for managing a variety of supplies and materiel. Equipment includes materiel for aircraft and airdrop, avionics, aircraft armament, and related test equipment.

The aviation division is organized as shown in Figure 6-9. Functions of each branch are discussed in the following paragraphs. A functional branch breakdown within the division permits special management of assigned commodities. This type of management provides centralized control of decentralized operations.

Aviation Division Office

Personnel assigned to the aviation division office include an aviation materiel officer, a chief aviation materiel NCO, and a clerk-typist.

The aviation materiel officer (with the advice and assistance of the branch chiefs) plans, directs, and supervises the division's operations. Together, they manage the day-to-day aviation assets of the corps and aviation equipment, including repair parts and specialized equipment. The aviation materiel officer refers materiel problems that deviate from the routine to the COSCOM ACofS, Materiel, as directed by the MMC commander. The ACofS, Materiel, coordinates materiel management problems that require top-level decisions with the corps G4.

The chief aviation materiel sergeant is the senior NCO in the division. Responsibilities of the senior NCO include—

- Maintaining suspenses.
- Maintaining administrative files.
- Accounting for personnel.

Aviation Equipment Supply Branch

Aviation equipment supply for the corps is managed by the aviation equipment supply branch. This branch manages day-to-day aviation equipment supply support for aircraft and airdrop, avionics, aircraft

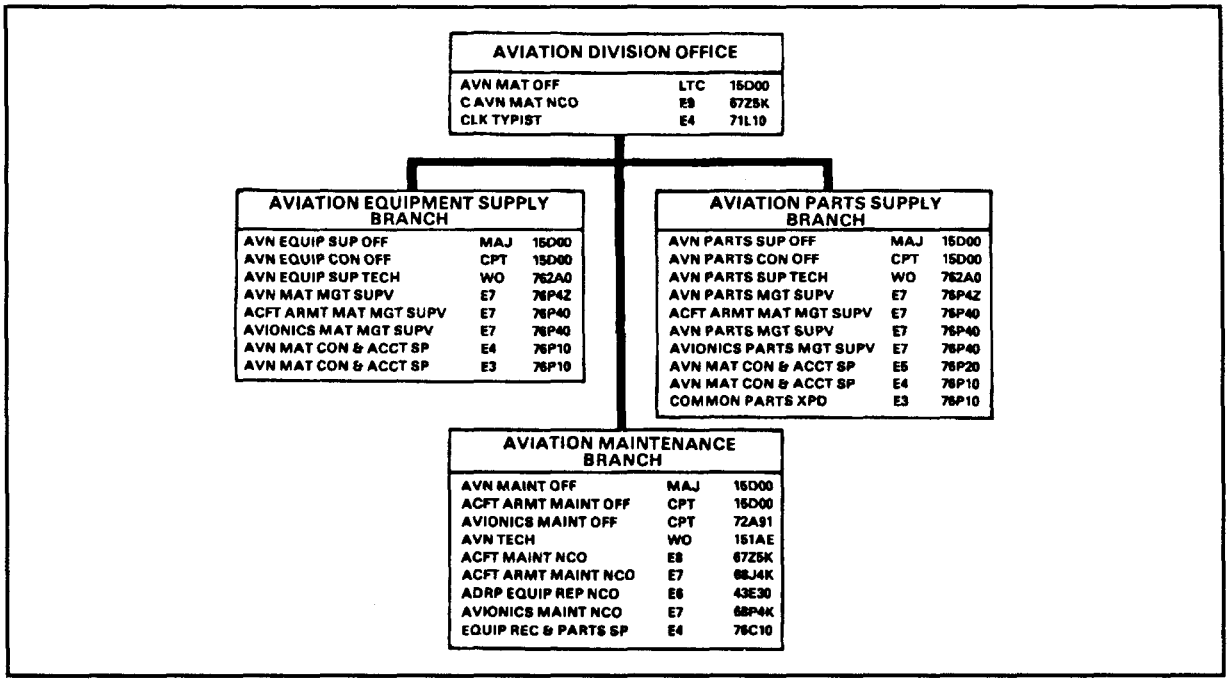


Figure 6-9. Typical organization and staffing of aviation division

armament, and related test equipment. See Figure 6-9 for a list of personnel in the aviation equipment supply branch. Personnel resources are subject to change. Check the latest TOE or MTOE for current Staffing.

Commodity managers of the aviation equipment supply branch implement policies and plans of the COSCOM ACofS, Materiel; MMC commanders and the chief, aviation division. They—

- Establish realistic requisitioning objectives and initiate their timely review through supply control studies.
- Maintain stock record accountability for Class VII supplies within the corps.
- Ensure that timely supply support is provided to the customer.
- Monitor requisition objectives created by the automated supply system in use (SAILS) and establish mandatory stockage levels for items that are not automatically stocked, stored, and issued through the SAILS software program.
- Monitor the functions of the automated supply system.
- Develop operating procedures and prepare distribution plans.
- Implement policies outlined in AR 710-1, AR 710-2, and TM 38-L03 series for operation of the stock record account.

The aviation equipment supply branch manages Class VII requisitions for TOE equipment. It—

- Processes them on a daily basis and follows upon them as required.
- Assists the equipment authorization branch, service support division, by cross-leveling aviation equipment already in the corps.
- Recognizes TOE or MTOE shortages and fills requisitions.
- Coordinates with TAMMC and NICPs to fill requisitions.
- Handles corpswide distribution problems.

Aviation Parts Supply Branch

The aviation parts supply branch manages day-to-day supply actions for aviation equipment. See Figure 6-9 for a list of personnel in the aviation parts supply branch. Personnel resources are subject to change. Check the latest TOE or MTOE for current staffing. Branch personnel implement policies and plans of the COSCOM ACofS, Materiel; the MMC commander; and the chief, aviation division. They—

- Recommend cross leveling of repair parts.
- Review output from the MCS module of the maintenance reporting and management (MRM) system to monitor all aspects of supply; determine trends in operational readiness.
- Maintain Class IX ASLs.

The aviation parts supply branch—

- Manages all aviation repair parts (Class IX).
- Processes requisitions daily and follows upon them as required.
- Handles corpswide distribution problems.
- Follows up day-to-day SAILS transactions.

Requisitions for repair parts are initiated by corps AVIM units and DISCOM MMCs. These requirements are placed directly on the COSCOM MMC. If the repair parts companies within the COSCOM. do not have required items or quantities on hand, the COSCOM MMC transmits the requirement to CONUS NICPs. (Requirements for selected items controlled by the TAMMC, however, flow to the TAMMC.)

Aviation Maintenance Branch

The aviation maintenance branch manages the maintenance system for aviation equipment managed by the aviation division. These managers are the single points of contact for maintenance management of aviation equipment in the corps.

See Figure 6-9 for a list of personnel in the aviation maintenance branch. Personnel resources are subject to change. Check the latest TOE or MTOE for current staffing.

Branch personnel implement policies and plans of the COSCOM ACofS, Materiel; the MMC commander; and the chief, aviation division.

Aviation maintenance branch personnel—

- Develop, in coordination with the aviation equipment supply and repair parts branches,

instruction for AVIM units on evacuation of unserviceable aircraft requiring higher-level maintenance. Similarly, the branch develops instructions for AMBs in the COSCOM on the evacuation of unserviceable aviation materiel and scrap. Instructions are developed under automated procedures and provided to the automatic data processing center (ADPC), which provides shipping instructions to the AVIM units.

- Provide guidance to command and control elements on processing aviation materiel.
- Provide repair priorities to the aviation maintenance battalion.
- Provide data to COSCOM staff and higher headquarters on production, deadlines, and problem areas.
- Inform COSCOM and corps aviation units of maintenance management data and report requirements from corps G4.
- Coordinate with the supply branch on repair parts requirements for maintenance of specific items that may be in short supply and requirements for cannibalization, controlled exchange, or parts fabrication.
- Make recommendations on tailoring units and forming like sections from several units to perform high-priority maintenance.
- Review reports and data submitted by subordinate AVIM units and division support commands. Branch personnel provide copies or extracts of these reports for use by the maintenance staff. They evaluate reports and listings processed by the ADPC and provide them with appropriate recommendations to the ACofS, Materiel.
- Act as expediters when estimated delivery date is unsatisfactory.

Theater Army Area Materiel Management Center

The MMC (Figure 6-10) is assigned to the TAACOM under the staff supervision of the ACofS, Materiel, and the direct supervision of the Deputy ACofS, Materiel Management, who is also the commander of the MMC. It serves as a control center for materiel activities in the TAACOM through daily monitoring of supply and maintenance. actions. The MMC performs

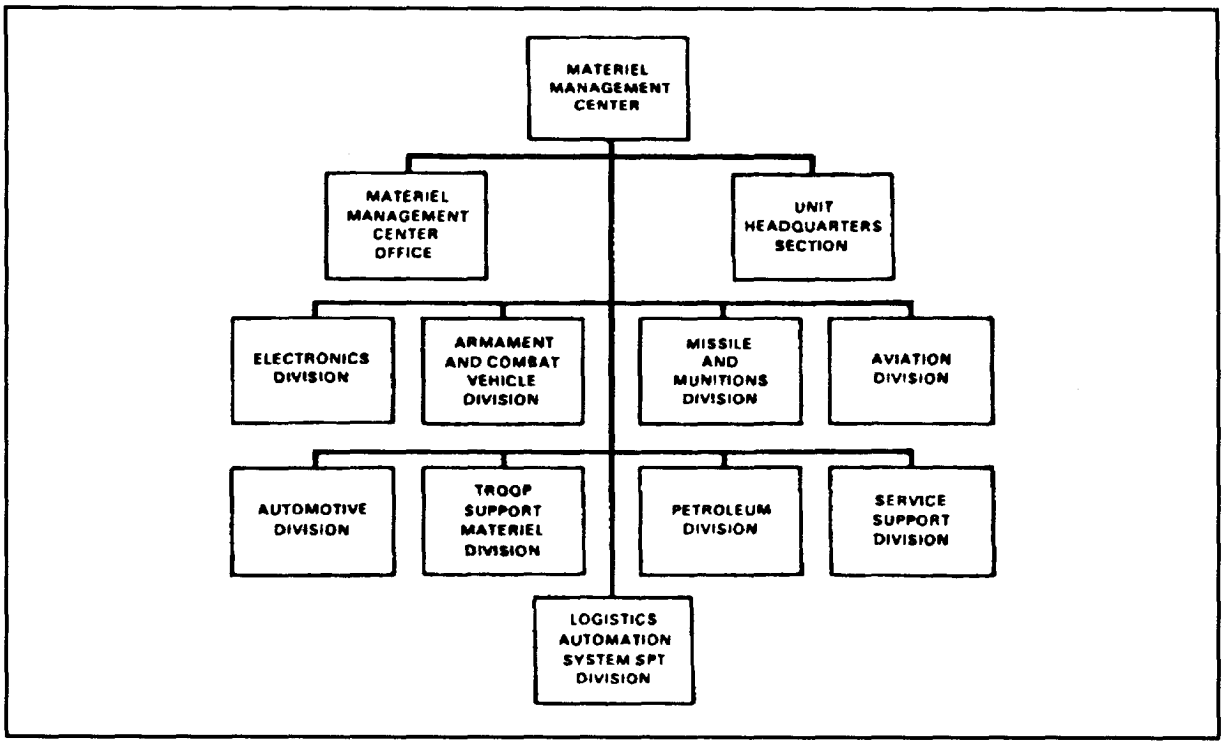


Figure 6-10. TAACOM MMC Organization

integrated supply and maintenance management in the TAACOM for ail classes of supply (except medical and map supply) and for maintenance activities that the TAACOM has control and responsibility for. The TAACOM MMC does not have responsibility for managing maintenance and supply of TA stocks that may be stored and distributed by TAACOM units, unless so directed by TA. Aviation materiel management is handled by the aviation division, which is organized with personnel and functions similar to those of DMMC/CMMC.

Theater Army Materiel Management Center

The TAMMC is the nerve center for theater supply and maintenance operations. A typical TAMMC organization is shown in Figure 6-11. TAMMC tracks supplies designated to be critical by the TA commander. It also serves as the prime interface between the theater and the CONUS sustaining base. To assist supply transactions, the TAMMC is connected electronically to the TAMCA, the TAACOM MMCs, the COSCOM MMCs, and the CONUS sustaining base (see Figure 6-12). It coordinates assigned tasks, objectives, and priorities to support the theater mission. The TAMMC may also task TAACOM intermediate (GS) maintenance units to provide maintenance support when directed by the TA commander.

Critical systems that require intensive management may be assigned a TA logistics system manager (TALSM). The TA commander will provide the TALSM with a charter specifying duties, responsibilities, and authority. The TALASM must be able to identify problems readily, establish priorities, and monitor theater requirements. The TALSM also coordinates with the CONUS base, TA staff elements, host nations, other service components, allied commands, and MMCs in the DISCOM, corps, and TAACOM. Aviation materiel management is handled by the troop support and aviation directorate,

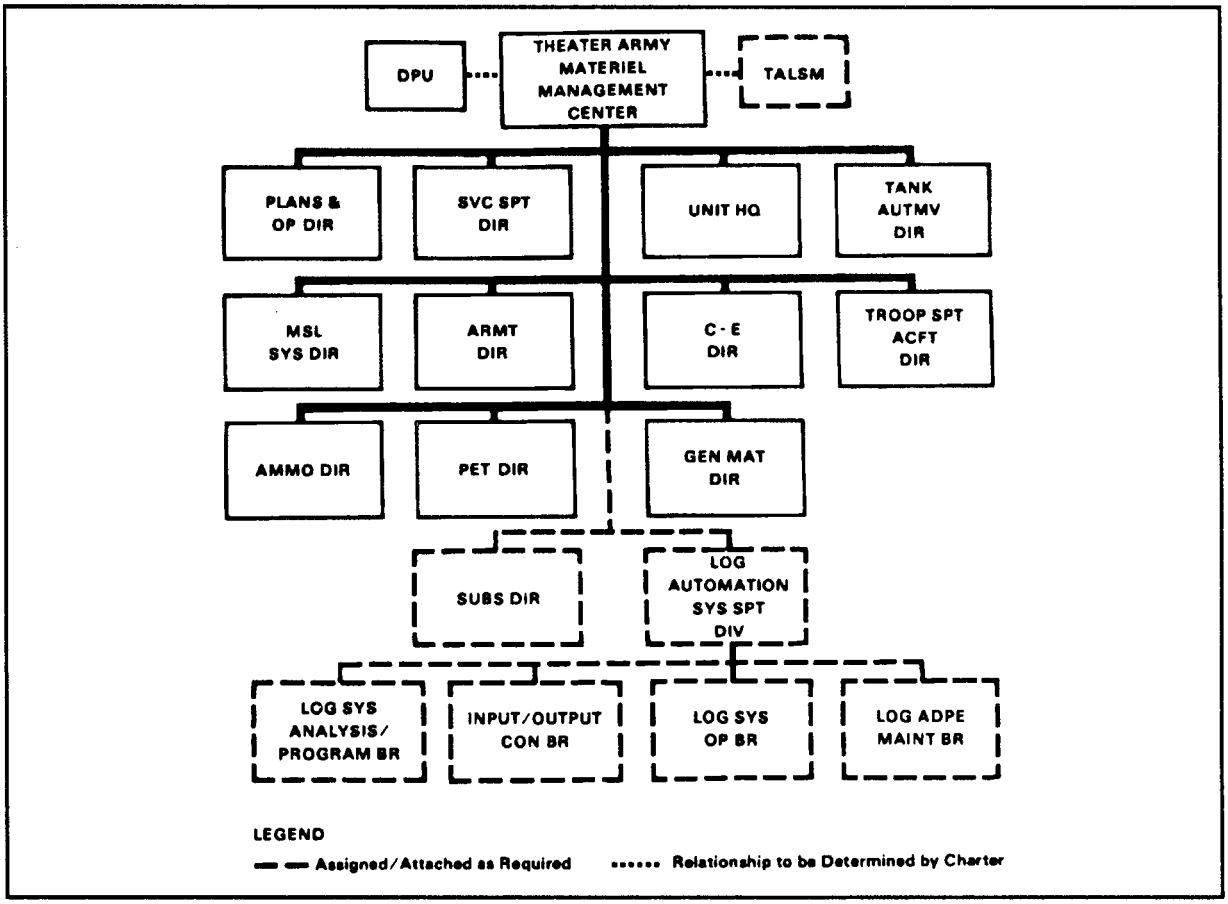


Figure 6-11. Theater army materiel management center

which is organized with personnel and functions similar to those of DENC/CMNC/TAACOM.

See Figures 6-12 and 6-13 for ALOC and surface supply requisition and materiel flow respectively.

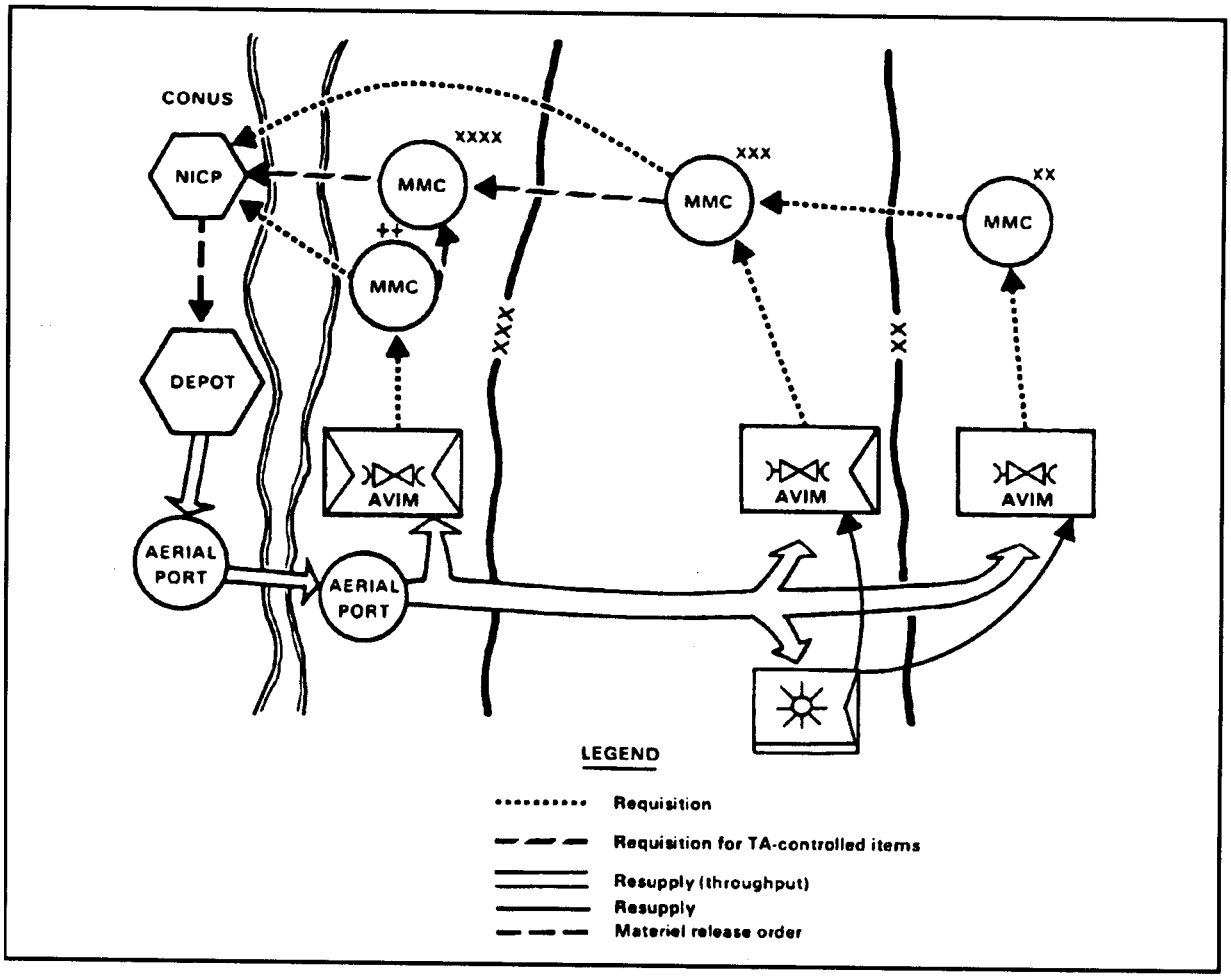


Figure 6-12. Supply request and materiel flow for Class IX and maintenance-related Class II (air-eligible) supplies in support of ALOC-designated units

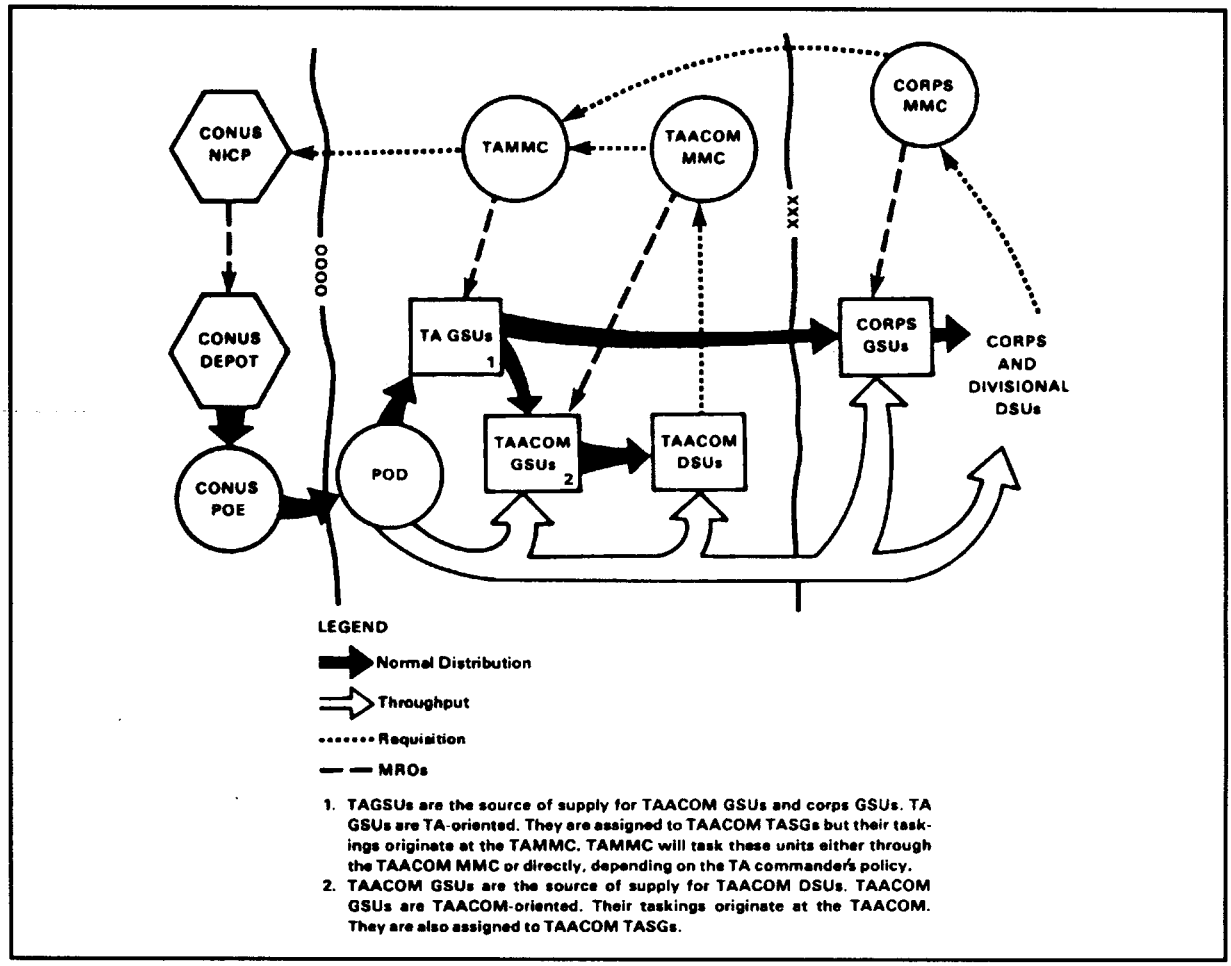


Figure 6-13. Surface supply requisition and materiel flow

CHAPTER 7

AVIATION MAINTENANCE IN UNUSUAL ENVIRONMENTS

Commanders must be aware of the unique implications of performing aircraft maintenance in unusual environments. They must ensure that adequate preparations are made before operating in such areas. Often, maintenance procedures used in one environment will not be appropriate for another.

Operations and maintenance may be conducted in desert (hot), jungle, mountain, or extremely cold climates. They may occur at night or in areas contaminated with nuclear, biological, chemical (NBC) contaminants. In general, commanders must look at factors like—

- Modifications to normal repair parts stockage levels. These include increased numbers of filters, bearings, and seals when operating in wind and sand environments.
- Mobility restriction for example, mountains, heavy foliage, ice, and so forth.
- Effect on personnel and equipment performance. These include altitude, excessive heat, cold, and so forth.
- Requirements for light discipline during night operations.
- Communications restrictions.
- Special shelter requirements.
- Modifications to normal scheduled and preventive maintenance.
- Specialized equipment and clothing requirements.

DESERT OPERATIONS

There is sand in the desert!

Sand, heat, wind and blowing dust, long lines of communication and poor roads present many unique maintenance problems in desert operations. This is not business as usual. All aviation functions must adapt to survive in the desert environment.

Dust and sand can easily cause failure of such items as cyclic and collective electrical switches, digital entry keyboards, radio tuning knobs, and circuit breakers. Sand erosion causes wear on rotor heads, leading edges of rotor blades, Teflon bearings, and all turbine engine blades. Blowing sand gradually degrades optical instruments and windscreens by pitting and scratching. Sand, dirt, and dust accumulation on oil cooler surfaces creates loss of cooling efficiency in an environment where that ability is paramount. Sand mixed with oil forms an abrasive paste. Lube fittings and bearing seals require frequent inspection. If they are missing, sand will enter the housing and cause bearing failure. Heat soaking of sensitive electronic "black boxes" will produce increased failures and demands on aircraft cooling systems.

Preventative maintenance is vital in the desert. It entails the need for more frequent inspections, daily cleaning, and engine flushing. Maintenance practices should emphasize measures to keep sand from contaminating systems and equipment. As much as possible, all maintenance should be done in a shelter. This will help prevent sand from entering the internal working parts of larger assemblies.

There are currently two shelter options over and above organic shelters. The unit maintenance tent is a canvas structure built on a metal frame. This shelter, available through normal supply channels, can accommodate one small aircraft. The second option is a "clam shell," which is a commercial hangar that has many available options. This shelter, available through the Aviation and Troop Command (ATCOM), can accommodate several large aircraft. Both tents are mobile, but they require a significant amount of cargo space and manpower commensurate with their respective sizes.

The two most significant areas of increased maintenance are rotor blades and turbine engines. These items will multiply the maintenance work load many times depending on the unit's basing and flying techniques.

Engine problems occur on all aircraft and include auxiliary power units. Operations Desert Shield/Desert Storm reported six accidents directly related to engine failure or loss of power. Different systems are more or less susceptible to the effects of sand.

Many systems rely on an inlet particle system to reduce engine wear. Keep in mind that these systems are not efficient at idle RPM. Ground runs must be kept at an absolute minimum. Filtration kits for all aircraft are now available through ATCOM readiness directorate. Since none of these systems are 100 percent effective, new hot-end flush procedures were developed. Instead of compressor cleaning, emphasis is on the power turbine section. Sand can accumulate in the blades of the power-generating wheels. This sand will eventually glaze, which inhibits cooling and heat expansion. In-flight health indicator check procedures are available but require training and close monitoring as a predictive tool.

Rotor blades require one of two current solutions. Blade painting requires relatively high repetition and inspection. Blade taping requires skilled application and an increase in rotor track and balance effort. Both solutions are short-term and require diligence by the crew during preflight and postflight inspections.

Teflon bearings also will see a rise in failures. Two current strategies include water flushing and protective dust boots. These procedures and kits are available through ATCOM.

On those systems which have a pressurized air system for cooling, extra filtration and decreasing cleaning intervals will solve most problems.

Protective covers should be used at all times. Optics can be protected in flight by stowing during landing, take-off, and FARP operations. Windscreens, blade covers, nose covers, and engine inlet covers should be installed when aircraft are not in use. Covers should have a tight tit to avoid flapping. Sand on the underside of a vibrating cover can scratch the windscreen. Use of covers combined with smart parking orientation will alleviate some “heat soaking” problems. A climatic heat aircraft protective system (CHAPS) is a camouflage screen designed to protect the aircraft. This system will not weather a full-fledged blowing dust storm.

The AN / ALQ 144 is very susceptible to main bearing failure in a sandy environment. Aircraft survivability equipment (ASE) should be covered whenever the aircraft is not in use.

AVUM requirements for assistance from AVIM units may increase. The quality control mission broadens to train all flight crew personnel in the additional inspection requirements. Flying crews will also be training on desert flying techniques which will complement the maintenance effort.

Increased AVUM mobility requirements will place greater emphasis on AVIM contact team support. The distance between AVUM and AVIM units will increase, however, creating problems in communications and in locating units. Contact teams must have a global positioning system receiver.

Maintenance personnel will consume much more water and should be more closely supervised during the heat of the day. Productivity will decrease as the environment becomes harsher. Reverse-cycle maintenance may be a solution to adverse daylight conditions.

ULLS and TACCS automation hardware will require added preventative maintenance emphasis to keep them operational. The two worst enemies of a computer, heat and dust, are everywhere in the desert.

Many lessons learned are available from units which have participated in NTC rotations, Bright Star exercises, and Operations Desert Shield and Desert Storm. Remember, there is sand in the desert. It is not business as usual.

For more information on desert operations, refer to FM 90-3 (HTF).

JUNGLE OPERATIONS

In jungle operations, heat and moisture affect equipment. Lenses and dials quickly fog with internal moisture. Electrical connections corrode quickly and battery life is shorter than normal. Weapons tend to rust quickly and must be cleaned and oiled more often than in other areas. Canvas rots and rubber deteriorates much faster. An aggressive corrosion-prevention program should be initiated. All parts and systems are susceptible to corrosion. Avionics are particularly sensitive to moisture, condensation, and corrosion.

Preventive maintenance practices must be given greater emphasis, and scheduled maintenance must be performed more often than in temperate climates. Higher maintenance requirements, combined with transportation difficulties, may require units to carry increased loads of repair parts. PLLs must reflect the increased turnover of those parts that deteriorate or wear out faster in the jungle.

Several factors greatly influence the type of transportation that can be used and the way maintenance is performed. These factors include the absence of adequate trails, roads, and waterways; the density of natural growth; the number of rainy seasons; the security of routes; and the general nature of the terrain in a jungle environment. AVUM units should request on-site AVIM maintenance to the most feasible extent. Air delivery of AVIM maintenance support teams (MSTs) to the AVUM location will be used whenever practical. Aircraft may be required to deliver repair parts and evacuate materiel.

When units are widely dispersed, AVIM units may have to augment the AVUM maintenance effort and perform more extensive maintenance than in normal operations. This is due to difficulties in evacuating materiel for backup and overflow maintenance.

Because of the jungle terrain, fewer good sites are available for maintenance operations. Considerable engineer effort may be required to prepare suitable locations. Therefore, maintenance units may be unable to deploy as often as they would in more favorable terrain. In areas where monsoon rains occur, maintenance sites must be selected carefully. These limitations may force maintenance units to locate with other types of units. This simplifies the problems of security from ground attack for such areas and is likely to be necessary in areas of large-scale guerrilla activity. However, such concentrations present good targets for air attack and require provisions for air defense.

For more details on jungle operations, refer to FM 90-5 (HTF).

MOUNTAIN OPERATIONS

Maintenance in mountain operations can be very difficult. Rugged terrain and abrupt changes in elevations limit the reliability of roads and suitable areas for unit locations. High altitudes and weather affect the performance of troops and equipment. Personnel must be trained to adapt to high altitudes, and equipment may need adjustment to operate efficiently at higher elevations.

Aircraft may be needed to move repair parts and contact teams on site and to evacuate unserviceable items.

AVIM units must be located as close as practical to the AVUM units they support. Maintenance support is critical in mountain areas. Therefore, the commander making area assignments must provide units with sufficient space to perform their maintenance functions.

For more details on mountain operations, refer to FM 90-6.

COLD WEATHER OPERATIONS

The terrain and climate of northern regions, and other areas similar in terrain and climate, complicate military operations. Operations in snow, ice, and extremely cold conditions require special training, personnel acclimation, and operational techniques.

Trafficability is one of the biggest problems in northern operations. This is especially true during spring breakup and in summer when the ground thaws and the ice in streams and lakes melts. With few roads in such regions, track-laying vehicles of the low-ground-pressure type may provide the only means of cross-country mobility. All ground movement is hampered by mud, muskeg, swamp, marsh, and open water in spring and summer. Therefore, thorough ground reconnaissance is necessary for overland movement. Extreme cold improves trafficability, although tracked vehicles and sleds may be required for movement. Weather conditions in winter may limit the use of aircraft.

Northern operations require a considerable amount of specialized equipment, such as tracked vehicles, sleds, heated shelters, and heated shop facilities. Every item of equipment is affected by extreme cold and snow in the winter and by mud and water in the summer. Extreme conditions increase wear and tear on equipment and increase the quantity and variety of parts required for maintenance.

Extreme climatic conditions hamper on-site maintenance operations and curtail personnel effectiveness. As a result, maintenance performed on site, as well as recovery of disabled equipment, will take more time and effort. Evacuation of unserviceable items from using units to support maintenance is also more difficult.

For more details on operations in northern regions, refer to FMs 31-70 and 31-71.

NIGHT AIRCRAFT MAINTENANCE

Battle doctrine calls for around-the-clock aviation operations. These operations, in turn, needfully productive, 24-hour-per-day aircraft maintenance capabilities. Maintenance done at night on aircraft that

have flown all day allows those same aircraft to be assigned to missions early the next day. This avoids their being "stacked up" in maintenance with night-flying aircraft for the first part of the day.

Light discipline is, of course, imperative to night maintenance activities on the battlefield. The closer to the main battle area a unit operates, the more restrictive light suppression precautions must be. Units operating relatively close to the battle area need to perform night maintenance inside closed blackout shelters. The approach would be with self-powered light under lightweight portable blackout enclosures that can be easily moved from one location to another. Units should perform forward night maintenance inside large (full-aircraft) lighted blackout shelters only if enough internal lighting can be provided without using noise-producing power generators.

Units operating toward the rear will normally have more latitude concerning the distance from which they must consider enemy detection. Rigid blackout provisions will still apply to all "inside" white light work, but certain tasks will be allowable outside, with subdued lighting devices. The degree of detection avoidance on the battlefield will be determined on a situation-by-situation basis. Generally, units operating farthest to the rear will be those whose prime mission is performing maintenance functions (AVIM). Due to the large task volume, some of the work load will have to be handled outside available shelters.

METT-T will play a major role in determining the extent of night maintenance that can be safely and effectively used. In the open-desert-type Mideast terrain, the faintest light may be visible from a long distance. That same light would not be detected from a comparable distance in the forested, hilly European scenario.

Certain tasks are difficult to perform at night under light-discipline conditions. For example, maintenance jobs that require rotor blade turning or engine run (rotor track, fuel control adjustment, and so forth) must be done outside. Sometimes these require significant area lighting. Then, adequate light discipline could not be imposed, and tasks would have to be delayed until daylight.

A single all-encompassing, definitive concept for night aircraft maintenance operations is not feasible. Each organization must establish and alter its plan for implementing night operations as it meets specific environmental conditions and threat changes on the battlefield. For example, as a unit moves forward into more open terrain, its night maintenance considerations will differ considerably from when it moves rearward into a more closed environment.

Preparation

Baseline criteria must be developed to help determine the amount of light discipline required in various tactical situations. A number of factors will influence the determination: estimated enemy detection capabilities, terrain, weather, level of maintenance, type of aircraft requiring maintenance, and so forth.

Systematic production control procedures must be developed to ensure safe, efficient continuity of work on a 24-hour basis. The assignment of work and flow of managerial paperwork and records must be as accurate and efficient under multishift operations as under single-shift (daytime) maintenance.

For night maintenance, units are staffed for 12-hour operations. Aviation units with AVUM capabilities should organize personnel resources in teams that will allow around-the-clock maintenance capability. As a rule, the day shift maintenance effort should equal approximately 80 percent of the AVUM potential effort. Night maintenance should represent 20 percent of the unit's effort. AVIM units have greater night maintenance potential because they are further to the rear. Light and noise disciplines are still major considerations, but they are less significant than for AVUM units. AVUM platoons/companies should request AVIM augmentation or MSTs for extended maintenance operations. AVIM units must provide support consistent with the combat mission and needs of their supported AVUM units.

Quality Control

Quality control procedures for night maintenance must be especially rigid. The potential for "missing something" increases as the adequacy of the work environment diminishes. Of particular concern are the visual restrictions associated with working in subdued (red, green) lighting as opposed to white light. Also, QC tasks requiring maintenance operational checks or test flights may have to wait until daylight for sign-off. Procedures and criteria for the night aircraft maintenance program (NAMP) must be developed. The main concern is that quality and SOF

standards are maintained at the same level as for daytime maintenance.

Transition Between Shifts

The chances of something "falling through the crack" increase when a wide range of maintenance tasks are interrupted and passed for completion to work crews other than those who started them. This particularly holds true at AVIM level. Administrative controls, such as detailed coordination meetings between shift supervisors, must be inherent to units using 24-hour maintenance operations. Supervisors must avoid any tendency to rush or circumvent such requirements so that personnel can "get on with the work." The transition from day to night shift must be handled efficiently.

Physiological Factors

Obviously, vision is reduced during night operations, but numerous other human factors can affect night maintenance. A comprehensive, detailed human factors indoctrination program must be developed for supervisors and repairers. Adjustment periods should be established, to the extent possible, to allow newly assigned personnel to adapt to night work. A sudden reversal of normal sleep patterns can result in an unavoidable tendency to become drowsy while performing critical maintenance tasks. Further, personnel working at night might have a psychological tendency to save the tough jobs for the daytime crew. This is particularly true during low-intensity operations, and many other examples could be cited. Some physiological factors that must be considered in night aircraft maintenance follow:

- The eyes normally require about 40 minutes to fully adapt to darkness.
- A loss of depth perception and color distinction is experienced at night.
- Smoking either three cigarettes in rapid succession or 20 to 30 cigarettes a day reduces night vision by approximately 20 percent.
- The danger of FOD increases at night.
- Fatigue affects a repairer's night vision and muscular actions.
- Diet affects night vision-individuals should eat only highly nutritious foods.

NUCLEAR BIOLOGICAL, AND CHEMICAL OPERATIONS

This discussion addresses the different types of NBC operations, their effects on the unit's mission, and proper decontamination procedures for personnel and equipment. For more detailed information on decontamination procedures, refer to FM 3-100.

NBC Threat

Threat forces around the world have inventories of NBC munitions and agents (see Appendix A). Some threat vehicles and aircraft possess overpressure systems, filtration devices, and detection systems to protect their crews. Aircraft maintenance personnel are often dispersed to locations where NBC detection devices are not available and where qualified medical help may not be readily available. Their missions could be severely affected by chemical and biological agents. The use of chemical or biological agents against US maintenance facilities and units will allow threat forces to isolate vital materiel from the battlefield with little risk of tactical exposure to their own forces. Aviation unit commanders and staff planners at every level must deal with the impact that NBC operations and attacks will have on their unit. They must consider ways to resume operations at the earliest opportunity. Decontamination of unit personnel, equipment, supplies, and operating areas is an arduous, time-consuming task that requires careful, realistic planning. (See Appendix M.)

Aircraft Decontamination

Aircraft frequently operate in small elements (usually of three to six aircraft) with little or no organic ground support. Organic decontamination capability for the aircraft is very limited. Currently, only one M-11 decontamination apparatus and two 1 1/3-quart cans of DS2 are authorized as on-board decontamination equipment. (This decontaminator can be used only on a very small portion of the aircraft surface because it is highly caustic and will destroy most aircraft materiels.) Standard decontaminators and decontamination procedures currently in use will ruin many types of aviation equipment and materiels.

Decontamination efforts can be greatly assisted by the M17 (SANATOR) heater/pump found in chemical companies. This equipment will quickly wash all aircraft and vehicles. The most significant planning consideration is water storage capacity. The M17 is

fielded with a 1580-gallon collapsible water tank. New systems are upgrading this storage capacity to 3000 gallons.

Any type of decontamination is costly. Resources must be diverted from fighting the enemy to decontaminating the aircraft. Therefore, repair personnel must know and practice contamination avoidance first. Contamination avoidance saves time and other resources that would otherwise be used up in decontamination. Simple, common sense measures can be used to avoid contamination or at least reduce its extent. (See FM 3-3 for information on contamination avoidance.) Some measures that avoid contamination are—

- Increase the use of covers when not flying. Keep maintenance areas covered and aircraft doors closed.
- Avoid spreading suspected contamination onto areas being inspected by touching or shaking them. Many inspection points can be inspected visually.
- Provide overhead cover to parked aircraft if possible.

At times, contamination cannot be avoided. Aircrews can survive with NBC protective equipment. (See FM 3-4 for information on individual and collective protection.) However, when aircraft are contaminated, the mission becomes very difficult and crew efficiency steadily degrades. Decontamination can stop the degradation, but, aside from being costly, special problems occur when decontaminating aviation equipment.

The decontamination method as well as the extent of decontamination depends on the specific activities of the aircraft. Most activities require partial decontamination. Surfaces are washed with decontaminators to remove gross contamination from agents that are harmful through skin contact. Some of the agent will probably have soaked into the surface, however. Even after decontamination, these surfaces will still give off agent vapors, and the decontamination agent itself will exude from the materiels. Individuals should avoid any contact of bare skin with such surfaces. If they absorb the agent through the skin, they could become casualties. Complete decontamination of aircraft components is necessary to allow maintenance personnel to work on the aircraft without wearing cumbersome protective gear.

Partial aviation decontamination operations are normally done in the FARP and AVUM areas. To a limited extent, they are also done in divisional and nondivisional (corps) AVIM areas. Complete decontamination of aircraft components will be done at divisional and nondivisional (corps) AVIM areas. The procedures at each activity will specify where the decontamination support will come from, if it is required. For example, divisional chemical company personnel and their equipment might be required to support divisional AVIM areas.

Impact on Maintenance

Support Concept

Maintenance personnel must be prepared to provide maintenance support on the integrated battlefield. To accomplish this, individual soldiers must be trained to survive an initial nuclear or chemical attack and to continue the mission in a toxic environment under great physical and mental stress. The long-term problems caused by contamination make it doubly important that maintenance units protect themselves. When possible, maintenance activities should occupy protected areas, such as underground garages or concrete buildings, to provide cover from liquid chemical agents and shielding from radioactive contamination. Overpressurized shelters like the M20 will protect soldiers doing component maintenance. The M20 will use an existing shelter as a skeleton and conform to its shape and size. Units should establish SOPs for contaminated aircraft and equipment maintenance procedures as follows:

- Inspection and contaminated maintenance collection point procedures.
- Procedures for performing unit-level hasty decontamination or requesting deliberate equipment decontamination from an NBC defense company.
- Procedures for repair without electronic test equipment (in the event equipment is destroyed by blast or electromagnetic pulse [EMP]).
- Responsibilities and procedures for establishing and operating a contaminated-equipment holding area.

Contamination Problems

There are special hazards in working on contaminated equipment—

- Petroleum products tend to trap chemical contaminants.
- An aircraft that is safe for an operator to use without MOPP 4 protection may be unsafe for a mechanic to repair.
- Chemical contaminants may collect in bolt threads, hydraulic fluids, and closed assemblies. A mechanic might break open a component, for example, and be exposed to lethal concentrations of hazardous vapors. Casualties could be high unless all repairs and preventive maintenance on previously contaminated aircraft are done in MOPP 4.
- Oil, grease, and dirt seriously degrade the protective qualities of the chemical overgarment. Mechanics must keep themselves as clean as possible. Extra overgarments should be on hand to replace dirty ones.
- Wet-weather gear helps keep overgarments clean but increases heat buildup and will eventually be penetrated. The combination of protective gear and wet-weather gear provides good (although hot) protection from a combination of toxic chemicals, grease, and oil contamination. Fuel handlers' aprons and field-expedient rubber sleeves can provide some added protection with less heat buildup.

Contamination Control

Do not spread contamination. Do not bring contaminated equipment into a clean shop. Maintenance teams should make every effort to repair contaminated equipment in a contaminated MCP.

Return repaired but contaminated equipment to units that are contaminated, whenever possible. Even if equipment has gone through unit hasty decon, it can still be hazardous to handle. A previously contaminated unit will already be conducting periodic contamination checks and will be able to use the equipment safely because of the precautions being taken.

Contaminated equipment and tools must be stored at a location downwind of clean areas. Every effort must be made to control the spread of contamination. Contaminated aircraft and equipment should not be evacuated for repairs. If AVIM maintenance is required, an MST will be sent forward to effect repairs in the contaminated MCP. AVIM maintenance units should treat all customer equipment as contaminated until inspection proves otherwise.

Use the contaminated to repair the contaminated. Since it is difficult to decontaminate equipment well enough to eliminate risk to mechanics, it may be impractical to decontaminate tools and equipment used to repair contaminated equipment. Segregate tools and equipment that are used to repair contaminated equipment from other tools. Use these already contaminated tools and equipment to repair contaminated equipment. Provide protection from contaminated equipment. At present, the Army's ability to detect contamination in the field is limited. Toxic vapor trapped by oil or held inside a closed assembly may appear at some point during the maintenance process. Because decon cannot guarantee safety for unprotected mechanics, the aviation maintenance officer must decide which MOPP level the mechanics should use. This is a tactical decision. Mechanics should use MOPP levels consistent with the threat and the mission.

Safeguards must be taken to protect people both inside and outside contaminated areas. Chemical agent detection equipment should be operated while contaminated equipment is being repaired. The testing must be a continuous process. Vapor hazards may not be present in open terrain, but as soon as the aircraft is moved into an area where air does not circulate, significant toxic vapors may concentrate.

If contamination is detected after an assembly is opened, it can be decontaminated quickly by flushing with JP-4 diesel fuel or motor gasoline. The unserviceable component must then be marked and taken to the contaminated holding area. There, it can weather or undergo more thorough decon. For repairable assemblies, personnel should either wait until the assembly no longer gives off vapor or replace it with a new assembly. The fuel used for flushing must also be marked as contaminated. It should be dumped in the contaminated sumps at the decon site or disposed of per unit SOP.

Maintenance personnel repairing equipment contaminated with radiation should wear dosimeters and be closely monitored for exposure. They must never exceed exposure levels. When the highest acceptable

levels are reached personnel should be replaced, mission permitting. The amount of radiological contamination that personnel can tolerate varies. It depends on operational exposure guidance and the tactical situation. Priorities for monitoring equipment should go first to the recovery teams, then to inspection point MSTs, and then to the MCP.

Mark aircraft and equipment to protect others. Aircraft and equipment that are contaminated or that have been decontaminated to low-risk levels for operators and crews could still present a serious hazard to mechanics. They need to know that the equipment has been contaminated. Contaminated aircraft must be identified with standard triangular contamination signs on all four sides and at the operator's controls. Write the type and date of contamination on the signs, which should be easily visible from the outside of the aircraft. For nonpersistent agents, signs may not be removed until decon has been verified by a detailed inspection. Contamination signs on aircraft and equipment contaminated with persistent agents will not be removed even after decon.

Maintenance Support Operations

Contaminated equipment maintenance should be performed from a clean area. Work within a clean area can be done at reduced MOPP and with greater efficiency. When NBC attacks have occurred within the support area, the unit must assume that all equipment is contaminated, and the aviation maintenance unit must set up separate inspection points and MCPs. All aircraft, personnel, and supplies must pass through an inspection point before they enter the maintenance area. Here, inspectors in MOPP 4 can use heaters or torches to warm equipment while they check it for contamination. The vapor hazard from liquid contamination may be undetectable at 65°F (18°C) in the open yet become lethal at 80°F (26°C) or when brought into closed areas. Some biological contamination, including toxins, may not be detectable. You must assume it is present if the equipment came from an area known to have been contaminated. Radiacmeters will easily detect radiological contamination.

The inspection team must segregate the equipment. Uncontaminated equipment can go straight to the maintenance area. Contaminated vehicles and equipment must be marked with contamination signs. A decision must then be made on the disposition of each item—

- If the equipment is contaminated and repairs can be performed in MOPP 4, the item may be sent through decontamination or left to weather.
- If weathering is the choice, the marked equipment must be placed in a holding area where it can decon itself. Waiting for equipment to weather before repair may be a luxury a commander cannot afford. It may take weeks in cool weather.
- The next choice is to decon. Before any repairs are made, the equipment should go through unit restoration decon. Priority equipment must be decontaminated first, but setting priorities is often not easy. For instance, you may have four attack helicopters equipped with antitank weapons. If they are lightly contaminated, perhaps all four could be decontaminated and repaired in the time it would take to decon and repair one heavily contaminated utility helicopter. Decisions like this require coordination between maintenance and operational staffs.

Decon should be done only if it is cost-effective. When a persistent agent is involved, every effort should be made to replace a contaminated component with the next higher assembly that can be done in MOPP 4. Contaminated equipment or components should be marked and placed in the holding area to await disposition instructions from higher headquarters.

Uncontaminated teams should not perform on-site maintenance and generally should not attempt recovery of contaminated equipment. Unserviceable contaminated equipment and aircraft should be recovered to the decon site or contaminated MCP by other contaminated vehicles or aircraft.

Both AVUM and AVIM maintenance activities will send teams forward to repair or recover aircraft and equipment if it is unknown whether they are contaminated. The teams must be in MOPP 4 and must test the equipment for contamination. If contamination exists, the maintenance team must decide whether or not repairs can be made in MOPP 4. If they cannot, the equipment must be decontaminated. Any surfaces the maintenance team must touch to repair or recover the aircraft must be given an operator's spraydown with an approved decon apparatus. This will not reduce the level of MOPP needed but offers

some additional protection and limits spread. Maintenance teams must carry extra on-board decon apparatuses for this purpose (or bulk decontaminator and cylinders to refill decon apparatuses). The objective is to limit transferring liquid contamination from the equipment to soldiers and equipment of the maintenance or recovery team.

After equipment and tools have been used for contaminated maintenance, they should remain contaminated. Use rags to wipe off only the gross contamination. Dispose of the rags in a sump, or bury them and mark the location. Maintenance teams may go through a MOPP gear exchange or detailed troop decon, but the team's equipment and tools should be left alone. A fresh team can use the contaminated tools on other contaminated equipment. For extended repairs, a fresh team relieves a contaminated team, which moves back and undergoes detailed decon. After a rest, the newly decontaminated team rotates forward and relieves the contaminated team.

Support from a contaminated area is limited to the amount of time that soldiers can operate in MOPP 4. This severely restricts the maintenance support from a contaminated area. It may be possible to extend the length of time the unit can continue to support from the contaminated location by scheduling periodic withdrawal of personnel to a clean area for complete personnel decontamination and a rest period at a reduced MOPP level. For continued effectiveness, however, the unit must leave the area, go through a detailed equipment and decontamination process, and set up shop in a clean area. Time limits may dictate that only the most critical repairs continue while a portion of the unit moves to a clean area. The limited organic transportation capability may require that some unit and customer equipment be left behind. After reorganization at the clean area, this equipment may be recovered or repaired using the procedures described for supporting from a clean area.

Contamination Avoidance

Contamination avoidance should be the keystone of the support strategy in an NBC environment. Unit NBC defense personnel should monitor the NBC situation by maintaining contact with higher headquarters and their counterparts in supported units. Before dispatch of MSTs, as much information as possible must be obtained relating to the threat along the route of march and at the support location. The location and availability of complete equipment decontamination stations must be carefully monitored. These facilities are operated under the supervision of elements of the division's chemical company. Combat elements usually have priority of support. See FM 63-3J for more details.

The US Army Chemical Research Development and Engineering Center and the US Army Chemical School are developing detailed procedures on the best-suited decontaminators for paint for each type of aircraft surface—plastic, fiberglass, or composite.

CHAPTER 8

ARMY AIRCRAFT QUALITY CONTROL AND TECHNICAL INSPECTION

Technical inspection is the commander's system of checks and balances which ensures the highest-quality maintenance effort. High quality decreases unscheduled maintenance, which disrupts flight and maintenance schedules. It also lessens the possibility of maintenance error or inadequate aircraft inspections, which can lead to aircraft damage, personal injury, and even death.

TECHNICAL INSPECTOR

A technical inspector is responsible to the maintenance or quality control (QC) officer, the QC noncommissioned officer in charge (NCOIC), and ultimately the unit commander. The inspector is the commander's representative in aircraft safety-of-flight areas. Otherwise, conflicts of interest arise which sacrifice objectivity. For this reason, the technical inspector's rating official should not be from the maintenance production area. If a QC NCOIC or QC officer is assigned, that person should be the rater; otherwise, the unit executive officer or unit commander rates the technical inspector. However, if either the unit executive officer or maintenance officer also serves as the production control officer, that officer will not rate the senior technical inspector.

Inspectors are under the operational control, not supervision, of the maintenance officer. The maintenance officer establishes priorities for inspector work assignments but does not supervise the work. The OIC or the NCOIC distributes the work and supervises the inspectors to meet the maintenance officer's work assignments.

QUALITY CONTROL DUTIES

Quality control is a management function. It ensures that maintenance is performed according to maintenance manuals for specific aircraft. QC management is coordinated with all phases of production and work load control to maintain maximum production effectiveness. Well-designed QC procedures assure an acceptable level of quality and a decrease in inspection requirements and management efforts. Maximum effective production is balanced against quality without lowering standards. The QC supervisor (the senior ranking or most qualified inspector) coordinates the efforts of the QC team, while technical inspectors do the actual inspecting. Technical inspectors are responsible for the safety of aircrew members. Their most critical duty is inspecting aircraft. They are also responsible for component and shop inspections and for maintaining and revising publications, forms, and records.

Aircraft Inspection

Safety of the aircraft and crew depends on how well the aircraft is inspected. Refer to TM 1-1500-328-23 for information on the preventive maintenance inspection system, acceptance inspection, transfer inspection, and in-storage inspection. For maintenance expenditure limits, as well as disposition instructions for crash, mishap, battle damage, deteriorated, or other natural phenomenon, refer to TB 43-0002-3.

Turn-In/Pickup of Aircraft at AVIM

Because technical inspectors are the people most knowledgeable of support maintenance, they accompany aircraft turned in to AVIM for maintenance. They also review aircraft records with AVIM personnel, resolve questions on the spot, perform a joint inventory with AVIM personnel, and accompany AVIM inspectors on the initial inspection of the aircraft. Upon completion of repairs and before acceptance of the aircraft, inspectors perform a joint inventory with AVIM personnel, review aircraft records for accuracy and completeness, and inspect aircraft to ensure that requested work was properly performed. If repairs are deferred because parts are unavailable, technical inspectors ensure that they are ordered.

Aircraft Technical Compliance (Technical Bulletins)

Inspectors ensure that all requirements of applicable aircraft technical bulletins are met and required entries are made on applicable DA forms. Inspectors are also responsible for two actions: (1) grounding an aircraft if required by the technical bulletin (refer to AR 95-3) and (2) submitting reports required by AR 95-3 to report compliance with technical bulletins.

Army Oil Analysis Program

Inspectors ensure that all aircraft are entered in the program and that all required records are maintained. Refer to AR 750-1, TB 43-0106, and DA Pam 738-751 for specific instructions. Inspectors ensure that—

- Oil samples are taken according to TB 43-0106.
- DD Form 2026 (Oil Analysis Log) is complete and accurate.
- All samples are dispatched expeditiously to the laboratory.
- Special samples requested by the laboratory are taken immediately.
- Notification is given to the assigned servicing laboratory of replacement or removal of AOAP components.

Component Inspection

QC personnel use computerized printouts or a time between overhaul and retirement life component chart to monitor the in-service time of all aircraft components requiring replacement on an hour or calendar basis. For a list of these components, refer to the applicable aircraft maintenance manual.

Component inspection ensures that the time between overhaul or retirement life is not overflown unless specifically authorized in TM 1-1500-328-23. Review TBO chart or computerized printouts and update periodically but not less than the reporting period (AR 700-138) and when reportable components are replaced. Two variations of the TBO chart can be used: time-change component schedule chart (Figure 8-1) and time-change bar graph component chart (Figure 8-2). If computerized printouts are used, make sure they contain all required information (Figure 8-3) and maintain a separate disk copy in the QC office. QC personnel must notify maintenance officers and noncommissioned officers when 100 hours remain until replacement of hourly components and when 2 months remain until replacement of calendar components.

Shop Inspection

This QC inspection includes two areas: facility and equipment (shop safety) and test equipment (calibration). When performing the facility and equipment inspection, inspectors check the shop and shop equipment for proper layout, clear fire lanes, fire extinguisher serviceability, and installation and use of equipment safety devices. See below for inspection procedures. Other details are provided in TM 1-1500-204-23-1. After the shop is properly

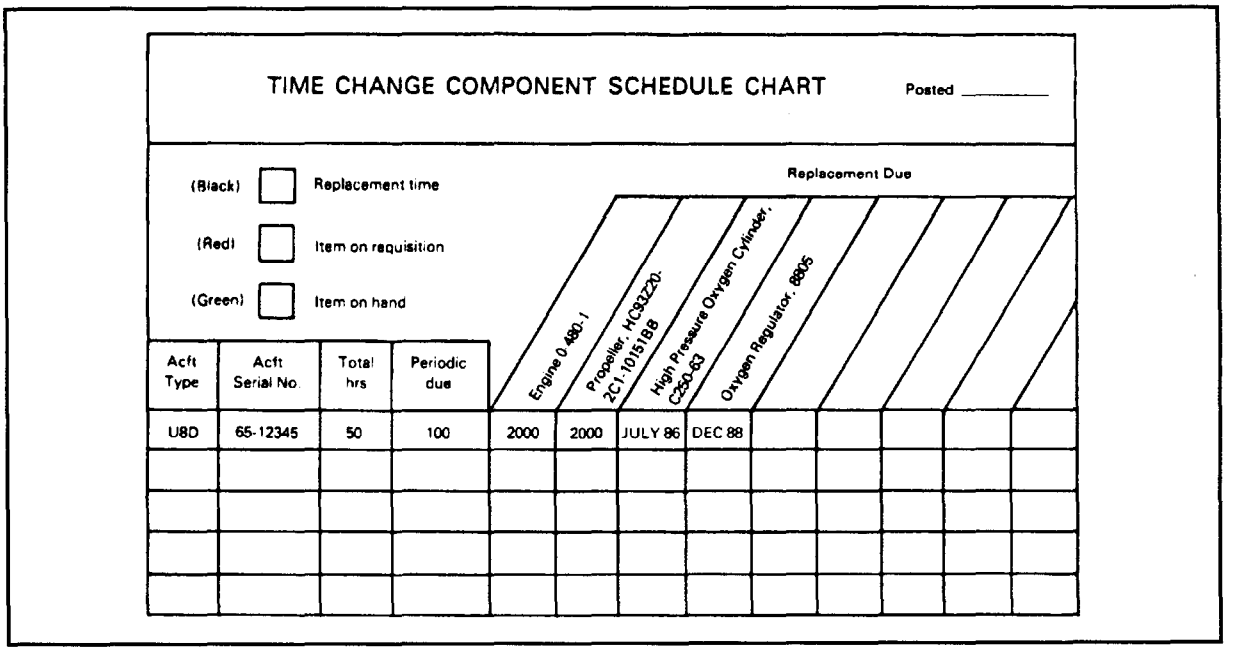


Figure 8-1. Time-change component schedule chart

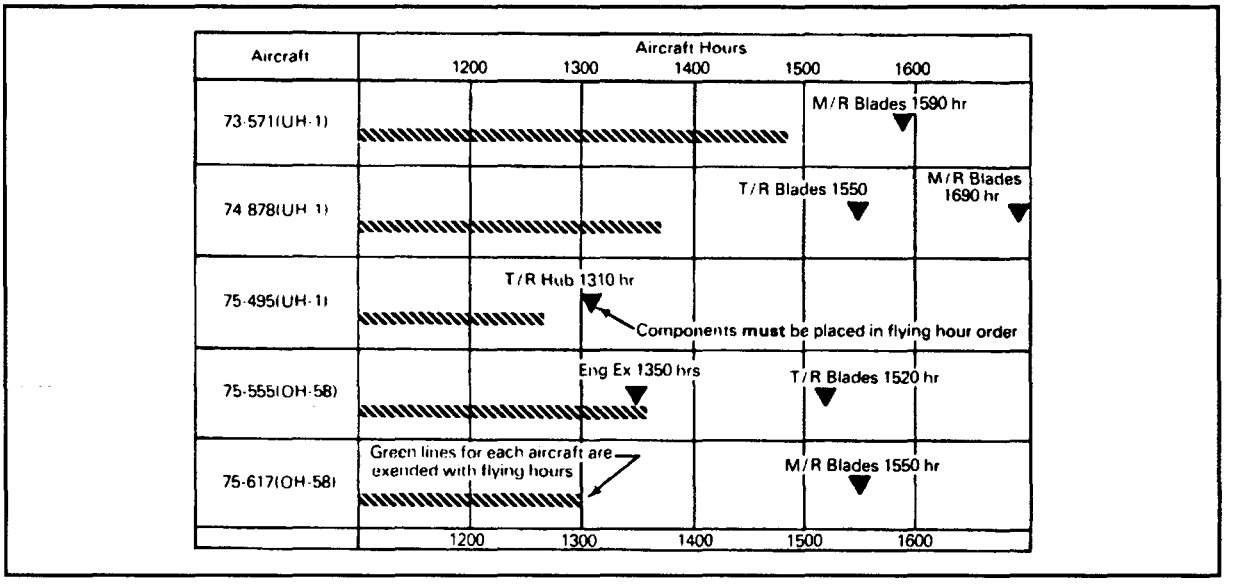


Figure 8-2. Time-change bar graph component schedule chart

2408-16 COMPONENT PROJECTION REPORT

PCN:AWAMR16A

REPORT DATE: 12-MAY-94 UIC: WG31A0

AIRCRAFT SERNO: 6916148 CURRENT HOURS: 3576.8

PROJECTED HOURS: 900

WUC	PART NUMBER	NSN	NOMENCLATURE	SERIAL NUMBER	AIRCRAFT HOURS TBO DUE	AIRCRAFT HOURS UNTIL DUE
05A01H04	206-011-140-1	1615018306653	RETENTION STRAP FITTING	A-4503	3695.0	118.2
05A01H04	206-011-140-1	1615018306653	RETENTION STRAP FITTING	A-1948	3695.0	118.2
05A01H03	206-010-123-3	5315008919358	RETENTION STRAP PIN	A19-38898	3695.0	118.2
05A01H03	206-010-123-3	5315008919358	RETENTION STRAP PIN	A19-38868	3695.0	118.2
05A01H	206-011-154-101	1615018631268	RETENTION STRAP	LK-11923	3695.0	118.2
05A01H	206-011-154-101	1615018631268	RETENTION STRAP	LK-11919	3695.0	118.2
04A05C	6895653	2915018444551	PUMP ASSY, FUEL	PE6398	4010.0	433.2
04A05G	2524912-2	2915011799734	GOVERNOR ASSY	86166686	4288.0	711.2
04A05A	2524911-3	2915012510688	FUEL CONTROL	337434	4473.0	896.2

Figure 8-3. Computerized printouts (example)

inspected, check the test equipment for accuracy. QC personnel ensure that all calibration requirements are met. Technical inspectors ensure that—

- An organizational maintenance program for TMDE is established.
- A TMDE support coordinator is appointed in the unit. The support coordinator is the focal point of contact for matters pertaining to TMDE support. An alternate coordinator is appointed and assigned the responsibility of monitoring the TMDE support program. Keep a copy of the appointment in the QC files (AR 750-43 and AR 25-400-2).
- ADA Form 2416 (Calibration Data Card) or DA Form AMXTM 34A is submitted to the supporting activity for each item requiring calibration (TB 750-25).
- A TMDE not listed in TB 43-180 is reported according to TB 43-180 and TB 750-25.
- ADA Label 80 or DA Label 163 is attached to items requiring calibration.
- TMDE are calibrated at the prescribed interval (TB 43-180). After removal from temporary storage, submit TMDE for calibration before use.

Publications Maintenance

QC and shop personnel establish and maintain a complete, up-to-date set of technical publications for supported aircraft. These publications provide instructions on procedures and issue, operation, maintenance, repair, modification, serviceability standards, testing, inspection, and storage of equipment.

Publication personnel are appointed in the unit. They are responsible for ordering and maintaining the unit's publication accounts.

Monthly and upon receipt of a new index, DA Pam 25-30 (published quarterly), the technical inspector reviews publication files (technical libraries) throughout the maintenance activity for completeness and currency.

Prepare recommendations for changes to publications on DA Form 2028 or DD Form 173/3 (OCR) (Cat I Deficiency Report only). The technical inspector establishes and maintains a file of recommended changes (AR 25-400-2).

Familiarization Chart

QC and shop personnel must have a technical data familiarization chart or computer printout to ensure that maintenance personnel are familiar with publications relevant to their duties. See Figures 8-4 and 8-5 for samples.

All publications applicable to equipment maintained and names of maintenance personnel are listed also. Personnel initial beside each publication to indicate their familiarity with that publication. As changes are received, post the change number and erase the initials. After reviewing each change, personnel initial the chart or printout again. Each shop maintains separate charts or printouts. Inspectors check the charts or printouts monthly to ensure that—

- All publications used by the shop are listed.
- All shop personnel are listed.
- All personnel have initialed to indicate their understanding of the publications.
- All changes are posted according to DA Pam 310-13.

Files Management

The most important files maintained by QC personnel are TWX files. These TWXs may ground aircraft, impose operating limitations, or provide information on aircraft maintenance techniques. Maintain separate TWX files for each model of aircraft assigned or supported. Maintain one file for general messages. TWXs are either informational or apply to specific models of aircraft. Separate each aircraft TWX file into two sections: SOF messages and maintenance and technical advisory messages. For more guidance on tiles management and SOF messages, refer to ARs 95-3 and 25-400-2.

Forms and Records

Technical inspectors monitor all forms and records for accuracy and completeness. These include—

- Aircraft historical records.
- Weight and balance records.
- Aircraft maintenance records.
- Blank Forms.
- Deficiency reports (DR).

* Quality Control

TECHNICAL DATA FAMILIARIZATION CHART

BY PLACING MY INITIAL OPPOSITE MY NAME, I CERTIFY THAT I HAVE READ AND I AM FAMILIAR WITH THE LITERATURE LISTED BELOW **TECHNICAL MANUAL	CHANGE NUMBER	MSG LAYMAN	MSG MATTOX	SFC BARR	SFC GAST	SSG HONEYCUTT	SSG WILEY	SSG MAZER	SGT KAY	SGT KEMP	SGT FAUSTICH	SGT WESLEY	SGT KRAFT			
55-1510-201-23	21	ℒ	m		ℬ			m					K			
55-1510-202-23	2	ℒ	m		ℬ			m				W	K			
55-1510-205-23		ℒ	m		ℬ			m								
55-1510-206-23	1	ℒ	m		ℬ			m		K						
55-1520-202-23	16	ℒ	m	B		H		m								
55-1520-203-23		ℒ	m	B		H		m								
55-1520-204-23		ℒ	m	B		H	W	m	K							
55-1520-205-23	6	ℒ	m	B				m			ℱ					
55-1520-206-23		ℒ	m	B				m	X							
55-1520-208-23		ℒ	m	B			W	m								
55-1520-210-23	31	ℒ	m	B		H		m								
38 750	102	ℒ	m	B	ℬ	H		m		K	ℱ					
55-1500-204-25/1	31	ℒ	m	B	ℬ	H		m		K	ℱ					

*Enter name of section or shop.

**Enter manuals most commonly used when performing the duties of each shop or section.

Figure 8-4. Technical data familiarization chart

FAMILIARIZATION CHART
D/1-234TH ATTACK BN
QUALITY CONTROL

	WO1 DAVENPORT	SFC ARNOLD	SSG DODD	SSG HARRIS	SSG COOPER	SSG GREEN
AR 95-1						
AR 95-2						
AR 95-3						
AR 25-400-2						
DA PAM 25-30						
DA PAM 25-400-2						
DA PAM 730-751						
FM 1-500						
TM 1-1500-320-23						
TM55-1500-284-25/1						

BY PLACING MY INITIALS OPPOSITE MY NAME, I CERTIFY THAT I HAVE READ AND I AM FAMILIAR WITH THE LITERATURE LISTED ABOVE.

Figure 8-5. Computer printout

Aircraft Historical Records

Inspectors maintain historical records for each aircraft assigned to their unit as follows:

- DA Form 2408-4-1 (Weapon Record Data).
- DA Form 2408-5 (Aircraft Modification Record).
- DA Form 2408-5-1 (Equipment Modification Record Component).
- DA Form 2408-15 (Historical Record for Aircraft).
- DA Form 2408-15-2 (Aircraft Vibration Record).
- DA Form 2408-16 (Aircraft Component Historical Record).
- DA Form 2408 -16-1 (History Recorder Component/Module Recorder).
- DA Form 2408-17 (Aircraft Inventory Record).
- DA Form 2408-19 (Aircraft Engine Turbine Wheel Historical Record).
- DA Form 2408-19-1 (T53/T55 Turbine Engine Analysis Check Record).
- DA Form 2408-19-2 (T700-Series Turbine Engine Analysis Check Record).
- DA Form 2408-19-3 (T700-Series Engine Component Operating Hours Record).
- DA Form 2408-20 (Oil Analysis Log).

For specific information about these forms, refer to DA Pam 738-751.

Weight and Balance Records

The assigned technician maintains the aircraft's weight and balance records. Inspectors coordinate with the technician anytime that maintenance on the aircraft could affect weight and balance. Refer to AR 95-3, TM 55-1500-342-23, the aircraft operator's manual, and the aircraft maintenance manual for information. The -10 operator's manual and the applicable maintenance manual contain weight and balance data.

Use standard forms with this data to provide an effective system for weight and balance control. Each aircraft serial number and information to be inserted on the charts or forms apply only to the individual aircraft. Maintain the weight and balance data and related forms for each aircraft according to AR 95-3 and TM 55-1500-342-23.

Before an aircraft is delivered, the manufacturer inserts all aircraft-identifying data on the various charts and completes all forms. Maintain DD Form 365 series, charts, and any other pertinent data about the aircraft's weight and balance in a permanent binder. The binder and all forms list the aircraft's designation and serial number. Annotate any changes that affect the aircraft's weight and balance on these forms.

Safeguard and maintain weight and balance forms for each aircraft. Individual weight and balance forms serve various purposes; therefore, their retention periods vary. Use the following to record aircraft weight and balance:

- DD Form 365 (Record of Weight and Balance Personnel) is a semipermanent form. Keep it in the weight and balance data file until all entry space is filled and a new replacement form is started. When new forms are started, destroy the replaced form.
- DD Forms 365-1 (Chart A-Basic Weight Checklist Record) and 365-3 (Chart C-Basic Weight and Balance Record) are permanent forms. Keep them in the weight and balance data file for the life of the aircraft. When new forms are started, staple them to the original form.
- DD Form 365-2 (Chart B-Aircraft Weighing Record) is a semipermanent form. Keep the current completed form in the weight and balance data form until the aircraft is reweighed, a new form is started, computations are verified, and necessary entries are made on DD Form 365-3. Then destroy the old DD Form 365-2.
- DD Form 365-4 (Weight and Balance Clearance Form F-Transport) is used to compute standard loads using the aircraft's current basic weight. The form is a current work form as long as load weights and locations remain current, until the basic aircraft weight is recomputed or changed. A weight and balance technician reviews and updates this form every 90 days. When entries are revised, destroy the old form. As a minimum, prepare DD Form 365-4 for each configuration in the operator's manual describing normal loading procedures. If a unit requires a configuration

not described in the operator's manual but within load and center of gravity limits, prepare DD Form 365-4 and keep it on file.

- The current Chart E (Loading Data, Charts, and Graphs), taken from the applicable aircraft maintenance manual, is revised when the maintenance manual is revised. Retain Chart E, a semipermanent chart, in the weight and balance file until a revised Chart E is published in the maintenance manual. Then destroy the old Chart E.

Duplicate DD Form 365 series to replace lost, mutilated, or illegible forms. When forms are duplicated, certify and sign each entry, date the form, and identify the organization. If information is lost or illegible, duplicate the forms and take a physical inventory to complete DD Form 365-1. To complete DD Form 365-2, reweigh the aircraft.

Upon transfer of an aircraft, the commanding officer of the transferring activity ensures that the weight and balance file accompanies the aircraft. A copy of the weight and balance data will normally be on the aircraft (see AR 95-3).

Dispose of aircraft weight and balance files for aircraft stricken from Army inventory as follows:

- Destroyed or damaged aircraft. If the aircraft does not fall into one of the following categories, destroy the tile locally after necessary investigation and reporting
- Aircraft involved in accidents resulting in death, personal injury, or nongovernment property damage. The operating activity retains weight and balance records for one year. After one year, forward the records along with a statement that aircraft may be subject to litigation to: Commander, US Army Aviation Systems Command, ATTN: DRSTS-M, 4300 Goodfellow Boulevard, St Louis, MO 63120.
- Damaged aircraft not economically repairable by Army standards. Transfer these aircraft or offer them for sale to other than an Army custodian. Then transfer weight and balance files for the aircraft to the receiving agency or individual.
- Excess aircraft. Transfer or offer for sale serviceable or repairable aircraft to other than an Army custodian. Weight and balance files accompany these aircraft to the receiving agency or individual.

Aircraft Maintenance Records

Inspectors monitor all records used in aircraft maintenance for accuracy and completeness.

These records include—

- DA Form 2405 (Maintenance Request Register).
- DA Form 2407 (Maintenance Request).
- DA Form 2408-4 (Weapon Record Data).
- DA Form 2408-12 (Army Aviator's Flight Record).
- DA Form 2408-13, 13-1, 13-2, 13-3 (Aircraft Inspection and Maintenance Record).
- DA Form 2408-14 (Uncorrected Fault Record).
- DA Form 2408-18 (Equipment Inspection List).
- DA Form 2410 (Component Removal and Repair/Overhaul Record).
- DD Form 1574 (Serviceable Tag-Materiel).
- DD Form 1575 (Suspended Tag-Materiel).
- DD Form 1576 (Test/Modification Tag-Materiel).
- DD Form 1577 (Unserviceable [Condemned] Tag-Materiel).
- DD Form 1577-2 (Unserviceable [Repairable] Tag-Materiel).

Refer to DA Pam 738-751 for complete information about these forms.

Blank Forms

Inspectors ensure that a 30-day supply of blank forms is on hand in the maintenance section.

Deficiency Reports (DR)

Technical inspectors are responsible for maintaining a deficiency report file (AR 25-400-2), assigning DRs control numbers, and establishing a DR log (see example at Figure 8-6). Inspectors check all submitted DRs for accuracy and completeness and assist in determining the category. If an exhibit is needed, they ensure that all applicable forms and records

CONTROL NUMBER	SUBJECT & CATAGORY	EXHIBIT Y or N	DATE OF SUBMITTAL	DATE OF REPLY
6TZFFF 900002	OH-58 PUMP, SUBMERGED, RUBBER CHECK VALVE	YES	11 OCT 93	29 APR 94
	MISSING FROM TOP OF FUEL BOOST PUMP			
	HOUSING (CAT I)			

Figure 8-6. Deficiencies log

accompany the exhibit (DA Pam 738-751). Technical inspectors review the TB 43-0001 series of equipment improvement and maintenance digests prior to submitting the DR.

Investigation of Recurring Deficiencies

The inspector investigates any deficiency that occurs on a continuing basis. If a materiel defect is involved, the inspector submits a DR informing ATCOM of the problem. If the defect is due to workmanship, the inspector informs all maintenance personnel of the problem, its possible effects, and how to correct it.

TYPES OF PUBLICATIONS

Army publications describe policies and procedures used in Aircraft maintenance and maintenance management. QC personnel ensure that publication libraries are current and updated with the latest changes. Technical inspectors set up and maintain the master reference library.

Army Regulations (AR)

Army regulations provide policies and responsibilities which govern administrative procedures and ensure compliance at all levels. Section 4 of DA Pam 25-30 contains an index of Army regulations. Subject matter is identified by a basic number. For example, all Army regulations in the 95 series are about aviation. A subnumber preceded by a dash indicates additional information about the basic subject. For example—

- AR 95-1, flight regulation.
- AR 95-3, SOF and weight and balance information.

Department of the Army Pamphlets (DA Pam)

DA pamphlets contain permanent information or reference material. Section 4 of DA Pam 25-30 contains an index of DA pamphlets. DA pamphlets are numbered in the same manner as Army regulations. A subnumber preceded by a dash distinguishes between DA pamphlets with the same basic number. For example, all DA pamphlets in the 25 series are about Army publications:

- DA Pam 25-30 is an index of publications and blank forms.
- DA Pam 25-33 is the standard Army publications system (STARPUBS) revision of the DA 12-series forms, usage, and procedures.

Field Manuals (FM)

Field manuals outline military doctrine, tactics, and techniques. They include instructions and reference material on training and operations, maintenance management, and aircraft systems repair theory. Section 5 of DA Pam 25-30 contains an index of field manuals. Field manuals are also numbered in the same manner as Army regulations. A basic number identifies the primary subject, and a subnumber indicates additional information. For example, all field manuals in the 1 series are about aviation operations:

- FM 1-500, aviation maintenance.
- FM 1-563, airframe maintenance.

Technical Manuals (TM)

Technical manuals provide training information on a variety of subjects and on specific items of equipment. Section 8 of DA Pam 25-30 contains an index of technical manuals.

Manuals for specific equipment provide instruction on operation, maintenance, and overhaul. They also provide a parts list and breakdown. The first two digits of these manuals identify the preparing technical service.

A dash and a four-digit number indicate the FSC code, including the equipment within the FSC. For example, -1510 represents freed-wing aircraft, and -1520 represents rotary-wing aircraft.

A dash and a three-digit number indicate the MDS of a particular aircraft. For example, -210 represents UH-1D/H helicopters, and -228 represents OH-58A helicopters. A dash and a two-digit number represent the category of maintenance. For example, -10 is for operators, and -23 is combined for AVUM and AVIM personnel.

A serial number preceded by a dash or a slash is added when a manual is published in more than one volume; for example, -1, -2, or /1, /2, and so forth. The letter "P" is used as a suffix when the repair parts and special tools lists are published in a volume separate from the maintenance instructions. This volume will have the same basic number as the corresponding technical manual. For example:

- TM 55-1510-213-10/1, maintenance manual for the OV-1D aircraft.
- TM 55-1520-210-23-1, maintenance instructions for UH-1D/H/F/EH-1H helicopters.
- TM 55-1520-228-23P, repair parts and special tools list for OH-58A/C helicopters.

Technical Bulletins (TB)

Technical bulletins contain technical information on equipment or professional management techniques. The most common technical bulletins encountered by QC personnel direct one-time inspections of aircraft or components. Section 7 of DA Pam 25-30 contains an index of technical bulletins. Urgent inspection requirements are initially sent to the units by a TWX. The subsequent technical bulletin then supersedes the TWX.

Technical bulletins directing one-time inspections are classified by priority as urgent, limited urgent, and normal.

Urgent

Urgent technical bulletins contain aircraft conditions which affect safety of flight. These conditions may cause damage or destruction to aircraft and death or injury to personnel. An urgent technical bulletin may direct that a specific aircraft be grounded. Normally, grounding takes place within a certain flying hour or calendar period. When grounding aircraft, follow procedures listed in the technical bulletin.

Limited Urgent

A limited urgent technical bulletin allows the aircraft to be operated only under specific conditions or limitations. These conditions are listed in the technical bulletin.

Normal

Normal technical bulletins are issued when problems occur that reduce equipment efficiency, life expectancy, or use of the aircraft. These technical bulletins do not impose any operating limitations; however, maintenance must be accomplished within a specified time.

Technical bulletins for specific items of equipment are numbered in the same manner as technical manuals for that item. An added number preceded by a slash differentiates between technical bulletins on the same item. The two-digit group indicates which category performs the technical bulletin maintenance. Technical bulletins pertaining to two or more different items of equipment within the same FSC have a zero for the third digit. For example—

- TB 55-1510-213-20/8—
  - -213 refers to OV-1D fixed-wing aircraft.
  - -20 refers to AVUM level of maintenance.
  - -/8 indicates that this is the eighth OV-1D AVUM technical bulletin published.
- TB 55-1520-242-35/1—
  - -242 refers to UH-1D/H helicopters.
  - -35 refers to AVIM level of maintenance.
  - -/1 indicates that this is the first UH-1 AVIM technical bulletin published on special-purpose/special-mission modification.

- TB 55-1500-337-24—
  - -1500 refers to all aircraft.
  - -24 indicates that this technical bulletin applies to AVUM through depot levels of maintenance.

Modification Work Orders (MWO)

MWOs are the only publications that authorize modification or alteration of Army equipment. MWOs are issued—

- To provide compatibility with newer equipment.
- To prevent serious damage to equipment.
- To increase operational effectiveness.
- To reduce support requirements.

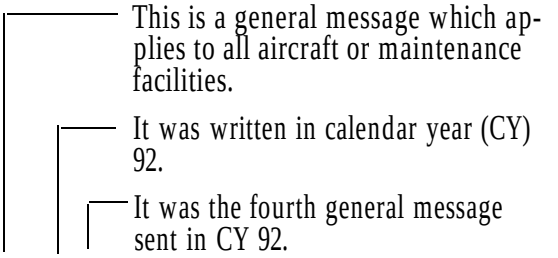
Each MWO contains specific instructions concerning—

- Time limit for compliance.
- Maintenance category to which the MWO applies.
- Parts required.
- Man-hours required.
- Form entries required.
- Method for performing the modification.
- Weight and balance data.

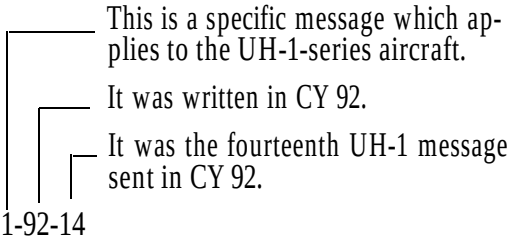
As with technical bulletins, MWOs are assigned priorities. The priority classifications and numbering system are the same as for technical bulletins. Section 6 of DA Pam 25-30 contains an index of MWOs.

Safety-of-Flight/Aviation Safety Action Messages

Safety-of-flight and aviation safety action messages provide information concerning safe operation of an entire model or series of Army aircraft. These messages are transmitted by TWX to all organizations concerned. The message number indicates general or specific information. General messages apply to all aircraft, while specific messages apply only to a specific series of aircraft. For example—



GEN-92-4



UH-1-92-14

There are three types of safety-of-flight messages: emergency, operational, and technical. There are also three types of aviation safety action messages: maintenance mandatory, informational, and operational.

Emergency

These messages contain serious information. They usually denote hazardous aircraft conditions that cause aircraft damage or personal injury. Emergency safety-of-flight messages are later published as urgent technical bulletins or MWOs.

Operational

These messages, issued by the US Army Safety Center (USASC), impose operating limitations on aircraft.

Technical

These messages ground or require modification of the aircraft. They usually require removal and replacement, or modification of the parts or components. Messages are issued by ATCOM and are later published as urgent action technical bulletins or MWOs.

Maintenance Mandatory

These messages direct maintenance actions and/or updates technical manuals.

Informational

These messages provide information of a maintenance technical or general nature.

Operational

These messages pertain to aircraft operations, fligbt procedures, limitations, or operational policies.

Every three months, ATCOM publishes an index of all messages they transmitted during that period. Check the message file when the index arrives to ensure that all required messages are on hand. For a detailed discussion of safety-of-flit or aviation safety action messages, refer to AR 95-3 and DA Pam 738-751.

Supply Bulletins (SB)

Supply bulletins provide important supply information to maintenance personnel—

- Stock number changes.
- Direct-exchange list changes.
- Reports on new materiel.
- Information on AIMI.

Supply bulletins are numbered in sequence by calendar year and usually have an expiration date. Section 6 of DA Pam 25-30 contains an index of supply bulletins.

Federal Aviation Administration (FAA) Publications

The FAA publishes books on aviation and aircraft maintenance. Only authorized Army-approved publications are used for aircraft maintenance. Do not use FAA or any other federal agency publications for maintenance unless authorized in writing or as part of a logistic support plan.

CHANGED/REVISED/RESCINDED PUBLICATIONS

Effective aircraft maintenance requires that the latest technical information be on hand at all times. Since Army publications are continually being updated, QC personnel ensure that units have adequate quantities of current publications. Therefore, it is necessary to understand how the publications distribution system operates. DA Pams 25-33 and the 310-10 series are a must for the technical inspector. These explain—

- How initial distribution and resupply are made.
- Which DA forms are required to order publications.
- Where to order publications.
- How a publications account is set up.

Refer to DA Pam 310-13 for information on posting and filing publications.

Changes

Rather than reprint an entire manual, changes are published to update existing manuals. Minor changes accumulate before being printed.

Serious errors result in the immediate printing of a change, which may be issued as an immediate action interim change (IAIC). The IAIC is only printed once and is not stocked for reorder.

Posting

When posting changes—

- Be accurate and neat. A publication that is incorrectly or illegibly posted is as worthless as one that has not been posted.
- Use a sharp, black pencil so that posting can be erased easily if future changes or corrections are necessary.
- Print or write the authority for changing a basic publication in the outside margin of the page by the changed portion. This authority is usually a numbered change (for example, C1). If the changed portion affects more than one page, make the same notation on all pages concerned.
- Draw a line through the first and last lines of the text when three or more lines of text are affected; then connect these lines from top right to bottom left, forming a Z-shaped figure.
- Ensure that change numbers are posted in proper sequence. An urgent change may be posted out of sequence (ahead of previous numbered changes) if authority to do so is stated on its front page.
- Ensure that manuals are not superseded or rescinded.

Message Changes

When there is no time to issue a printed change, a TWX is used to amend a publication. The message is identified as an interim change. Prepared in the format of a published change, the message provides the exact language of the changed material. When posting the change, follow the procedures directed by the message. Show the message number

and date in the margin of the publication opposite the changed portions (for example, DA message 0614202 Mar 92).

File a copy of the message in front of the basic publication or the last printed change. If a copy is not available, insert a cross-reference sheet showing where a copy of the message can be found. When the next printed change or revision of the publication is received, check the supersession notice. If the notice states that the message is rescinded or superseded, remove the message or cross-reference sheet and destroy it.

Revisions

A revision is a complete new edition of an existing publication. It replaces or supersedes the preceding publication, together with all changes, supplements, and appendixes.

Safety-of-Flight Supplements

Safety-of-flight supplements are used to quickly provide safety information when a hazardous condition exists. These supplements contain important operational, precautionary, and restrictive instructions that cause flight limitations. The first page is printed with a bold red border of FS initials and the words SAFETY-OF-FLIGHT appear at the top and bottom of the page. Supplements have the same title as the basic publication they supplement. When safety-of-flight information applies to more than one type of aircraft, an individual supplement is issued for each type of aircraft involved. These supplements are issued in one of two forms: interim or formal.

Interim

Interim supplements are publication changes issued by TWX when loss of life or serious personal injury is involved.

Formal

Formal supplements are issued and distributed through normal channels when serious damage to the aircraft is involved or to replace previously issued interim supplements.

Rescissions

A publication is rescinded (canceled) when its material becomes obsolete. Destroy obsolete publications. DA Pam 25-30 contains a list of rescinded publications.

Disposal

Dispose of publications after they have been rescinded, replaced, or superseded. Classified publications are disposed of in accordance with AR 380-5; unclassified publications, according to instructions from the local disposal officer. However, do not discard old publications until new ones are reviewed. Use the DA Form 12 series (Requirements for Distribution of Publications and Blank Forms) to order the quantity of publications needed. If more publications are received than needed, update the DA Form 12 series in accordance with DA Pam 310-10 and DA Pam 25-33. Determine if publications are needed by other aviation units; if not, contact the post adjutant general (AG) publications officer for disposal instructions.

TECHNICAL LIBRARIES

Technical files and libraries are required on all equipment. Local policies differ according to the size of the unit concerning the location of publications. In a small unit, they may be filed in the maintenance office or QC office. In field maintenance (AVUM/AVIM) or depot operations, they may be filed in a technical library. In either case, the area should be convenient to maintenance personnel. DA Pam 310-13 is required reading for technical inspectors. It explains setting up, maintaining, and posting changes to technical libraries.

Master and Shop

Technical inspectors are responsible for two types of libraries: master and shop. The master library is located in the QC office and is used by all personnel. It contains publications required to maintain all series of aircraft supported by the shop. The shop library contains manuals on the specific duties of the shop. Inspectors ensure that these manuals are up to date. Technical inspectors also check the master and shop libraries monthly to ensure that—

- Libraries are located conveniently to users.
- All required manuals are on hand or on order.
- No unnecessary publications are on hand.
- Changes are properly posted and indexes reflect current status of publications on hand.
- No superseded or rescinded manuals are used.
- Classified manuals are controlled according to the AR 380 series.

Filing System

Use AR 25-400-2 and DA Pam 310-13 as master guides for maintaining the technical publications file. DA Pam 25-30 contains an index of DA publications and forms. Verify the status of publications against the listings in the latest index. A star by the number indicates a new publication or a revised edition. A star following the entry indicates a change in the title or a new change.

If publications are received before they appear in the index, prepare and keep a list with the index. When these publications appear in the index, delete them from the list. Also, line out rescinded publications as rescission notices are received. Be sure to check the current supersessions and rescissions section of the index. If all supersessions and rescissions are posted correctly, files are accurate and agree with the index. File the following types of publications as described below:

- Technical manuals—numerically when letters are added to the publication number—numerically and alphabetically. For example—
  - TM 55-1500-204-23 series
  - TM 55-1520-238-10
  - TM 55-1520-238-23-1
  - TM 55-1520-238-23P-1
  - TM 55-1520-238-23P-2
  - TM 55-1520-238-PMD
- Technical bulletins—numerically, preceding or inside the front cover of the applicable technical manual (if related to a specific technical manual). Technical bulletins that do not pertain to a specific technical manual are numbered consecutively and filed alphanumerically, separately from technical manuals.
- MWOs—numerically, separately from technical manuals.
- Supply manuals—alphanumerically.
- Lubrication orders (LOs)—with manuals that they apply to (an LO has the same number as the technical manual or technical bulletin that best covers preventive maintenance for the equipment).
- Supply bulletins—numerically.
- Field manuals—numerically.
- Supply catalogs—numerically by FSC, then alphabetically.
- Department of Defense (DOD) manuals—numerically by federal classification, then alphabetically.
- Supply letters—numerically, separated by CY.
- Safety-of-flight supplements—alphanumerically immediately following the basic publication.

INTERSERVICE PUBLICATIONS ACCOUNTS

Air Force Publications

Some of the equipment used by the Army is procured through the Air Force. However, publications to support these interservice items are not always obtained with the equipment. To establish an Air Force publications account—

- Complete two copies of AFTO Form 43 (Air Force Technical Order).
- Complete one copy of AFTO Form 187 (Resupply and Initial Distribution Form).
- Mail copies to Commander, Oklahoma City Air Logistics Center, ATTN: OC-ALC/MMDUB, Tinker AFB, OK 73145.

Navy Publications

Use NPFC 2002 to order Navy publications. This index is available only on microfiche and is obtained by calling customer service (DSN 442-2600). There is no charge for Navy publications, but there is a charge for blank forms. To obtain permanent distribution of the index, write to Naval Publications and Forms Center, 5801 Tabor Avenue, ATTN: CODE 1011, Philadelphia, PA 19120.

Once an account is established, order Navy publications using DD Form 1348M (DOD Single Line Item Requisition System Document [Mechanical]). For requisitioning instructions, refer to AR 725-50. An authorized DODAAC number, which can be obtained from the unit supply document register, must be assigned to DD Form 1348M when ordering Navy publications. After a proper unit identification code (UIC) is established, mail publications to the address on the DODAAC. To obtain permanent distribution

of publications, write to Commanding Officer, Naval Air Technical Services Facilities, 700 Robins Avenue, ATTN: CODE 321, Philadelphia, PA 19111. For coordination by telephone, call AUTOVON 442-2660. Binders used to store publications are available through the same procedures.

Military specifications and standards are also available through the Naval Publications and Forms Center (AUTOVON 422-2660). Use DD Form 1425 (Specifications and Standards Requisition) to request a copy of the index. Once the initial index is received, request all further orders using DD Form 1425.

TECHNICAL INSPECTION PROCEDURES

Technical inspection of aircraft maintenance ensures that standards and practices established by applicable publications are followed. It also ensures that all applicable technical requirements are met, the maintenance shop is organized, and quality work is performed efficiently. Before performing an inspection, QC personnel review the latest applicable reference material to ensure that the inspection meets current requirements. To ensure uniform safety and reliability, inspection procedures must be standardized.

Red-X Authorization

The technical inspector is the commander's designated representative for aircraft maintenance QC. Authorization to sign off "red-X" or "circled-red-X" conditions is designated in writing (by memorandum for record or on DA Form 1687) by the owning unit commander. This provides the name, rank, and duty position of the inspector and authorizes him to inspect and sign off red-X and circled red-X conditions on specific aircraft models and components. Only the inspector's initials and signature are required to release an aircraft for flight. A sample signature and initials help eliminate unauthorized use by other personnel.

A technical inspector or maintenance supervisor who works on a red-X or circled-red-X fault cannot sign off the work as his own inspector. The work must be inspected and signed off by another person designated in writing by the commander. If no repair work or maintenance is involved and only an inspection required, the technical inspector performs the inspection and signs off with no recheck. The parent unit's orders are sufficient authority to sign off a red-X or circled-red X on aircraft belonging to another unit (DA Pam 738-751).

NOTE: When authorization is given to sign off red-X or circled red-X conditions on specific aircraft models or components, the memorandum for record must list these items and be signed by the commander. Keep a copy of the authorization on file in the QC office for six months after the representative departs the unit.

Designated Representative

Several manuals contain phrases stating that an individual (the commander or property book officer, for example) or a designated representative performs a particular function. This authority is designated in writing (by memorandum for record) or DA Form 1687 (Notice of Delegation of Authority—Receipt for Supplies). Maintain a list of the following as applicable to TOE/TDA units:

- Aviators appointed as maintenance test pilots (AR 95-1 and TM 1-1500-328-23).
- Personnel entering deferred maintenance on DA Form 2408-14 (DA Pam 738-751).
- Personnel signing for and turning in equipment (aircraft maintenance only) (AR 750-43).
- Personnel authorizing evacuation of aircraft on a red-X status for a onetime evacuation mission (DA Pam 738-751).
- Personnel authorizing a change of aircraft red-X (status symbols) for the performance of a one-time test flight (DA Pam 738-751).
- Personnel inspecting aircraft first aid kits (TM 1-1500-328-23).
- Weight and balance technician (AR 95-3).
- Unit safety officer (AR 385-95).
- Unit safety NCO (AR 385-95).
- TMDE support coordinator and alternate (AR 750-43).
- Personnel qualified to inspect, service, and repair oxygen equipment.
- Publications officer or NCO (DA Pam 310-10).
- Commander's assumption of command orders.
- AOAP monitor (TB 43-0106).
- Personnel qualified to inspect ejection seats by type and model.

- Personnel qualified to repair or work on ejection seats by type and model.
- Unit maintenance officer.
- Controlled exchange officer (AR 750-1).
- Servicing records manager (AR 25-400-2).

Whichever form is used, it states the function that is delegated. Keep completed forms on file in the QC office. Review any changes or revisions to subsequent Army publications affecting the above designations. Make any additions or deletions of orders at that time.

Inspection Stamps

Use an inspection stamp to indicate a satisfactory condition. It carries the same authority as an inspector's signature and must be guarded against unauthorized use. If an inspection stamp is used, it is round and no larger than 1/2 inch in diameter (see Figure 8-7). It includes the unit designation and inspector's number. Obtain the stamp through local purchase. The following requirements must also be met:

- Keep unissued stamps under lock and key.
- Destroy illegible stamps.
- Do not assign relieved stamps for six months.
- Keep a stamp inventory or register (see Figure 8-8) in the QC section.

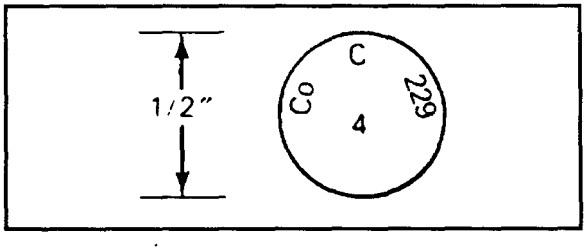


Figure 8-7. Sample of inspection stamp

Status Symbols

For a discussion of status symbols for aircraft defects, refer to DA Pam 738-751.

AIRCRAFT INSPECTION

Aircraft are inspected to ensure that published specifications are followed, maintenance requirements are complied with, and quality work is completed efficiently. Many times an inspector is not completely familiar with the area or item being inspected. If this is the case, the inspector reviews the manuals on the subject area or item. In general, monitor maintenance procedures to ensure that—

STAMP NUMBER*	ASSIGNED TO	DATE ASSIGNED	DATE RELIEVED
1	JERRY H. BROWN SSG	17 AUG 1985	
2	JOHN W DOW SSG	10 JAN 1985	25 SEPT 1985
3			
4			
5			
6	STAMP DESTROYED/LOST		
2	DAVE E. HONEYCUTT SFC	25 APRIL 1985	

* All stamp numbers must be accounted for.

Figure 8-8. Sample of inspection stamp inventory/register

- Proper tools and equipment are used.
- Aircraft and components are maintained according to specific publications.
- Publications used are current.
- Forms and records are complete and accurate.
- Safety precautions are observed.

The most common aircraft technical inspections are discussed below.

Forms and Records Inspection

Forms and records are the first items checked in any aircraft inspection. All form entries must follow the policies in DA Pam 738-751, TM 55-1500-342-23, and TB 43-0106. All necessary forms, publications, tools, and test equipment are available at the inspection station. Refer to DA Pam 738-751 for the required locations of the various forms.

DA Form 2408-12

Ensure that hours and landings are correctly totaled.

DA Form 2408-13

Ensure that—

- Hours and landings are correct and correctly carried forward from DA Form 2408-12.
- Current aircraft hours, landings, autorotations, and APU history and rounds field, if applicable, are correctly carried forward from previous DA Form 2408-13.

- Status in Block 10 reflects the most serious uncorrected fault listed on DA Form 2408-13-1, -2 -3, and DA Form 2408-14.
- All corrected red-X and circled-red-X corrective actions were inspected by an authorized inspector.
- All entries signed off as carried forwarded from the previous DA Form 2408-13-1 are on the current DA Form 2408-13-1.
- Entries are carried forward word for word, and status symbols are correct.
- Inspection times are correctly carried forward from previous DA Form 2408-13.

DA Form 2408-14

Ensure that—

- Faults are transcribed word for word from DA Form 2408-13-1 or 13-3.
- Reasons for delay are valid.
- Individual's signature (Block 8) is an authorized signature, as designated in writing.

DA Form 2408-18

Ensure that all required inspection items are entered. Enter any inspection that is due on DA Form 2408-13-1.

DA Form 2408-5 and -1

Ensure that—

- All applicable modifications are entered in Section 4.
- Required completion date is entered in pencil in Block 5F for modification not complied with.

DA Form 2408-15,-1, and -2

Ensure that—

- Form is on hand for aircraft and/or for each gas turbine engine.
- Significant historical data is shown, as required by DA Pam 738-751.
- Turbine engine analysis checks are listed.

DA Form 2408-16 and -1

Ensure that—

- Required forms are on hand as listed in DA Pam 738-751.
- Serial numbers match component serial numbers on the aircraft.
- Replacement due date is correct and not past due.

DA Form 2408-17

Ensure that—

- All applicable items listed in the Master Inventory Guide are shown in Column b.
- Property additions and deletions made after aircraft delivery are correctly reflected.
- All equipment checks have a signature in the corresponding numbered block at the bottom of the form.
- All items added, deleted, or short are explained on the back of the form (refer to DA Pam 738-751).

DA Form 2408-19,-1,-2, and -3

Ensure that it is properly completed and on hand for each gas turbine and engine turbine wheel.

DA Form 2408-20

Ensure that a properly completed form is on hand for each aircraft component in the AOAP.

DD Form 365 series

Ensure that forms are on hand and up-to-date as required by AR 95-3 and TM 55-1500-342-23.

Initial Inspection

AVIM inspectors perform an initial inspection before the aircraft enters the shop for maintenance. This inspection determines—

- Deficiencies.
- Work required.
- Economical repair of aircraft and components.
- Accountability of equipment.
- AVUM deficiencies (minor AVUM deficiencies will not justify refusal to accept an aircraft into the AVIM shops).

Enter all deficiencies on DA Form 2408-13-3. Return the form(s) to production control after the inspection.

Perform the initial inspection at AVIM level to verify that aircraft or components meet specifications of published maintenance manuals. Remove only those cowling and access panels necessary to inspect the faults listed on DA Form 2407 or DA Form 5504 by the AVUM unit.

One Hundred Percent Inspection

If numerous faults are found after the initial inspection is completed, conduct a 100 percent inspection. Also remove all cowling and access panels and inspect the entire aircraft, including all systems and components. Items to look for during the inspection are—

- Correct assembly.
- Proper safety techniques (for example, use of wire and cotter pins).
- Wear.
- Rigging.
- Leaks.
- Structural defects (cracks, punctures, loose rivets, separation in honeycomb panels, and so forth).
- Security of components.

In-Progress Inspection

AVUM and AVIM technical inspectors perform this inspection. It ensures that—

- Final product is reliable.
- Areas are inspected before they are covered by access panels or components,
- Mistakes are discovered and corrected on the spot.

Before performing an in-progress inspection on aircraft in phase maintenance, review all logbook forms and records which are completed by the maintenance crew. Enter deficiencies missed by the maintenance team on DA Form 2408-13-1.

The in-progress inspection is a continuing inspection performed periodically while the aircraft or component is in the shop. The technical inspector should be available to answer the repairers' questions and resolve problems. Set up the stations, if possible, so that the inspector is near the work being performed. Equipment at each station should include all items needed to perform the inspection. All necessary forms, publications, tools, and test equipment should also be available.

Final Inspection

A final inspection is a complete inspection and functional test (if required) of all aircraft or components released from the shop after maintenance. Inspections determine if—

- Repairs meet the specifications of the maintenance manuals.
- Work requested on DA Form 2407 or 5504 was completed.
- Correct tools and equipment were used.
- Entries on DA forms are complete and accurate.
- Aircraft or component conforms to standards.

Correct major (red-X) deficiencies before the aircraft or component leaves the shop. Correct minor (red-diagonal) shortcomings based on the availability of parts and man-hours. All deferred maintenance has a valid requisition or work-order number. The decision to defer maintenance rests with the commander or designated representative as stated in DA Pam 738-751.

Nondestructive Inspection

NDI is a tool of quality control inspection. Aircraft components may have suspected metal flaws which must be confirmed or denied. A defect may be visible, but the seriousness of it is unknown. For example, scratches can look like cracks and hairline cracks can look like scratches. In any case, the technical inspector must evaluate the defect. That is when the technical inspector turns to the NDI. NDI details and procedures are fully discussed in FM 1-514 and TM 55-1500-335-23.

TECHNICAL COMPLIANCE

The technical inspector monitors and ensures compliance with the following publications:

- Modification work orders.
- Technical bulletins.

- Safety-of-flight messages.
- Aviation safety action messages (ASAM).

Modification Work Orders

Use the following forms to ensure MWO compliance:

- Upon receipt of an MWO that applies to the serial-numbered aircraft assigned to your unit, enter MWO information on DA Form 2408-5 (refer to DA Pam 738-751). This includes MWOs directed by a higher commander. Also enter MWOs that apply only to aircraft based at specific locations. If the aircraft serial numbers are included, list the MWO on DA Form 2408-5. Complete DA Form 2408-5 showing MWO compliance. Sign off the MWO entry on DA Form 2408-13-1 (refer to DA Pam 738-751).
- If the MWO is not applied by the specified date, enter the MWO on DA Form 2408-13-1. For an overdue normal MWO, reenter it on DA Form 2408-14 (refer to DA Pam 738-751).

Technical Bulletins

Technical bulletins direct one-time inspections of an aircraft or component. Use the following forms to ensure compliance with technical bulletins:

- DA Form 2408-13-1. Use this form to enter the one-time inspection due on the aircraft or aircraft component. Perform inspections according to the technical bulletin. Normally, if a technical bulletin is not applied within the specified time frame, the aircraft is grounded. If no defects are found, sign off the inspection due on DA Form 2408-13-1. If defects are found, enter them on DA Form 2408-13-1. Then notify maintenance personnel for corrective action. After the defect is corrected, inspect the corrective action and sign off the inspection due on DA Form 2408-13-1.
- DA Form 2408-15. Enter on this forma one-time inspection of an aircraft or aircraft component. Also enter technical bulletins for turbine engines on DA Form 2408-15 (TEAC).
- DA Form 2408-5. Enter technical bulletins that apply to components on DA Form 2408-5 (see DA Pam 738-751). The procedure is the same as for MWOs.
- DA Form 2408-16. If a technical bulletin applies to a component on which DA Form 2408-16 is maintained, enter technical bulletin compliance in Block 8. DA Pam 738-751 and TB 55-1520-238-23 (AH-64) list all components that require DA Form 2408-16.
- DA Form 2408-18. A technical bulletin may require a recurring inspection at specified intervals. If so, enter this inspection on DA Form 2408-18 for the aircraft.

Safety-of-Flight Messages

Comply with safety-of-flight messages and log them on applicable DA forms in accordance with DA Pam 738-751.

SHOP INSPECTION

A shop that is below standard cannot put out quality work. Inspectors conduct informal inspections of the various shops periodically and bring any deficiencies or safety hazards found to the attention of shop supervisors. Keep a tile of all safety inspections in the QC section and a file copy in the subject area inspected.

The USASC publication, Guide to Aviation Resources Management for Aircraft Mishap Prevention, outlines safety procedures. It has guidance on inspection requirements for the technical inspector. Get copies from the unit safety officer. Minor changes to the guide appear in the USASC publication, Flightfax, which is distributed weekly to all aviation units. Other publications outlining specific safety precautions are FM 10-68 and TM 1-1500-204-23 series.

See Appendix E for a sample shop safety inspection checklist.

DIAGNOSTIC AND TEST EQUIPMENT

Diagnostic and test equipment includes testers, test sets, and other test equipment used to verify that aircraft systems are functioning properly or that they are malfunctioning. Diagnostic and test equipment may be portable or fixed in place, depending on the design. This paragraph describes typical diagnostic and test equipment, identified by national stock number or type. It also identifies applicable technical manuals for detailed descriptions and operating instructions. Whether or not a unit contains specific

items of equipment depends on its category of maintenance (AVUM or AVIM) and its TOE.

Diagnostic and test equipment is used to test aircraft, components, and accessories. The equipment tests systems for proper functioning, analyzes malfunctioning units, and presents an accurate picture of serviceability. Quality control inspectors use diagnostic and test equipment to monitor maintenance procedures. Safe, economical operation of Army aircraft depends on the skilled use of diagnostic and test equipment in a comprehensive maintenance program.

Exhaust Gas Temperature Tester

The exhaust gas temperature (EGT) tester (4920-00-673-5514) is a portable unit used primarily to check the entire EGT indicating system of a gas turbine engine. All tests can be conducted without running the engine.

The EGT tester checks—

- Individual thermocouples before they are placed in the parallel harness.
- Each engine thermocouple in the parallel harness for continuity.
- Resistance of the EGT circuit (without the EGT indicator) to determine if it is within allowable limits.
- Insulation of the EGT circuit for shorts to ground.
- EGT circuits for shorts between leads.
- Engine thermocouple and parallel harness on the engine after removing the engine from the aircraft.
- Engine readings to determine if they are within +/-0.1 percent during engine run-up.

The EGT tester can also be used to check—

- Compressor speed indicating system.
- Fire detector system.
- Overheat detector.
- Engine anti-icing systems.

Refer to TM 55-4920-244-14 for operating instructions.

Vibration Tester

The vibration tester (4920-00-973-2149) measures turbine engine vibration at specified operating speeds to determine if maximum permissible engine vibration is exceeded. Vibration pickups attached to adapters mounted on the engine transmit electrical impulses through cables to the vibration meter. The vibration meter indicates the total amount of engine movement. Refer to TM 55-4920-326-40 for operating instructions.

Electronic Blade Tracker

The electronic blade tracker (4920-00-623-5954) is a portable instrument that detects and measures the out-of-track condition of helicopter rotor blades. The three major units of the electronic blade tracker are the electro-optical pickup unit, electronic conversion unit, and magnetic phase detector. The electro-optical pickup unit has two photoelectronic cell-and-lens assemblies; it is placed on the ground under the rotor blades. As the rotor blades cut through the photoelectronic cell-and-lens assemblies, the out-of-track distance, or difference in blade planes, is indicated on a meter on the electronic conversion unit. Two to six blades can be tracked on single- or dual-rotor installations. The magnetic phase detector is mounted on the rotor swash plate or near any component having the same RPM as the rotor blades. Refer to TM 11-4920-215-15 for operating instructions.

Propeller Balancing Kit

The propeller balancing kit (4920-00-572-0987) is used to balance fixed-wing aircraft propellers. The maximum weight of propellers that can be balanced is 550 pounds. The kit can balance propellers with spline sizes of SAE 20 through 50 and flange sizes of SAE 1 through 4. Refer to TM 55-4920-201-14 for operating instructions.

Electronic Weighing Kit

The electronic weighing kit (6670-00-526-8498) can weigh aircraft up to 150,000 pounds. It consists of three cells placed between the aircraft jack points and the pad on the hydraulic jacks. The cells are connected to a control unit by electrical cables. The control unit can zero the kit and read out the aircraft weight when the aircraft is on jacks. Refer to TM 55-6670-200-14&P for operating instructions.

Fuel Quantity Gage Tester

The fuel quantity gage tester (6625-00-302-4802) checks the accuracy of fuel indicating systems that

use capacitance-type fuel probes. Refer to TM 11-6625-363-15 for operation and maintenance details.

Aircraft Electronic Fuel System Test Set

The aircraft electronic fuel system test set (6625-00-987-9868) checks the serviceability of capacitance-type fuel gaging systems on Army aircraft. The test set measures the capacitance of fuel gaging systems and calibrates fuel quantity indicators in compensated and noncompensated fuel gaging systems. It also measures the insulation resistance of tank units, fuel quantity indicators, cables, and fittings. Refer to TMs 11-6625-363-15 and 55-4920-325-14&P for operating instructions.

Gyrocompass Tester

The gyrocompass tester (4920-00-341-1892) checks the accuracy of gyromagnetic compasses, flux valves, slavings, and the power supply. Refer to TM 11-6625-247-15 for operating instructions.

Fire Detector Systems Test Set

The fire detector systems test set (4920-00-334-9595) is used to test 28-volt aircraft fire detector systems. The test set tests all major components of an aircraft fire detector system. It tests the system or any of its major components by substituting equivalent circuits into the aircraft fire detector system. Refer to TM 55-4920-413-13&P for operating instructions.

Pitot-Static System Tester

The pitot-static system tester (4920-00-474-8311) is a self-contained pressure and vacuum system. Its primary function is to test aircraft instruments such as altimeters, rate-of-climb indicators, airspeed indicaters, and manifold and fuel pressure gages. The tester accurately simulates engine or atmospheric pressures and vacuums such as those encountered in the aircraft's normal operation. This is accomplished by a small, high-speed pump capable of producing pressures up to 50 psi and a vacuum equivalent to an altitude of 80,000 feet. Refer to TM 55-4920-231-14 for operating instructions.

Hydraulic Test Stand

The hydraulic test stand (4920-00-141-8801) contains a complete hydraulic system with the necessary valves, controls, and gages for creating and controlling various hydraulic systems. Several sizes of hydraulic fluid hoses are provided for conducting fluid to the hydraulic system of the tested aircraft. (A manual is being developed.)

Torque Tester

The torque tester (6635-00-514-4836) provides a simple, positive method for testing the accuracy of torque wrenches. The principle of operation is based on a geared-down pendulum. Torque applied to the input segment transmits movement to the pendulum, which, in turn, moves an indicator calibrated in both inch-pounds and foot-pounds. The scale is trigonometric and based on the angle through which the pendulum is moved. The scale reading is compared with the torque wrench readings to determine torque wrench accuracy. Refer to TB 5-6635-200-35 for operating instructions.

Aircraft Inspection Tool Kit

The aircraft inspection tool kit (5180-00-323-5114) consists of items primarily used by technical inspectors: a briefcase and various flashlights, mirrors, tools, and measuring instruments. Exact contents are subject to change. Refer to SC 5180-99-A09 for a list of contents.

APPENDIX A

THE THREAT TO AVIATION MAINTENANCE

The focus of military confrontation has changed from the Soviet threat to regional conflicts around the world. The disbanding of the Warsaw Pact, withdrawal of Soviet forces from Eastern Europe, and the signing of the arms control accords prove the change in Soviet intent. We must, however, remember that Soviet armed forces are still the largest in Europe and have significant deployment capability. The rise of regional threats is partly the result of the decreased Soviet threat and largely the result of arms proliferation in the Third World. During the 1980s, nearly 80 percent of world arms production went to developing countries. Iraq is an example of the Capability that a regional power can attain. The major lesson of the Gulf War for emerging regional powers is that they will purchase or develop advanced weaponry to preserve or extend their power. Those nations or groups that cannot achieve their goals in diplomatic channels or by conventional military means will resort to unconventional warfare to influence events. Rather than a decreased threat, the US Army faces an expanding and more diverse threat.

CHARACTERISTICS OF THREAT FORCES

Aviation maintenance activities are susceptible to disruptions and are vulnerable to military actions in high-, medium-, and low-intensity conflicts. During major conventional wars, aviation maintenance units are likely to be located but may not be high-priority targets. At the low-intensity level of conflict, the enemy is more likely to strike softer logistics targets such as aviation maintenance units. Some characteristics of possible threat forces follow:

- Regional threat military forces will initially outnumber us and allied forces. Soviet-trained forces will continue to follow older Soviet tactical doctrine. This stresses combined arms operations, artillery, careful planning, surprise, shock action, and adherence to the plan.
- Soviet forces in the future may conduct independent combined arms operations using the latest doctrine and tactics. The Soviet armed forces will continue to increase quality of leadership and equipment as they reduce in size.
- Threat forces worldwide will seek to narrow technology gaps with both regional and global powers. Soviet, American, and European weapons may be reverse-engineered copied, license-built, or purchased. Advanced weapon technology may be incorporated in locally designed and built arms. Older weapons may be modified with advanced-technology fire-control systems, protection packages, and warheads.
- Threat forces may seek to prevent deployment of US forces through interdiction of lines of communication. Several regional powers have submarine forces, capable air forces, and short-range ballistic missiles (SRBM). US Army aviation maintenance units may encounter hostile fire on debarkation.
- Regional powers may seek to gain regional air superiority. This presents problems for deploying Army aviation and maintenance units. Operations under hostile air superiority or parity will increase the maintenance work load while self-protection becomes an increased priority.
- Ground operations will emphasize mobility and depth of attack to disrupt assembly areas and destroy US forces before they can be committed. Soviet-trained threat forces can carry out rapid combined arms maneuvers in offensive operations.
- Terrorist or guerrilla forces will seek out targets of opportunity with low risk of return fire. Rear area units such as aviation maintenance present high-value, low-risk targets.
- Threat forces may use chemical, biological, or radiological (CBR) warfare agents against US forces specifically or against allied positions and support areas indiscriminately. Proliferation of CBR production capability in developing countries increases the likelihood of its use.

TYPES OF THREAT

Enemy

Hostile forces will attack aviation maintenance through attempts—

- To disrupt or negate command, control, and communications.
- To disrupt or destroy the maintenance facility, its personnel, and its equipment.
- To destroy or damage aircraft in the air and on the ground.
- To disrupt or destroy logistic supplies, fuels, and parts.
- To curtail or sever transportation links.
- To contaminate or render useless water, foods, fuels, oils, and soils.
- To neutralize or disturb electronic devices used to measure, communicate, navigate, and control.

Friendly or Neutral

The growing complexity of modern warfare and the sophistication and lethality of weapons increase the problem of friendly fire. The requirement for camouflage, conceahment, and deception for survival also increases the possibility of poor recognition by friendly forces. Joint and coalition operations increase the likelihood of electromagnetic interference from radars, communications, and navigation equipment, not to mention friendly electronic warfare operations.

Threat Capabilities

In high- and mid-intensity conflicts, aircraft maintenance units create large signatures for hostile intelligence, reconnaissance, surveillance, and target acquisition systems. Proximity to aircraft units increases the probability of as primary targets. Hostile forces may use missiles, artillery, fighter bombers, armed helicopters, mobile armor forces, directed-energy weapons (DEW), radioelectronic combat (REC), or special operations units to attack aviation maintenance units. While the range of weapons decreases in a low-intensity conflict or operations other than war, the lethality to our units remains high. Some threat capabilities follow:

- Aircraft and missile forces operating from land bases or seaborne platforms can deliver weapons ranging from nuclear, biological, and chemical to high-explosive, fragmentation, and incendiary warheads. Delivery means are free-fall (dumb) bombs, ballistic rockets, precision-guided munitions (smart to brilliant), and cannon/gun-fired projectiles.
- Air- and sea-delivered ground forces can attack rear area facilities with howitzers, mortars, and direct-fire weapons. They can lay mines, set ambushes, conduct REC, or provide targeting information to other forces.
- Conventional artillery (howitzers, guns, and mortars) can reach up to 50 kilometers with extended-range ammunition. Multiple-rocket launchers achieve similar ranges with standard rockets and fewer launchers for area saturation. Artillery projectiles include high-explosive, fragmentation, incendiary, smoke, and improved conventional munitions. Larger-caliber warheads add nuclear, chemical, and submunition capability to conventional forces. Submunitions include antitank and antipersonnel mines, chemical bomblets, and fuel-air explosives. Limited-use munitions are used for marking, electronic jamming, reconnaissance, psychological warfare, and non-nuclear electromagnetic pulse rounds.
- Missiles, guns, directed-energy weapons, and electronic countermeasures represent threats against freed- and rotary-wing aircraft used for logistics as well as combat aircraft. Aircraft entering the maintenance facility may contain unexploded ordnance or CBR contamination.
- Tactical missiles can reach targets throughout the theater army area. Free rocket over ground (FROG), short-range ballistic missiles, and cruise missiles are becoming more common among regional military powers. Missiles can deliver the full variety of conventional and CBR munitions from land, surface ships, and submarines. Missiles and rockets of diverse origin are available in quantity and lend themselves to single or mass launches.
- Directed-energy weapons use amplified, pulsed-light, microwave, or millimeter wave frequencies to disrupt or destroy controls, sensors, structures, or personnel. Current

non-weapon lasers can damage night vision devices and optics and can cause eye damage. Future applications of DEW and radio frequency and particle beam weapons are expected to inflict structural damage. DEW presents severe problems for unshielded electronic components such as fly-by-wire systems and computers.

- Threat force armor units may operate in our support areas when exploiting success in battle. Combat operations doctrine expects this situation on the fluid battlefield of tomorrow. Aviation maintenance units may be attacked by tanks (100mm to 125mm guns), infantry fighting vehicles (20mm to 73mm automatic cannon/gun), self-propelled artillery, and armored personnel carriers mounting heavy machine guns or grenade launchers.
- Infantry-type units; special forces, rangers, naval infantry, and guerrillas; and saboteurs or terrorists pose a threat to facilities, aircraft, supplies, and lines of communication. Large groups of infantry are likely to target high-priority targets that are lightly defended or easy to destroy. Stealthy forces can operate relatively freely in rear areas and attack with little warning. Though man-portable, their weapons will be quite lethal.
- Rocket-propelled grenades, antitank guided missiles, light antitank weapons, and recoilless rifles provide heavy punch to light forces. Terrorists, saboteurs, and snipers may be a persistent and deadly threat to aviation maintenance units as well.

AVIATION MAINTENANCE VULNERABILITY

Aviation maintenance units and facilities in the field have distinct signatures. Reconnaissance units or observers can easily recognize the characteristic shape and configuration of vehicles and equipment under normal conditions. Thermal emissions, energy output, electronic signals, and noises associated with maintenance work contribute to the identification of aviation maintenance locations. The sites are vulnerable not only to weapons but also to electronic countermeasures, disruption of lines of communications, and even to environmental conditions like humidity, temperature extremes, and weather. Environmental conditions may impede mission completion and increase the effect of CBR or incendiary weapons. Directed-energy weapons can destroy electronic equipment with no visible damage. Aircraft at the facility, both on the ground and in flight, increase the facility's signature and priority for threat targeting. Forward maintenance and BDAR require deployed maintenance teams that face the same threat as the unit they are supporting.

RATIONALE

This appendix required change intone and focus due to change in national strategy and political alignments. The Soviet threat has changed in direction as well as capability. Regional forces present a more serious threat, especially in light of proliferation of missiles, long-range artillery, and weapons of mass destruction. Changes in US Army doctrine and concepts exacerbate change in the threat to aviation maintenance.

APPENDIX B

SAMPLE AVUM/AVIM INTERNAL SOP

This SOP can be tailored for use by AVUM/AVIM units as appropriate. (Head the SOP with the names of the organization and the station, the date, and the SOP number.)

PURPOSE

This SOP provides a standardized guide for maintenance support procedures used by this AVUM/AVIM unit in performing its mission.

MISSION

The mission of this unit is—

- To perform maintenance on aircraft, aircraft armament, and avionics and to provide related repair parts supply.
- To provide maintenance assistance teams to support units, when possible.
- To provide aircraft recovery support.

FUNCTIONS

The functions of this unit are—

- To prepare maintenance support plans for new aviation units to be supported and for those relocated from other areas.
- To provide timely exchange of essential aircraft maintenance information with supported units.
- To recommend general maintenance policies and procedures for aircraft, aircraft armament, avionics, and related repair parts.
- To prepare statistical analysis, as required, to accurately depict the status of all maintenance operations, including man-hour expenditures, items and systems repaired, backlogs, and aircraft processed.
- To review and analyze aircraft maintenance reports and statistical data to detect trends and problem areas.
- To determine requirements for contractor technical assistance personnel.
- To provide technical assistance and information to supported units.
- To prepare plans to provide maintenance support for new types of Army aircraft and avionics equipment.
- To provide repair parts, maintenance materials, and recovery and evacuation assistance to supported units.

RESPONSIBILITIES

The success of this unit's maintenance effort and its reputation depend on the reliability and integrity of the personnel assigned to the quality control section. Technical inspectors must base their decisions, as objectively as possible, on information in technical publications. Files are maintained on all aircraft the unit is required or expected to support.

Technical Training

Specialized and technical training is needed for logistical support to keep pace with current developments.

The need for a timely, comprehensive training program must be recognized. The training program must ensure that each individual receives training to develop maximum potential and the highest level of efficiency.

Technical Assistance

Technical assistance is a command responsibility at all levels of maintenance and supply down to, and including, this unit. This unit provides maintenance and supply technical assistance teams to supported units and activities in the problem areas of maintenance and repair parts supply. This assistance is provided through continuous contact and routine maintenance and supply activities. For technical assistance, the supported unit contacts this unit and states its requirements, essential data concerning the problem area, and when and where the team is required. A formal request for technical assistance is not required. Technical assistance improves aircraft maintenance and supply systems, thereby increasing aircraft availability. Assistance required beyond the capability of this unit will be referred to higher headquarters. This unit submits reports of completed team visits directly to the supported unit. Reports are not

used for disciplinary action. They will be narrative and include, as a minimum, the following:

- Date of visit.
- Unit visited and its location.
- Team members.
- Key personnel contacted.
- Observations and comments.
- Recommended actions.

During the visit, this unit informs applicable personnel of observations, comments, and recommended actions and conducts an exit interview, if practical. A written report of the visit is forwarded to the supported unit commander as soon as possible. A copy of the report is kept in the technical assistance file for future reference.

Repair Parts Supply

To improve the efficiency and effectiveness of supply support, this unit will—

- Accurately report all data for all required reports.
- Consolidate all storage locations where multiple locations exist for the same item.
- Establish an NMCS section to provide effective response to supported units on NMCS requisitions.
- Walk-through requests from support units if the situation justifies such action. Honor requests for follow-up (AF1) and status (AS1) from supported units.
- Accept serviceable and unserviceable turn-ins.
- Ensure 100 percent accountability on repairable.
- Perform a 100 percent inspection on all unserviceable turn-ins to ensure that all such items are packed, crated, and boxed as needed for transport.
- Keep sufficient packaging and crating materials on hand for mission support.
- Ensure proper control over parts in transit.
- Make every effort to achieve the following established performance standards:
  - Maintain at least 90 percent accuracy in storage.
  - Eliminate double locations in storage.
  - Maintain a minimum of 85 percent agreement between quantity recorded and quantity on hand (inventory accuracy).
  - Process all requests within 24 hours of receipt.
  - Expedite turn-in of excess and non-stock-list items.

Status Report

The AVIM unit is responsible for keeping supported units informed of the status of their aircraft while in the maintenance shops. A supported unit must have a realistic forecast on the completion date. This information should be provided on a continuing basis and on request.

As soon as production control determines the initial target date, it is telephoned to the supported unit. When unanticipated events or circumstances force extension of the target date, notify the supported unit immediately. If the target date is extended by more than one working day, notify the supported unit.

To assist a supported unit in preparing DA Form 1352, the blue copy of DA Form 2407/5504 is annotated during the month the aircraft is returned to the owning unit with the following information "This aircraft was in AVIM maintenance hours and aircraft not mission capable, supply (NMCS) hours." This data must be accurate.

Production Control

Establish maximum production of shop maintenance operations. Maintain and regulate uniform flow of the aircraft and its associated components through the shops. Process records as repairs are completed or parts are removed to reflect the current status of aircraft and parts. Information originates from the maintenance crews and passes by way of reports to the production control office. The production control office maintains DA Form 2405 for all aircraft work orders. Shop platoon clerks also maintain a maintenance request register for all aircraft components routed through the allied shops. The production control office also maintains an MWO request register.

Procedures for controlling the flow of DA Form 2407/5504 are as follows:

- Production control clerks date the work request and enter it on the production control board. DA Form 2407/5504 and the logbook are then passed to the technical inspection section, where a technical inspector is assigned. He reviews the work package and prepares for the initial inspection. He inspects the aircraft and records all faults noted during the initial inspection. The technical inspector also reviews and processes the following:
  - Faults (on DA Forms 2408-13,2408-13-1, 2408-13-2, and 2408-14).
  - Type of work requested (on DA Form 2407/5504). MWO requirements.
  - Faults that require reentering from DA Forms 2408-13 series and 2408-14.
- Production control supervisor notifies the appropriate section chiefs (maintenance/allied shops and maintenance officers) of the work assignment, based on evaluation of estimates returned from quality control. Production control supervisor estimates the date/time of the work's completion. Maintenance officers evaluate current work loads and priorities of work to be done.
- Final technical inspection is made on all work accomplished. A run-up and test flight are made, but only after a complete technical inspection is performed and appropriate entries recorded. If the inspector notes faults that require extensive or additional work, return the aircraft component to the shop foreman and return to work status. Appropriate data and time entries are monitored and recorded.
- Production control computes total man-hours and cost figures as required and closes outwork requests on DA Form 2407/5504 when the work is completed. The production control board is posted, and the supported unit is notified that the aircraft is ready for pickup.
- Supported unit representative signs and dates DA Form 2407/5504. He checks the aircraft records and departs with the aircraft.
- Routing procedures are the same for component repair except that an intershop work order is used; one person can usually do the work. Distribution and disposition of DA Forms 2407/5504 and 5504-1 are according to DA Pam 738-751/738-750.
- DA Form 2404 is prepared in three copies and distributed as follows:
  - The original is sent to the supported unit along with the blue copy of DA Form 2407/5504, the logbook, and the test-flight work sheet, if applicable.
  - The carbon copy is filed in the tub file in production control and attached to the work request (buff copy) for a permanent record of the individual aircraft's maintenance history. Aircraft hours, engine hours, and periodic inspection number (if applicable) are entered at the bottom of the carbon copy.
  - The second carbon copy is retained in the quality control file.

Quality Control

Usually, the quality control section performs the following actions:

- Inspects aircraft and associated components received for maintenance to determine the need for requested repairs and the quality of maintenance accomplished.
- Determines when functional test flights are required according to TM 1-1500-328-23.
- Maintains a complete reference file of technical publications applicable to the unit's operation.
- Prepares and controls equipment EIRs and QDRs required by DA Pam 738-751/738-750.
- Maintains an MWO status file.
- Requisitions and maintains control of all required kits and parts until equipment is received for modification.
- Ensures proper reporting of all modifications applied at that level by use of DA Form 2407/5504.

The quality control officer or another qualified person is appointed as the weight and balance technician as directed by AR 95-3. Appropriate records are completed as required by AR 95-3, the applicable operator's manual, and TM 55-1500-342-23.

Quality control personnel review each incoming technical publication or other directive applicable to their organization. They determine how to apply the document within the maintenance function or to the items being maintained. All directives applicable to

that equipment are immediately posted to the organic equipment's historical records. Special attention must be given to those publications requiring MWO actions. The production control section is furnished an information copy of this type of publication.

Publication files throughout the organization are inspected at least once every three months to ensure that they are complete and that the publications in use are current. At this time, pinpoint distribution requirements are reviewed and updated if necessary. The quality control supervisor ensures that his personnel read all applicable incoming publications. During each inspection, the inspectors determine whether personnel in the maintenance activity are familiar with pertinent directives and are using them in conjunction with repair actions.

The quality control section initiates and follows up all correspondence needed to clarify technical publications when the intent or requirement is not clear or specific. Using DA Form 2028 (Recommended Changes to Publications and Blank Forms), the person or section recommending changes to DA publications routes suggestions through the quality control section.

The quality control section is responsible for ordering all required publications using the company's pinpoint distribution account number. In cases where required publications have not been initially distribute the QC section uses DA Form 17 (Requisition for Publications and Blank Forms) in conjunction with DA Form 17-1 (Requisition for Publications and Blank Forms-Continuation Sheet). Maintain a card file with the following information:

- Publication number, date, and title.
- Quantity requested and for whom, if required.
- Dates of request and of due-out received.
- Date received.

QC will review each publication center bulletin to determine those items for which a due-out was received or shipped. If quality control does not receive these items within 30 days of the publication date, a follow-up request will be submitted and so noted on the tile card.

PROCEDURES

Initial Receipt

When this unit receives an aircraft on a work request, the work package is immediately routed to the quality control supervisor. A technical inspector is assigned to review the maintenance request to identify faults for repair. The required information is then posted to the assignment sheet.

Policies for receiving aircraft are as follows:

- All historical records accompany the aircraft into the shop. Hold all requests received without records until the records arrive. DA Form 2408-16, which has critical-time figures of components, is especially important. Technical inspectors review the logbook to determine if the necessary records are included and whether time entries are on the form before the work request is submitted to the production control officer for acceptance. Technical inspectors will also check DA Form 2408-15 for proper entries. Review aircraft armament records, if appropriate.
- DA Form 2407/5504 is properly filled out according to DA Pam 738-751/738-750. The supported unit indicates on the form the faults or symptoms of trouble, based on the diagnostic procedures outlined in the applicable equipment technical manual. After the production control officer accepts the work request, the receipt copy of the form is given to the supported unit's representative, and the aircraft is placed in a work status.
- The work request will not be refused because DA Form 2407/5504 was not properly prepared. The production control clerk will give the supported unit representative a blank form, if required, and will help prepare it correctly.
- A loose equipment BIIL inventory is made on all aircraft that are admitted to the shop for maintenance.
- Emergency maintenance services are provided to any transient aircraft when service is within the capabilities or limitations of this unit. DA Form 2407/5504 is filled out and signed by either the pilot or crew chief. If

records for the aircraft are not available, the pilot or crew chief will telephone the parent unit for the required information. An SOF inspection is made by the technical inspection section and the production control officer prior to release of the aircraft.

Aircraft components beyond the unit's repair capability are reported to the backup unit. The MAC found in the applicable aircraft technical manual is used as a guide in determining the category of maintenance required.

Initial Inspection

Technical inspectors will have a thorough knowledge of FM 1-500 and will perform a thorough inspection before the aircraft enters maintenance. They make maximum use of available diagnostic equipment. Engine and systems operational checks follow the visual inspection, if possible. Technical inspectors ensure that required modifications have been applied and that all faults are recorded on DA Form 2404. Technical inspectors have the applicable aircraft maintenance manual with them during inspections and conduct inspections according to standards in those manuals.

In-Progress Inspection

The assigned technical inspector keeps abreast of ongoing maintenance progress to determine serviceability of parts and to ensure that safety policies are practiced. He is available for advice and assistance. The inspector enters his signature or inspection stamp in the corrective action column after the work has been accepted. He is familiar with every fault on the aircraft and pays close attention to quality maintenance practices.

Final Inspection

When all maintenance work is done, the production control section routes the work package to the quality control section. If possible, the responsible team chief accompanies the completed records. Technical inspectors perform the following tasks:

- Review forms and records to ensure that all required maintenance has been done and properly documented and that all special inspection items have been properly posted; for example, items due for retorque or inspection.
- Assist the team **chief in properly preparing** any required DA Forms 2410 (Component Removal and Repair/Overhaul Record) and ensure that the required information is properly posted on DA Form 2408-16.
- Post information as required on DA Form 2408-15. All major repairs that should be made a permanent part of the aircraft's historical records are posted; for example, crash damage, repairs, and engine internal inspections.
- Perform a thorough inspection, paying **special** attention to the proper completion of all maintenance performed. Any improperly completed work or newly discovered faults are entered on DA Form 2404 and corrected on the spot, if possible, by the repair team. Faults that indicate negligence or obvious disregard for accepted maintenance practices are promptly reported to the quality control officer for corrective action. Record the final inspection on DA Form 2404 with time expended. When all required maintenance has been done, the aircraft is prepared by the maintenance crew for a functional test flight, if required. If a test flight is not required, the team chief returns all DA Forms 2404 to the quality control section. AU historical records are given a final review. All uncorrected faults are reentered on the current DA Form 2408-13-1, and the work package is returned to the production control section for disposition.

Functional Test Flight

Prior to the functional test flight, the technical inspector reviews the aircraft historical records and checks DA Forms 2408-13 and 2408-14 for correct entries according to DA Pam 738-751/738-750. He reenters faults to be corrected from DA Form 2408-13 to DA Form 2404. He corrects only AVIM faults, except in the following instances:

- When organizational maintenance faults prevent or delay completion of AVIM.
- When conditions are "red X."
- When they are beyond the capability of the supported organization.
- When performing organizational maintenance will not interfere with this unit's primary mission.

The technical inspector also reviews the following, after which he files the logbook on the locator shelf:

- DA Form 2408-5 for MWOs listed as current and checks it for MWOs applied and proper entries. If this unit has responsibility for AVIM on this aircraft, the inspector checks the MWO suspense file for any outstanding MWO requests for which kits are on hand or can be otherwise completed. DA Form 2407/5504 is returned to production control with the work package. MWO kits, if required, are delivered to production control.
- DA Form 2408-15 for unusual entries, such as hard landings, crash damage, and other pertinent data.
- DA Form 2408-16 for proper entries as required by DA Pam 738-751/738-750 and the retirement schedule as listed in the applicable -20/-23-series aircraft organizational maintenance manuals. Maintains a separate form for time replacement and condition components. The technical inspector ensures that time entries are correct, checks DA Form 2408-16 serial-numbered components physically against those installed on the aircraft, and corrects any faults discovered before the aircraft is released for maintenance.
- Aircraft armament records, if appropriate.
- DA Form 2408-17.
- DA Form 2408-18 for any inspections due while the aircraft is in maintenance and notes any inspection due on DA Form 2408-13.

Maintenance operational checks and functional test flights are conducted according to TM 1-1500-3213-23, the applicable aircraft organizational maintenance manuals, and maintenance test flight manual.

Functional test flights have two important and distinct purposes. The first, and most important, is to ensure that the aircraft is safe for flight and capable of accomplishing its assigned mission. This is done through in-flight inspection and functional testing of the aircraft and its operating systems. The second purpose is to accurately determine and report the quality of maintenance performed.

The commanding officer designates, as prescribed in TM 1-1500-328-23, maintenance test pilots authorized to flight-test aircraft. Copies of all such orders are furnished to the quality control section. The number of crews appointed is held to a minimum in order to standardize functional test flights.

Crew scheduling is coordinated with the flight operations section. Functional test flight crews are scheduled to preclude delays to the maintenance work schedule. Quality control personnel supervise test flights and brief the purpose of the flight to the crew before the flight.

Functional test flight check sheets are guides prescribing format and test flight inspection items as contained in the appropriate aircraft test flight manual. They become part of the aircraft's records when completed. When check sheets are needed to check specific equipment or systems, only applicable portions of the checklist are used. Quality control personnel indicate which sections are not applicable for the proposed test flight. All faults are recorded on DA Form 2408-13-1 and explained in enough detail to make prompt corrective action possible. After each test flight, a thorough visual inspection is made to detect faults developed during the test tight. The faults are corrected before the aircraft is released for flight. After the faults are corrected, all test-flight work sheets with the aircraft logbook are forwarded to the quality control section. Quality control personnel review each completed work sheet and determine the adequacy of corrective action. After all review actions are completed, the complete set of maintenance documents is forwarded to the production control section.

Repairable Exchange

Units requesting items for exchange will have on file at the RX point a properly completed, current DA Form 1687. DA Form 2765-1 is completed for the repaired exchange. Units should also have a current copy of their supporting AVIM's RX listing.

APPENDIX C

SAMPLE AVIM EXTERNAL SOP

(Head the SOP with the name of the organization, the station, the date, and the SOP number.)

PURPOSE

This SOP establishes policies and procedures for supported units (customers) requesting support maintenance for aircraft and maintenance-related functions. The procedures have been established to obtain maximum efficiency of personnel, facilities, and equipment. Customers are requested to follow this SOP in all transactions with this unit. Customers are also requested and encouraged to coordinate both by telephone and in person with the production control officer or NCO on problems involving maintenance support.

ASSISTANCE VISITS

This unit will make assistance visits to all supported units. These visits are not designed as an inspection but to acquaint this unit with the customer's needs.

Maintenance assistance visits will be scheduled for any unit upon request. Reports of such visits are forwarded directly to the supported unit commander, not routed through command channels.

MAINTENANCE REQUESTS

The maintenance officer should coordinate requests for maintenance with the production control officer or NCO of this AVIM unit. Direct coordination is emphasized so that the customer may provide the type of maintenance to be performed, parts required, when the aircraft will arrive for maintenance, mission requirements, and any other information that will enable timely return of aircraft.

DA Form 2407/5504 is normally used to request scheduled maintenance, i.e., maintenance of faults that have accumulated since the last scheduled maintenance. (Scheduled maintenance should be coordinated 30 days prior to expected start time). An initial technical inspection will be performed and all faults noted. This unit may correct organizational maintenance faults if the maintenance backlog allows but recommends that customers provide a crew chief to perform AVUM for faults discovered during the initial inspection.

Request unscheduled maintenance in the same manner as above, except for the lead time requirements. Again, direct coordination is encouraged.

On-site maintenance is a service extended to all supported units. Submit the request on DA Form 2407/5504 and coordinate it through the production control section. On-site maintenance is governed by the extent of maintenance required and the current work load of this unit. If possible, limit on-site maintenance requests to component change and minor airframe repair. Do not submit such requests for phased-maintenance assistance.

Customers may submit special maintenance requests when operational requirements dictate. In such instances, list specific maintenance defects for corrective action, and all other work except unsafe flight items will be deferred. Unsafe flight items causing a red X condition will be corrected in all cases.

PROCEDURES

Personnel submitting DA Form 2407/5504 for aircraft or components will report to the production control office. The following procedures will implement the administrative and inspection requirements in processing a work request.

Before arriving here, the customer will correct all unit faults before requesting work. (Unit faults need not be corrected if this results in duplicate maintenance by the repairers of this unit.) In addition, the customer will clean the aircraft thoroughly by removing all mud, excess grease, oil, and hydraulic fluid from all surfaces. Upon arrival here, the customer will—

- Present the aircraft historical records to the production control section for a complete records check. The customer will make the necessary corrections.
- Make a complete basic item issue list (BIIL) inventory jointly with the supporting unit. Representatives of both the customer and this

unit will sign the inventory check sheet. One copy of the check sheet will be retained by the production control section, and one copy will be given to the customer's representative.

- Check serial numbers to ensure that the components installed match those listed on DA Form 2408-16.
- Fill out DA Form 2407/5504 according to DA Pam 738-750/738-751, identifying the specific problem.

This unit will have a complete safety-of-flight inspection conducted by the quality control section if the aircraft requires a test flight. After the SOF inspection, faults noted during the tight will be added to DA Form 2407/5504. When the technical inspector estimates the work required on the aircraft to be over 60 percent of the retrograde criteria, a 100 percent inspection will be performed to determine whether the aircraft is economically repairable at AVIM level. Aircraft that are retrograde on the acceptance inspection will be handled according to procedures described in TM 1-1500-328-23.

NOTE: All scheduled maintenance which becomes due while aircraft is in possession of the AVIM unit will be performed by the AVIM unit.

Procedures for aircraft inventory and status reporting are as follows:

- When the customer has an aircraft in the maintenance shop at the end of the report period, information required from this unit will be recorded on DA Form 1352-1 and provided to the owning unit. The 1352-2 will be started when the aircraft arrives at the AVIM and end when the aircraft is returned to the owning unit or at the end of a report period. A new 1352-1 will be initiated by the AVIM if the aircraft is still at the AVIM at the beginning of a new reporting period. This will be done on the first day of the month following the reporting period.
- Aircraft turned into this unit for extensive retrograde maintenance must have a DA Form 1352-1 before this unit can turn in the aircraft. The report will include status through 2400 hours of the day of transfer.

Processing Avionics Components

All incoming equipment will have a DA Form 2407/5504 work order filled out according to DA Pam 738-750/738-751. Class IX avionics components handled as a Class IX repair part in the repairable exchange (RX) supply system will be ordered on DA Form 2765-1. Equipment will be inspected by the appropriate platoon before it receives DA Form 2407/5504 and the component. These inspections ensure that equipment is complete and that no controlled substitution has occurred.

An RX will be made only if the equipment is complete according to procedures for aircraft maintenance. When an RX is made, this unit will repair the defective equipment and return it to stock. If the equipment is not available for RX, receipt copy number 1 of DA Form 2407/5504 will be signed and returned to the unit.

All units will be notified by letter or telephone that the required equipment is ready for pickup. If the equipment is not picked up within 30 days, it will be returned to stock.

Processing Armament Components

Armament systems will be processed through this unit's production control section on DA Form 2407/5504. RX items will be listed according to AR 710-2. This unit will send a listing to the supported unit and keep it current as items are added and deleted.

Submitting a Quality Deficiency Report (QDR)

Procedures for submitting a QDR are outlined in DA Pam 738-750/738-751. A single QDR will not necessarily lead to a reevaluation study to determine if equipment or components should be redesigned. However, repeated QDR submission on the same item is sufficient reason to investigate whether an item should be changed. Therefore, a QDR must be submitted for each equipment failure. Disposition instructions for copies of the QDR are in DA Pam 738-750/738-751.

TURN-IN REQUIREMENTS

This unit will require all removable structural panels to be opened for inspection to ensure against trapped water, oil, hydraulic fluid, dirt, spent brass, or other items that are not an integral part of the aircraft. Special emphasis will be given to the belly panels

where dirt and water could be trapped and not noticed.

DA Form 2407/5504 will be submitted to the avionics inventory inspector. A copy of DA Forms 2407/5504 and 2404 stating what components are missing, if any, will accompany the aircraft logbook to the production control section when the aircraft is ready for turn-in.

Items of equipment missing due to combat or accident damage may be listed in a brief statement that explains the facts behind the loss. The unit commander will sign the statement. All recovered items, even if damaged beyond repair, must be available for inventory.

The following actions must be accomplished prior to turn-in of aircraft:

- All soundproofing, troop seats, first aid kits, fire extinguishes, and clocks installed.
- All avionics equipment installed or a copy of the report of survey for missing components included in the logbook.
- Aircraft data plate placed with the aircraft. If the data plate is not available due to combat loss or other circumstances, a certificate of loss (in four copies) is required. If a data plate is missing through loss other than combat, a replacement must be requested through channels from US Army Aviation Troop Command (ATCOM), 4300 Goodfellow Boulevard, St Louis, MO 63120.
- All other aircraft forms, records, and items of equipment listed on the DA Form 2408-17 placed with the aircraft. If they are not with the aircraft, a statement explaining the reason for their loss will be shown with the name of a duly appointed survey officer. The unit commander will sign these documents.
- Prior to transfer of an aircraft, DA Form 2408-17 signed in the appropriate block to indicate that it is current and that all required adjustments have been made.
- Permanent removal of property as a result of an authorized change is recorded as follows:
  - Entry lined out.
  - Complete reference authorizing the removal of property entered on the reverse side of the form, including the effective date, the organization removing the equipment, and the voucher number of the turn-in.
  - Three blank columns left on DA Form 2408-17.
- Components and parts removed for teardown and analysis, accompanied by a commander's signed statement citing the EIR/QDR control number.
- For all other missing items, relief from responsibility indicated in appropriate regulations as applicable. A list of missing equipment with a statement explaining the reason for loss and the name of a duly appointed survey officer, signed by the unit commander, is sufficient.
- Release obtained from the accident investigation board for crash-damaged aircraft.
- DA Form 1352-1 feeder information for the DA Form 1352 completed. This information will include status through 2400 hours of the day of transfer.
- Inventory and serial number check performed by the supporting unit.

RESTRICTED SHOPS

Subsystems repair, shop supply, and quality control shops are designed for the exclusive use of this unit. Admission to these shops may be secured only through the production control officer, the NCO, or the aircraft maintenance sergeant.

DISAGREEMENTS

Differences in the opinions of technical inspectors or other reasons may create disagreement about the quality of work performed. The customer will immediately bring such matters to the attention of the production control officer, and the commanding officer of this unit will be notified.

APPENDIX D

PRODUCTION CONTROL MAINTENANCE MANAGEMENT TOOLS

PRODUCTION CONTROL BOARD

The production control board (Figure D-1) is a graphic that displays, data concerning shop operations. Information recorded on the board is used to control current operations, plan anticipated work, and measure work performed. A well-planned and informative production control board (equipment status board) will serve as a ready source of information for the commander and for preparation of reports to a higher headquarters. Key personnel, such as platoon leaders and section chiefs, should have access to the board. It should provide them with information on the progress of work in other shops or sections in relation to work in their activities.

The design of the board should be simple and easy to work with. Entries on the board must be accurate and prompt. As a minimum, the board must display the following information:

- Actual work load in process.
- Work awaiting shop entry.
- Location of work within the shop.
- Reasons for stopped work.
- Work awaiting receipt of parts.
- Completed work awaiting disposition or pickup.

IN-PROCESS (TUB) FILE

This file is for active maintenance requests, which are placed in records file jackets. The status of a repair job in the shop is indicated by the location of its maintenance request and records tile jacket within the tub file. The tub file is manufactured locally and should be lightweight and portable for use when moving frequently. It should be adapted for use in the field by eliminating sections within compartments and reducing its size. Figure D-2 shows how an in-process file is organized.

Compartment 1 — Inspection and Predetermination of Parts

When initiated, the maintenance requedt in its records file jacket is placed in this compartment, where it remains until the following actions have been taken:

- Initial inspection.
- Routing of intrashop maintenance requests and DA Form 2408-13-2/3 (Equipment Inspection and Maintenance Worksheet) to the responsible sections or platoons.
- Monitoring or reviewing of the repair parts needed to complete the job. (Disassembly during maintenance may reveal a need for additional parts.)

Compartment 2 — Awaiting Parts

If work must be delayed, the maintenance request is placed in its records file jacket in one of the 32 sections in the second compartment. If the delay is caused by some administrative matter that must be resolved before work proceeds, the file jacket is placed in the first unnumbered section. The remaining sections are numbered 1 through 31. Each section represents one day of the month. If the delay is caused by a lack of parts, the file jacket is placed in the section that corresponds to the requisition date of the parts. This procedure provides a means of highlighting the parts shortage and serves as a reminder for follow-up supply action. It also serves as a means to determine requisitioning time on critical and routine items. This method reveals the time required to process repair parts and put them in the hands of maintenance personnel. Maintenance should not be delayed solely because all parts are not on hand. The work is started without all required parts and the file jacket is placed in the third compartment. However, the highlighting of the parts shortage is continued for outstanding requisitions by placing a strip of manila folder marked with the maintenance request control number in the section that corresponds to the original requisitioning date of the parts.

Compartment 3 — Shop Entry

When the item is ready to enter maintenance, the file jacket is placed in this undivided compartment.

Compartment 4 — Maintenance in Process

This compartment is divided and numbered like compartment 2. When repairs actually begin, the file

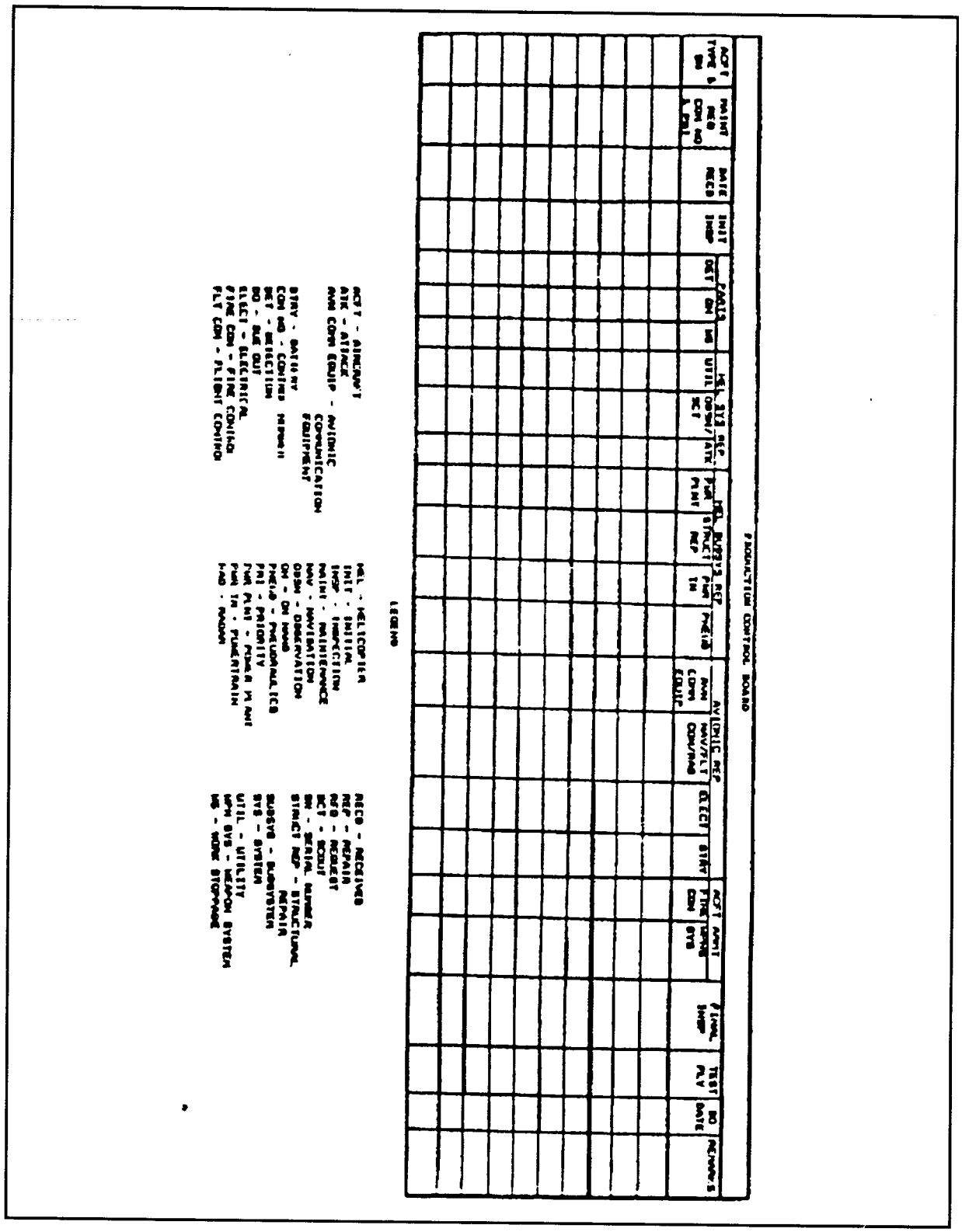


Figure D-1. Sample production control board

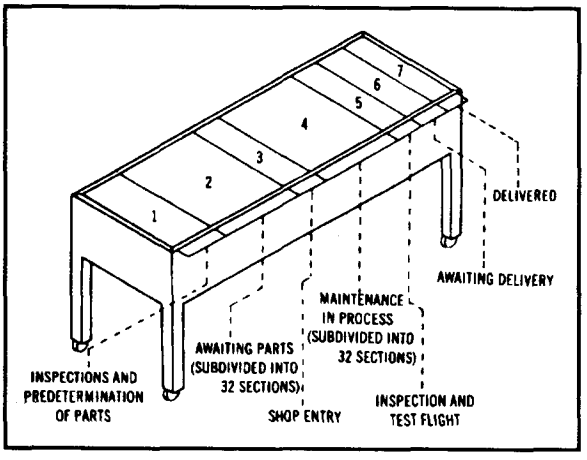


Figure D-2. In-process (tub) file

jacket is placed in the section that represents the estimated date of completion. This alerts production control that the job may not be completed as scheduled. As the scheduled date of completion approaches, production control analyzes the information on the production control board and the daily shop status reports. If it appears that the schedule will not be met, the reason for this is determined and a revised completion date is agreed on.

Compartment 5– Inspection and Test Flight

When repair is completed, the tile jacket is placed in this compartment. It remains there until the final technical inspection/test flight or until a maintenance operational check on the equipment is complete.

Compartment 6–Awaiting Delivery

Following the successful completion of the final inspection/test flight or maintenance operational check of the aircraft, the file jacket is placed in this compartment. It remains there until the final joint inventory has been made and the supported unit accepts delivery of the aircraft.

Compartment 7—Delivered

After the supported unit accepts the aircraft, the maintenance request is placed in its records file jacket in this compartment. The records are retained or disposed of as prescribed in DA Pam 738-751.

MAINTENANCE REQUEST REGISTER (DA FORM 2405)

This form provides a chronological record for the supporting activity to identify work requests received and job orders completed. It also contains supplemental information about the type of equipment repaired, the serial number or other identification, the owning unit, and the date (Julian) when the maintenance request was received. Adequate control may require maintaining separate DA Forms 2405 for fixed-wing aircraft, rotary-wing aircraft, and components. Allied equipment may be carried on the DA Form 2405 maintained for the type of aircraft with which the equipment is associated. The purpose, uses, and preparation of this form are discussed in DA Pam 738-751.

SCHEDULING SYSTEM

A scheduling system that promotes efficient work flow is needed to ensure that customers receive their aircraft with the least possible delay. Many factors must be considered to develop a scheduling system. These factors may include the current work loads and priorities of the supported units, the availability of tools, and the supply of major components, parts, and hardware.

A successful production control operation requires a scheduling system and preplanned work flow. The PC element must track the following information in order to establish maintenance workweek priorities compatible with the unit's mission:

- Aircraft maintenance flow, by flying hours remaining for each assigned aircraft until upcoming scheduled maintenance inspections.
- Current total number of flight hours, status of avionics and armament, and the operational status of each assigned aircraft.
- AVUM-level work in progess and work deferred.
- AVIM-level work in progress and work deferred.
- Time-change requirements for components, by individual assigned aircraft tail number.

Coordinating, planning, and scheduling are closely associated, Experienced PC officers and NCOs handle planning and scheduling. They should specify in detail the work required to achieve the desired results. When preparing intrashop DA Forms 2408-13-2/3 and DA Forms 2407/5504 (Maintenance Requests), production control should coordinate closely with QC personnel. DA Forms 2408-13-2/3 and 2407/5504 should specify in detail all work required or inspections to be performed.

The following procedure applies to a typical production control section. It includes the entry of aircraft or allied equipment into the maintenance unit, control of work and records as they progress through the different shops and sections, and delivery of the finished product.

Whenever practical, maintenance test pilots should perform a prephase test flight on aircraft scheduled for phase or periodic maintenance. The maintenance and the production control officers should review the results to determine which platoon or section will do the required maintenance. Faults noted on the appropriate phase checklist become a part of the phase inspection. The technical inspector assigned to make the phase inspection on the aircraft should accompany this test flight.

When the aircraft arrives at the maintenance activity, production control receives DA Form 2407/5504 and the aircraft's equipment logbook assembly (records). Production control personnel review the DA Form 2407/5504. When they accept the aircraft, they log it on a DA Form 2405 and set up a records file jacket. They send the records file jacket, containing DA Form 2407/5504 and the logbook assembly, to the quality control section. AVIM units operating under the Standard Army Maintenance System–Level 1 (SAMS-1) will follow the procedures outlined in SAMS-1 End User Manual AISM 18-L21-AHN-BUR-FM.

PC personnel will complete Block 24 of DA Form 2407. (If using SAMS-1, they will complete the applicable portions of DA Form 5504 according to DA Pam 738-750.) A copy of the receipt and the carbon of the inventory sheet go to the supported activity's representatives. These personnel direct the work flow through the various shops, entering all maintenance requirements on the production control board. The records file jacket is placed in the production control section tub tile. As work progresses through the shops and sections, QC personnel conduct in-progress inspections. QC personnel conduct inspections on intrashop maintenance requests as they are completed and route them to the production control shop. Faults are recorded on DA Forms 2408-13-1, -2, -3 (Aircraft Inspection and Maintenance Records). PC personnel extract the necessary information from the completed intrashop maintenance requests and DA Form 2408-13-1, -2, -3 and enter it on DA Form 2407/5504.

PC personnel receive and consolidate all accumulated documents relating to the maintenance performed on the aircraft. This indicates that the required maintenance is complete. They then request the QC shop to make a final inspection of the aircraft, and they furnish the necessary paperwork, forms, and records for this purpose. This inspection, plus the recorded in-progress inspections, ensures quality maintenance and an airworthy aircraft. It also verities that inspection plates and panels have been properly reinstalled and that the aircraft has been properly serviced and cleaned. QC personnel also check forms and records in the aircraft's equipment log assembly (records) to ensure that all entries are neat, correct, and up-to-date.

After the final inspection, the technical inspector signs or initials and enters the Julian date in Block 26 of DA Form 2407 (Block 37 of DA Form 5504). This indicates that he has inspected the aircraft and verified that all services and repairs have been done. If the maintenance or repairs requested are recorded in the faults or remarks block of DA Form 2408-13-1 as a red-X item, the technical inspector must sign in the correcting information block. This signifies that he has inspected the items and that they have been corrected. The technical inspector determines whether a test flight or a maintenance operational check (MOC) is required according to TM 1-1500-328-23 or appropriate aircraft manuals. If so, he notifies production control that a test flight is required. The basic issue item list (BIIL) gear and loose equipment required for test flight purposes is removed from the loose equipment storage area and reinstalled in the aircraft. If an MOC is required, it will be annotated in the aircraft logbook.

After the test flight, the test pilot will perform a post-test-flight inspection of the aircraft. If maintenance test pilots do not release the aircraft for flight, they make the required entry on DA Form 2408-13-1. The aircraft is again prepared for a test flight. All equipment belonging to the aircraft is placed in the aircraft after the test flight, and then the aircraft is released. QC personnel return the completed paperwork, forms, and records to the production control shop. PC personnel notify the owning unit that the aircraft is ready for delivery.

The QC personnel or crew chief and the supported activity's representative perform a joint inventory of the BIIL gear and loose equipment. The maintenance request clerk enters in Column h of DA

Form 2405 the Julian date when the aircraft maintenance was completed (SAMS-1 units follow procedures in AISM 18-L21-AHN-BUR-EM). The supported activity's representative completes Block 27 of DA Form 2407 (Block 38 of DA Form 5504) signifying acceptance and delivery of the aircraft.

PRODUCTION CONTROL MEETINGS

Besides reviewing completed aircraft forms to determine the maintenance status of the aircraft, the production control officer should review the daily aircraft status report and conduct daily aircraft production control meetings. Representatives from the flight platoons (leader/sergeant/maintenance officer) should attend. The major goal of each production control meeting is to identify any aircraft maintenance problems as soon as possible. The representative must then coordinate the support necessary to correct the deficiencies in the least amount of time with the highest possible aircraft readiness rates. Flight platoon representatives should bring their most current aircraft status reports to the meeting to update the aircraft maintenance officer. They should also be prepared to discuss any special maintenance support required for their aircraft by either the AVUM platoon/company or the AVIM company. The aircraft maintenance officer will tell the flight platoon representatives which aircraft will be worked on next, which aircraft need to be moved to the AVUM or AVIM hangar, and which, if any, special aircraft preparations the crew chiefs require. Representatives should also discuss deviations from the flying schedule. They may also make minor changes to the aircraft flying schedule. These changes allow for mission change and for scheduled aircraft anticipated to be grounded for maintenance or services during the time of missions they were to support. These meetings should also be attended by representatives from quality control, supply, and component repair.

SLIDING SCALE SCHEDULING METHOD (FLOWCHART)

For scheduling aircraft into maintenance, the maintenance officer monitors the scheduling of aircraft on a daily basis to control the number of aircraft entering maintenance inspection at any given time. The sliding scale system (Figures D-3 and D-4) is a very simple, but effective method that has been used successfully by maintenance officers.

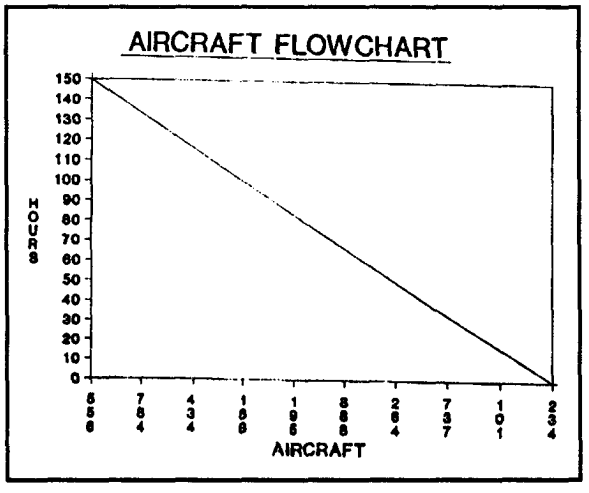


Figure D-3. Sliding scale method of maintenance scheduling (example 1)

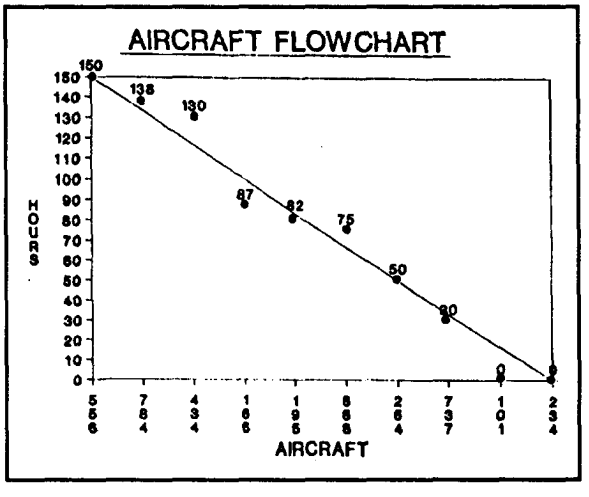


Figure D-4. Sliding scale method of maintenance scheduling (example 2)

The sliding scale method—

- Prevents an unnecessary backlog of scheduled maintenance inspections under normal conditions.
- Prevents a corresponding sudden surge in requirements for aircraft parts.
- Allows the unit maintenance officer a degree of control over individual aircraft hours flown.
- Provides a graphic depiction of future scheduled maintenance requirements.

A simple chart is used to reflect the exact number of aircraft in the unit. In Figure D-3, the unit has 10 UH-1 aircraft with their numbers shown at the bottom of the chart. These numbers should be marked on a tag or some other object that can be moved each day on the chart. The chart must reflect the phase interval for that particular aircraft. This interval is shown on the left side of the chart as 150 hours for the UH-1H in this sample. A line will be drawn across the chart at an angle called the optimum line. This optimum line will be the target that will ensure separation of aircraft between scheduled maintenance inspections.

Aircraft are arranged in descending order by hours remaining to phase with the actual hours plotted on the chart (Figure D-4). As flying hours accumulate on the aircraft, its tail number "slides" toward the bottom of the chart –reflecting where it falls on the optimum line. As the aircraft progresses down the optimum line, it gets to zero hours remaining to phase. Upon completion of the phase inspection and maintenance test flight, the aircraft is available for missions and is placed on the left side of the chart, and the hours remaining to phase are plotted. This begins the cycle again.

To assist the aircraft maintenance officer in determining how well he is meeting his scheduling goal, a bank time formula is used. The formula is—

number of aircraft (by type) x phase interval x ½ = optimum (ideal) bank time for the unit.

EXAMPLE (as depicted on the sample chart):

10 aircraft (UH-1) x 150 hours x ½ = 750 hours

If every aircraft were exactly on the optimum line, this would be the ideal bank time, or 750 flying hours, available. Obviously, this is unrealistic as some aircraft will be above the line and some will be below the line. Therefore, the only way to obtain the actual bank time is to add up the total flying hours remaining on all aircraft until next phase inspection. Thus, total actual bank time is only a relative indicator of how well the maintenance scheduling process is working compared to the ideal, or optimum bank time, formula. Under heavy flying conditions (surge), bank time available will obviously be lower than desired.

A few simple rules should be observed when using the sliding scale maintenance scheduling chart—

- Update the chart at least once each day that aircraft fly.
- Fly aircraft that are above the optimum line to attempt to get them down to the line.
- Hold (do not fly) aircraft that are below the optimum line to attempt to bring them up to the line or fly minimum number of hours.
- Count aircraft that are in phase inspection zero towards actual bank time.
- Count aircraft that are grounded for any reason (other than phase) towards actual bank time.
- Remember that total actual bank time is only a relative indicator of the maintenance scheduling process.

In newer TOEs, where missions may be handed down from battalion, maintenance is in one company while flight crews are in another. Therefore, scheduling aircraft for missions requires closer coordination. The use of assigned block time scheduling is a method which aids the maintenance officer in methodically and purposefully flowing aircraft into their normal scheduled maintenance intervals. It also gives the flight companies better mission flexibility.

In this manner of scheduling, flight companies receive blocks of flight hours per aircraft from the maintenance officer of the AVUM company. For such a system to work, battalion commanders must back up their maintenance officers by ensuring that flight companies do not overfly the given block times. To determine how many hours each aircraft will be allowed to fly during a given period, the maintenance officer uses the following formula:

Step 1:

$$\frac{\text{Total number of hours to be flown}}{\text{Number of aircraft to be flown}} = \text{Average hours per aircraft}$$

$$\text{Example: } \frac{140 \text{ hours}}{8 \text{ aircraft}} = 17.5 \text{ hours per aircraft}$$

Step 2:

Plot the average hours per aircraft on the flowchart below the highest-time flyable aircraft. Then draw a line parallel to the optimum bank time line (Figure D-5).

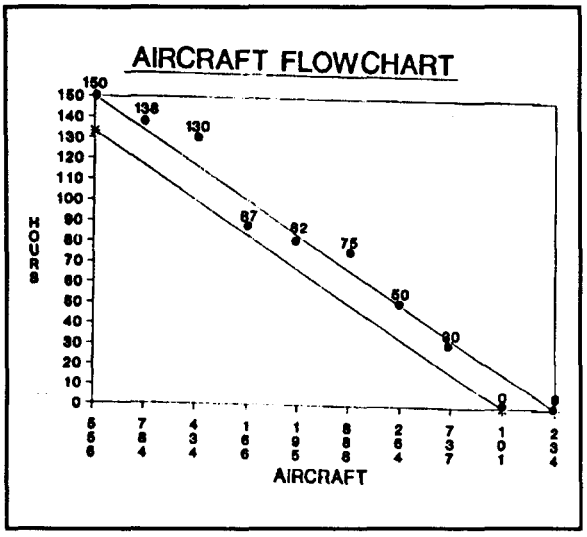


Figure D-5. Block-time scheduling (example 1)

Step 3:

Compute the difference between the aircraft current position on the flow chart and the new parallel line (Figure D-6). These figures will now become the maximum amount of flight hours which that particular aircraft can fly during the mission.

Example: Aircraft 784 is 20 hours above the lower optimum line (Figure D-6), so it will be given a block time of 20 hours to fly.

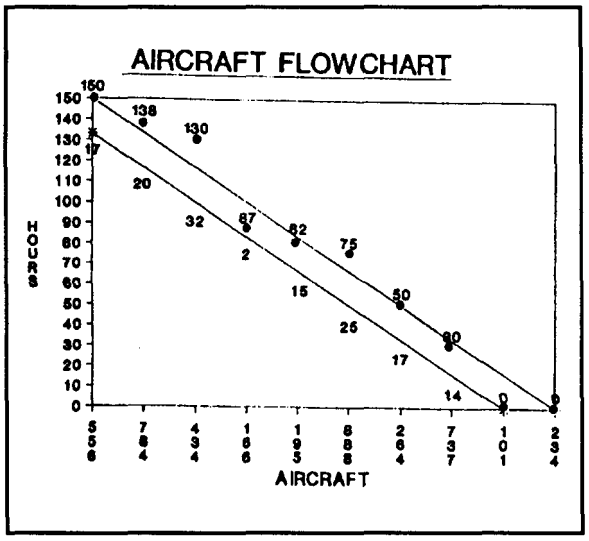


Figure D-6. Block-time scheduling (example 2)

The benefits of such a scheduling system are—

- Flight companies have flexibility in selecting aircraft for daily missions during the operation.
- Flight companies can match the aircraft to the mission.
- It spreads the responsibility of aircraft assignments and staggers the aircraft on a flowchart.
- The maintenance officer can plan his work load in advance versus having to react to everyday changes in missions and unscheduled maintenance.
- The flowchart posture should still look good after the operation.

UNIT LEVEL LOGISTICS SYSTEM–AVIATION (ULLS-A)

ULLS-A is a computerized system that automates and integrates flight line, production and quality control, technical supply, and aircraft readiness/status reporting into a single standard Army management information system. ULLS-A consists of an International Business Machine compatible micro-computer with keyboard, monitor, printer, and backup tape system.

There is a four-system local area network (LAN) at the AVUM company with work stations for the technical supply section, quality control section, and production control office. The fourth terminal is not a work station; it functions as a dedicated file server and contains the consolidated ULLS-A data files. The system allows for the automated recording and reporting of materiel status, supply transactions, work load projections, statistical data gathering, TBO listing, and historical records data.

The objective goal for hardware distribution in the flight companies is one laptop computer issued for every aircraft. Since that goal is not currently attainable, the distribution will range from one computer for every three to five aircraft depending on the type and mix of aircraft within the unit. The flight company uses the system to maintain its aircraft logbook records, create demands for repair parts, maintain aircraft flight time and crew data, and initiate and correct aircraft and subsystem faults. The flight company systems are kept synchronized and current with the LAN by a data transfer process that can be accomplished by modem (the primary and most preferred method) or diskette. Data transfer between

the flight companies and LAN should occur at least once daily. The data flow will be two directional. Data generated at the LAN (work order status, parts requests, parts status, component historical record update, and aircraft inventory records) flows to the flight companies; other information generated at the companies (aircraft faults records, flight time, servicing data, and flight crew data) is transferred from the flight company to the LAN.

The system interacts with support maintenance through the Standard Retail Support System (SARSS) and the Standard Army Maintenance System-Level 1 (SAMS-1). This interaction is done through diskette transactions. This is also a two-way information transaction. The exact procedures for the use of ULLS-A will vary between units, so unit internal and external SOPs must discuss its use.

APPENDIX E

SAFETY

An effective safety program for maintenance operations is a basic requirement in all Army aviation units. Everyone in the unit must constantly be alert to recognize and correct potentially dangerous safety hazards immediately. All personnel must understand the hazards of working around aircraft and know the other safety principles discussed here.

RESPONSIBILITIES

Accidents and injuries can seriously reduce the unit's ability to complete its required mission. The unit commander must ensure that all personnel know proper operation and safety-associated procedures for all aircraft, vehicles, equipment, tools, and machinery. Soldiers are responsible for protecting equipment and the lives of fellow soldiers. Therefore, they must actively participate in safety programs. The primary responsibility for safety for all maintenance work performed on the aircraft or on its components rests with the quality control section.

Unit Commander

Unit commanders are responsible for ensuring that all activities of their units are conducted according to established safety rules and regulations. These regulations include ARs 385-40 and 385-95, DA Pam 38540, and other required local directives. Unit commanders are also responsible for determining the cause of accidents and for making certain that corrections are made to prevent their recurrence. They must be aware of, and enforce, all safety regulations established by higher headquarters. When a deviation from an established safety rule is desired, unit commanders are responsible for requesting permission to do this. This request, including full particulars and detailed plans and specifications, is submitted to the appropriate headquarters. However, unit commanders cannot rely on the safety programs of higher headquarters to ensure the safety of their people. They must also establish their own programs and become personally involved in implementing them.

Supervisor

Effective supervision is the key to accident prevention. In their daily contact with soldiers, supervisors are in a position personally to observe working conditions and hazards. Supervisors must apply all established accident prevention measures in daily operations. They should conduct meetings with their subordinates frequently at regular intervals to brief them on safety procedures, to get their suggestions on improving safety practices, and to announce any new safety procedures. Such meetings should beheld in the work area. The agenda should include—

- The overall job and the end result expected.
- The how, why, and when of the job and any ideas from the group on ways to improve methods and procedures.
- The part each person will play. Supervisors must ensure that all personnel understand the significance of individual roles.
- Existing and anticipated hazards and the action needed to resolve these problems.
- The need for prompt, accurate reporting of all injuries, accidents, or near accidents, and the importance of first aid when required.
- The need to search constantly for, detect, and correct unsafe practices and conditions to prevent accidents and injuries.

Individual

All personnel must be aware of the safety rules established for their individual and collective protection. Each person is responsible for reading and following all unit SOPs, instructions, operating procedures, checklists, and other safety-related data. Personnel must then apply all cautions and safeguards in their everyday work areas. Soldiers are responsible for bringing to their supervisor's attention safety voids, hazards, and unsafe or incomplete procedures. Each soldier must follow through until the problem is corrected, then cooperate in developing and practicing safe working habits. The unit commander should make certain that this spirit of cooperation prevails throughout the unit.

Accidents

An aviation accident is seldom caused by a single factor such as human error or materiel failure.

Accidents are more likely to result from a series of incidents. This fact must be recognized in developing an aviation accident prevention program.

Areas that require constant command attention to prevent aviation accidents are—

- Human factors.
- Training education, and promotion.
- Equipment design, adequacy, and supply.
- Normal and emergency procedures.
- Maintenance.
- Facilities and services.
- Environment.

The US Army Safety Center has found that human error accounts for approximately 80 percent of total mishaps. Maintenance-related mishaps do account for a percentage of total mishaps. As expected, more complex aircraft have higher maintenance mishap rates. At unit level, commanders and maintenance supervisors must ensure that their personnel know of maintenance errors generated in their own units. They can be made aware of those in other units by examples found in Flightfax and other publications. All maintenance activities and personnel must strictly adhere to published maintenance procedures and apply risk management/risk assessment at all levels of operations.

Programs

AR 385-10 regulates overall safety. One important aspect of this regulation is that it integrates Occupational Safety and Health Act (OSHA) requirements into the Army Safety Program.

AR 385-95 regulates the Army Aviation Accident Prevention Program. DA Pam 385-40 covers accident investigation and reporting. Personnel who have key responsibilities in the unit's aviation accident prevention program are the commander, the safety officer, all aviators, the flight surgeon, and the unit safety NCO. A complete knowledge of aviation personnel, materiel, and operations is necessary to establish and maintain an effective aviation accident prevention plan. The plan must be tailored to the mission and requirements of the command. All activities that affect aviation operations must be considered.

SHOP SAFETY

A shop that is below standard cannot put out quality work, Therefore, the inspector conducts an informal inspection of the various shops periodically and brings any deficiencies or safety hazards to the attention of the shop supervisor. Keep a file of all safety inspections in the QC section and a file copy in the subject area inspected.

The USASC publication, Guide to Aviation Resources Management for Aircraft Mishap Prevention, is one publication that outlines safety procedures. It has guidance on inspection requirements of the technical inspector. Get copies of the guide from the unit safety officer. Minor changes to the guide appear in the USASC publication, Flightfax which is distributed weekly to all aviation units. Other publications outlining specific safety precautions are FM 10-68 and TM 55-1500-204-25/1.

Following are reminder questions for the technical inspectors, broken down by type of shop inspection.

Aircraft Operations

- Have pilots checked status of DA Forms 2408-13 and 2408-14? (Refer to DA Pam 738-751.)
- Are fuel sample bottles available and convenient for use in preflight? Are fuel sample bottles stored properly? (Refer to FM 10-68.)
- Is smoking allowed within 50 feet of the aircraft? (Refer to AR 95-l.)
- Are flashlights used in night preflight? (Refer to AR 95-l.)
- Are flight and ground crews familiar with fuel servicing and defueling operations? (Refer to TM 55-1500-204-25/1 and FM 10-68.)
- Are the required number of first aid kits and fire extinguishers available in each aircraft ? (Refer to AR 95-1, CTA 8-100, and TM 1-1500-328-23.)
- Are aircraft -10 and -10CL manuals in the binder? (Refer to AR 95-1 and DA Pam 738-751.)

POL

- Are fuel servicing procedures followed? (Refer to FMs 10-68 and 10-71.)
- Is fuel in aircraft tanks checked for water and other contaminants before the first flight of each working day? Is the fuel in the refueler sampled and tested for water daily? (Refer to FMs 10-68 and 10-71.)

- Are aircraft tie-down anchors free of debris when used as refueling, servicing, or grounding points? (Refer to TM 5-678 and FM 10-68.)
- Are fuel servicing points and equipment properly maintained and regularly inspected? (Refer to FMs 10-68 and 10-71.)
- Are ground rods installed at each refueling point? Were the grounding points tested for electrical resistance when installed and retested if mechanical damage occurred? (Refer to TM 55-1500-204-25/1.)
- Are grounding points marked according to FM 10-68 and logs maintained to show identification of each rod, date tested, and electrical resistance in ohms? (Refer to FM 10-68.)
- Are refueling vehicles marked with the appropriate fuel grade? (Refer to AR 746-1, FMs 10-68 and 10-71, and TB 43-0209.)
- Do vehicles have chocks on board? Are they used during refueling? (Refer to FM 10-68.)
- Are fire extinguishers mounted on vehicle dispensing units? (Refer to FMs 10-68 and 10-71.)
- Are petroleum products stored according to existing command policies?
- Are personnel prohibited from carrying lighters or matches within 50 feet of a refueling aircraft?
- Are refueling personnel wearing protective clothing? (Refer to FM 10-68.)

QC Shop

- Are aircraft maintenance publications up to date? (Refer to DA Pams 25-30 and 310-13.)
- Do aircraft maintenance areas have sufficient quantities of manuals for assigned work? (Refer to FM 1-500.)
- Are the appropriate publications used when working on aircraft? (Refer to FM 1-500.)
- Are DA Form 12 series available and updated? Do QC personnel know what publications they are to receive? (Refer to DA Pam 25-33 and the DA Form 12 series.)
- Are red-X conditions properly signed off in sequence by technical inspectors? (Refer to DA pares 738-751 and 600-8.)
- Does the unit maintain a safety-of-flight TWX file? Is it separated by aircraft mission, type, design, and series? (Refer to AR 25-400-2.)
- Are there procedures for QC and maintenance personnel to familiarize themselves with publications? Is there a technical data familiarization chart?
- Do QC personnel conduct in-process inspections of products to assure reliability of the completed assembly? (Refer to FM 1-500.)
- Does the unit actively participate in the submission of recommended changes to publications and deficiency reports? (Use DA Form 2028 and DD Form 173/1.)
- Is SF 368 (Quality Deficiency Report) submitted for each preliminary report of aircraft mishap (PRAM) for materiel failure or malfunction? (Refer to DA Pam 738-751.)
- Are aircraft maintenance and flight forms and records properly filled out and filed? (Refer to DA Pam 738-751.)
- Are all assigned aircraft involved in the AOAP? Is the program properly followed? Are crew and maintenance personnel familiar with oil sampling procedures? Are records maintained? (Refer to AR 750-43 and TB 43-0106.)
- Are aircraft inspected according to established aircraft maintenance procedures? Are they not being flown beyond the required inspection intervals? (Refer to TM 1-1500-328-23.)
- Are test flight check sheets part of DA Form 2408-13 for all test flights, or are all MTF requirements entered on DA Form 2408-13? (Refer to TM 1-1500-328-23.)
- Is the equipment calibrated in the specified time interval and properly stored? (Refer to TB 43-180.)
- Are calibration records maintained? (Refer to TB 750-25.)
- Are turbine engine analysis checks (TEAC) and health indicator test (HIT) baselines performed, and are they recorded on DA Forms 2408-13,2408-14,2408-15, and charts? (Refer to DA Pam 738-751, applicable -23 technical manuals, and applicable -24 engine technical manual.)

- Was an inventory completed after initial receipt of the aircraft or every 12 months that the unit possessed the aircraft? (Use DA Form 2408-17 and DA Pam 738-751.)
- Are the safety inspection and testing of lifting devices monitored? Are forms and records maintained? (Refer to TB 43-0142.)

Maintenance Shop

- Does the shop foreman emphasize accident prevention measures and check for marking and width of personnel safety aisles, safety and warning posters, and smoking and nonsmoking areas? (Refer to TM 55-1500-204-25/1, AR 385-30, FM 1-500, and DA Pam 385-l.)
- Is all stationary and portable shop electrical equipment properly grounded? (Refer to TM 55- 1500-204-25/1 and National Electrical Codes.)
- Is there a program in effect to encourage reporting of hazards, near accidents, unsafe shop practices, and so forth? (Refer to ARs 95-1 and 385-40.)
- Are equipment and vehicle operators thoroughly familiar with the equipment's operation, handling, care, and preventive maintenance? For instance—
  - Do operators have permits? (Refer to AR 600-55.)
  - Is the maintenance manual in proximity to equipment? (Refer to FM 1-500.)
  - Is equipment or vehicle maintained according to organizational and operator's manuals?
- When parts or items are removed from aircraft, are they marked and stored to be plainly seen? (Refer to FM 1-500.)
- Are proper safety procedures practiced to prevent FOD when maintenance is performed on turbine engines?
- Are run-up and exhaust areas policed? Are containers available for trash and loose objects? Are loose hardware and other foreign objects removed? (Refer to TM 55-1500-204-25/1.)
- Are grounding cables provided for aircraft in hangars? Are they used? Has an initial electrical resistance test been performed and recorded on grounding points? (Refer to National Fire Codes, TM 55-1500-204-25/1, and FM 10-68.)
- Are grounding safety wires visible? Are they bright yellow?
- Is adequate lighting provided for maintenance shops and hangars?
- Are parts removed from aircraft immediately written up on appropriate forms? (Refer to DA Pam 738-751.)
- Are required numbers and types of fire extinguishers available? Are aircraft and ground fire extinguishers checked as required? Are shop personnel trained to use fire fighting equipment? (Refer to TM 55-1500-204-25/1 and FM 1-500.)
- Are trained specialists available to maintain special equipment such as ejection seat, armament, and so forth, when installed in unit aircraft? (Refer to AR 95-1 and FM 1-500.)
- Are shops clean and floors grease-free? (Refer to FM 1-500.)
- Do personnel using power tools (for example, drills, grinders, lathes, torches, and so forth) wear safety goggles and noise-attenuating devices as required? Do repairers remove jewelry while performing maintenance? (Refer to TM 55-1500-204-25/1 and ARs 40-5 and 385-32.)
- Are hoisting instructions for lifting aircraft components or aircraft followed? Are cranes, hoists, cables, slings, and forklift trucks inspected, weight-tested, and stenciled with the load rating? (Refer to TB 43-0142.)
- Are aircraft on jacks labeled and is access to them restricted? Are aircraft jacks marked with the maximum lifting capacity? (Refer to TM 55-1500-204-25/1, OSHA Standard 1910.244, and FM 1-500.)
- Do personnel in the instrument shop know the procedures for cleaning up mercury spills? (Refer to TB 385-4.)
- Are oily rags stored in closed metal containers? Are containers properly labeled? (Refer to TM 55-1500-204-25/1 and FM 1-500.)
- Are hydraulic, fuel, and oil lines protected from dirt while disconnected? (Refer to TM 55-1500-204-25/1 and FM 1-509.)

- Are all ammunition and pyrotechnics removed from aircraft before maintenance and before putting aircraft in hangars? (Refer to TM 55-1500-204-25/1.)
- Are engine, hydraulic, propeller and rotor, technical supply, and other work areas clean and well arranged? (Refer to TM 55-1500-204-25/1 and FM 1-500.)
- Are oxygen gaseous storage areas properly marked? Are oxygen gaseous cylinders stored in a separate building (area) from aircraft servicing and maintenance areas? Are empty and full cylinders stored separately? (Refer to TM 55-1500-204-25/1 and National Fire Codes, Standard 410B.)
- Are sample bottles available to check fuel contamination in aircraft fuel tanks during preflight? (Refer to FM 10-68.)
- Are proper containers used and stored? Are containers clean and adequate? Are samples properly discarded? Is a fire point nearby?
- Are complete daily inspections conducted? (Use PMD/PMS cards and DA Form 2408-13.)
- Are tops of booths, shelves, and other surfaces in the paint shop clean to prevent lint accumulation? Are dope or paint deposits removed from the floor? Are there no more paint and dope stored in the paint shop than will be used during the work shift? Are there fire blankets at strategic points and the required number (and correct type) of fire extinguishers provided throughout the paint shop? Is electrical equipment in the paint shop explosion-proof? Are smoking restrictions enforced? (Refer to TM 55-1500-204-25/1.)
- Are unsealed hydraulic fluid containers considered contaminated and destroyed? (Refer to TM 55-1500-204-25/1.)
- Are the assigned aircraft marked and painted to include warnings? (Refer to TM 55-1500-345-23.)
- Are necessary accident prevention signs posted in the shop area? (Refer to AR 385-30.)
- Are aircraft parked in hangars? Are aircraft batteries disconnected? Are static ground cables attached? Are drip pans placed beneath aircraft?
- Does gasoline-powered equipment (tugs, APUs, and so forth) parked in hangars overnight have full fuel tanks?

Battery Maintenance Shop

- Is eyewash located within 25 feet of work area? Is eyewash easily accessible?
- Is shower located within 25 feet of work area?
- Is the correct type of fire extinguisher located in work area?
- Is protective equipment provided in each tool kit (TK-90/6)?
- Does the safety board have the required items posted in shop?
- Is the battery tested for proper filler-cap operation? (Refer to TM 11-6140-203-14-2.)
- Are battery maintenance personnel thoroughly trained in charging, discharging, and testing procedures? (Refer to TM 11-6140-203-14-1 and TB 385-4.)
- Are smoking, open flames, or sparks prohibited in the battery-charging area? Is the area marked NO SMOKING? Are arc-proof electrical switches installed?
- Is the battery-charging area adequately ventilated to prevent accumulation of explosive gases? (Refer to TM 11-6140-203-14-1.)
- Are facilities provided for flushing and neutralizing spilled electrolyte? (Refer to TM 11-6140-203-14-1.)
- Are tools and other conductive materials stored so as not to fall on batteries and cause a short circuit or hydrogen ignition? Do shop personnel remove all jewelry while working with batteries? Do shop personnel wear protective clothing? (Refer to TB 385-4.)
- Is battery inspected, cleaned, and repaired before charging? (Refer to TM 11-6140-213-14-1.)
- Is charging equipment energized after the battery is connected to the circuit? (Refer to TM 11-6140-203-14-1.)
- Is water or electrolyte added to the battery only when fully charged and stabilized for at least 30 minutes? (Refer to TM 11-6140-203-14-l.)
- Are racks and trays substantial and resistance-treated to the electrolyte? (Refer to TB 385-4.)

- Are shop floors made of acid-resistant construction or protected from acid accumulations? (Refer to TB 385-4.)
- Are unsealable batteries arranged in well-ventilated rooms or in enclosures that have outside vents? (Refer to TM 11-6140-203-14-1.)
- Are lead-acid and nickel-cadmium batteries stored separately? Are acids stored properly? Is separate equipment used to maintain each battery? (Refer to TM 11-6140-203-14-1.)
- Does the shop have an SOP? (Refer to TB 385-4.)
- Have battery maintenance personnel received formal training (MOS 68F) in the care of nickel-cadmium batteries?
- Is battery cleaned, dried, and wiped free of white deposits (potassium carbonate) every 25 flight hours or weekly?
- Is battery checked to ensure that excessive corrosion and spewing do not occur? Is battery case dry?
- Is battery checked for damage, loose and missing filler caps, and hardware?
- Are there cracks or leakage on top of the battery cells?
- Are cables damaged or frayed?
- Isa battery leakage check performed on batteries returned to direct support if leakage is more than 1 milliampere per amp hour between the battery terminal and ground?
- Are aircraft voltage regulators checked by qualified personnel? Are voltage regulators adjusted according to the appropriate maintenance manual?
- Is the flowchart in Chapter 2 of TM 11-6140 203-14-1 followed during AVIM maintenance?
- Is the nickel-cadmium maintenance shop used only for nickel-cadmium batteries, that is, no acid electrolytes? (Refer to TM 11-6140-203-14-1.)
- Are cell shorting straps available? Are they used to discharge cells to zero volts? (Refer to TM 11-6140-203-14-2.)
- Are battery vents loosened slightly but left in place during battery charging? Are vent caps pressure-cleaned and tested at 2-10 psi during the 120-day or 100-hour maintenance inspection? Are battery box vent tubes checked and cleaned when the battery box is reinstalled? (Refer to TM 11-6140-203-14-2.)
- Do maintenance personnel monitor the voltage of individual cells at regular intervals during charge and discharge cycles? Are cell voltages checked when a battery is received from the field (for shorted cells) and at the beginning of charge for high voltage (for low electrolyte cells)? (Refer to TM 11-6140-203-14-2.)
- Is an electrolyte-level checking device available? Is battery electrolyte level checked only when fully charged and after having stabilized for 30 minutes to 2 hours (except the BB-641-A and BB-676-A, which should be checked within 30 minutes of charge completion)? (Refer to AVSCOM message 091130Z Mar 91 GEN-91-7 and TM 11-6140-203-14-2.)
- Are the discharge times strictly followed during the battery capacity test? (Refer to TM 11-6140-203-14-2.)
- Do maintenance personnel understand that cells from different manufacturers cannot be mixed in the same battery? (Refer to TM 11-6140-203-14-2.)
- Are tool kit (TK-90), charger/analyzer or charger with load bank (AN/ASM-137 or AN/ASM-137A), test equipment (TS-352R/U), and required technical literature available? (Refer to TM 11-6140-203-14-2.)

Avionics Shop

- Does the unit have a training program that provides personnel with information concerning safety practices? (Refer to AR 385-10 and DA Pam 385-1.)
- Are necessary technical publications and regulations on hand? Are the latest changes posted? (Refer to DA Pares 25-30 and 310-13.)
- Are maintenance forms and records properly maintained? (Refer to DA Pam 738-751.)
- Are calibration requirements of test equipment up-to-date? (Refer to TBs 43-180 and 750-25.)
- Are binding posts insulated, covered, and clearly marked with voltage and current values? (Refer to TM 55-1500-204-25/1.)

- Are test equipment and aircraft systems properly used? (Refer to TMs 11-664 and 11-4000.)
- Are technical inspections for repaired equipment accomplished?
- Are workbenches wired according to the National Electrical Code?
- Are rubber floor mats or similar insulating materials provided in front of repair positions? (Refer to TM 11-4000 and TB 385-4.)
- Are all power attachment plugs and connectors constructed so that there are no exposed current-carrying parts except the prongs? (Refer to National Electrical Code, ART 410-52[d].)
- Are hazardous power sources (other than 110-volt convenience outlets) appropriately color-coded? (Refer to AR 385-30.)
- Is all test equipment properly grounded? (Refer to TM 55-1500-204-25/1; National Electrical Code, ART 250-45[d]; and TB 385-4.)
- Are all physical hazards identified and appropriately color-coded? (Refer to AR 385-30.)
- Are compass systems properly calibrated? (Refer to TMs 11-4920-292-15 and 55-1500-204-25/1.)
- Is the avionics equipment in the aircraft properly safety-wired? (Refer to TM 55-1500-323-24, Section 16.)
- Are the necessary accident prevention signs posted in the shop area? (Refer to AR 385-30.)

Armament Shop

- Are aircraft pyrotechnics (flares and signals) removed from the aircraft when not required? (Refer to TMs 9-1370-203-20&P, 9-1370-203-34&P, and 9-1370-206-10.)
- Are ground safety pins inserted in the ejector racks after the helicopter is shut down after each flight? (Refer to TMs 55-1520-234-23-1 and 55-1520-234-23-2.)
- Are jettison cartridges removed from the pylon stores ejection device before maintenance or storage of the aircraft? (Refer to TMs 55-1520-234-23-1 and 55-1520-234-23-2.)
- Are jettison cartridges marked on the cartridge base each time the cartridge is removed from the ejection rack? (Refer to TMs 55-1520-234-23-1 and 55-1520-23423-2.)
- Are weapon record data forms maintained? (Refer to DA Pam 738-751.)
- Do personnel performing ground crew operations, servicing and maintenance on weapon subsystems, especially in the areas of loading, unloading, and operational checks, observe the following safety precaution
  - Ensure that aircraft is positioned so that weapons are aimed into clear or riveted areas?
  - Understand and comply with arming procedures for assigned weapon subsystems and use of hand signals according to FM 21-60?
  - Understand and comply with routine and emergency or unsafe disarming procedures?

Technical Supply Shop

- Are all items issued on a first-in, first-out (FIFO) basis?
- Are assigned shelf lives exceeded?
- Are unserviceable and repairable parts turned in on time?
- Is the required paperwork turned in with parts?
- Are unserviceable and repairable parts inspected by the technical inspector before turn-in?
- Is the materiel condition tag signed?
- Are excess reusable containers turned in?

Ground Support Equipment

- Is a deficiency report submitted if deficiencies are noted during a reinspection of new or repaired equipment that was inspected and classified serviceable? (Refer to TM 55-1500-204-25/1.)
- Besides special inspections, are regular periodic inspections performed? (Refer to TM 55-1500-204-25/1.)
- Is equipment free of mud and other debris? Is equipment receiving proper lubrication?

- Are seals that show definite leakage replaced? (Refer to TM 55-150204-25/1.)
- For equipment with batteries, are battery terminals and posts tight, clean, and corrosion-free? (Refer to TM 55-1500-204-25/1.)
- Are ignition systems clean, wiring correct, and coils and condensers operating properly? (Refer to TM 55-1500-204-25/1.)
- Does ground support equipment meet performance and safety requirements? (Refer to TM 55-1500-204-25/1.)
- If the ground support equipment is in storage, is there a prescribed interval of inspection? (Refer to TM 55-1500-204-25/1.)
- Is the ground support equipment used on landing strips, taxiways, and other tight areas painted and reflectorized? (Refer to ARs 58-1 and 746-1, FM 1-500, and TM 55-1500-204-25/1.)
- Are markings maintained on the ground support equipment? (Refer to TM 55-1500-204-25/1 and AR 746-1.)
- Is the proper polarity marked on all male and female electrical receptacles of APUs and aircraft? (Refer to TM 55-1500-204-25/1.)
- If the two-wheel type of APU is used, are appropriate inspections completed at the end of the day or at the completion of 8-hour operations? (Refer to TM 55-1500-204-25/1.)
- Are required inspections of the three-wheel APU accomplished? (Refer to TM 55-1500-204-25/1.)
- Are maintenance workstand adjustable height and freed height stenciled with the load rating? (Refer to TB 43-0142.)
- Are major welds sound? Are handrails and steps cracked or worn? Are flexible hoses, fittings, and tube assemblies damaged or leaking? (Refer to TM 55-1500-204-25/1.)
- Are precautions taken to protect electrically and gasoline-driven air compressors from severe weather and extreme temperatures? (Refer to TM 55-1500-204-25/1.)
- Do compressors have belt and flywheel guards installed? (Refer to TM 55-1500-204-25/1.)
- Are air compressors inspected daily? Are they drained at least twice daily if they are operated in extreme moist conditions? (Refer to TM 55-150204-25/1.)
- Is a hydrostatic test completed annually on air compressors? Is the tank stenciled with the date the test was completed? (Refer to TB 43-0151.)
- Are periodic inspections of 10- and 100-hour intervals accomplished on compressor and carrying case assemblies? (Refer to TM 55-1500-204-25/1.)
- Is the high-pressure air pump in proper operating condition? (Refer to TM 55-1500-204-25/1.)
- Are aircraft jacks stenciled with the maximum lifting capacity? (Refer to TB 43-0142 and TM 55-1500-204-25/1.)
- Are the jacks periodically disassembled, cleaned, inspected, and reassembled when replacing defective rubber packings? (Refer to TM 55-1500-204-25/1.)
- Are daily inspections performed if engine- or motor-driven hydraulic test stands are used daily? (Refer to TM 55-1500-204-25/1.)
- Is preventive maintenance performed on the hydraulic test stands? (Refer to TM 55-1500-204-25/1.)
- Do grease guns have the type of lubricant identified? Are identification tags protected from deterioration and obliteration by grease? Are they securely attached to the grease gun? (Refer to TM 55-1500-204-25/1.)
- Is the electrical wiring insulation on the portable lighting equipment defective or frayed? (Refer to TM 55-1500-204-25/1.)

Hand Tools and Equipment

- Are racks, shelves, or toolboxes provided for tools not in use?
- Are precautions taken to prevent tools from dropping or falling from ladders, scaffolds, platforms, or other elevations?
- Are tools frequently inspected by responsible personnel? Are defective tools turned in for repair or salvage?
- Are tools with sharp cutting edges carried in protective covers?

- Are power tools equipped with guards? Are electrical contacts enclosed? Is wiring well insulated and grounded?
- Are exposed sharp edges smoothed down when work is completed?
- Are ladders used rather than improvised ladders, such as packing cases or barrels?
- Are parts and items removed from the aircraft stowed out of the way or marked so they are visible day or night?
- Are tools stored so that sharp edges do not protrude?
- Are electrical tools used inside the aircraft?
- Are nuts and bolts torqued as specified in the appropriate technical manual?
- Are items stored in the tool crib cleaned and lubricated to prevent rust? Are they within the calibration due date if calibration is required? (Refer to TB 43-180.)
- Are grease guns labeled with contents?

Welding Equipment

- During welding or cutting operations, is caution observed to prevent sparks from starting fires? Is a fire extinguisher available?
- Are safety goggles provided for operators using oxyacetylene equipment?
- During electric welding operations, is the operator wearing a face shield or helmet with shaded falter glass, protective sleeves, gloves, and apron? Are welding operations screened off when other personnel are in the vicinity?

General Housekeeping

- Are covered, fire-resistant rubbish cans used in work areas?
- Are self-closing covered metal waste cans conveniently located to dispose of oil rags and waste?
- Are volatile flammable liquids used for washing or cleaning parts? Are they stored in open containers? Are working quantities of such liquids confined to approved containers?
- Is dripping or spilling of oil prevented? Are drip pans or other suitable means provided to collect excess oil?
- Are conspicuously marked fire extinguishers of the appropriate type provided in armament, maintenance, and training areas?
- Are all fire extinguishers properly charged, periodically tested, and ready for instant use?
- Are all unit personnel trained to use fire-extinguishers?

APPENDIX F

AIRCRAFT RECOVERY AND BATTLE DAMAGE ASSESSMENT

AIRCRAFT RECOVERY

Equipment supporting combat operations is normally repaired forward as rapidly as possible; however, sometimes this is not possible. Commanders must plan for recovery operations in cases where aircraft are not repairable in the operations area. When damages exceed the immediate repair capabilities of maintenance units, including BDAR procedures, the aircraft must be recovered.

Aircraft recovery operations move inoperable aircraft from the battlefield to a maintenance collection point (MCP) or maintenance unit location. Aircraft that cannot be repaired for self-powered recovery from the down site are moved directly to the first appropriate MCP or maintenance activity by another aircraft or surface vehicle. In contrast to aircraft recovery, aircraft evacuation is the movement of an inoperable aircraft between maintenance points to a higher echelon of maintenance. This normally occurs when, in consideration of METT-T, necessary repairs to aircraft are beyond the capability of the lower echelon of maintenance.

FM 1-513 provides detailed procedures for preparing and performing aerial recovery operations for specific aircraft.

FM 1-103 provides doctrinal guidance for commanders and staff, for corps through maneuver battalion. Included are the Army's requirements, procedures, and command and control tasks involved in planning, coordinating, and executing the airspace control function.

Aircraft recovery is the responsibility of the operational aviation unit, using its AVUM element within the limits of its organic lift capability. Supporting AVIM units provide backup recovery support when recovery is beyond the AVUM team's capability. Successful recovery operations require a highly coordinated effort between the owning organization, its AVIM support, the ground element in whose area the recovery will take place, and any organization that may provide aircraft or vehicle assets to complete the recovery. Overall control of the recovery rests with the TOC of the aviation brigade.

Recovery operations and, to a lesser degree, maintenance evacuations, are easily detected and subject to attack by enemy forces, regardless of combat intensity.

Command, control, and coordination to support aircraft recovery operations are planned in advance within the context of the size of the force and the density of recovery assets at the disposal of commanders. Aircraft recovery procedures are included in unit SOPs, contingency plans, operation orders, and air mission briefings.

Recovery operations in the NBC environment pose special risks to personnel which can be minimized through the wearing of protective clothing by the recovering crew at the scene of the disabled aircraft. Also, the receiving crew at the maintenance site should wear protective clothing because of possible contamination of the disabled aircraft, the recovering aircraft, and rigging sets.

Night recovery operations increase hazards and the need for security. Increased risk must be weighed against the urgency considering time, weather, and the tactical situation.

Recovery Team

Each AVUM organization will prepare for aircraft recovery contingencies by designating an aircraft recovery team. The team is dispatched to downed aircraft sites as the situation requires and as the intensity of the conflict allows. Capabilities and decisions for recovery missions on the hostile side of the FLOT differ considerably from those on the friendly side. The recovery team consists of maintenance personnel, a maintenance test pilot, an aircraft assessor, and a technical inspector. All will be trained to prepare aircraft for recovery. The team chief ensures that appropriate rigging and recovery equipment is kept ready for quick-notice recovery missions. The team's size and composition depend on the type and size of disabled aircraft, type of recovery aircraft or vehicle, and length of time the recovery area will be accessible. At times dictated by local circumstances, one team may function as both the BDAR team and the recovery team, performing both functions.

Recovery Method

If a downed aircraft cannot be flown out under its own power, the recovery team assumes the mission and implements the best method of recovery– surface or air.

Surface

Surface recovery and evacuation uses ground equipment and wheeled vehicles to move disabled aircraft to an MCP or maintenance facility. Planning a surface recovery follows these logical steps:

- Evaluate the downed aircraft.
- Decide the equipment and transportation needed to recover it.
- Perform a thorough reconnaissance and evaluate available ground routes to and from the recovery site.

Then expand these steps to include characteristics of the recovery site and special tactical considerations; for example—

- Likely enemy avenues of approach.
- Minefields and actions to minimize the danger of booby traps in downed aircraft.
- Tactical cover.
- Need for troop or aerial escort to protect against ambush.

Advantages. Surface recovery restricts the enemy's ability to detect movement of recovery assets to an area relatively close to the movement routes. It can be used when weather conditions prohibit flight. Also, the threat of total loss of the aircraft during transport because of recovery equipment malfunction is low.

Disadvantages. Surface recovery may tie up route security assets badly needed elsewhere. The time needed for surface recovery is much greater than for aerial recovery. Recovery personnel and equipment assets are tied up for long periods. This relatively high exposure time on the battlefield with slow-moving equipment increases the threat. Also, a significant amount of aircraft disassembly or modification is often required to adapt the aircraft to surface travel; for example, the shortening of height dimensions to accommodate overhead road clearances or the fabricating of extensions for trailers because the aircraft wheelbase is too wide. Ground routes must be accessible, and meticulous reconnaissance of the route is required. Loading procedures and travel on rough terrain can cause further damage to the aircraft.

Aerial

Aerial recovery involves attaching the aircraft to suitable airlift recovery equipment, connecting it to the lifting helicopter, and flying it to the MCP or maintenance area. Again, planning for this type of recovery entails thorough analysis of the recovery site and the threat associated with relatively slow air movement over a battlefield. Medium-lift helicopters will be required for heavier-type aircraft aerial recoveries.

Advantages. Aerial recovery reduces the time recovery assets are tied up and exposed to the battlefield. Route reconnaissance and security escort requirements are considered less, as is the need for aircraft disassembly. Recovery site accessibility requirements are not as rigid. The distance from which recovery assets may be obtained is much greater.

Disadvantages. The possibility exists for complete loss of aircraft through failure of recovery equipment. Although exposure time is less, the distance from which recovery activities are detectable is much greater. Loss of recovery assets through enemy action will more severely degrade total force fighting capabilities. This is due to the multiuse value and relative low density of airlift helicopters, particularly medium-lift helicopters, compared to ground recovery vehicles.

OUTLINE FOR AIRCRAFT RECOVERY AND EVACUATION

(Head the SOP with the names of the organization and the station, the date, and the SOP number.)

Purpose

Responsibilities

- Owning unit (AVUM)
  - Commander
  - Maintenance officer
  - Recovery team
  - BDAR team
- Supporting unit (AVIM)

Training Requirements

Recovery Operations

Safety Considerations

BATTLE DAMAGE ASSESSMENT AND REPAIR (BDAR)

During combat operations, situations arise that make expediting normal maintenance procedures imperative. In such cases, the unit commander will authorize the use of BDAR procedures. BDAR is an AVUM-level responsibility, with backup from supporting AVIM units. The concept uses specialized assessment criteria, repair kits, and trained personnel. It modifies peacetime aircraft maintenance standards to safely return damaged aircraft to battle as soon as possible. Often, such return-to-battle repairs will be temporary, necessitating future permanent follow-up actions when the tactical situation permits. The BDAR system is designed to multiply force capability in a combat environment by augmenting the existing peacetime maintenance system.

The following discussion defines BDAR requirements and procedures at the AVUM level. Similar actions apply to AVIM BDAR teams when used as backup support.

Team Composition and Materiels

The BDAR team is formed from AVUM platoon assets. A typical team includes a trained inspector for damage assessment, two or three repairers (MOS 67/68), and a maintenance test pilot. The actual composition of a team given a specific BDAR mission depends on the type and extent of maintenance work anticipated.

The team will use BDAR manuals containing revised aircraft damage assessment criteria and repair procedures. These manuals are formally processed and validated publications for use in combat environments only, as authorized by the unit commander. Each type of aircraft has its own BDAR manuals that provide—

- Combat damage inspection and assessment techniques.
- Combat area maintenance serviceability and deferrability criteria.
- Cannibalization techniques that permit quick, efficient removal of critical components and structures from unrepairable and nonrecoverable aircraft.

The BDAR team will be provided with specially designed combat repair kits for repairing major aircraft systems. With the tools and materials in these kits, team members can make quick, temporary combat-damage repairs. Kits are man-portable (suitcase-sized).

Procedures

When an aircraft is forced down, the aircraft commander, or one of his crew, will use the aircraft radio (if operable and the tactical situation permits) to notify the parent AVUM commander of the problem and request BDAR assistance. This information may have to be relayed through other aircraft operating in the area as time and security allow. The crew takes the first step in the assessment process by providing the AVUM commander with key critical information on the problem. The information should include-

- Location of down site.
- Assessment of site security.
- Adaptability of the site, including existing weather conditions, for the insertion of a BDAR team.
- An evaluation of aircraft damage, to the extent possible, so that needed BDAR personnel, equipment, and parts requirements can be estimated.
- Information on crew and passenger condition to determine their capability to assist in repairing the damage. For example, the aircraft commander may be able to fly the aircraft out, eliminating the need for an aviator on the BDAR team.

Initial Inspection

The AVUM unit commander authorizes dispatch (normally airlift) of a BDAR team with manuals, repair kits, materials, and repair parts to the site.

The team's initial on-site inspection determines the actual extent of damage. It also provides information needed to determine which of the following alternatives apply:

- Clear the aircraft for immediate return to battle, deferring any damage repairs to a later time.
- Make permanent repairs, returning the aircraft to a completely serviceable condition.
- Make temporary repairs that will allow safe return of the aircraft to meet immediate battle

needs, deferring higher-standard permanent repairs to a later time.

- Repair the aircraft to allow a onetime flight back to a more secure and better resourced MCP or maintenance area.
- Rig aircraft for aerial recovery and make necessary recovery arrangements (repair not feasible at repair site).
- Cannibalize critical components and abandon or destroy aircraft (repair or recovery not feasible). The decision to destroy an aircraft will be based on the possibility of an abandoned aircraft failing into enemy hands.

Assessor

A trained assessor will assess aircraft battle damage. One of the assessor's primary tasks is to determine the location of the damaged aircraft relative to the battlefield and the extent of the threat. Modern air defense threats may make aerial recovery in forward areas of the battlefield an impractical or unacceptably high risk. The ability to determine rapidly that a onetime flight is feasible or that a quick-fix repair is possible is important. It may prevent a situation where the aircraft would otherwise be destroyed (in place) to prevent capture by, or compromise to, the enemy. Once the battle subsides, maintenance decisions are based on standard operational maintenance practices. It must be emphasized that deferment of maintenance tasks is a "fly now, pay later" concept. Postponing maintenance, where feasible, will provide the combat commander with increased availability for short periods only.

APPENDIX G

SPECIAL EQUIPMENT PACKAGES

The evolution of technology shifted with the introduction of the AH-64A, CH-47D, OH-58D, and UH-60A aircraft. With the mission, design, and series (MDS) aircraft comes a fundamental change in the way missions are planned and managed.

Among items used for day-to-day operations are composites; digital tight control computers; super high-speed data bus and avionics interface units; aircraft survivability equipment systems; and wide-field-of-view, helmet-mounted display systems. Their broad-based application has eliminated many technical barriers to flexible and distributed arrangements. Responsive MDS aircraft now have importance equal to or greater than inspection or repair training. For examples of hook-on special equipment packages, see Figure G-1.

	CH-47	UH-60	EH-60	UH-1	AH-1	AH-64	OH-58	OH-58D
ESSS		X						
230 TANK		X						
ATHS		X				X		X
HELLFIRE		X				X		
XM139		X						
HICHS	X							
ERFS	X							
FLOTATION KIT	X	X	X	X	X	X	X	X
HOS	X	X	X	X				
M130	X	X	X	X	X	X	X	X
ATAS	X	X	X	X	X	X	X	X

Figure G-1. Examples of hook-up special

EXTERNAL STORES SUPPORT SYSTEM

The external stores support system (ESSS) for the UH-60 consists of airframe-fixed provisions, which are incorporated into the airframe, and a removable external stores support system. The ESSS is made up of a horizontal stores support (HSS), two support struts, and two vertical stores pylons (VSP) on each side of the aircraft. The ESSS contains provisions for a stores jettison control panel and an auxiliary fuel management panel (AFMP) for operating the external extended range fuel system (ERFS). The AH-64 has a plumbing system mounted in the aft fairing of each wing which makes it ERFS compatible.

230-GALLON FUEL TANK

This system is an externally mounted, pressure-fed fuel tank. The tank, which weighs approximately 135 pounds, has a fuel capacity of between 230 and 235 gallons. Provisions are for open-port refueling only. The fuel tank is compatible with, and capable of being jettisoned from, the BRU-22 ejector rack. While being ballistically tolerant of projectiles up to at least a 14.5mm armor-piercing incendiary (API), the tanks are not self-sealing.

AIRBORNE TARGET HANDOFF SYSTEM

The processor-interface unit is commonly known as the airborne target handoff system (ATHS). It provides the aerial scout and advanced attack helicopters with the capability to process messages necessary for indirect Hellfire missions, general target handoff missions, and airborne attack command and control.

HELLFIRE WEAPON SYSTEM

The Hellfire modular missile system is a helicopter-launched missile equipped with a terminal homing seeker. A shaped-charged warhead, launcher support equipment, and test equipment, tactical shipping and storage containers, and training equipment are also included. The missile configuration has growth capability for additional modular-seeker heads (RF/IR and IR).

XM139 MINE DISPENSER (VOLCANO)

The Volcano is a rapid deployment system for launching a mixture of antitank and antipersonnel mines (up to 960 mines) from 5-ton wheeled tactical vehicles and UH-60 helicopters. The system consists of the XM139 dispenser, mounting hardware kit (one air system kit: LIN Z67980, or one ground system: LIN Z45341, for use on ground and air), canister mine XM87 (expendable module containing gator-type, five each AT and one each AP, mines) and/XM88 (expels dummy mines).

CH-47 HELICOPTER INTERNAL CARGO-HANDLING SYSTEM

The CH-47 helicopter internal cargo-handling system (HICHS) is a cargo-handling system consisting of the following components:

- Ramp extension, which allows cargo to be loaded by cargo-handling equipment.
- Ramp rollers.
- Cabin floor roller.

Cargo is restrained with tie-down straps or, in the case of 463L pallets, locks, or rails. The HICHS will allow rapid loading and unloading and restraint of standard NATO (94 inch x 48 inch) cargo, US Air Force 463L pallets, and break-bulk cargo, thus enhancing aircraft cargo mission performance.

CH-47 EXTENDED RANGE FUEL SYSTEM

The CH-47C/D ERFS is a modular, interconnectable system consisting of three 1000-gallon fuel cells with self-contained faltering mechanisms, electrical pumping mechanisms, emergency feed system, and defueling capability. It can be refueled by gravity (splash fill) refueling, D-1 pressure refueling, and single-point closed-circuit refueling. The ERFS is a kit for installation in the CH-47C/D as mission requirements dictate.

FLOTATION KIT FOR ARMY HELICOPTER AIRCREW MEMBER/PASSENGER

This flotation kit consists of an inflatable rubberized individual raft, a CO^2 bottle for inflation, and a flotation-kit carrying case that the user wears. The flotation kit is issued only as a mission-essential item to any aircrew member/passenger required to fly over water in rotary-wing aircraft. The kit is used according to AR 95-3.

HELICOPTER OXYGEN SYSTEM

The helicopter oxygen system (HOS) is a lightweight integral oxygen system designed for quick installation and removal. The system consists of an oxygen mask an oxygen tank, a dilute-demand regulator, quantity gauge hoses, and a simple unit shutoff pressure-reducing valve. The HOS will be installed on the CH-47, EH-60, OH-58, UH-1, and UH-60 helicopters flying high altitudes, search and rescue mission and military intelligence gathering missions.

M130 GENERAL DISPENSER

The M130 general dispenser consists of a single systern (dispenser assembly, payload module assembly, electronics module and dispenser control panel). It is designed to dispense either M206 decoy flares or M-1 chaff from US Army helicopters and freed-wing aircraft. The system provides effective survival countermeasures against radar-guided weapon systems and infrared-seeking missile threats. The M130 dispenser system has the capability of dispensing flares (30 each) or chaff (30 each).

AIR-TO-AIR STINGER

The air-to-air Stinger (ATAS) is a weapon system developed initially for selected Army OH-58C (round glass) and all OH-58D helicopters. However, it is adaptable to other launch platforms. Depending on the aircraft, the configuration of the ATAS weapon system differs only in the physical size and shape of the control panel, the pilot's cyclic handgrip switches, and the missile sight subsystem (MSS) installation hardware. The ATAS system supports Stinger missile rounds, and it controls and affects their launching in response to command from the helicopter fire control system.

The launcher includes the launcher structure, launcher electronics, launcher adapter, coolant bottle, and coolant system. In addition, the ATAS weapon system includes an MSS and complete aircraft provisions.

GLOBAL POSITIONING SYSTEM

The global positioning system is a precision, satellite-based navigation system. This system provides UTM accuracy to 10 meters, latitudinal/longitudinal compatibility, and standard time reference. Current hand-held equipment can be modified to any MDS. Future systerns will integrate this type of navigation technology.

AIM-1 LASER GUNSIGHT SYSTEM

The AIM-l provides gun aiming point compatible use of night vision goggles, primarily for use on AH-1 aircraft.

INLET PARTICLE SEPARATION/ENGINE AIR PARTICLE SEPARATION

IPS/EAPS are available for all MDS for operation in desert environments.

BALLISTIC ARMAMENT SUBSYSTEM

A ballistic blanket made out of Kevlar is available for the UH-60. This blanket is installed on the floor of the cabin and provides protection to 7.62mm.

APPENDIX H

DEPLOYMENT

The successful deployment of any unit depends heavily on the unit's ability to maintain the fighting force. This appendix is designed to aid the maintenance section, platoon, company, or battalion in preparing for and supporting a unit deployment by land, sea, or air. In most cases, a unit deployment can be divided into four distinct phases; preparation; movement to the port of embarkation (POE); actions at the POE; and actions at the port of debarkation (POD). The following references should be on hand in the unit:

- AR 220-10
- AR 220-10
- FM 55-9
- FM 55-12
- FM 55-30
- FM 55-65
- FORSCOM Reg 55-1
- FORSCOM Reg 55-2
- TB 55-46-1
- TM 38-250
- TM 55-1500-344-23
- TM 55-1520-400-14

PREPARATION

During the preparation phase, the commander and maintenance personnel should take the following steps:

- Review aircraft maintenance/historical records for upcoming services, inspections, component replacement, or deferred maintenance that could impact destination mission.
- Coordinate required support maintenance for disassembly or assembly of aircraft at the POE/POD.
- Identify shortages of all classes of supply, order replenishment, and sustainment needs.
- Coordinate for priority assistance from TMDE support facility for calibration requirements.
- Ensure vehicle load plans have space for mission-essential equipment; use standardized load cards. (See Figure H-1.)
- Prepare checklist to ensure vehicles are properly prepared for shipment. (See Figure H-2.)
- Determine transportation requirements beyond organic capability.
- Determine requirements and sources for blocking, bracing, and tie-down material.
- Ensure vehicle operators are assigned and qualified.
- Overprint DA Form 2408-13-2 (Figure H-3) to guide the disassembly and reassembly of aircraft to be shipped on Air Force aircraft. This standardizes procedures and expedites the work.
- Prepare buildup kits for each aircraft to be shipped. Identify and have on hand those one-time-use parts and supplies required to place the aircraft into operational status after being shipped. Ship the kits with each aircraft.
- Secure padding and prepare stowage plan (Figure H-4) for components removed from the aircraft to facilitate loading.
- Plan the sequencing of special tools, personnel, technical inspectors, and test pilots available to reassemble aircraft after shipment. This minimizes aircraft downtime and clears the ramp or port for follow-on equipment.
- Construct ramps to facilitate rolling helicopters on and off Air Force aircraft. (See Figure H-5.)
- Designate and train load teams. Give each member specific duties and responsibilities. (See Figure H-6.)

MOVEMENT TO POE

Movement to the air or sea, APOE/SPOE may involve a combination of modes. For example, aircraft are usually flown and vehicles, depending on the distance to the APOE/SPOE, may be driven in

convoys or shipped via rail. Actions taken during the movement include–

- Coordinate support at en route airfields for aircraft flying to the POE. This includes services for any night maintenance and aviation ground support equipment (AGSE) requirements.
- Coordinate and assign maintenance contact teams to perform scheduled and unscheduled maintenance at en route destinations.
- Identify and package any AGSE, TMDE, site, and repair parts required to accompany contact teams.
- Plan convoy operations. Brief drivers on safety. Cover convoy speeds, interval, emergency procedures, phone numbers, and security of equipment.
- Prepare strip maps to POE for all drivers. Station road guides at critical points on the route.
- Plan stops en route to check vehicles, refuel, secure loads, and change drivers.
- Follow convoys with a maintenance vehicle that has mechanics, tools, parts, and lubricants to make emergency repairs en route.
- Send an aviation maintenance representative with the advance party to guide vehicles to the staging area at the POE.

ACTIONS AT POE

Actions at the POE should be coordinated in advance with the departure airfield control group or seaport transportation officer–

- To determine a staging area for vehicles and equipment.
- To arrange for an aircraft disassembly area.
- To distribute flyaway kits, component stowage plans, and overprinted DA Forms 2408-13-2 for each aircraft to be shipped by air.
- To use organic equipment or obtain support for lifting rotors, masts, and so forth.
- To prepare vehicles for shipment. Use low profile. Leave keys in ignition or secured to steering column. Gas tanks should be IAW the transporting agencies' instructions.

ACTIONS AT POD

Actions at the port of debarkation usually include the following:

- Send advance party on the first sortie. Send unit representative to coordinate with the receiving aerial or seaport.
- Unload equipment and establish staging area.
- Establish maintenance operation to reassemble aircraft and to control equipment and personnel.
- Coordinate for a run-up and test flight area.
- Coordinate refueling of aircraft, vehicles, and equipment.
- Request assistance from local transportation officer to arrange for onward movement of personnel and equipment beyond the unit's organic capability.
- Prepare to clear the ramp or seaport and move to the employment area. Take similar steps when moving to the POE.
- Inspect aircraft shipped on sea vessels for salt water corrosion and wash with fresh water as soon as possible.

SELF-DEPLOYMENT

Self-deployment of aviation assets requires extended maintenance efforts in both preparation and execution. To better support the self-deployment, maintenance operations should consider and plan for the following:

- Not all of the unit's aircraft maybe deployed. The aircraft that remain may continue to perform required missions at home station and will require normal maintenance. In this case, support may be required to meet both the deploying and home station unit's missions.
- Some component TBO hours and aircraft flight hours may be reduced as a result of installing extended range fuel systems or exceeding maximum allowable gross weight.
- Maintenance personnel may be required to perform primary duties as mechanics, component repairers, supply technicians, and inspectors as well as additional duties as door gunners. Maintenance test pilots may be

required to perform operational missions and test pilot flight duties.

- Support services may not be established in the theater of operations for several weeks. Sufficient amounts of required classes of supplies, adequate TMDE, AGSE, special tools, and repair parts may not be immediately available.
- Aircraft may be transferred to and from the deploying unit with different transfer criteria than that established in TM 55-1500-328-23.
- Special navigation kits and aircraft modifications may be required prior to the aircraft self- deploying. Contract, depot, or other support maintenance may be required to accomplish these MWOs.

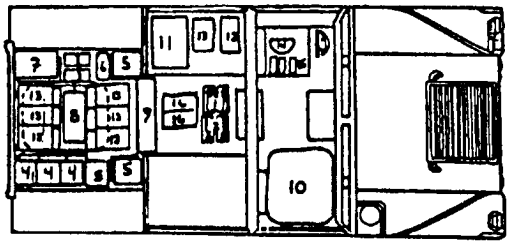
CMD + Control **VEHICLE LOAD CARD**

UNIT	BUMPER NO	DATE COMPILED
	HQ	

VEHICLE INFORMATION

TYPE	LENGTH	WIDTH	HEIGHT	EMPTY WT	CB/CG is ____ inches from
M998	180"	86"	72"	5200	

CARGO COMPARTMENT VIEW



Cargo Loc No	Cargo Description and Type Pack (PC WT)	Quantity	TOT Weight
1	5GAL WATER CAN (40Lbs ea)	2	80Lbs
2	5GAL FUEL CAN (41Lbs ea)	2	82Lbs
3	5.56MM BALL (A059) (72Lbs ea)	2 CS	144Lbs
4	5.56MM 4+1 (A064) (64Lbs ea)	6 CS	384Lbs
5	7.62MM 4+1 (A131) (79Lbs ea)	5 CS	395Lbs
6	FLARE TRIP (L495) (62Lbs ea)	1 CS	62Lbs
7	60MM HE (B642) (112Lbs ea)	2 CS	224Lbs
8	66MM LAW (H557) (45Lbs ea)	1 CS	45Lbs
9	CAMO SUPPORT SYS (70Lbs ea)	1	70Lbs
10	CAMO SCREEN SYS (65Lbs ea)	1	65Lbs
11	ANT. RC292 (44Lbs ea)	1	44Lbs
12	CANVAS ASSY w/ DOORS	1	
13	MRE (46Lbs ea)	14 CS	224Lbs
14	OVM	1	
15	DS2/M11	3	
16	GRENADE, FRAG (6551) (51Lbs ea)	2 CS	102Lbs

SAMPLE

LOADED VEH WEIGHT	DRIVER (Name and Grade)

LEGEND:

CB = center of balance
CG = center of gravity
gal = gallon
LAW = light antitank weapon
MM = millimeter
OVM = organizational vehicle maintenance

Figure H-1. Vehicle load card (example)

EXAMPLE

VEHICLE INSPECTION CHECKLIST

UNIT_____ TYPE VEHICLE_____

BUMPER #_____ INSPECTOR_____

S = Satisfactory U = Unsatisfactory NA = Not Applicable

A. Vehicle Operation/Level of Maintenance:

_____ 1. Engine starts and runs.
_____ 2. Tires (including spare) properly inflated.
_____ 3. No fuel, oil, water, battery leaks.
_____ 4. Proper fuel, oil, water levels.
_____ 5. Vehicle clean (including under chassis).
_____ 6. Fuel, oil, radiator, and battery caps present and secure.
_____ 7. Rubber battery post covers present and battery cables secure.
_____ 8. Lifting shackles and cotter pins present.
_____ 9. Lifting eyes and locking nuts (on wheels) present and tight.
_____10. (M561/M792) Drain plugs present and tight.
_____11. (M561/M792) Hull empty of oil and water.

B. Preparation for Air Movement:

_____ 1. (M561/M792) Windshield, cab canvas/bows, cargo canvas/bows, mirrors removed and stored when applicable.
_____ 2. Cargo load not greater than cross-country load capacity.
_____ 3. Cargo secured with 1/2" rope and 5000-lb cargo tie-down straps.
_____ 4. NO METAL TO METAL CONTACT between metal fuel cans.
_____ 5. Vehicles reduced to 102" in height.
_____ 6. Antennas disassembled and stored in vehicle upon notification; otherwise remain up for daily comm checks.
_____ 7. Pioneer tools secured by two safety ties of 550 cord.
_____ 8. OVE present and secured IAW unit SOP.
_____ 9. Fuel cans filled to welded seam and serviceable rubber gasket present. Fuel spillage/seepage wiped from fuel cans and breather vent.
_____10. TOW missile rack pads/straps present, serviceable, and secured.
_____11. (M561/M792) Truss kit complete and mounted.
_____12. Vehicle C/B marked with 2" tape on both sides, GWT, FAW, RAW on vehicle.
_____13. Chalk card filled out and mounted on driver's side of vehicle.
_____14. (M966) Tie antenna to missile rack with 550 cord.
_____15. (M966) Camouflage nets and poles secured in left/right seat to prevent interference with missile storage.
_____16. (M966) Camouflage net tie-downs on rear must be S-rolled and taped.
_____17. (M1038/998) Accompanying cargo (less ballast) placed to the front of the cargo bed prepared to be secured with 15' Dacron lashings (DRF #1 unit provides six each lashings per vehicle). Cargo will be secured for road movement, but it is not required to be completely tied down while vehicles are in the ULACC.

Figure H-2. Vehicle inspection checklist (example)

C. Trailers:

_____ 1. Trailer clean.
_____ 2. Shoring present M416 = 1' x 1' x 3/4", M101 = 2' x 2' x 3/4".
_____ 3. Generator and lantern fuel levels IAW TM 38-250.
_____ 4. Cargo secured with 1/2" rope, CGU-1/B tie-down devices, and 5000-lb cargo tie-down straps.
_____ 5. Canvas present and secured.
_____ 6. Load does not rise higher than sides of trailer bed.

NOTE: Units must leave space for ballast to be added at HDRS, if ballast must be placed inside trailer.

D. Logbook:

_____ 1. DD Form 1970 (Motor Equipment Utilization Record)
_____ 2. DA Form 2404 (Equipment Inspection and Maintenance Worksheet)
_____ 3. SF 91 (Operator Report on Motor Vehicle Accidents)
_____ 4. DD Form 518 (Accident Identification Card) (2 copies)
_____ 5. Appropriate -10 manual and draft PMCS manual.
_____ 6. Lubrication Order.

E. Load Packet:

_____ 1. Load card (filled out & matches actual vehicle load and is in accordance with division standardized load plans).
_____ 2. Blank load card.
_____ 3. Vehicle inspection checklist (filled out/dated/signed by AMO).
_____ 4. Blank vehicle inspection checklist.
_____ 5. Blank chalk card.
_____ 6. DD Form 1387-2 (Special Handling Data/Certification) (if required).

THIS VEHICLE/TRAILER HAS BEEN INSPECTED AND IS READY TO COMPLETE AN ARMY/AIR FORCE INSPECTION AT GREEN RAMP.

_____
(Signature of Inspector/Unit)

_____
(Date)

LEGEND:

AMO = aircraft maintenance officer
C/B = center of balance
DRF = division ready force
FAW = forward axle weight
GWT = gross weight
IAW = in accordance with
OVE = organizational vehicle equipment
RAW = rear axle weight
TOW = tube-launched, optically tracked, wire-guided

Figure H-2. Vehicle inspection checklist (cont)

DATE _____ Page 1

1 STATUS	2 SERIAL NUMBER	3 SYSTEM CODE	4 TIME
	5 FAULT DATE	6 FAULT NUMBER	

7 FAULT Acft disassembled for shipment

8 STA	9 FAULT	10 ACTION	11 PID	12 MMH
	Pitot tube disconnected from mount.			
	UHF antenna removed.			
	FM antenna removed (fwd).			
	Stab bar assy s/n ____removed.			
	M/R hub s/n ____removed.			
	R/M/R blade s/n ____removed.			
	W/M/R blade s/n ____removed.			
	M/R mast s/n ____removed.			
	Swashplate s/n ____removed.			
	L/cyclic servo disconnected at bellcrank			
	in hellhole.			
	R/cyclic servo disconnected at bellcrank			
	in hellhole.			
	R/H gun mount removed.			
	L/H gun mount removed.			
	R/H sync elevator s/n ____removed.			

DA FORM 2408-13-2, NOV 91 RELATED MAINTENANCE ACTIONS RECORD

For use of this form, see DA PAM 738-751; the proponent agency is OCSR OG

Figure H-3. DA Form 2404 (overprinted) (front)

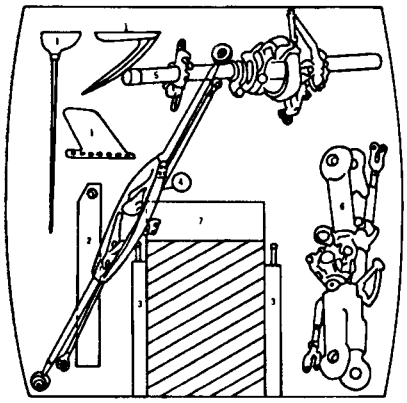
1 STATUS	2 SERIAL NUMBER	3 SYSTEM CODE	4 TIME
	5 FAULT DATE	6 FAULT NUMBER	

7 FAULT

8 STA	9 FAULT	10 ACTION	11 PID	12 MMH
	L/H sync elevator s/n ____removed.			
	FM whip antenna removed (aft).			
	T/R blade s/n ____removed.			
	W/M/R P/P tube removed.			
	R/M/R P/P tube removed.			
	Coll P/P tube disconnected at collective			
	levers.			
	W/dampener P/P tube disconnected at			
	dampener arm.			
	R/dampener P/P tube disconnected at			
	dampener arm.			
	Insp due of internal load for			
	compliance with load plan.			
	Insp due for placement of load plan on			
	copilot's window and shipment packet in			
	copilot's seat.			

REVERSE OF DA FORM 2408-13-2, NOV 91 ★ U.S. GOVERNMENT PRINTING OFFICE: 1992-327/60364

Figure H-3. DA Form 2404 (overprinted) (back) (cont)



ITEM	WEIGHT
1. RADIO ANTENNAS	
2. T/R BLADE	
3. SYNC. ELEVS.	
4. STAB. BAR ASSY.	
5. SWASHPLATE SUPPORT & MAST	
6. M/R HUB ASSY	
7. TROOPSEATS & GUN MOUNT	
	TOTAL

Figure H-4. Stowage plan

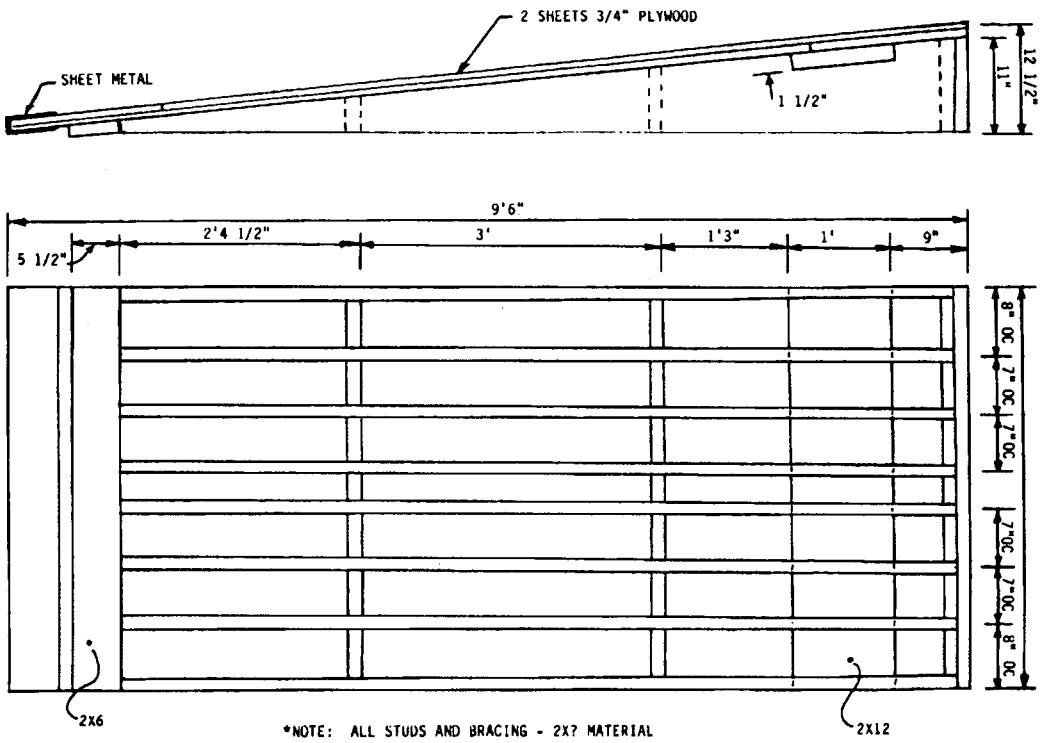


Figure H-5. Sample loading ramp diagram

EXAMPLE

DUTIES OF A LOAD TEAM

NO. 1 Man (Driver)

1. Responsible for preparing vehicle and towed load.
2. Responsible for removing all bows, tarps, and side boards.
3. Responsible for lowering windshields and folding inside mirror.
4. Responsible for ensuring motor is warmed up before loading.
5. Responsible for ensuring motor and vehicle are in 4-wheel drive.
6. Takes all guiding signals from the team leader only.
7. Licensed to drive all TOE equipment.

NO. 2 Man (Team Leader)

1. Responsible for loading, balancing, and lashing of cargo.
2. Gives all commands and arm and hand signals.
3. Locates himself to direct the movement of all equipment being loaded.
4. Responsible for the safety of his team.

NO. 3 and 4 Men (Safety Men)

1. Follow the vehicle up or precede the vehicle down the ramp with their wood chocks.
2. Assist in spotting and lashing the load.
3. May act as port or starboard guides.
4. Do not use wheel chocks on low-incline, ramp-type vehicles.
5. Do not use wheel chocks when winching vehicles aboard aircraft.

NO. 5 and 6 Men (Utility Men)

1. Prepare the aircraft for the load.
2. Raise or remove the troop seats.
3. Clear cargo compartment of unnecessary items.
4. Prepare the tie-down devices and tie-down fittings.
5. Assist the load master in all tasks as necessary.
6. Assist in spotting and lashing the load.

Figure H-6. Load team duties (example)

APPENDIX I

AVIATION MAINTENANCE COMMANDER'S CHECKLIST

MAINTENANCE MANAGEMENT

1. Does the unit have an adequate MTOE/MTDA for its mission? (DA Staffing Guide.)

2. Are all authorized positions tilled with qualified personnel? (AR 750-1.)

3. Are there adequate SOPs covering all aspects of the unit's function and mission? (AR 385-95.)

4. Are all personnel aware of and complying with unit SOP? (AR 385-95.)

5. Are the following duties and positions designated in writing and current –

a. Technical inspectors. (DA Pam 738-751, FM 1-500.)

b. Weight and balance technician. (AR 95-3.)

c. Oil analysis monitor. (AR 750-1, TB 43-0106.)

d. Safety officer (or director) and safety NCO. (AR 385-95.)

e. Test pilot. (TM 1-1500-328-23.)

f. Fire marshal and assistant fire marshal. (AR 420-90.)

g. Controlled exchange authority. (FM 1-500, AR 750-1.)

h. FOD officer. (AR 385-95.)

i. Corrosion-preventive control (CPC) officer. (TM 1-1500-328-23.)

6. Are there frequent technical assistance or maintenance assistance instruction team visits to subordinate units? (FM 1-500.)

7. Are personnel properly assigned in their primary or secondary MOS? (AR 611-201.)

8. Are unqualified or inexperienced personnel receiving properly planned and documented on-the-job training? (FM 1-500.)

9. Is there an aviation safety bulletin board in the maintenance area? (TM 55-1500-204-25/1.)

10. Does the shop officer emphasize accident avoidance measures in maintenance operations? (AR 385-95, FM 1-500.)

11. Is there an operation hazards program in effect to encourage reporting of hazards, near accidents, unsafe shop practices, and so forth? (AR 385-95.)

12. Are supervisors aware of proper procedures for securing parts analyses for accident investigation purposes? (DA Pam 385-95.)

13. Are weight and balance records complete, current, and properly maintained? (TM 55-1500-342-23, AR 95-3.)

14. Are controls established to preclude unauthorized cannibalization and controlled exchange? (AR 750-1.)

15. Are personnel aware of radioactive hazards and materials associated with aircraft repair?

QUALITY ASSURANCE

1. Forms and records–

a. Are aircraft maintenance and flight forms and records properly filled out and filed? (DA Pam 738-751, local SOP FM 1-500.)

b. Are aircraft forms and records screened to ensure that all work accomplished is reflected on forms and records? (Appropriate phase book, preventive maintenance checklist, DA Form 2408-13-1, -2, -3.)

c. Are all DA Forms 2408-13 retained in a maintenance organizational file for 6 months and then destroyed? (DA Pam 738-751.)

d. Are DA Forms 2408-16 (Aircraft Component Historical Record) checked carefully for accuracy to prevent overflying the replacement times for aircraft components and subcomponents? (DA Pam 738-751.)

(1) Are TBO charts or appropriate computerized equipment used to keep track of component replacement time? (FM 1-500.)

(2) Are TBO charts kept current? (FM 1-500.)

e. Does DA Form 1352-1 (Daily Aircraft Status Report) reflect the actual current status? (AR 700-138;)

2. Does the unit maintain a safety-of-flight TWX file? (FM 1-500.)

3. Calibration equipment and records-

a. Is equipment calibrated in the specified time intervals and is it properly stored? (TB 43-180, TB 750-25, AR 750-43.)

b. Are calibration records maintained by the unit and support activity? (TB 750-25.)

4. Are all assigned aircraft under the Army Oil Analysis Program? (AR 750-1, TB 43-0106.) Is the program functioning according to appropriate regulations and directives?

5. Are safety inspection and testing of lifting devices being monitored? (TB 43-0142.)

a. Are forms and records maintained? (TB 43-0142.)

b. Are items properly marked with load rating, next periodic inspection date, and internal load test? (TB 43-0142.)

6. Does the unit actively participate in the submission of quality deficiency reports (QDR) and equipment improvement recommendations (EIR) using Standard Form 368 (Product Quality Deficiency Report)? (DA Pam 738-751.)

7. Are aircraft inspected according to established aircraft maintenance procedures within required inspection intervals? (TM 1-1500-328-23.)

8. Do quality control personnel conduct in-progress inspections of products to assure reliability of complete assembly? (FM 1-500.)

9. Are work area and hangar safety inspections being conducted by quality control personnel periodically per FM 1-500? (FM 1-500.)

10. Publications–

a. Are aircraft maintenance publications current, available, and used? (DA Pam 25-30, FM 1-500.)

(1) Do aircraft maintenance areas have the appropriate quantities of applicable manuals for assigned work?

(2) Are DA Form 12-series forms available and up-to-date?

(3) Are appropriate publications used at all times when working on aircraft? (AR 385-95.)

(4) Are required publications carried aboard each aircraft? (AR 95-1.)

b. Is there a policy requiring quality control and maintenance personnel to familiarize themselves with publications, using a technical data familiarization chart or by initialing the technical manual? (FM 1-500.)

MAINTENANCE WORK AREA

1. Supervision–

a. Do maintenance supervisors ensure that accident prevention measures are included in the maintenance annex to the unit SOP and that they are complied with in all maintenance operations? (FM 1-500.)

b. Do personnel using power tools (drills, grinders, lathes, torches, and so forth) wear protective clothing and equipment (PCE)? (AR 385-10, OSHA.)

2. Shop / hangar safety markings. Are proper color-coded signs posted in hazardous areas? (AR 385-30.)

3. Fire prevention–

a. Are smoking and no-smoking areas designated, and are no-smoking signs posted? (TM 55-1500-24)4-25/1.)

b. Are the required number and types of fire extinguishers available in the shops and hangar? (TM 55-1500-204-25/1.)

c. Are shop and hangar fire extinguishers inspected as required? (TM 55-1500-204-25/1.)

d. Are shop and hangar personnel trained in the use of fire-fighting equipment? (FM 1-500.)

e. Are there enough grounding points to adequately support the unit's aircraft parking areas and maintenance facility? (FM 10-68.)

f. Is the entire grounding system for which the unit is responsible inspected annually? (FM 10-68.)

g. Are all ground rods for which the unit is responsible tested every 2 years or when there is a possibility of mechanical damage? (FM 10-68.)

h. Does the unit keep a log that identities each rod the date tested, and the reading in ohms? (FM 10-68.)

4. Foreign object damage prevention-

a. Is the FOD prevention annex to the unit SOP adequate? (AR 385-95.)

b. Is a specified time established for policing aircraft parking areas, run-up areas, exhaust areas, runways, and taxiways? Is the policing done as established? (TM 55-1500-204-25/1, AR 385-95.)

c. Are there enough FOD receptacles in all work areas for trash, ferrous and nonferrous scrap, safety wire, and so forth? (TM 55-1500-204-25/1, FM 1-500, AR 385-95.)

d. Is a checklist of all maintenance areas completed? (AR 385-95.)

5. General maintenance practices. Are parts and items that have been removed from aircraft properly marked and stored? (DA Pam 738-751, FM 1-500.)

6. Housekeeping–

a. Are shops and hangars kept clean and free of grease and oil on floors? (FM 1-500.)

b. Are shops, shop sets, and hangars well arranged and uncluttered? (FM 1-500.)

c. Are clean-up periods established and followed? FM 1-500.)

7. Use of oxygen. Are oxygen gaseous cylinders stored in a separate location away from aircraft servicing and maintenance areas of aircraft hangars? (Exception is cylinders scheduled to be installed in aircraft.) (NFPA Std 410.)

8. Ground support equipment-

a. Are equipment and vehicle operators properly trained and thoroughly familiar with the operation, handling, care, and maintenance of equipment and vehicles? (AR 60055, AR 385-95, FM 1-500.)

b. Are vehicle operators properly licensed? (AR 600-55.)

c. Are ground support equipment (APU, generator) operators properly licensed? (TB 600-1, TM 55-1500-204-25/1.)

d. Are maintenance and operator manuals located with the equipment? (TM 55-1500-204-25/1, FM 1-500.)

e. Are maintenance records kept on equipment? (DA Pares 738-750 and 738-751.)

f. Is ground-handliig equipment reflectorized? (TM 55-1500-204-25/1.)

g. Is all GRE under a 180-day corrosion-preventive control program? (TB 1-1500-328-23, Section X.)

9. Maintenance paint shop–

a. Are more paint and dope stored in the paint shop than will be used during one work shift? (FM 1-500, TM 55-1500-204-25/1.)

b. Are fire extinguisher provided throughout the shop area? (FM 1-500, TM 55-1500-204-25/1, DA Pam 385-1, OSHA.)

c. Is all electrical equipment in the paint shop explosion-proof? (FM 1-500.)

d. Are smoking restrictions posted and enforced? (TM 55-1500-204-25/1.)

e. Are flammable liquid containers marked? (AR 385-30.)

BATTERY SHOP MAINTENANCE

1. Does the battery shop have an operational SOP? (TB 385-4.)

2. Are facilities provided for flushing and neutralizing spilled electrolyte? (OSHA Std 1910.178[g][2].)

3. Are arc-proof switches installed? (OSHA Std 1910.178[g][11].)

4. Training–

a. Are battery maintenance personnel formally trained (MOS 68F) in the care of nickel-cadmium batteries? (FM 1-500.)

b. Are battery maintenance personnel thoroughly trained in charging, discharging, and testing procedures? (TM 11-6140-203-14-2, TB 385-4.)

5. Equipment. Are the following safety items available in or near the battery shop and used when needed:

a. Eyewash or shower within 25 feet of the work area? (FM 1-500, OSHA Std 1926.403[a][6].)

b. Correct fire extinguisher? (FM 1-500, TB 385-4.)

c. Aprons, rubber gloves, and face shield or goggles (all provided as part of tool kit, TK 90/16)? (TM 11-6140-230-14-2, TB 385-4.)

d. A safety bulletin board with all required items posted in accordance with TB 385-4? (FM 1-500.)

6. Ventilation–

a. Is the battery-charging area adequately ventilated to prevent accumulation of explosive gases? (NFC 410-8, TM 11-6140-203-14-2.)

b. Does mechanical ventilation (when required) conform to the type approved for use in Class 1, Group B, hazardous locations as defined in NEC 500 and 513? (NFC 410-8.)

c. Do exhaust ducts lead directly to the outside, above roof level, where fumes cannot accumulate? (NFC 410-8.)

7. How have the commander, safety officer, and supervisory personnel ensured the following:

a. Tools and other conductive materials are stored or placed where they cannot fall into batteries, causing a short circuit and hydrogen ignition. (OSHA Std 1910.178 [g][1]), FM 1-500, TB 385-4.)

b. All shop personnel remove all jewelry while working with batteries. (NFC 410-8, FM 1-500.)

c. Necessary inspections, cleaning, and repairs are accomplished before charging, (FM 1-500.)

d. Charging equipment is energized after the battery has been connected to the circuit. (TM 11-6140-203-14-1.)

e. Water or electrolyte is added to the battery only when fully charged and stabilized for at least 30 minutes. (TM 11-6140-203-14-2.)

f. Nonseal batteries are located in enclosures with outside vents or in well ventilated rooms and arranged to prevent the escape of fumes, gases, or electrolyte spray into other areas. (OSHA Std 1926.403[a][2].)

g. Lead-acid batteries are stored separately from nickel-cadmium batteries. (TM 11-6140-203-14-2.)

h. Acids are properly stored.

i. Cell shorting straps are used to completely discharge cells to 0 volts. (TM 11-6140-203-14-2.)

j. Maintenance personnel monitor the voltage of individual cells at regular intervals during charge and discharge cycles. (FM 1-500, TM 11-6140-203-14-2.)

k. Discharge times are strictly followed during battery capacity tests. (TM 11-6140-203-14-2, FM 1-500.)

8. Are materiel safety data sheets (MSDS) posted? (AR 700-141.)

AVIONICS/ELECTRICAL

1. Does the unit have an adequate avionics maintenance SOP? (TB 385-4.)

2. Training–

a. Does the unit have a training program to educate personnel in safety procedures and lifesaving techniques appropriate to the work being performed? (AR 385-10.)

b. Have electrical MOSs completed initial training in CPR with annual refresher updates annotated by installation safety officer?

3. Test equipment –

a. Are calibration requirements for test equipment kept up-to-date? (TB 750-25.)

b. Is all test equipment properly grounded? (TB 385-4.)

4. How does the commander ensure knowledge of and compliance with the following–

a. A mounted safety board is present in the shop. (TB 385-4.)

b. Rubber floor mats or similar insulating materials are provided for repair positions. (TB 385-4, FM 1-500.)

c. All power attachment plugs and connectors are serviceable with no exposed current-carrying parts except the prongs. (OSHA Std 1910.305, FM 1-500.)

d. All physical and ligh-voltage hazards have been identified and marked according to AR 385-30. (FM 1-500.)

5. Is the Operational Readiness Float Program established and maintained? (AR 750-1.)

6. Are unserviceable and nonrepairable items being turned in promptly? (AR 750-1.)

7. Are technical inspections of repairable equipment being accomplished? (FM 1-500.)

8. Are necessary technical publications on hand and current? (DA Pam 25-30, FM 1-500.)

TECHNICAL SUPPLY

1. Is the unit required to maintain a prescribed load list (PLL)? (DA Pam 710-2-1.)

a. Is the PLL properly computed and current? (DA Pam 710-2-1.)

b. Are PLL items replenished as used? (DA Pam 710-2-1.)

2. Is the unit's authorized stockage list (ASL) current (reviewed within the last 6 months)? (AR 710-2.)

3. Are the document register and other documents current and posted correctly? (DA Pam 710-2-1.)

4. Does the stockage location of each RX item coincide with the location listed on the title insert (DA Form 3318)? (DA Pam 710-2-1.)

5. Are supplies in open storage preserved to withstand exposure to elements? (DOD 4145.19-R-1.)

6. When covering supplies (stored outside) with tarpaulins or other such materials, is a 12- to 18-inch clearance maintained between the bottom of the covering and the ground? (DOD 4145.19-R-1.)

APPENDIX J

COMMUNICATIONS NETS

This appendix contains external and internal communications nets in which aviation logisticians and personnel who have an impact on aviation logistics participate.

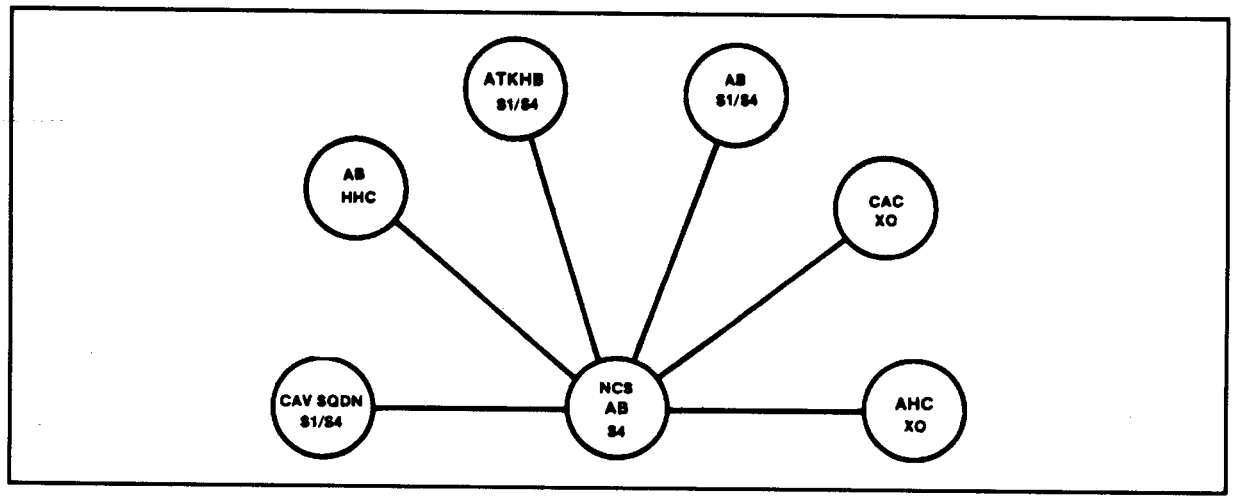


Figure J-1. General-purpose FM net in aviation brigade, heavy division

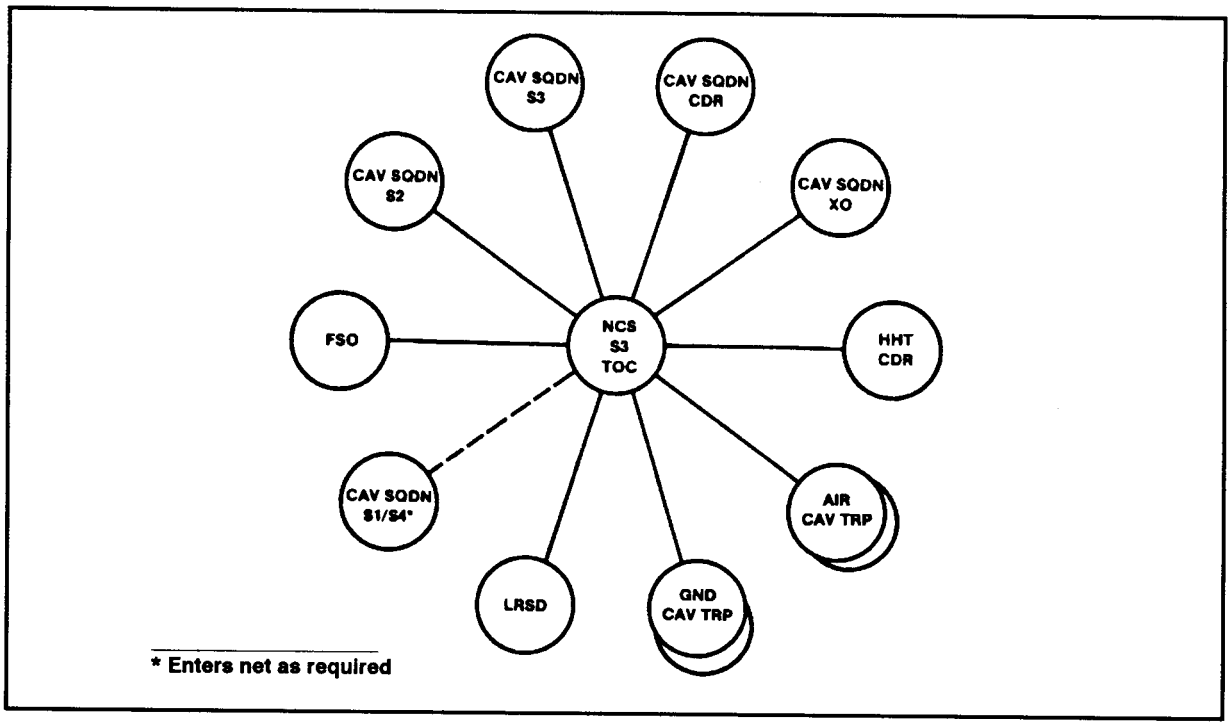


Figure J-2. Command/operations FM net in cavalry squadron, heavy division

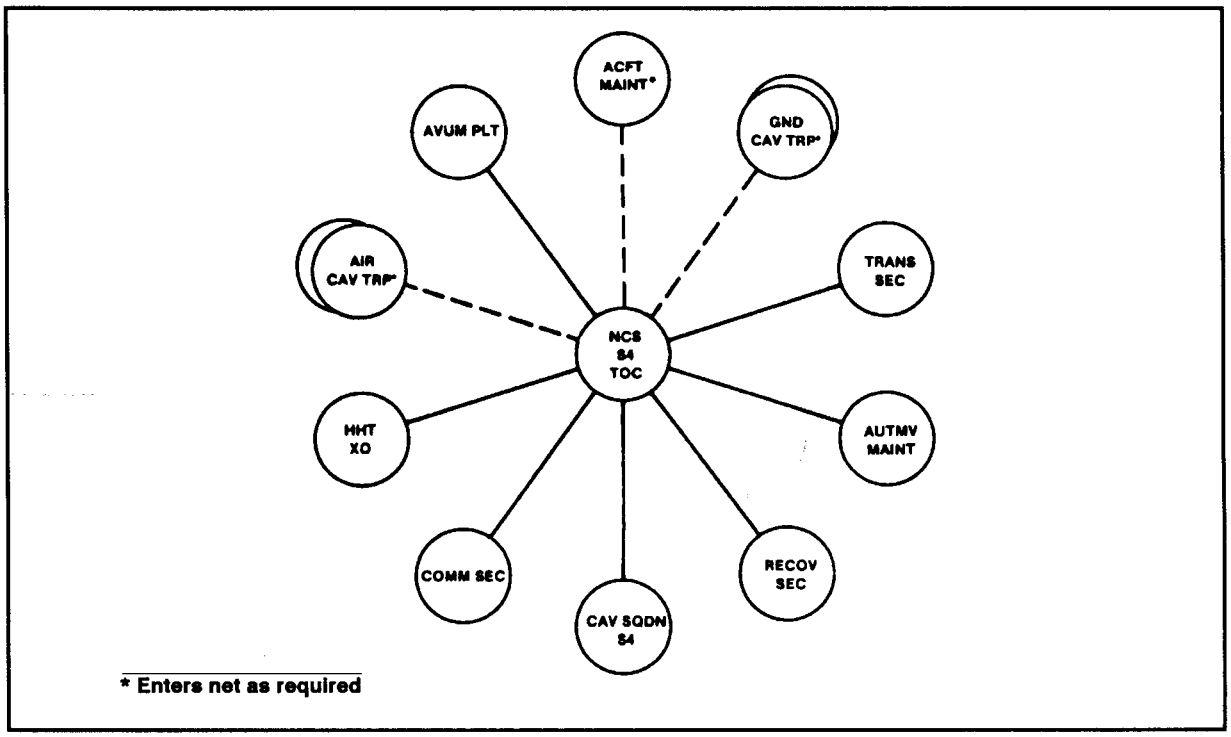


Figure J-3. General-purpose FM net in cavalry squadron, heavy division

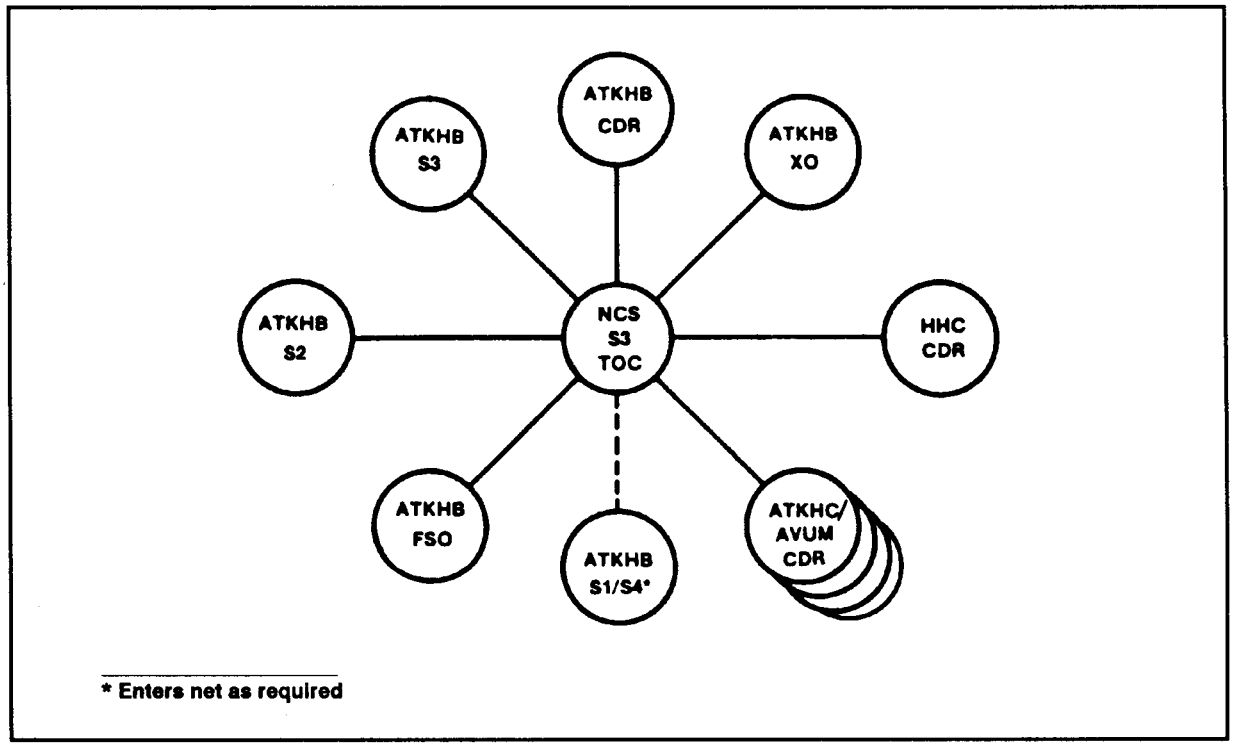


Figure J-4. Command/operations FM net in attack helicopter battalion, heavy division

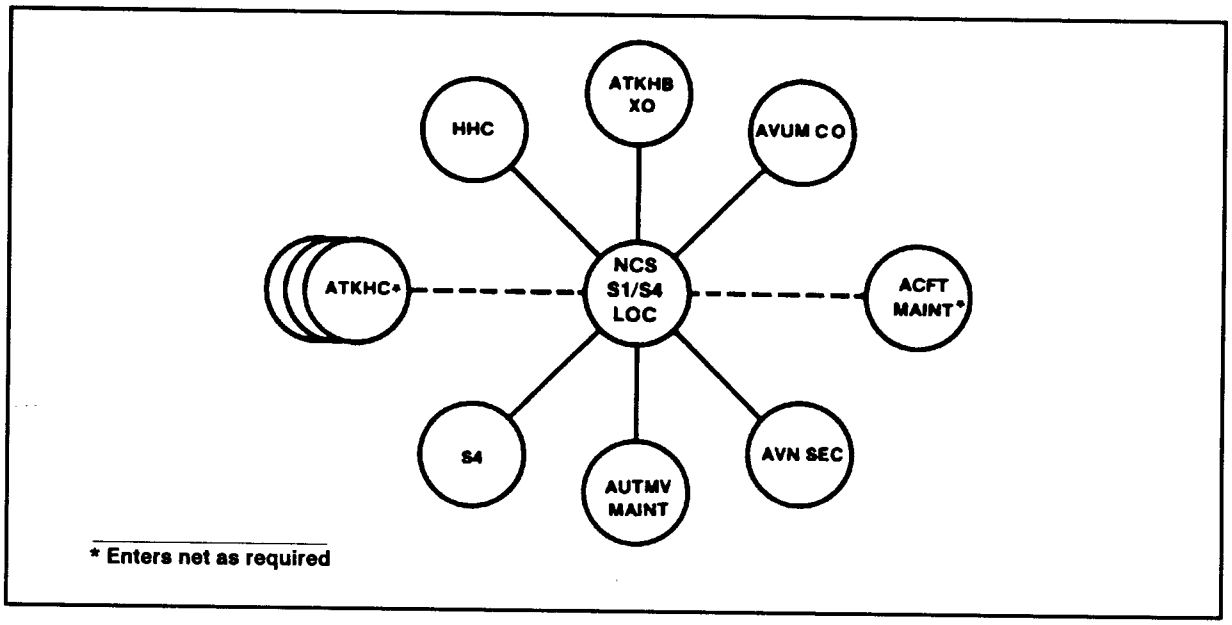


Figure J-5. General-purpose FM net in attack helicopter battalion, heavy division

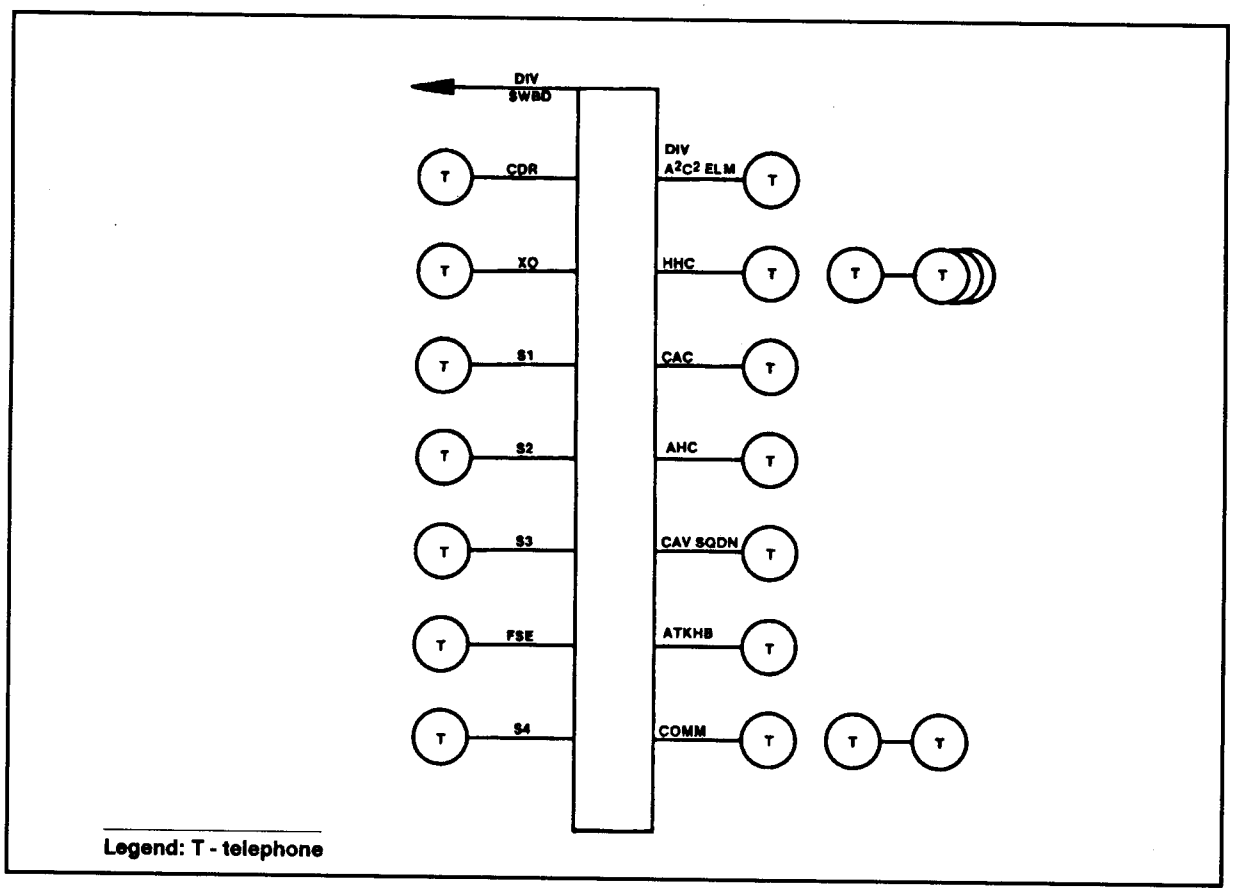


Figure J-6. Telephone system in aviation brigade, heavy division

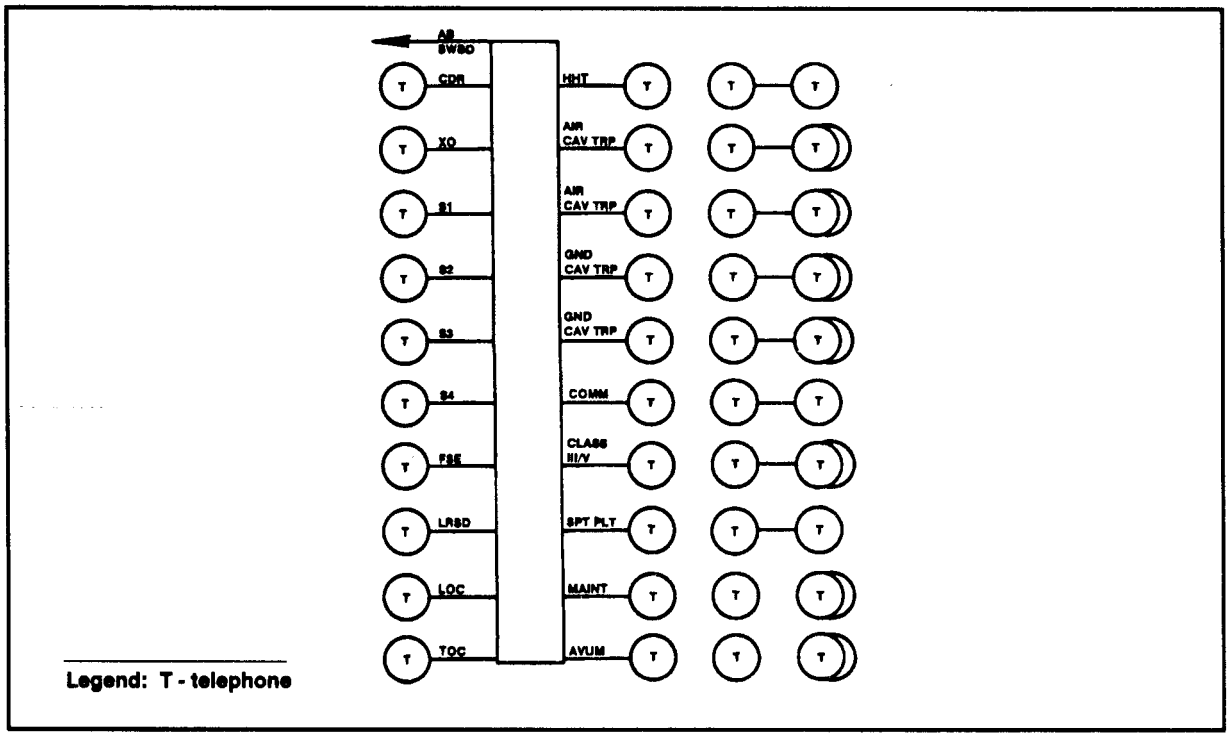


Figure J-7. Telephone system in cavalry squadron, heavy division

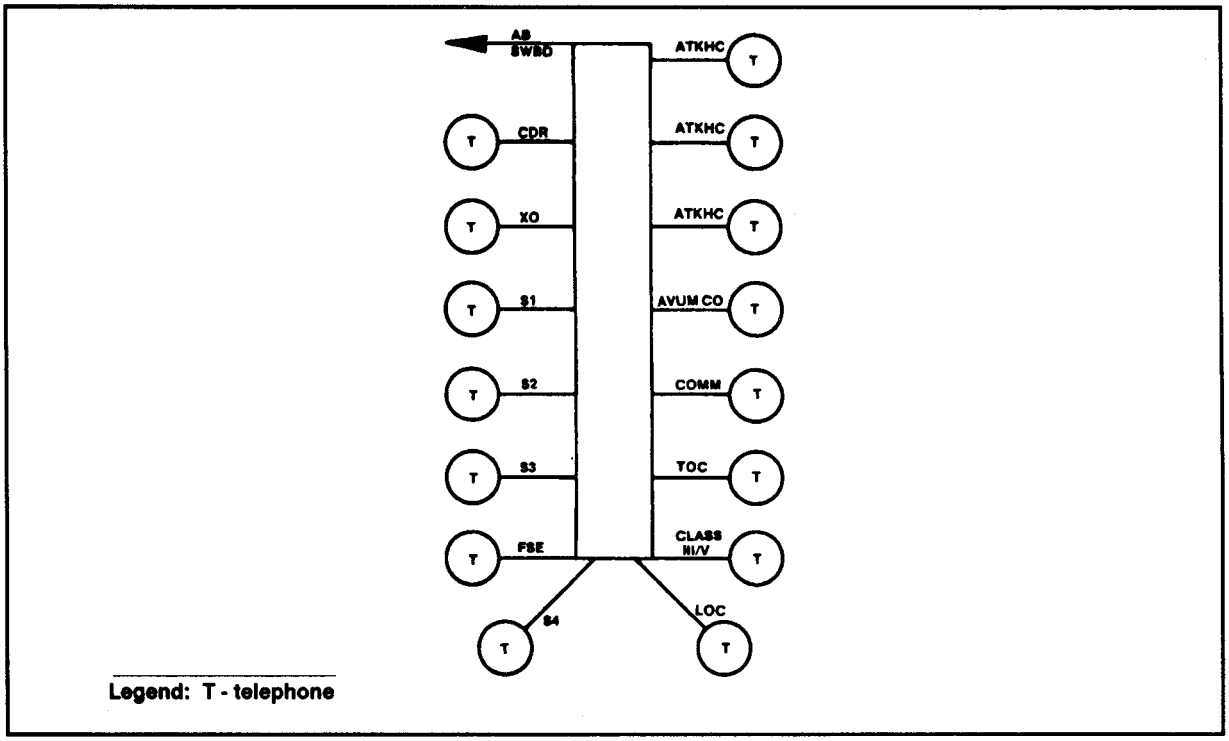


Figure J-8. Telephone system in attack helicopter battalion, heavy division

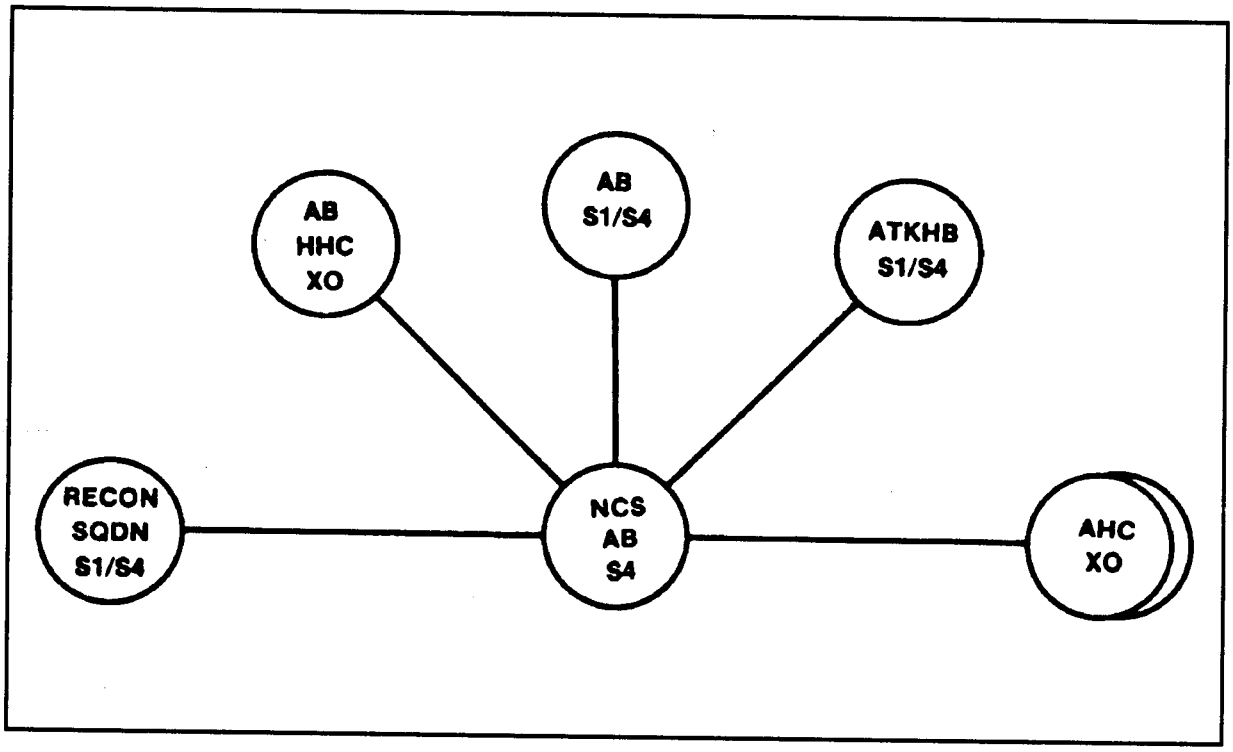


Figure J-9. General-purpose FM net in aviation brigade, light division

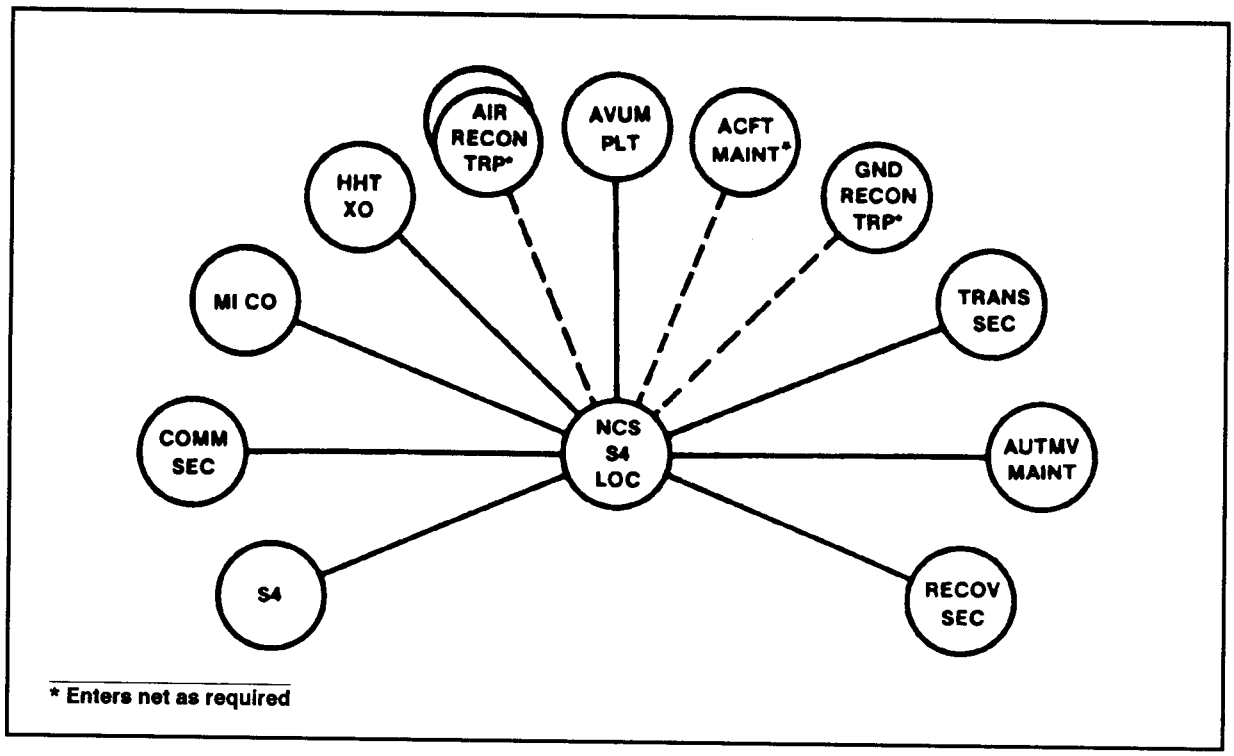


Figure J-10. General-purpose FM net in reconnaissance squadron, light division

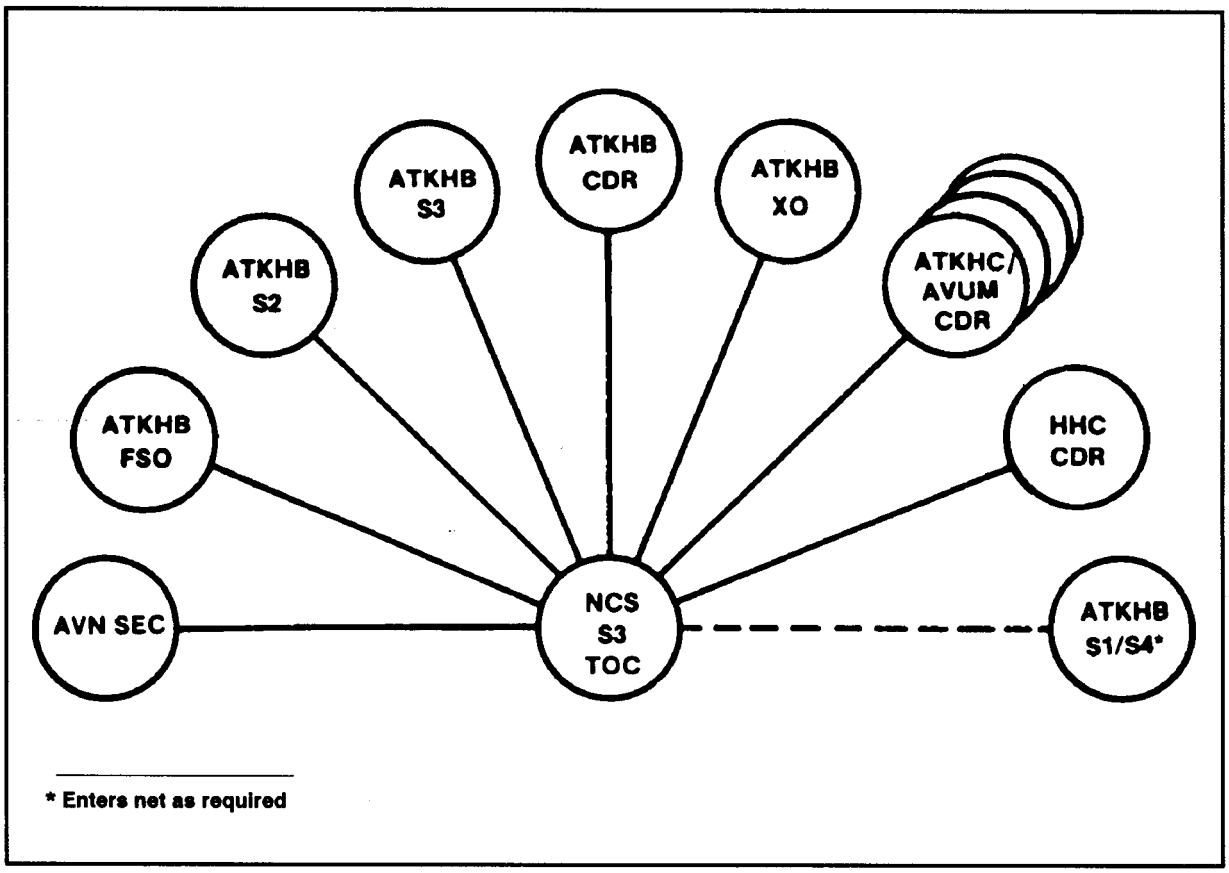


Figure J-11. Command/operations FM net in attack helicopter battalion, light division

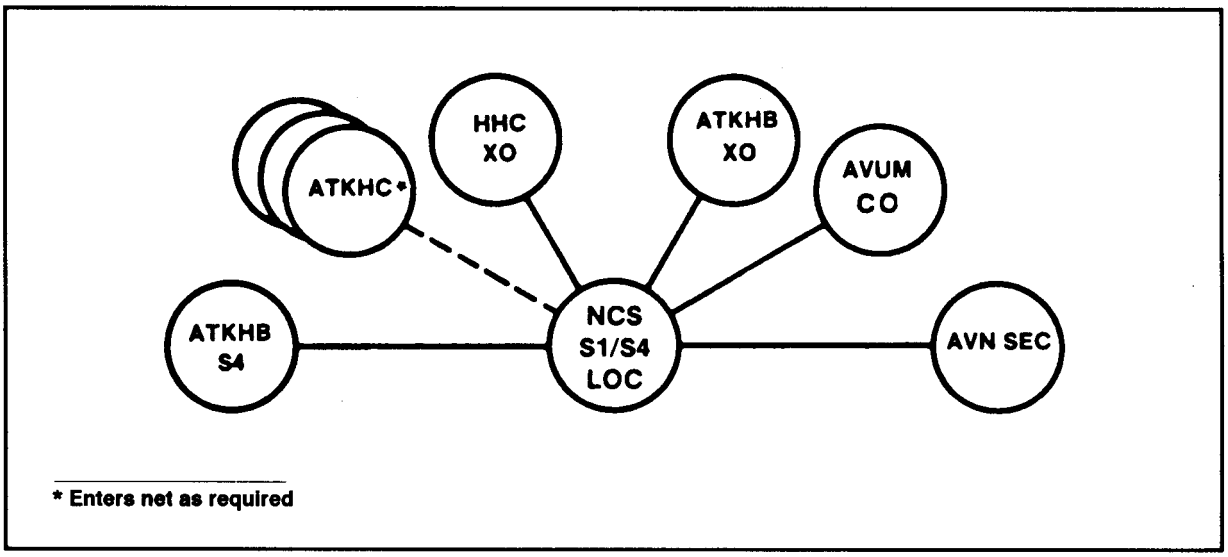


Figure J-12. General-purpose FM net in attack helicopter battalion, light division

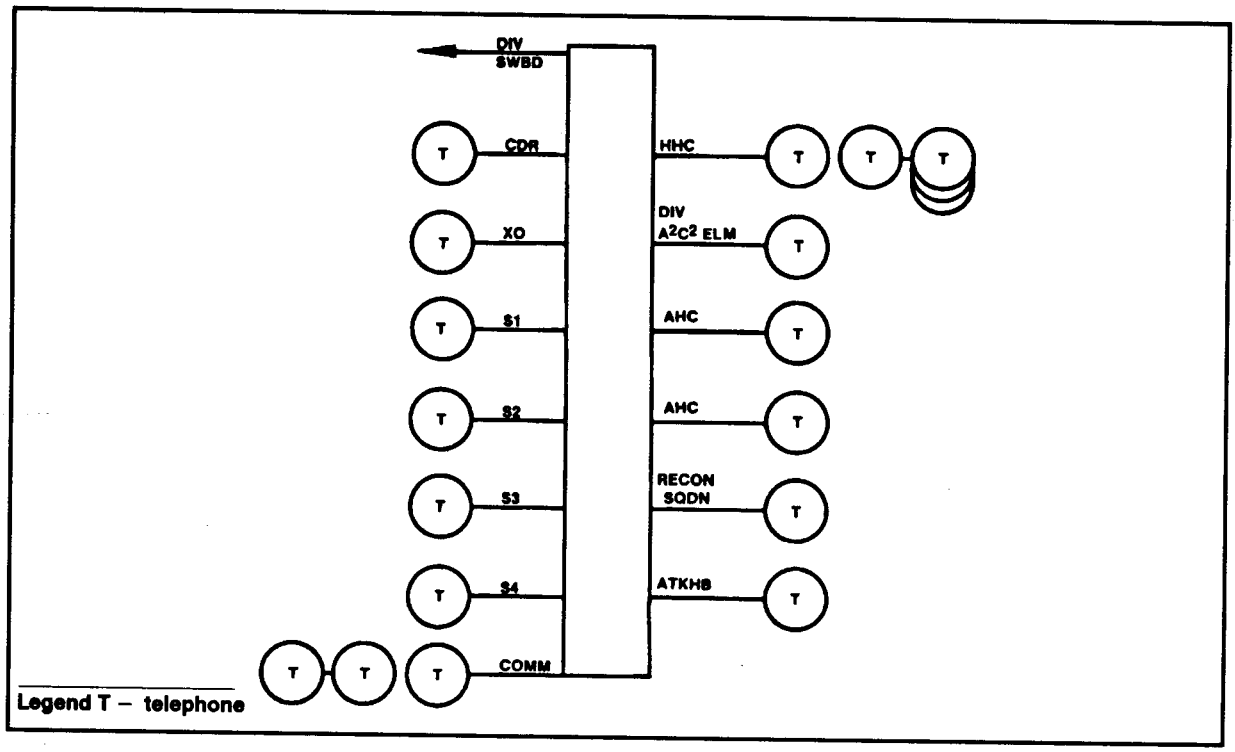


Figure J-13. Telephone system in aviation brigade, light division

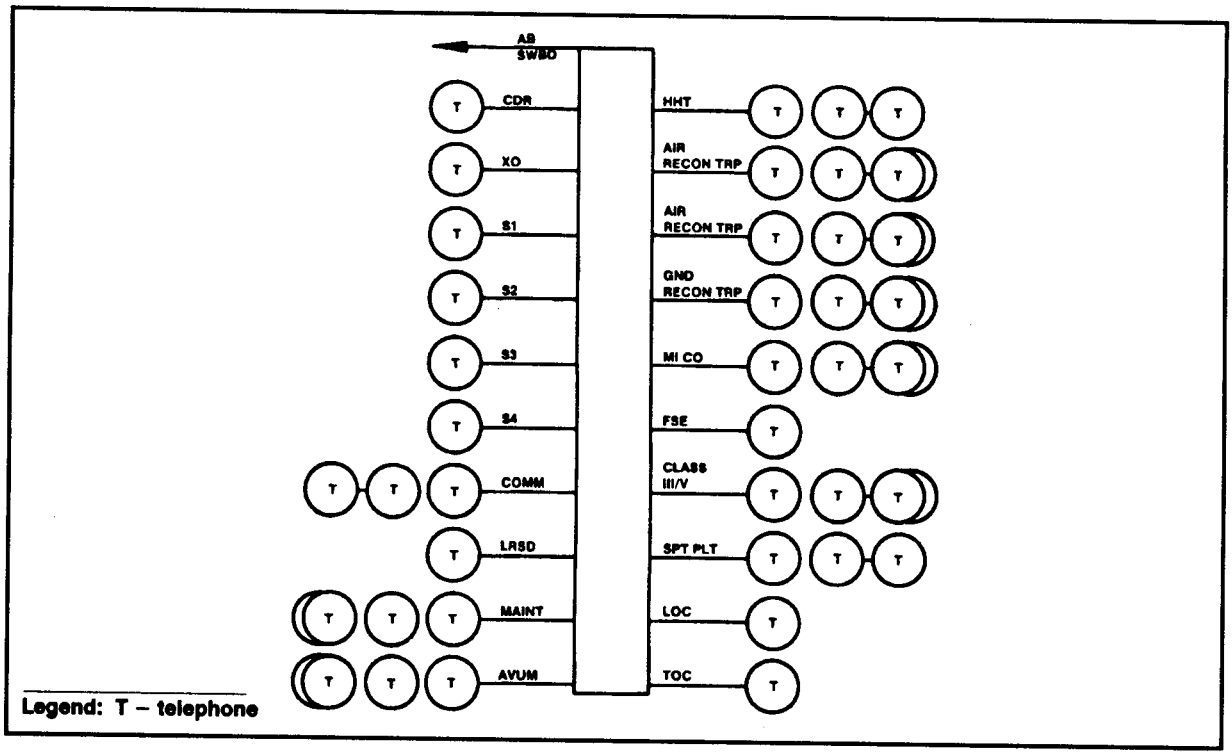


Figure J-14. Telephone system in reconnaissance squadron, light division

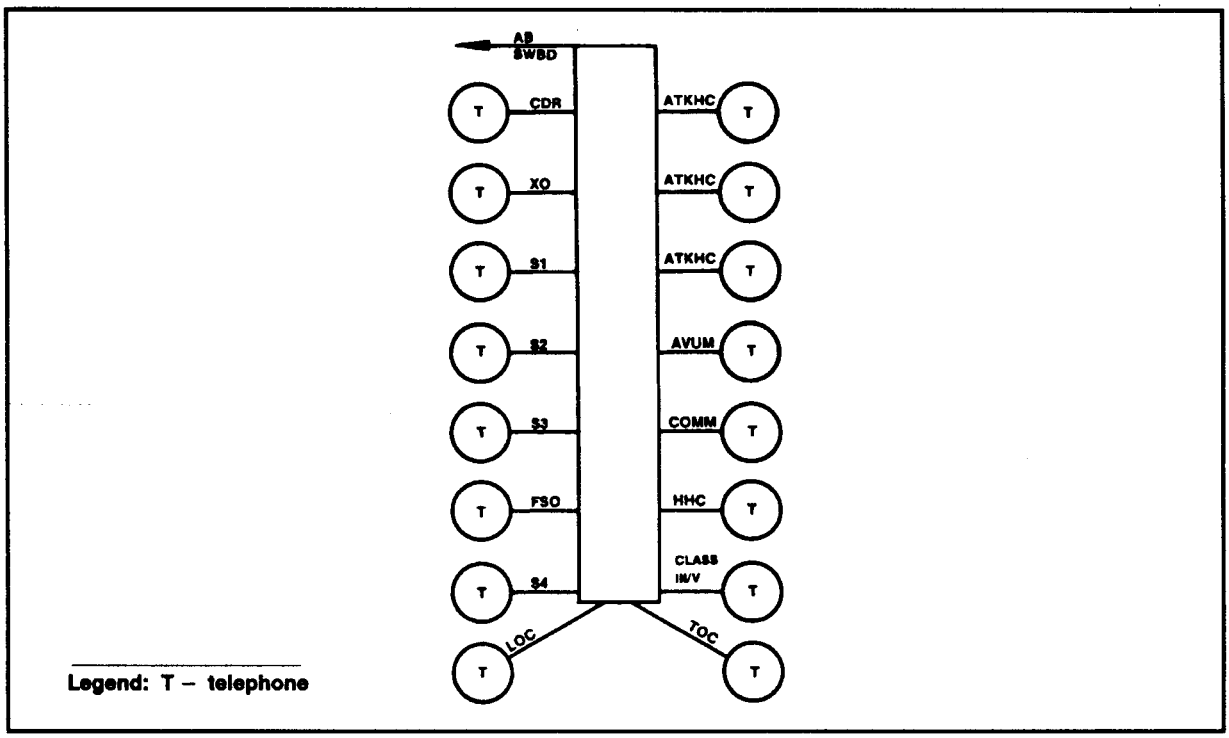


Figure J-15. Telephone system in attack helicopter battalion, light division

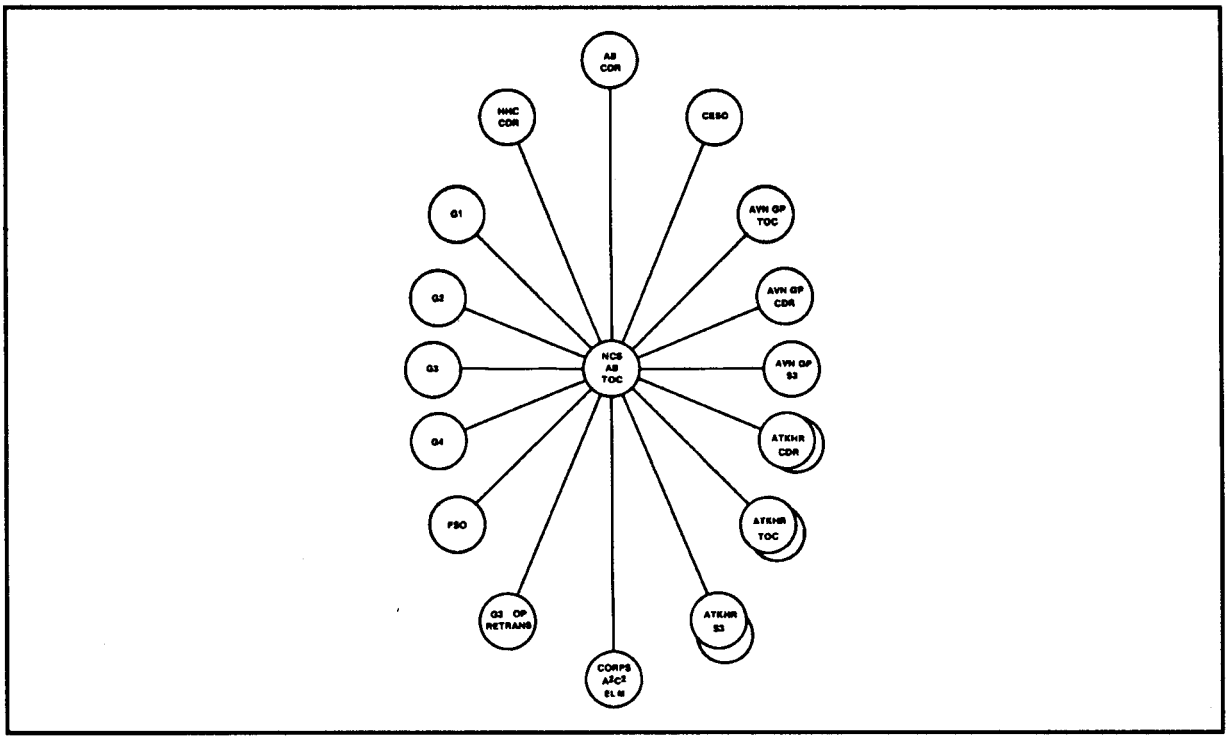


Figure J-16. Command/operations FM net in aviation brigade, heavy corps

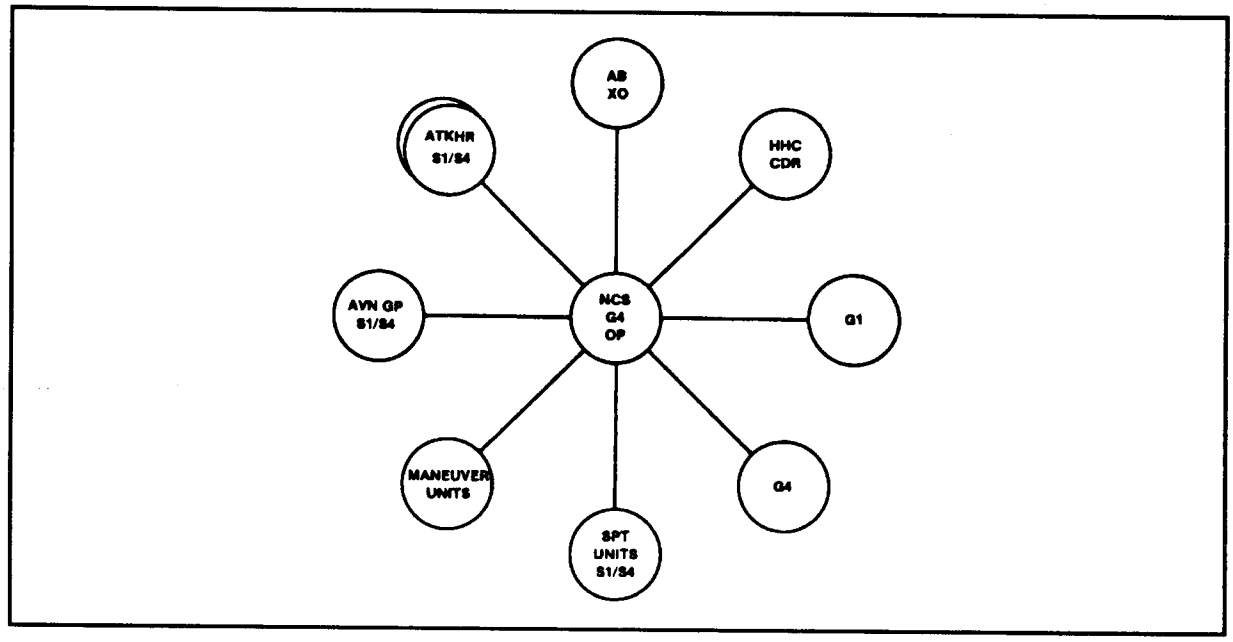


Figure J-17. General-purpose FM net in aviation brigade, heavy corps

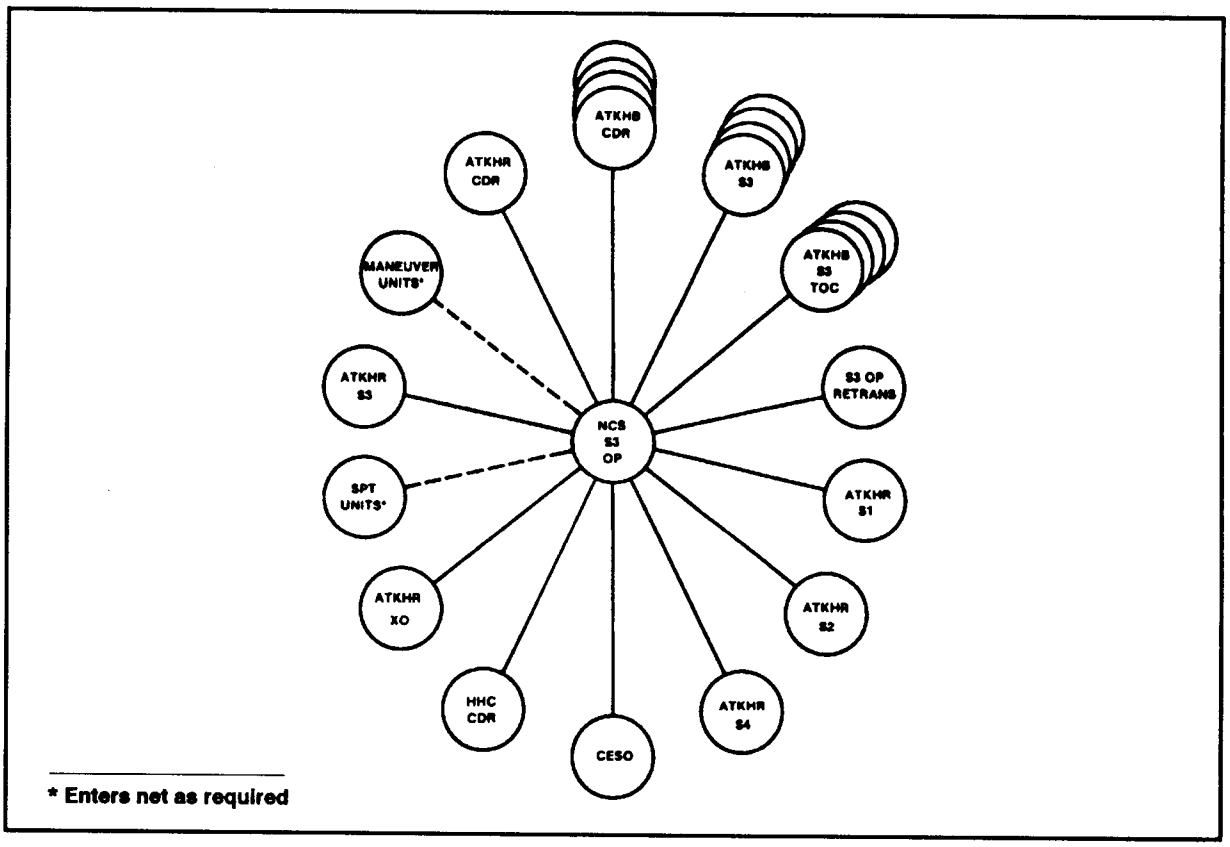


Figure J-18. Command/operations FM net in attack helicopter regiment, heavy corps

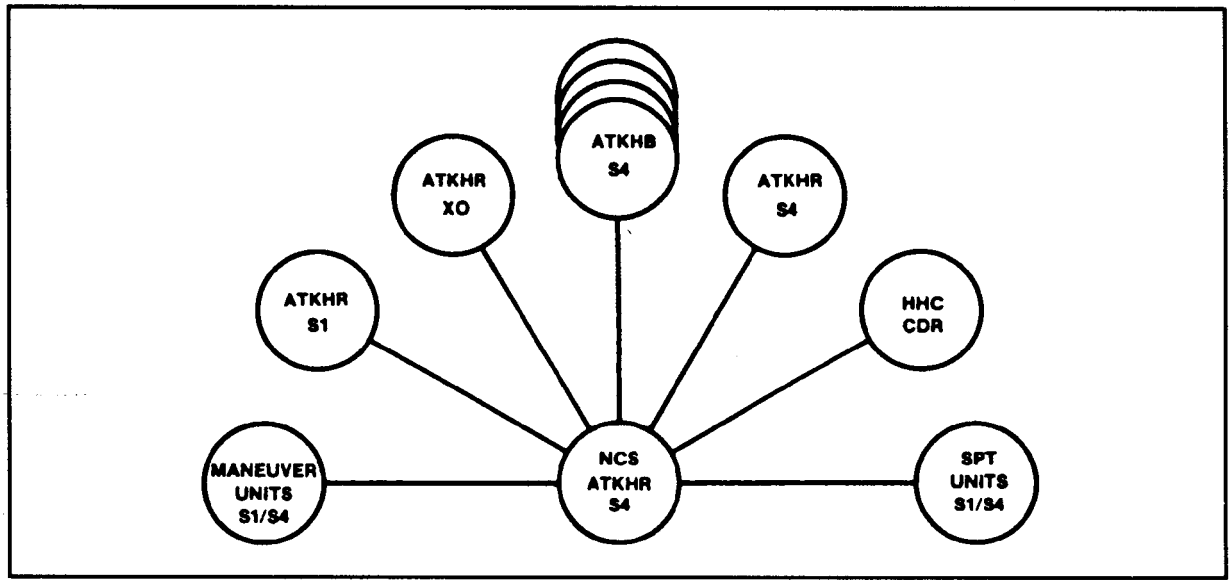


Figure J-19. General-purpose FM net in attack helicopter regiment, heavy corps

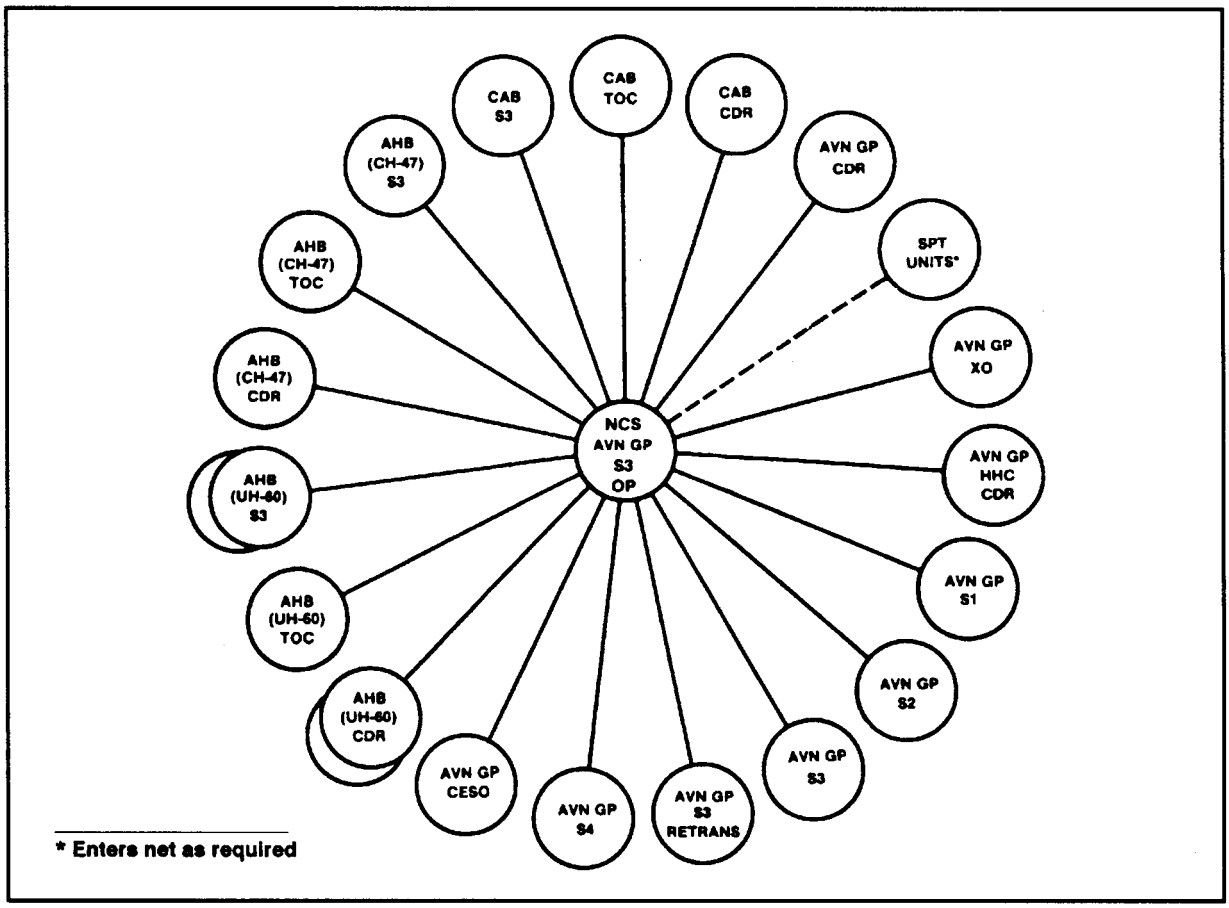


Figure J-20. Command/operations FM net in aviation group, heavy corps

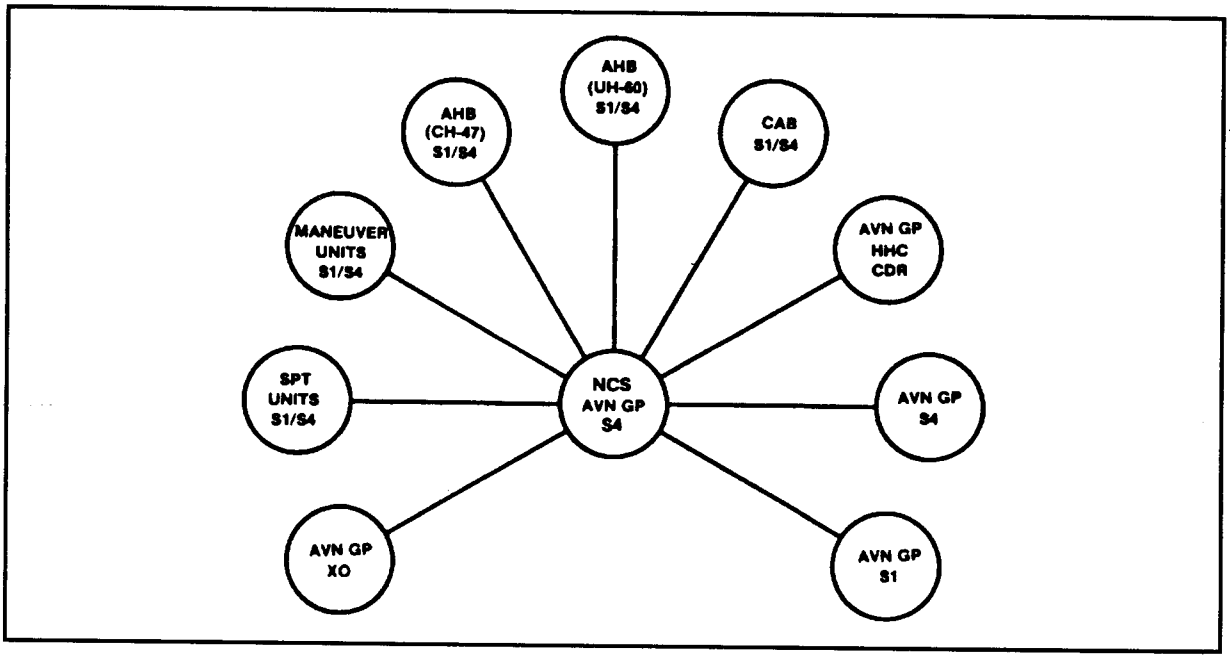


Figure J-21. General-purpose FM net in aviation group, heavy corps

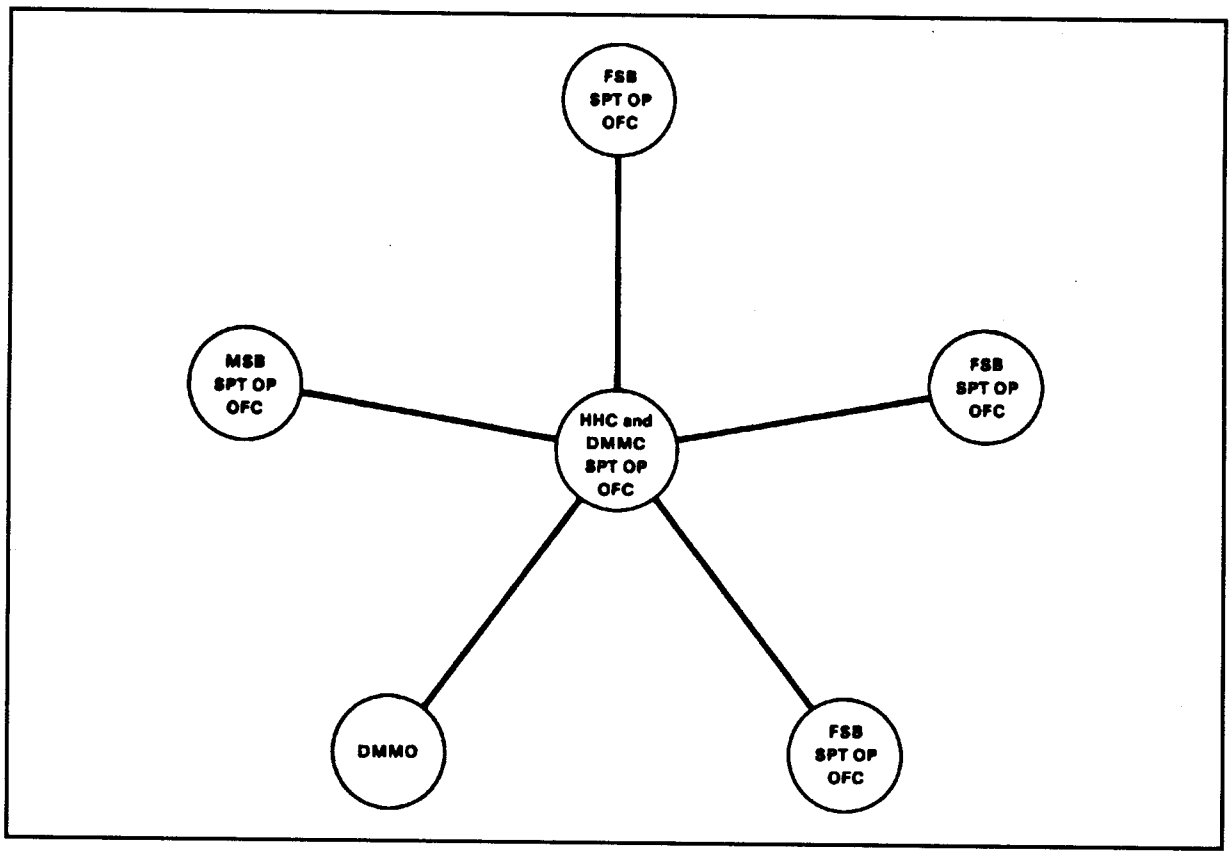


Figure J-22. Heavy division DISCOM logistics operations net (AM-SSB)

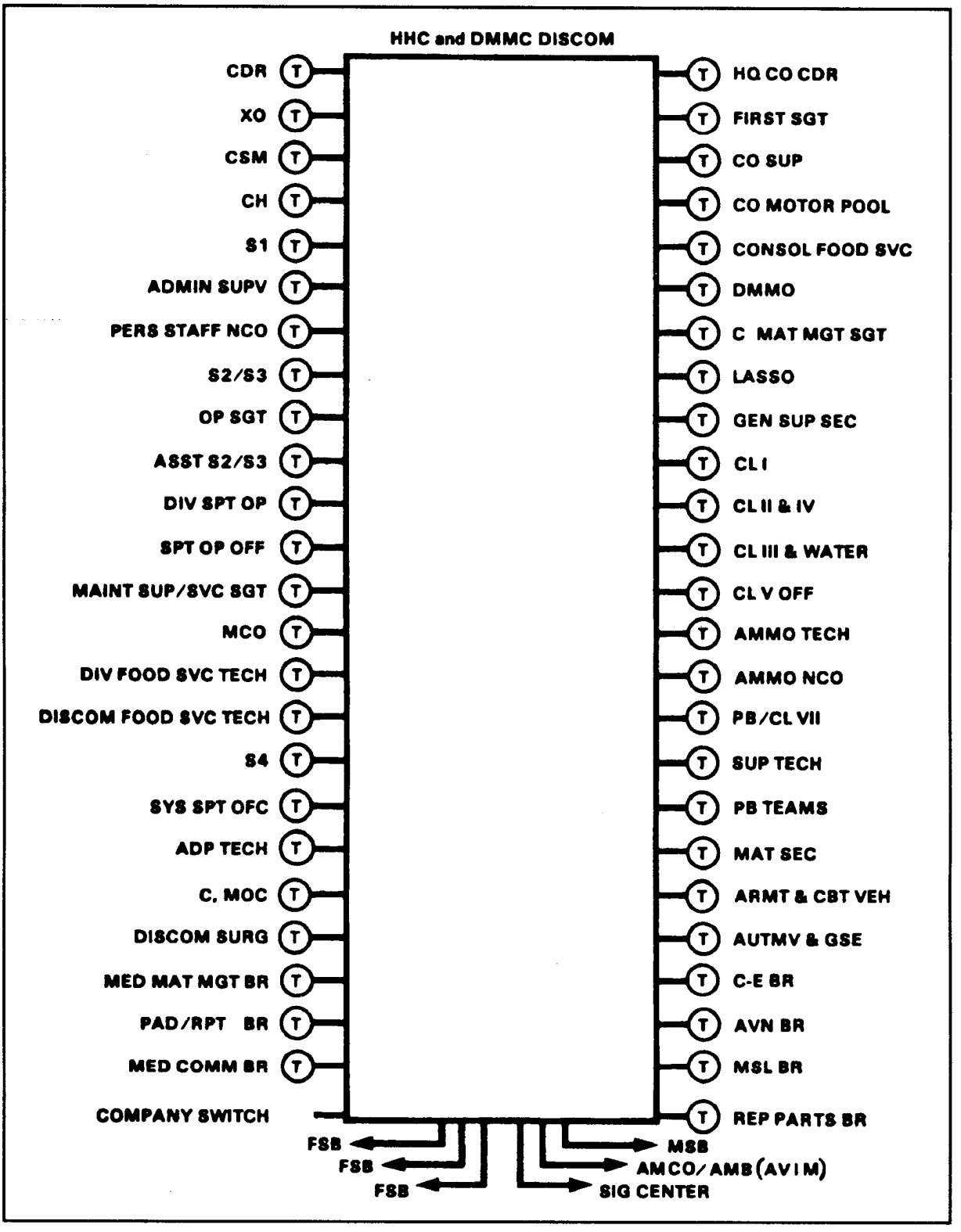


Figure J-23. DISCOM Wire net

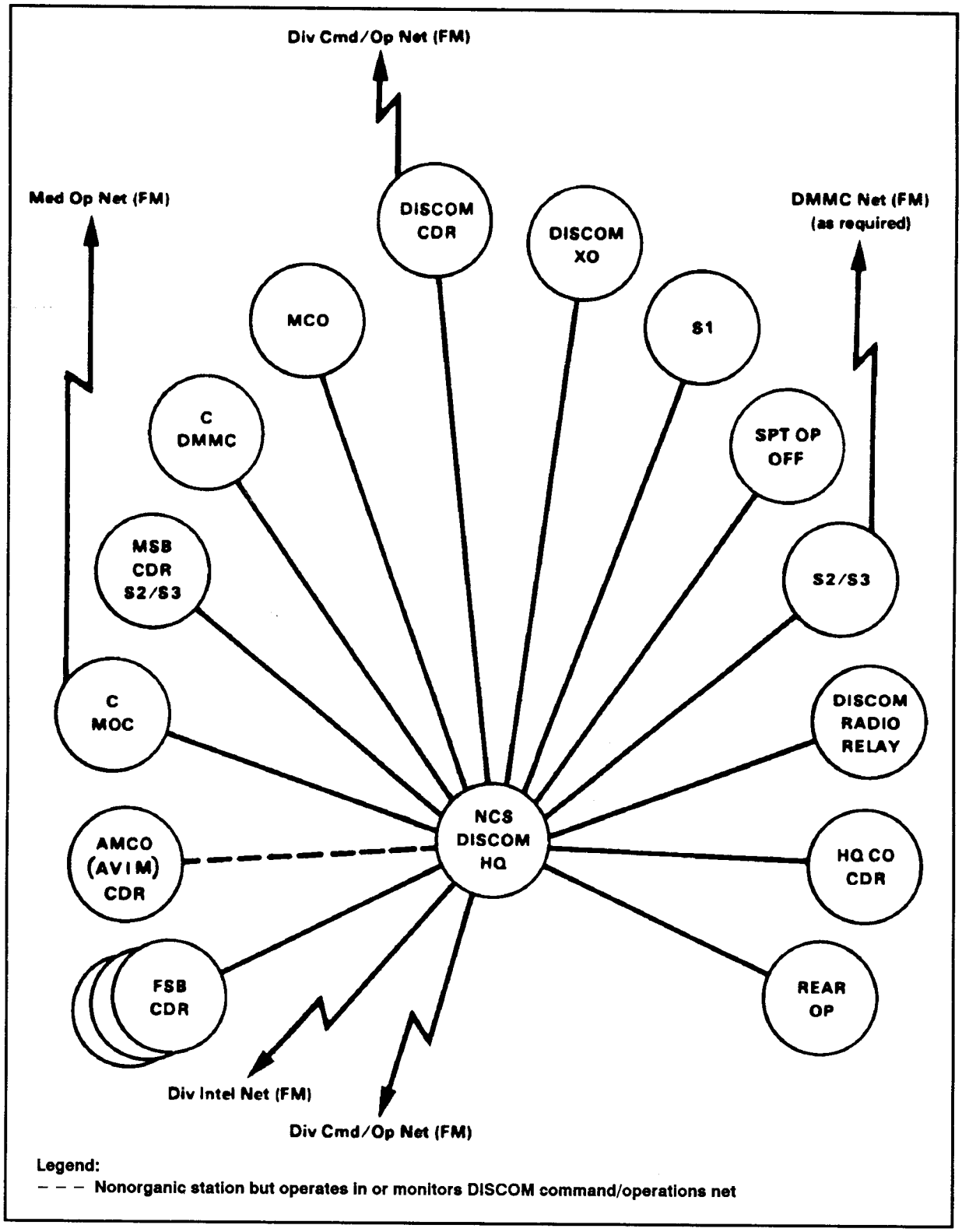


Figure J-24. Heavy division DISCOM command/operations net (FM)

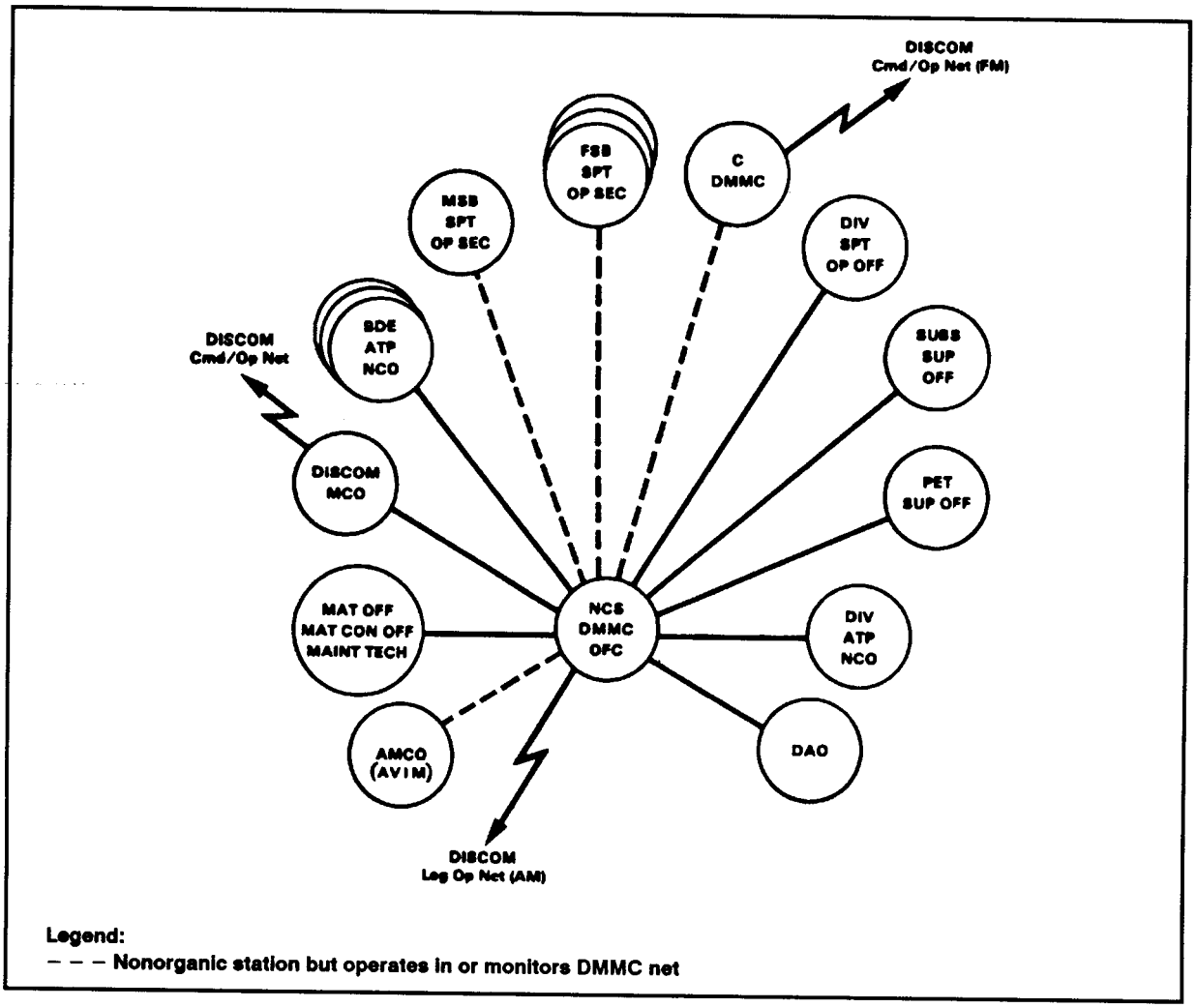


Figure J-25. Heavy division DMMC net (FM)

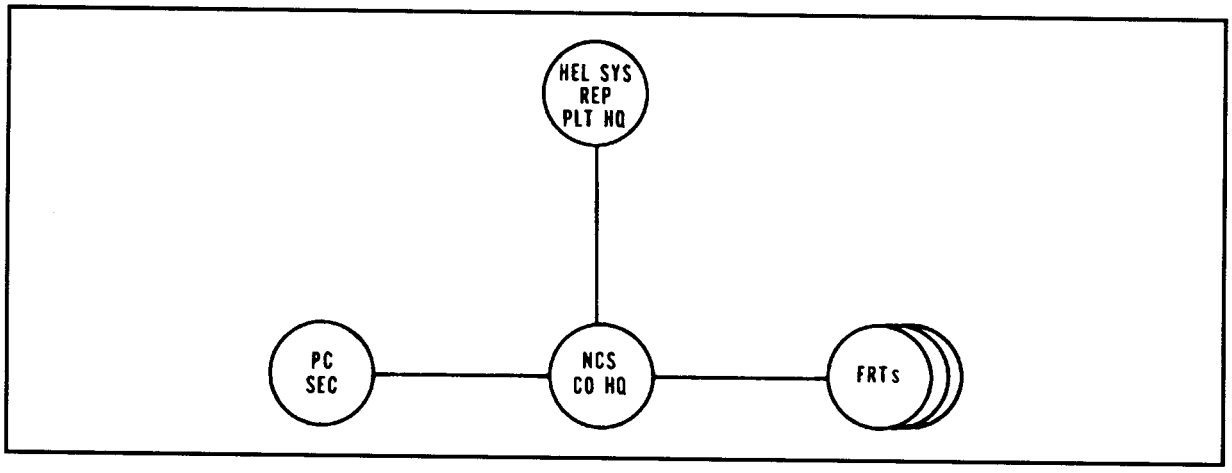


Figure J-26. Typical AMCO (AVIM) operations/logistics net (FM)

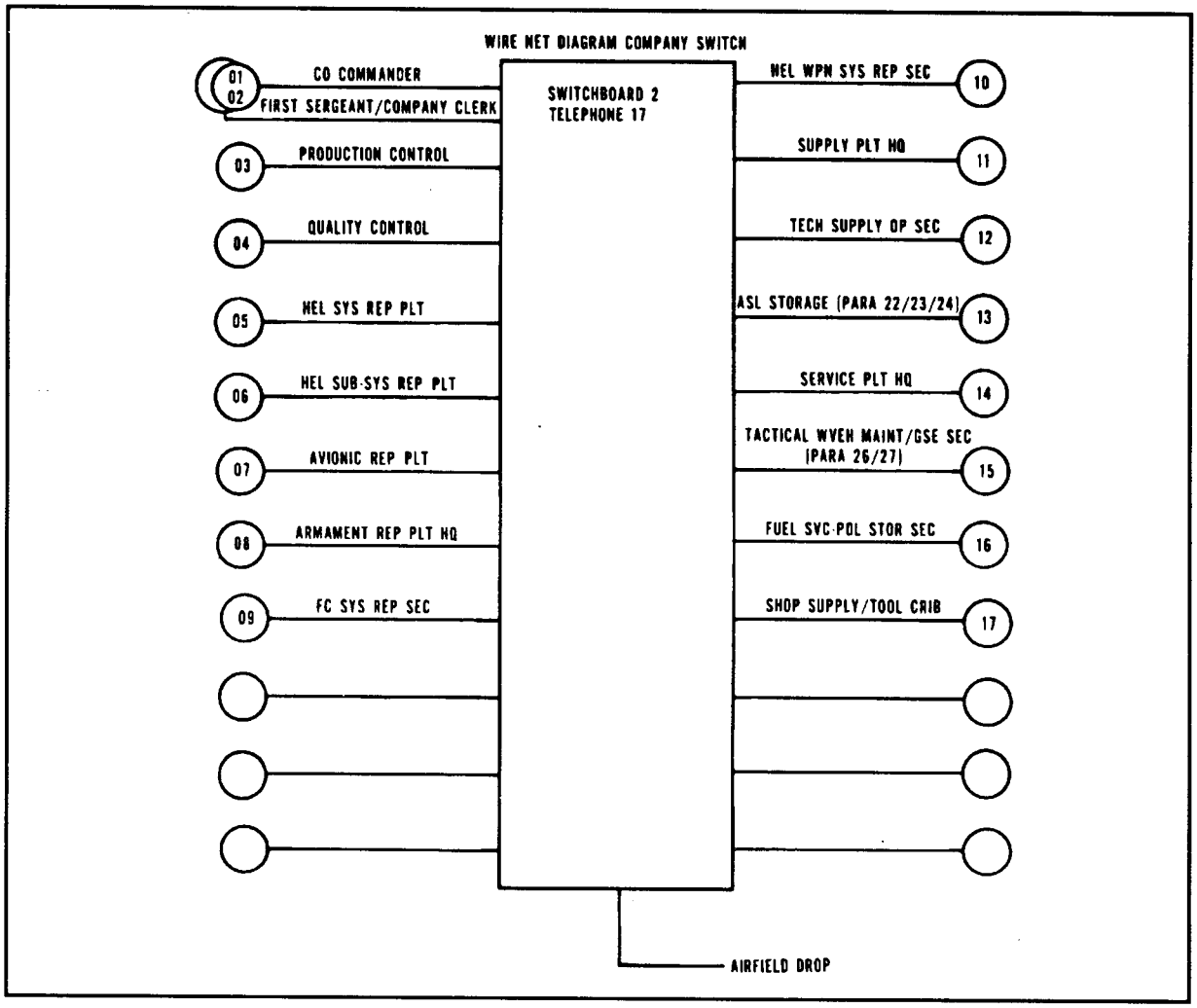


Figure J-27. Wire net diagram, AMCO (AVIM)

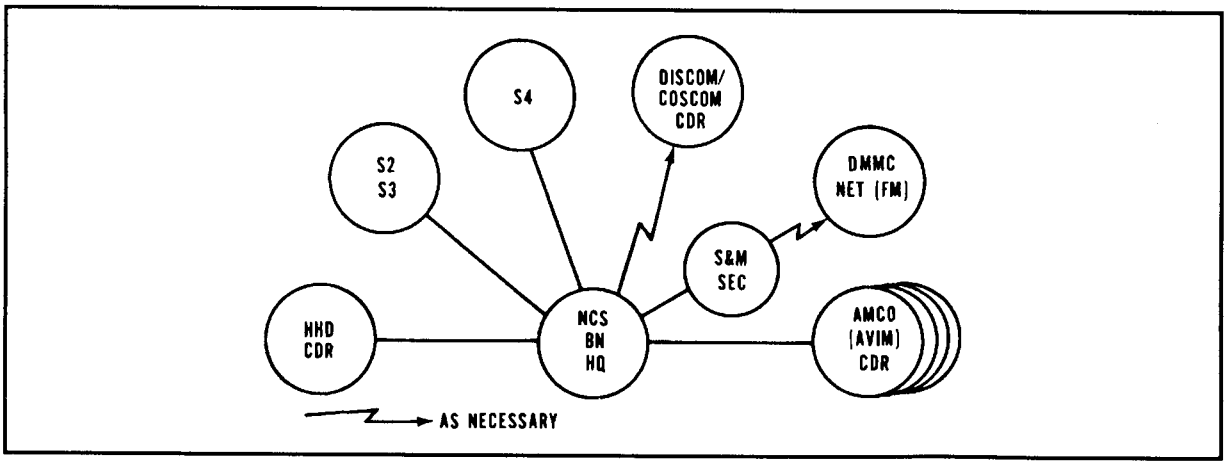


Figure J-28. Typical HHD, AMB, FM/voice company command net

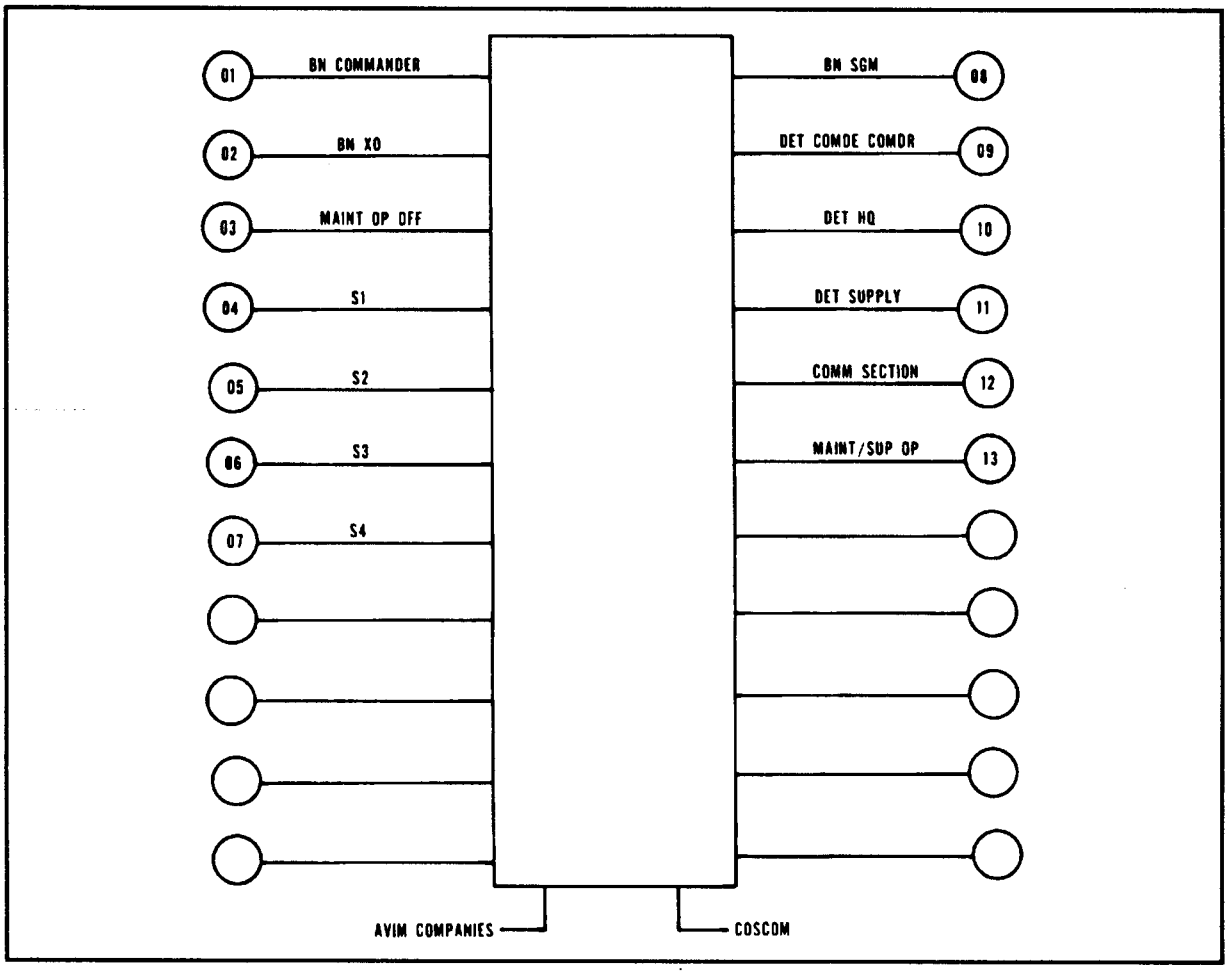


Figure J-29. Wire net diagram, HHD, AMB (AVIM), COSCOM

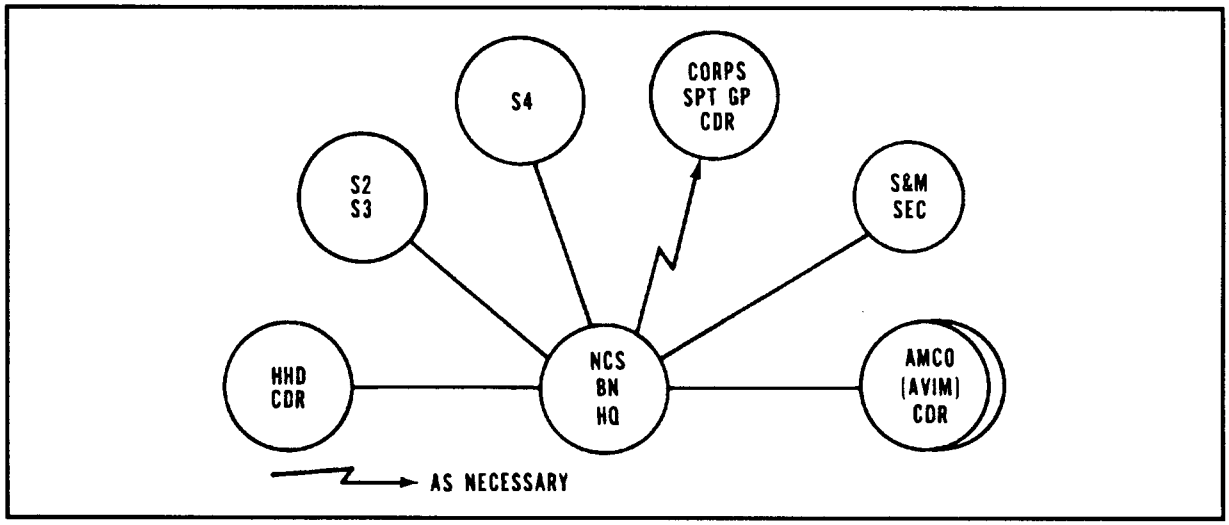


Figure J-30. FM voice net diagram, HHD, AMB (AVIM), TAACOM

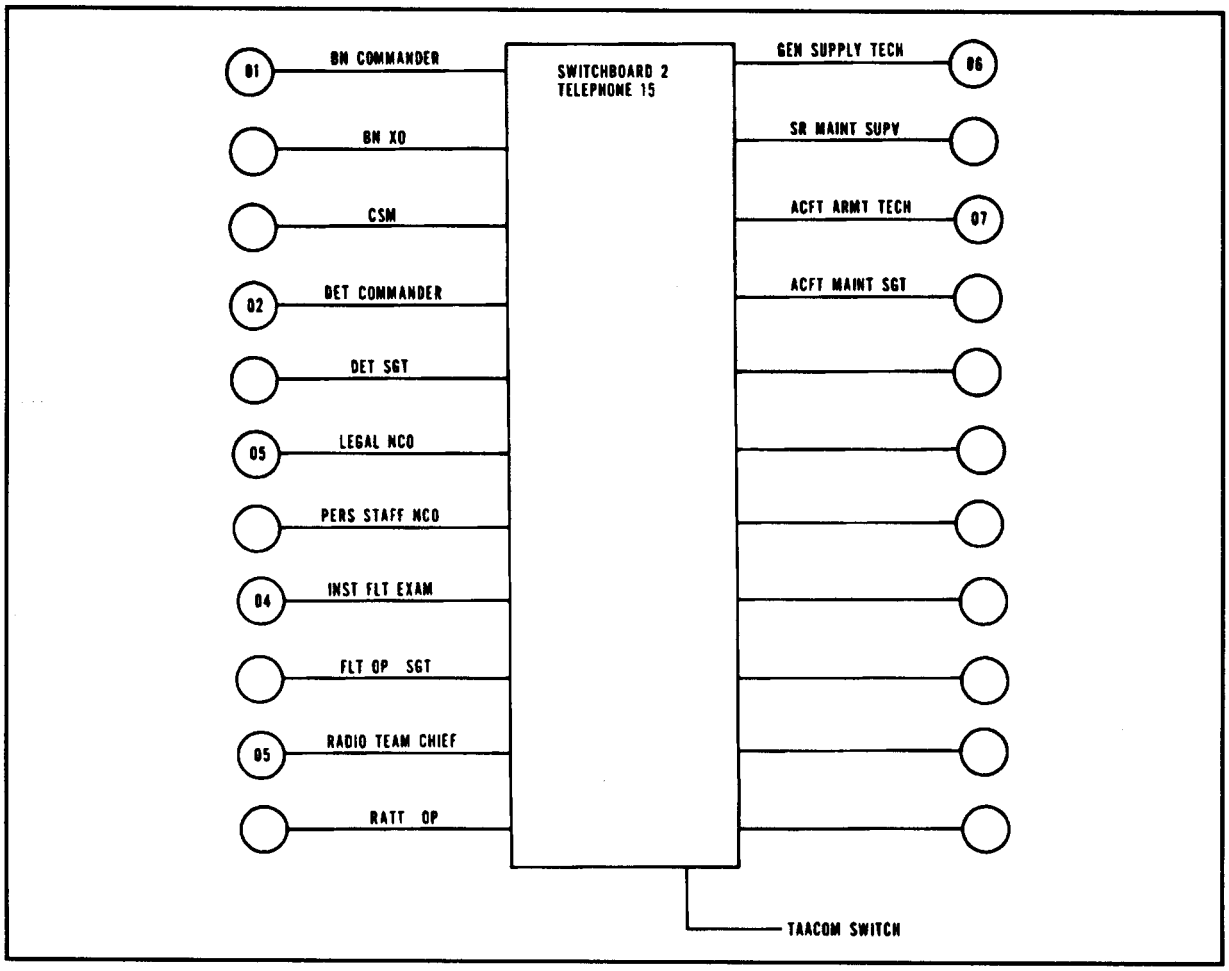


Figure J-31. Wire net diagram, HHD, AMB (AVIM), TAACOM battalion switch

APPENDIX K

CALIBRATION

MANAGEMENT AND CONTROL

AR 750-43 assigns Armywide management command and control of the US Army TMDE Calibration and Repair Support (C&RS) Program to HQ, AMC, except for the ARNG. In turn, US Army TMDE support group (USATSG) (through AMC) is assigned technical control of the DA TMDE C&RS program. It has command and control of all calibration and repair centers (CRC). The National Guard Bureau is assigned management, command, and control over the ARNG maintenance companies (TMDE). It also controls calibration facilities at combined support maintenance shops.

TRACEABILITY OF MEASUREMENT ACCURACY

The DA TMDE C&RS program makes sure that measurement accuracies are traceable from owner or user instrumentation through the Army system to the National Institute of Standards and Technology (NIST) or fundamental physical constants. The US Army Primary Standards Laboratory (USAPSL) (an organizational element of USATSG) and CRCs are established to provide calibration and repair support for US Army instrumentation. They assure the accurate transfer of measurements within the Army. Calibration service traceable to NBS is provided by the following:

- The USAPSL or primary level receives calibration service from NIST for selected US Army primary reference standards. The USAPSL provides calibration and repair service for selected calibration standards in subordinate calibration laboratories and for TMDE which requires the USAPSL level of accuracy. All standards requiring NBS support must be coordinated with USAPSL, AMXTM-S, Redstone Arsenal, AL 35898-5400.
- Area Calibration Laboratories (ACL) or secondary (S) level receives calibration and repair service from the USAPSL for selected measurement standards in each measurement parameter and calibrate all lines accuracy standards within the ACL. The ACL provides calibration and repair service for selected measurement standards and instruments of area TMDE support teams (ATST) tertiary or (T) level and other customers that are identified in TB 43-180 as requiring ACL support. The ACL may also provide calibration and repair service for measurement standards and instruments not listed in TB 43-180 that the ATSTs do not have the capability to support.
- Owner/user receiving calibration and repair services from its supporting ATST for TM-DE identified in TB 43-180 as requiring ATST calibration and repair support. DS/GS/AVIM units provide calibration and repair service for TMDE support program (TMDE-SP) identified in TB 43-180 as requiring DS/GS/AVIM unit calibration and repair.

SUPPORT OF TMDE

Calibration and repair support requirements of instruments used in support of US Army materiel will be listed in TB 43-180. The calibration procedures listed in TB 43-180 are DOD-or USATSG-approved procedures and shall be used. The approved maintenance manual is also listed in TB 43-180.

TMDE designated in TB 43-180 as requiring ATST support must be transported to the location where the ATST is scheduled to provide calibration and repair services. When justified by sufficient work load or when the size or construction of the TMDE precludes movement, the ATST will be dispatched to the TMDE owner/user site. When an ATST is not capable of providing a calibration or repair service, the TMDE will be evacuated as directed by the calibration and repair center. The CRC is responsible for providing the necessary service and returning the repaired and calibrated TMDE to the owner/user. When service external to the CRC is necessary, except for warranty TMDE, the CRC will arrange for the service and assure the return of the TMDE to the owner/user.

TMDE and/or standards requiring ACL support or USAPSL support may be transported to the ATSTs or shipped directly to the ACLs or USAPSL.

TMDE support requiring manufacturer's calibration or repair will be arranged by the supporting activity. If the TMDE is under warranty, the owner/user will arrange for support and send it to the manufacturer for service.

RESPONSIBILITIES OF THE TMDE SUPPORT COORDINATOR

Following are instructions for TMDE support coordinators and an outline of their responsibilities. This guidance will acquaint TMDE support coordinators with procedures to enable them to monitor their units' implementation of the US Army TMDE support program for compliance with the regulations and directives.

The TMDE support coordinator is the focal point of contact and key person for all matters pertaining to TMDE support for the unit. The TMDE support coordinator is the principal interface between the TMDE user and the TMDE support organization. The assigned TMDE support coordinator should establish and maintain a good working relationship with the TMDE support operation.

The TMDE support coordinator–

- Serves as the central point of contact for matters concerning TMDE calibration and repair support.
- Develops and implements SOP for identification, turn-in, and control of TMDE requiring calibration and repair support.
- Ensures that hand receipt (HR) holders bump HRs when changes to TB 43-180 or to supply catalogues occur.
- Assures compliance with AR 750-43, TB 750-25, TB 43-180, DA Pam 738-750, command regulations, local SOPs, and the supporting CRC's external SOP.
- Reviews the instrument master record file (IMRF) to ensure that all authorized TMDE requiring calibration or repair support is contained therein and that the listed information is correct. Ensures that the supporting CRC is notified of any changes.
- Ensures that the supporting CRC is advised when changes, additions, or deletions in the TMDE inventory occur to make sure that the IMRF is maintained according to TB 750-25.
- Coordinates with the supporting CRC and the unit to ensure that the recording scheduling and reporting system is maintained as prescribed in AR 750-43 and TB 750-25.
- Monitors the projected items list to make certain that TMDE is submitted for calibration service according to the published schedule. When necessary, arranges for unscheduled calibration support.
- Monitors the delinquent items list to determine why TMDE was not submitted for calibration as scheduled. Initiates action to obtain calibration service for these delinquent items.
- Assures that all organizational maintenance has been performed on TMDE submitted for support and that the TMDE is accompanied by required accessories and manuals.
- Highlights delinquent list with appropriate HR holder and commander monthly.
- Reviews all reports received from support organization—
  - To identify TMDE that was out-of-tolerance, repaired or determined to be unserviceable when presented for calibration.
  - To determine if system maintenance checks previously performed using this out-of-tolerance TMDE must be repeated.
  - To advise TMDE owners/users who did not present their equipment for calibration according to the schedule that corrective action must be taken.
- Ensures that new items of TMDE not listed in TB 43-180 are reported according to TB 43-180 and to Appendix B of TB 750-25.
- Maintains a record of all items in temporary storage by nomenclature, model, and serial number. Ensures that this equipment is operational and the affixed DA Label 80 has been overstamped "calibrate before use" (CBU). Notify the supporting CRC in writing which TMDE has been placed in storage so that these items may be removed from the cyclic calibration schedule. Ensures that a designated temporary storage area is established for storing CBU/void items.

Constant monitoring of the TMDE inventory is required to achieve maximum effectiveness. Items that are seldom used should be placed in temporary storage. Items never used should be turned into supply and deleted from the TOE or TDA authorization.

TMDE Users

Whether the unit or installation is large or small, the TMDE support coordinator's responsibility remains the same, that is, assuring that responsive TMDE calibration and repair support is provided. These services may be rendered by a TMDE support office (TSO), area calibration and repair center (ACRC), installation calibration and repair center (ICRC), DOD support facility, or DS/GS/AVIM support unit for TMDE-SP.

From the same control point, the TMDE support coordinator must assure that users identify their calibration and repair needs and then adhere to the schedules and procedures for obtaining the required support. Enlightening customers concerning the goals of the TMDE support program and what this support means to them is an important task. Essentially, the customer should know that cyclic calibration of TMDE provides a high confidence factor in the integrity and reliability of measurements performed. Should the measurement capabilities of TMDE ever be in doubt, calibration should be requested.

Some organizations may be so large that there should be an alternate TMDE support coordinator or several unit coordinators assigned to a major mission area. The primary coordinator needs to assure that unit coordinators are knowledgeable of program objectives, policies, and procedures and of their responsibilities.

The following checklist applies to TMDE users; other checklists in applicable regulations also contain questions concerning customer compliance with regulatory requirements:

- Have the property book and hand receipts been reviewed to determine calibration and repair requirements of TMDE?
- Does TMDE in usc have a current DA Label 80 (US Army Calibrated Instrument) or 163 (US Army Limited or Special Calibration) affixed and correctly annotated?
- Is TMDE that was provided a limited calibration identified with DA Label 163?
- Is physical inventory periodically conducted to verify the types and quantities of TMDE on hand that require calibration or repair?
- Are all TMDE changes, additions, and deletions identified to the supporting CRC as they occur?
- Is an operational check performed on items before they are placed in CBU status, is a correctly annotated DA Label 80 affixed, and has the supporting CRC been notified of the status change?
- When TMDE is removed from temporary storage (CBU), is it submitted for calibration before use?
- Is the storage area segregated from the work area?
- Are projected items lists provided by the supporting facility? Are they reviewed and corrective action taken?
- Are delinquent items lists (TMDE not presented for scheduled calibration) reviewed and corrective action taken by HR holder and is commander briefed?
- Are controls established to assure that TMDE is not used after expiration of the calibration due date on the DA Label 80 or DA Label 163?
- When there is doubt about the accuracy of TMDE, is action taken to request unscheduled calibration?
- Has an operator or organizational maintenance program for TMDE been established?
- Is operator or organizational maintenance performed as prescribed by equipment maintenance manuals?
- Are preventive maintenance services performed on TMDE as listed in the appropriate technical publications and are faults recorded on DA Form 2404 (Equipment Inspection and Maintenance Worksheet)?
- Is DD Form 314 (Preventive Maintenance Schedule and Record) maintained at unit level for all CNR items of TMDE requiring scheduled periodic preventive maintenance services other than calibration?

Management Reports

IMRF (master list) is distributed monthly to TMDE support coordinators. TB 750-25 requires TMDE calibration and repair support activities to establish and maintain an IMRF. The IMRF for TMDE-SP supported by DS/GS/AVIM units will also be maintained by the supporting CRC. The accuracy of these files rests, in part, with the TMDE owner/user who must initially provid e accurate information and thereafter review master lists for accuracy and take corrective action when necessary. The TMDE owner/user must advise the supporting CRC/DS/GS/AVIM as changes, additions, or deletions in the TMDE inventory occur. The IMRF must contain all TMDE that requires support.

Forms and Labels

ADA Label 80 or DA Label 163 must be affixed to all calibration standards and TMDE identified in TB 43-180 as requiring calibration. This certifies that the instruments have been calibrated to required specifications and indicates support dates. Detailed instructions for the preparation of these labels are in TB 750-25, Appendix C. Instructions for maintenance forms are in DA Pam 738-750. Surveillance of the TMDE support program includes a review of forms and labels to ensure uniformity and proper annotation. Policies and questions pertaining to labels and forms used for instruments in storage are specified in Appendix C, TB 750-25, also.

APPENDIX L

SITE SELECTION

Site selection and shop layout principles remain the same regardless of the intensity and type of conflict. Conflicts will be fought on a variety of terrain. The environment may range from mountain to desert or from urban to rural. Regardless of environment, maintenance managers must be able to apply site selection principles to the situation, not only to perform the mission most effectively but also to safeguard troops. Whenever possible, AVIM commanders and leaders should participate in supported units' site selection planning.

The site chosen must be—

- Compatible with organic vehicle off-road capability.
- Adjacent to the COSCOM or DISCOM AVIM to assure fast, effective support.
- Accessible around the clock in all types of weather.

SITE CONSIDERATIONS

Map, Aerial, and Ground Reconnaissance

The maintenance company commander will assign a general area for the maintenance site on the map. A map reconnaissance is made first. Only routes that the unit is likely to travel over will be selected. Next, an aerial reconnaissance is made to check the size, suitability, natural cover, and road network of each possible site. Finally, a ground reconnaissance is made of each proposed area to select the best location for the unit. The ground reconnaissance team should include members of each platoon or section that will occupy the selected area.

Ideal Site

An ideal maintenance site has the following features (not all of which are normally found at any one site):

- Close proximity to the aircraft assembly area for the unit/units supporting.
- Close proximity to the AVIM providing its support.
- Should be located in a wooded area or an area that provides good concealment.
- Existing roads should lead into and through the site, and be large enough to accommodate the unit's largest vehicle. Also, the road network into the area should be concealed. (Vehicles should not have to cross open fields to reach the company or platoon area-vehicle and aircraft tracks on bare, cultivated, or grassy ground are highly visible from the air.)
- Good drainage to preclude the area's turning into a swamp during rainy weather.
- Buildings that provide concealment, with existing roads or paths leading to them that will not be considered unusual when viewed from the air. (The natural surroundings of the buildings should be left intact if possible.)
- Proximity to a main supply route with existing roads leading into the storage, issue, and shop sections and with access routes for the maintenance platoon or section. (A complete turnaround, or loop, is desirable to move traffic directly through the area.)

Additional factors to consider when selecting a site are—

- Surface material that will support operations in all kinds of weather.
- An area that will accommodate unit vehicles and shop facilities and allow dispersion.
- Adequate aircraft parking with enough area so that aircraft operations will not interfere with maintenance.
- Ready access to external road nets and landing areas.
- An area suitable for aircraft landing, defueling, and armament testing.
- Security, including cover and concealment.
- Host nation support/concerns.

UNIT POSITIONING

After a location is selected, an advance party is sent ahead to prepare for the main unit's arrival. Each platoon or major section of the company furnishes people for the advance party. These individuals select locations for their elements. Members of the advance party serve as route and area guides when the company moves to the area. The guides must position the vehicles quickly to avoid convoy stoppage in open areas.

Efficiency is the primary goal when organizing company elements within the selected area. Work areas and facilities must be located to obtain the most efficient work flow. However, some compromises, which will somewhat reduce efficiency, may be necessary to meet rear area protection (RAP) or rear area combat operations (RACO) requirements. The company's elements must be positioned so that they can defend themselves and offer mutual defense support to each other.

Figure L-1 shows a typical AVIM unit in a wooded area. Each element is located for easy access to the aircraft assembly and landing area. This area should be approximately 300 to 500 square meters. METT-T will be considered when dispersing the unit sections.

Production control and quality control elements should be near each other and the maintenance area.

The storage and issue section should be close to the airfield for easy access but near the area's outer boundary to minimize traffic through the maintenance area. It should have a road network capable of handling truck traffic and have an area large enough to allow for dispersion.

The shop platoon headquarters should be near production control because the two sections must coordinate their work.

The shop sections should be far enough away from the airfield that dust, dirt, and rotor and propeller blast do not blow into the shop area. Shop sections should not be placed for convenient access to customers. Any contact between the shop platoon and its customers should be made through the production control office.

Each maintenance section should be in an area large enough for dispersal of its equipment.

The shop supply section handles repair parts and tools for the shop section and the maintenance platoons and, therefore, should be near them. The storage and issue section should also be near the shop supply section.

The supply platoon headquarters should be close to its own sections to assist in control and supervision. It should also be near production control.

The aviation electronics (avionics) section and the armament platoon are located with the shop section and the allied trade shops. The electronics and avionics section shelters should be as near to the allied trade shops as practical.

The company headquarters element should be centrally located because it is responsible for overall company operations.

The unit may be augmented with a heavy helicopter repair section, a freed-wing repair section, and an additional avionics repair section, if required, to support OV-1 or U-21 reconnaissance aircraft. These sections should be located with the shop platoon and avionics/armament platoon elements adjacent to the airfield.

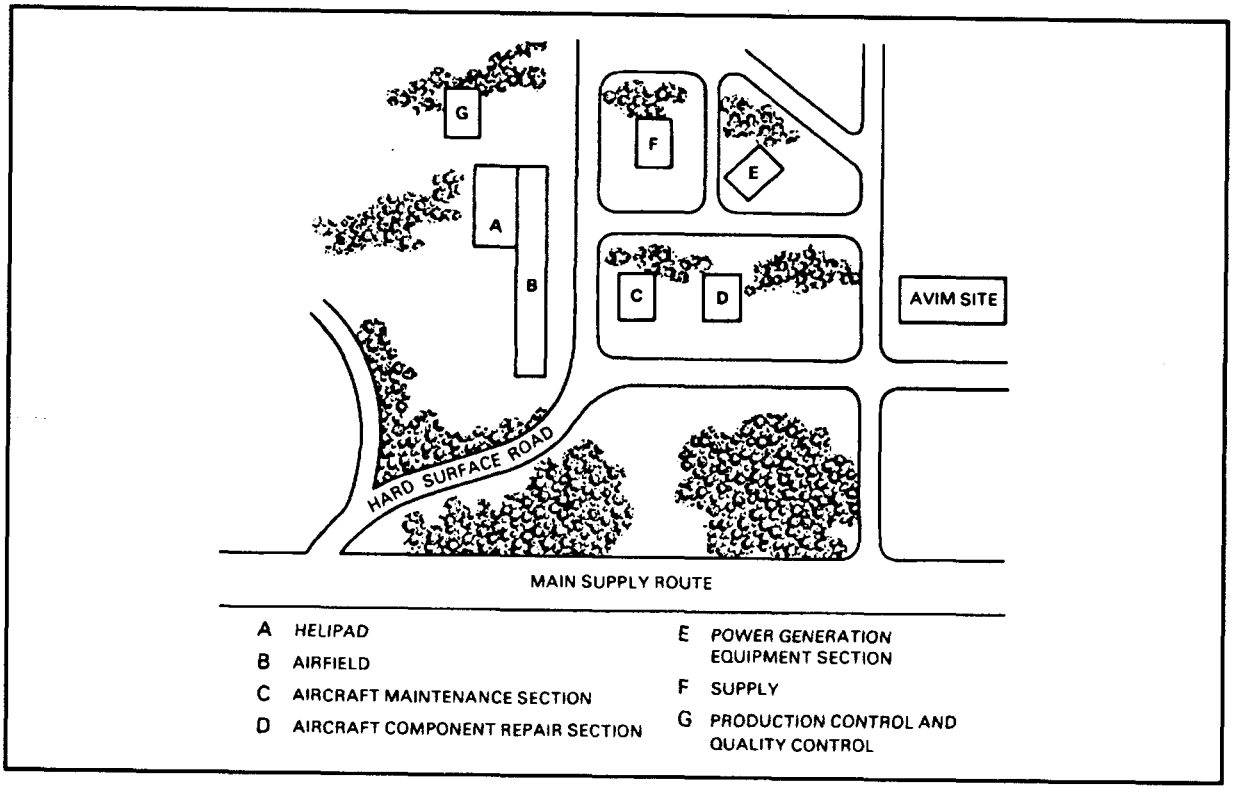


Figure L-1. Layout of portions of an AVIM company dispersed in a wooded area

APPENDIX M

RECONSTITUTION

Reconstitution is defined as extraordinary actions taken by a commander to restore a unit to a desired level of combat effectiveness. A unit is not reconstituted just because it has lost its combat effectiveness. Reconstitution decisions must be based upon an assessment of the overall battlefield. Available resources are limited and must be used where they will have the greatest effect. FM 100-9 outlines how the Army reconstitutes units in greater detail.

OVERVIEW

Reconstitution actions are implemented immediately following a commander's determination that a unit is not sufficiently effective to meet operational requirements. Timely reconstitution sustains the fight and preserves the initiative and agility of commander and subordinates.

Possible reconstitution actions include reestablishing or reinforcing command and control; cross-leveling or replacing personnel, supplies, and equipment; and conducting essential training. Command priorities should be established to allocate resources and preserve unit cohesiveness.

If reconstitution is necessary, commanders have two options: reorganization and regeneration. Often these are executed in combination.

Reorganization shifts internal resources within a degraded unit to increase its combat effectiveness. Equipment and personnel are redistributed among internal elements to balance combat capabilities, match operational weapon systems with crews, and form composite units.

Reorganization is categorized as either immediate or deliberate. Immediate reorganization is the quick, temporary restoration of degraded units to minimum levels of combat capability. Deliberate reorganization restores degraded units to a specified degree of combat capability. It involves more extensive repair and cross-leveling procedures and is usually conducted farther to the rear than immediate reorganization.

Regeneration rebuilds a unit through large-scale replacement of personnel, equipment, and supplies. Command and control is reestablished and mission-essential training is conducted. Regeneration is the more challenging reconstitution option. It requires more time and resources. Regeneration can be accomplished by adding personnel and equipment to an existing unit. This is termed incremental regeneration. Whole-unit regeneration is the replacement of whole units or definable subelements in an organization. Regeneration by introducing cohesive, trained units can achieve more rapid assimilation.

ECHELONS ABOVE CORPS

Reconstitution operations place very high demands on the existing CSS system. High-priority requisitions for replacement materiel are processed by MMCs. Area support groups (ASG) provide most of the support required by units undergoing reconstitution. Special procedures may be implemented at an ASG to speed supply support of reconstitution operations.

The ASG materiel and services directorates are heavily involved in the reconstitution mission. Supply and maintenance units at the ASG will be challenged by surges in work load caused by reconstitution operations. Teams from the ASG may be sent forward to corps areas to assist units being reconstituted. Routine ASG operations may have to be changed to provide maximum support to units being reconstituted. For example, major end items may be restricted to those essential to maintenance operations. This ensures the maximum number of usable systems on the battlefield.

Reconstitution should take place as far forward as possible. However, the area chosen should be free from enemy harassment. In the COMMZ, a reconstitution location is normally designated by the TAACOM commander. Availability of facilities and services is a major consideration. Other factors affecting selection of a reconstitution site include the size of the unit, nearby communication services, and availability of transportation assets. The need for decontamination may make water sources a high priority. The future mission of the renewed unit also influences site selection.

ASG facilities and adjacent areas are usually good locations for reconstitution. Lost equipment and materiel are replaced by ASG supply units as directed by MMCs. Maintenance or repair of equipment is performed by ASG maintenance units. An ASG petroleum supply company or supply and support (S&S) company refuels the division. If host nation support (HNS) is available and appropriate, it is coordinated by the ASG HNS directorate. ASG support of reconstitution significantly increases its work load. Supporting reconstitution may reduce the ASG's ability to perform its routine area support mission for other units in the ASG territory. ASG personnel may be task-organized to support a reconstitution mission.

Reconstitution may also be conducted at ASG facilities for units assigned to EAC. Only the nature of the materiel and other support needed will vary. For all reconstitution missions, the TAACOM personnel and administration group and MEDCOM units serving the area provide personnel and health services. ASG personnel may be diverted from routine duties to support the reconstitution. Unit commanders usually design and direct reconstitution of their units if command lines have survived or have been reestablished. Existing CSS systems and procedures are used to achieve the reconstitution. High priorities and temporary variations to procedures may be necessary to ensure maximum responsiveness of ASG support systems.

ASG unit commanders must plan for reconstitution of their own organizations. Plans must be developed and refined before a unit is confronted with conditions that may require reconstitution. ASG units may become candidates for reconstitution after involvement in rear operations.

For example, if an ASG aircraft maintenance company is hit by an NBC attack, equipment and personnel losses can make the unit ineffective. The ASG will probably be tasked to perform the reconstitution. In this situation, the ASG coordinates with TAACOM headquarters, the TAACOM MMC, PERSCOM, local MEDCOM units, MP units, ENCOM headquarters, and others. These organizations are contacted for support to rejuvenate the designated unit. The ASG provides supply, maintenance, and other area support to its own unit in the same way it would to non-ASG units. Each reconstitution mission is different since no two units will have lost the same assortment of personnel and materiel.

The ASG security, plans, and operations (SPO) directorate is responsible for overall ASG reconstitution planning and coordination. Reconstitution is conducted to restore an ASG unit's effectiveness when ordered by TAACOM headquarters. The overall theater objectives must be the basis for reconstitution decisions. Unit SOPs must include procedures for reconstitution. Innovative management at the ASG and elsewhere is the key to successful, timely reconstitution.

Regeneration cannot be accomplished using organic resources. Generally, it must be done by the headquarters two echelons above the unit being reconstituted. The assets to accomplish regeneration are estimated based on projected losses developed in the logistics estimate process and the desired levels of combat power. Not all units are regenerated after a battle, only those critical to the follow-on mission that require timely return to combat.

The corps includes the regeneration requirements in its requirements to theater. In addition, a reconstitution site is selected that is remote enough to be safe from enemy fires but possesses good road nets and suitable areas for bivouac sites and training. This area most likely will be in the corps rear area or in the COMMZ.

CORPS RECONSTITUTION TASK FORCE

COSCOM MMC commodity managers, together with staff from the COSCOM ACofS SPO, materiel, services, and transportation sections, should form the nucleus of a reconstitution task force. If tasked, combat service groups (CSG) will form a casualty and damage assessment team. The team will coordinate requirements with degraded units and determine priority needs for weapons systems, other end items, major assemblies, supplies, and services. CSG support operations staff may provide the best estimate of supply requirements and requirements for maintenance support. They may also provide early notice of the need for reconstitution.

In addition to C3 and liaison elements, the reconstitution task force may consist of the following elements—

- Replacement-regulating detachment to coordinate personnel replacements according to command priorities, critical MOSs, and the established fill plan.

- Chemical decontamination elements, as required.
- Medical triage personnel, combat stress and mental health teams, and air or ground medical evacuation assets.
- Supply elements for replenishment of Class II, III, IV, VII, and water and rations.
- Service elements for clothing exchange and bath (CEB).
- AVIM/IDSM teams for maintenance and Class IX and RX support.
- Ammunition supply point (ASP) assets to replenish Class V basic loads.
- Transportation assets to support replenishment and evacuation operations.

An automated decision matrix will enable CSG support operations staff officers to compare reconstitution requirements against available replenishment supplies, support units, and sites.

MATERIEL REQUIREMENTS

The division transmits requirements which are beyond its capabilities to the COSCOM MMC. Initial priority will be to replenish Class III and V unit basic loads and to refuel and rearm operational combat systems. Staff plans and estimates must also include projected requirements for equipping replacement personnel.

Given notice, CSGs may be prestocked and pre-positioned with materiel—

- Class I and II supplies may be pre-positioned based on head count and requirements.
- Class V, VII, and IX may be pre-positioned based on the type of units to be reconstituted and their condition.
- Class VII items may be made available from pre-positioned war reserve stocks, recovered and repaired equipment, redistributed assets, and ready-for-issue replacements through the supply system.

The TAMMC maintains backup reconstitution pull packages in unit sets which may be used when corps forward-positioned equipment is expanded. CSG support operations staff will assist in coordinating tailored push packages of Class VII.

CSG maintenance staff personnel should review PLL/ASL equipment compatibility to ensure that unique systems can be replenished and that special tools and test equipment for those systems are available. Unique PLL/ASL items may be stored on unitized flex pallets until required for reconstitution.

Upon receipt of notice to be prepared to reconstitute, the CSG may be tasked to provide members to be part of casualty and damage assessment teams. Reconstitution should be performed as far forward as possible. The corps may determine that reconstitution may take place in the division area. The preferred alternative is to withdraw the unit or battalion to a secure area in the corps rear or EAC and replace it with a reserve element. Decontamination should be performed before entering the reconstitution site. Deliberate decontamination requires an adequate water source.

Forward-employed battle damage assessment teams should have identified component replacement requirements and evacuation support. Reconstitution task force personnel should review evacuation requirements and identify corps and theater transportation assets which may be used to backhaul unserviceable equipment to maintenance collection points. AVIM/IDSM elements will concentrate on repair of critical major end items. Operations orders may restrict maintenance to essential maintenance only.

Emergency medical treatment which began as far forward as possible will continue in the reconstitution area. Medical evacuation air or ground ambulance assets will be on hand to evacuate personnel following any necessary triage or treatment.

Some Class VII items should be configured in unit sets. Reconstitution Class VII packages will be developed to enable the CSG to rapidly reconstitute those covering force units most likely to suffer heavy losses. Replacement crews will then be matched with ready-to-fight weapon systems. The weapons system replacement operations (WSRO) process will not normally be used in reconstitution.

APPENDIX N

ARI AVIATION MAINTENANCE FORCE STRUCTURE

ARI AVIATION STRUCTURE

The ARI doctrinal aviation designs are illustrated in Figures N-1 through N-9.

Under AOE unit designs, general support (GS) utility aircraft were organic to aviation and aviation maintenance units. In ARI units, these aircraft are consolidated in divisional GS aviation battalions and dvisional/corps command aviation battalions. They are dispatched to the AVIM and using aviation units on a task or mission basis.

The corps light utility helicopter (LUH) battalion, by design, is intended to attach its subordinate companies to division aviation brigades.

AVIM MODULARITY

The FSA analysis reviewed AVIM design parameters in an unconstrained and doctrinally uncompromised environment. The FSA recommendation for a modular AVIM design is intended to link maintenance structure and approximate maintenance capability within maintenance units to specific aviation units being supported. As illustrated in Figure N-9, TOEs and MTOEs were to continue to document the organization, manpower, and equipment necessary to support general war. Modular design and definition within TOEs/MTOEs is to provide the flexibility to reconfigure the TOE/MTOE general war organizational design to support the requirements of the aviation task organization designated for the conduct of a limited war and to allow the flexibility in organizational design necessary to execute "fix forward" doctrine.

To implement "fix forward" doctrine and maximize the operational flexibility inherent to the AVIM modular organizational designs, maintenance commanders, their staffs, and other logistics planners have to be intimately familiar with the organization and capability of their AVIM units. While the TOEs and MTOEs would reflect the organization and resources necessary to support general war, commanders would no longer have to fight their units in this configuration. They would have the capability of rearranging organizational modules to best satisfy operational requirements.

In any scenario, two primary purposes of predeployment logistics planning are to define the concept for aircraft maintenance support and to identify the aircraft maintenance capability necessary to support the designated aviation force. These determinations will be made based on the composition of the aviation task force (aviation units and numbers/types of aircraft) and how the aviation units are to be operationally employed.

It must be noted that AVIM units are specifically designed to support a designated aviation brigade and its projected modernization over time. Time lines for the modernization of AVIM units, and the units they support, vary substantially and are subject to frequent change. For this reason, AVIM units (and elements within AVIM units) are frequently not "interchangeable" and should always be deployed with the aviation brigade (units) they are designed to support. Failure to maintain intended supporting-to-supported relationships greatly increases the risk of personnel and equipment incompatibtities in the maintenance task organization. As a designated aviation brigade is task organized to its "provisional" design, modular definition within the MTOE will permit the adjustment of maintenance capability to accommodate the provisional aviation brigade requirements.

ARI AVIATION MAINTENANCE FORCE STRUCTURE

The ARI AVIM force design, Figure N-4, incorporates the heavy division support battalion, a third AVIM company for the air assault division, and an AVIM company for the corps regimental aviation squadron (RAS). FM 63-23 details the doctrine for the organization and operation of the aviation support battalion. Doctrinally, the RAS AVIM company can be assigned to the corps AVIM battalion or, preferably, the support squadron of the armored cavalry regiment.

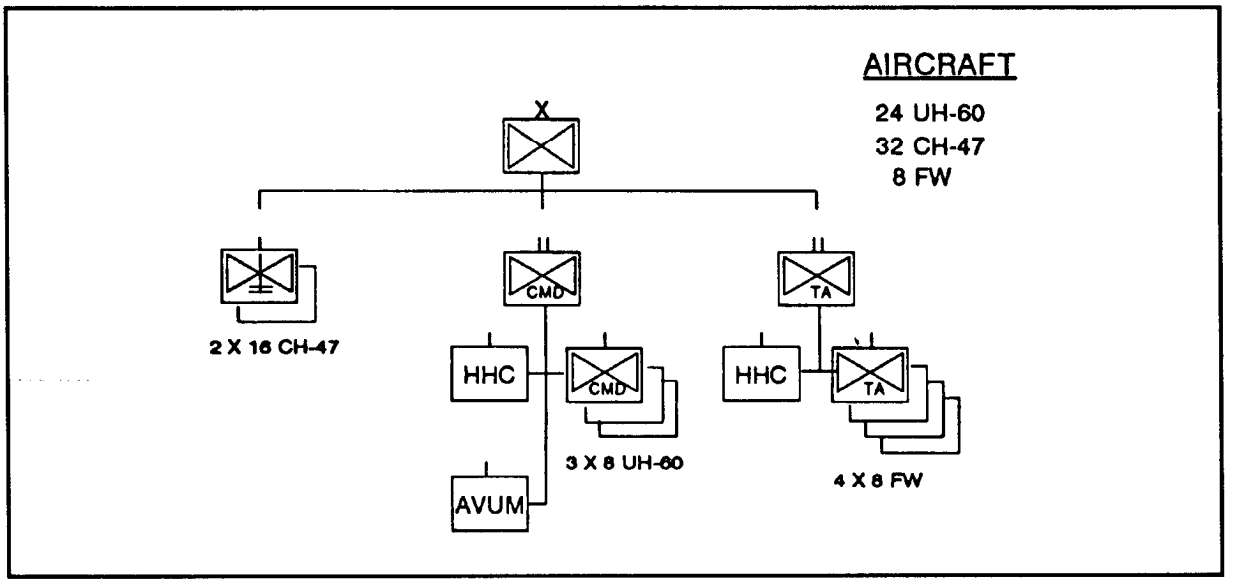


Figure N-1. ARI EAC Aviation brigade

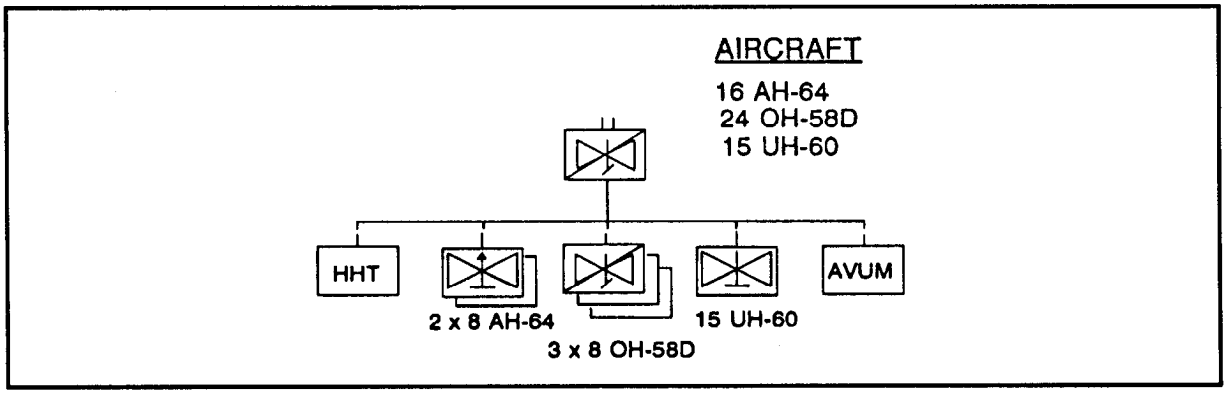


Figure N-2. ARI Regimental aviation squadron

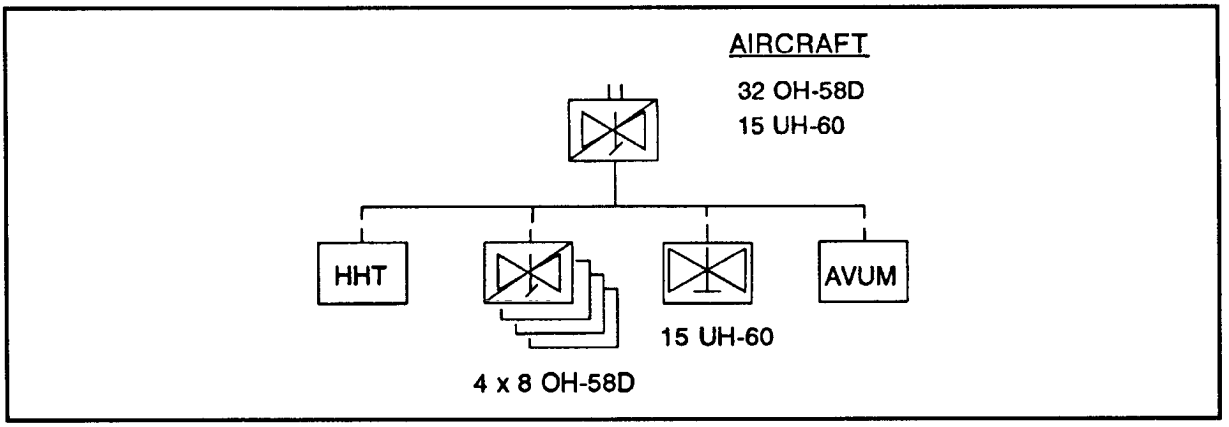


Figure N-3. ARI Regimental aviation squadron, light

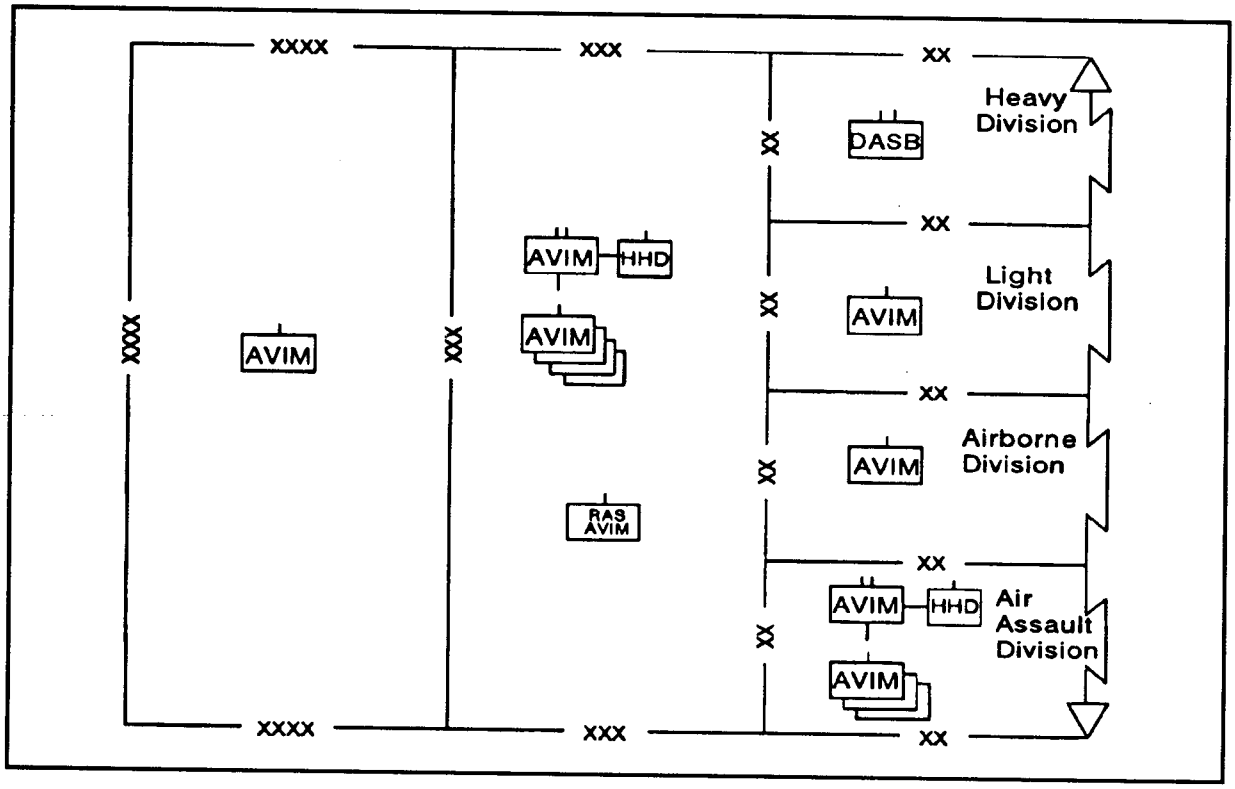


Figure N-4. ARI AVIM Force design

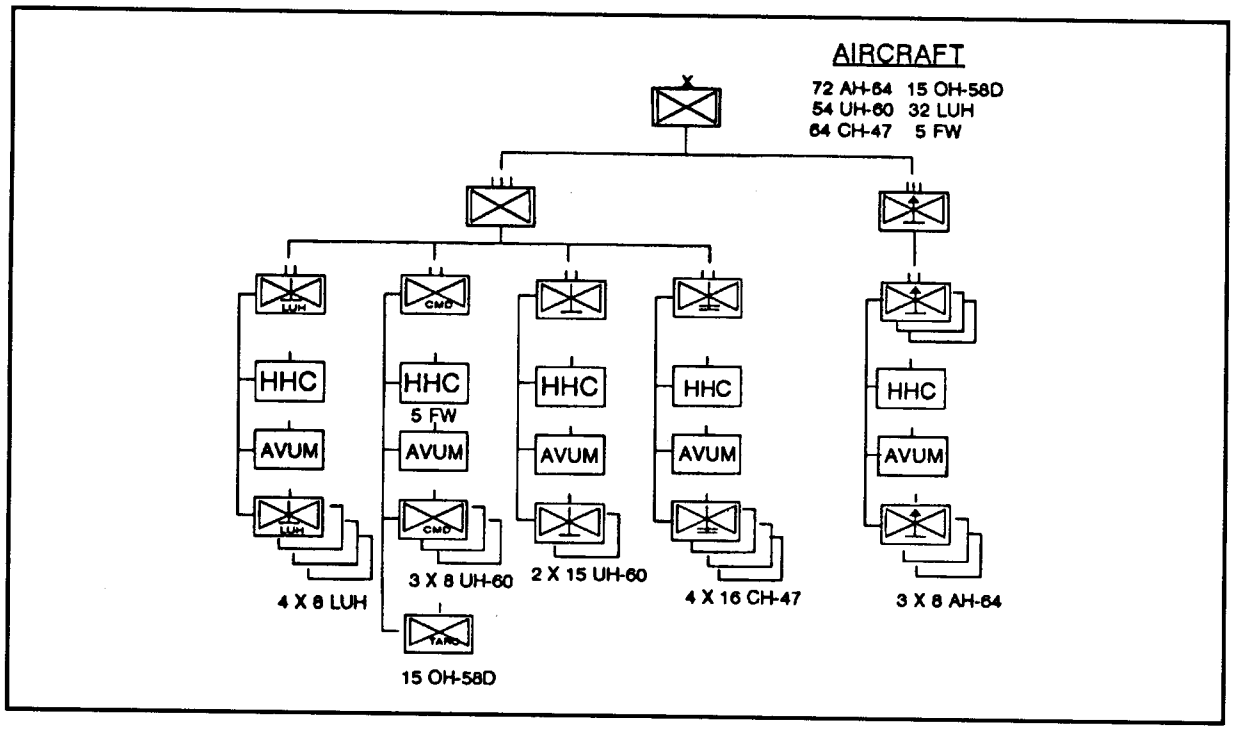


Figure N-5. ARI Corps aviation brigade

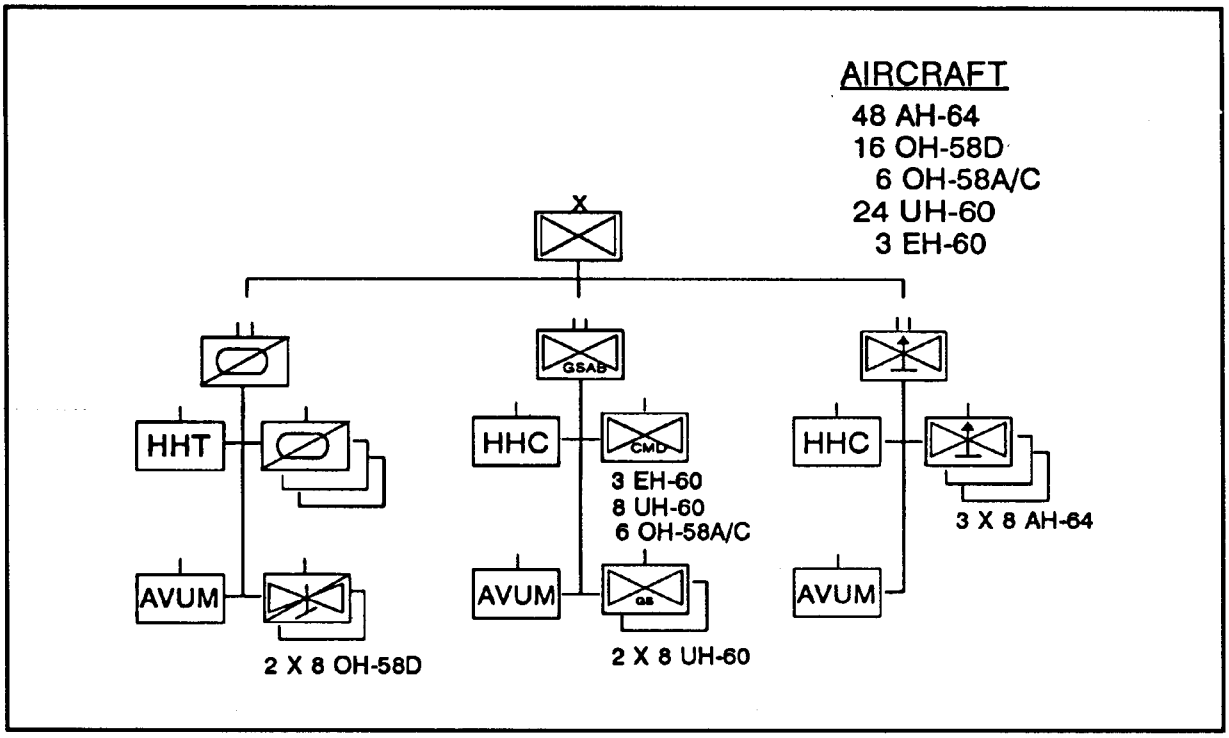


Figure N-6. ARI Heavy division aviation brigade

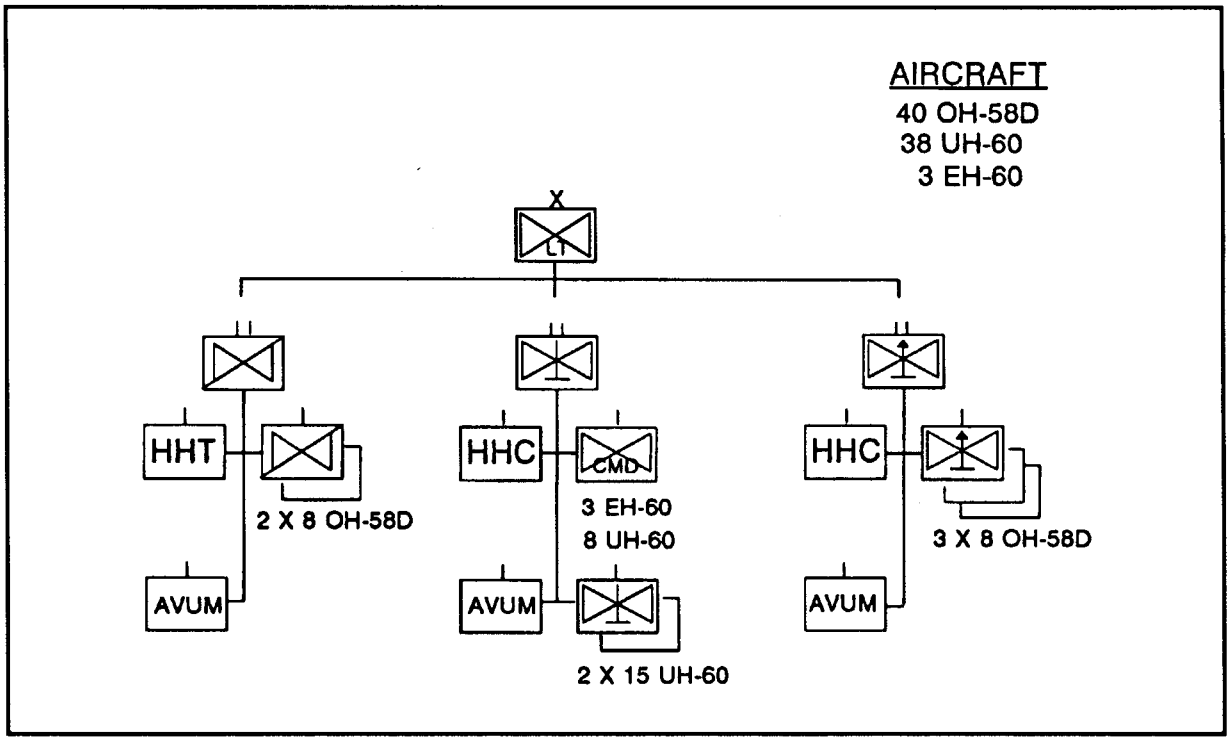


Figure N-7. ARI Light/airborne division aviation brigade

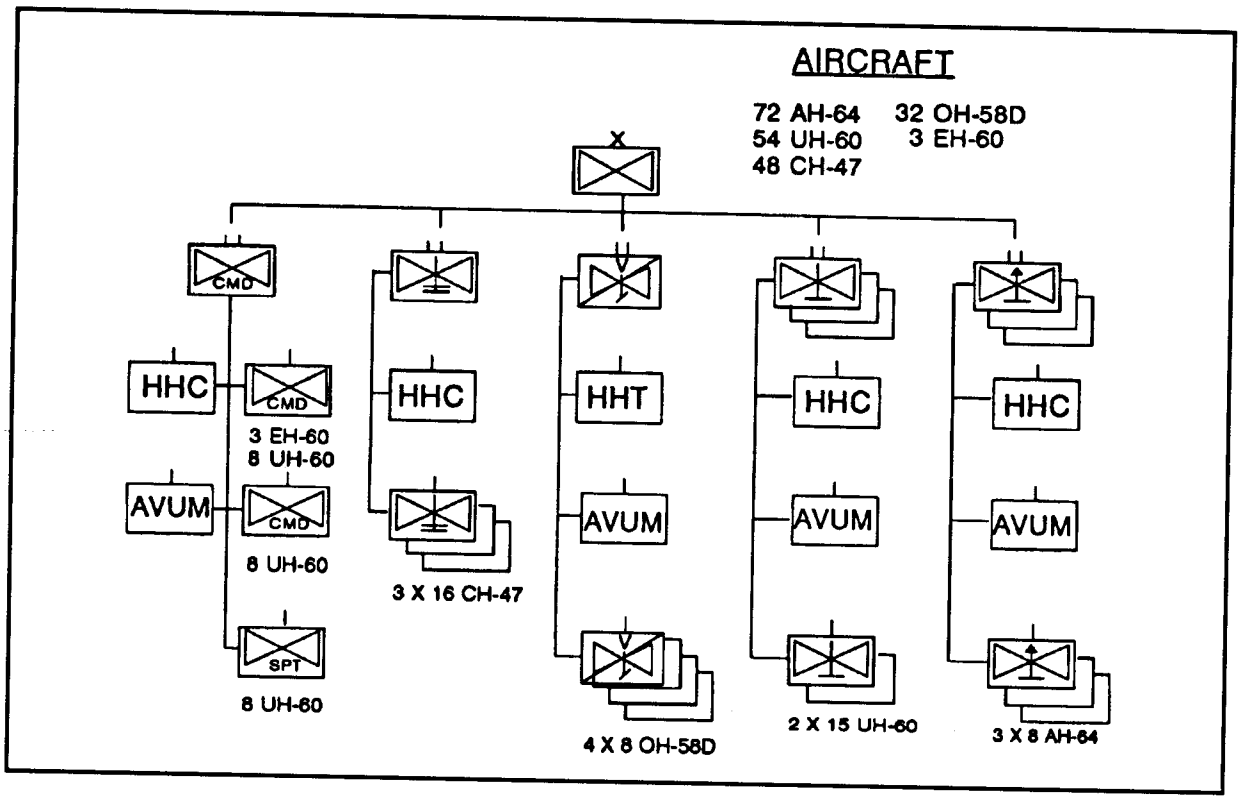


Figure N-8. ARI Air assault division aviation brigade

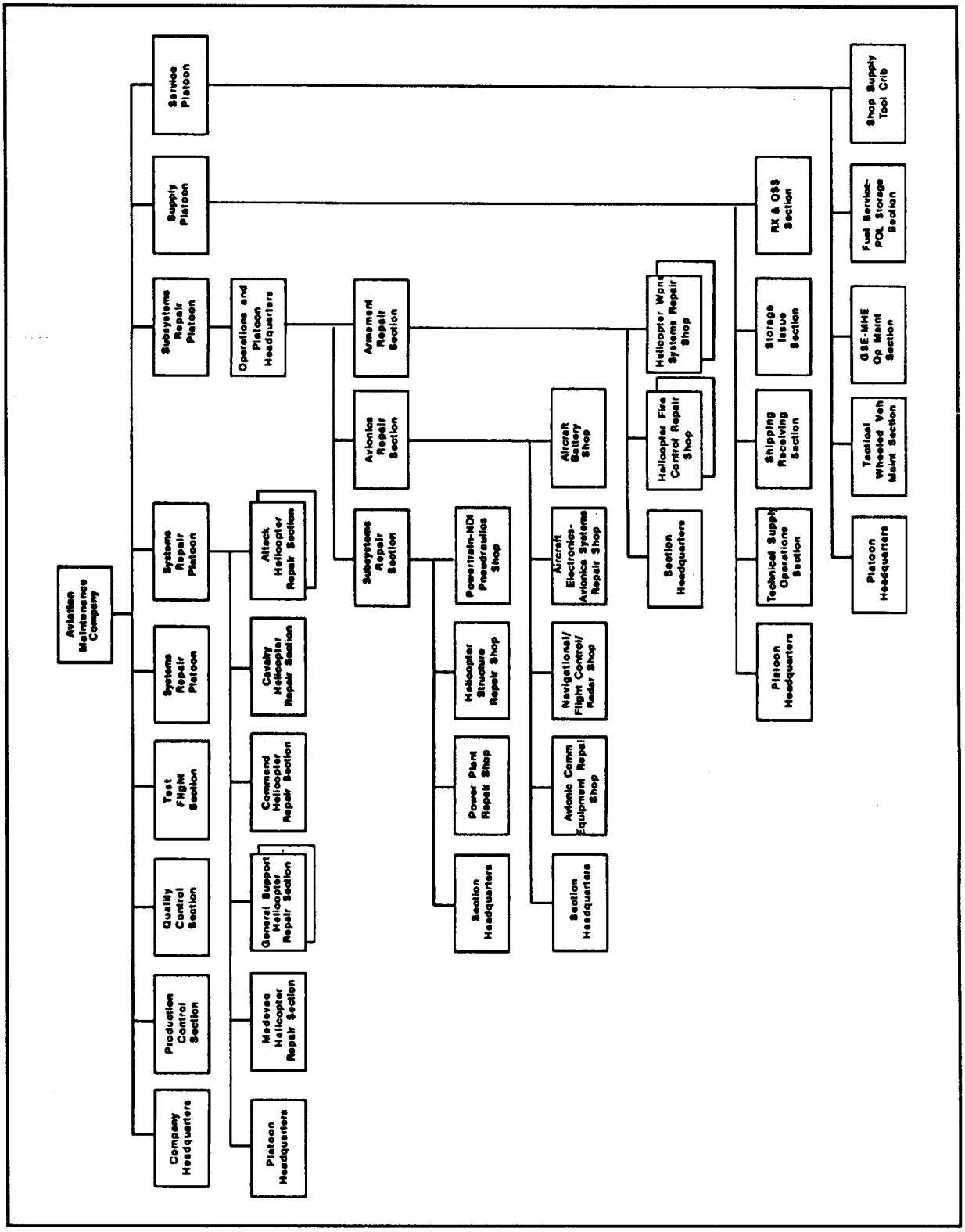


Figure N-9. Doctrinal ARI AVIM AMC

GLOSSARY

AAC	acquisition advice code
AAD	air assault division
AB	aviation brigade
ABD	airborne division
ABF	availability balance file
abn	airborne
A^2C^2	Army airspace command and control
acct	account
acft	aircraft
ACL	Army Calibration Laboratories
ACofS	Assistant Chief of Staff
ACR	armored cavalry regiment
ACRC	area calibration and repair center
ACSMAT	Assistant Chief of Staff, Materiel
ACT	air cavalry troop
ADA	air defense artillery
admin	administrative
ADMRU	aviation depot maintenance round-out unit
ADP	automatic data processing
ADPC	automatic data processing center
ADPE	automatic data processing equipment
adrp	airdrop
AEB	aerial exploitation battalion
AFMP	auxiliary fuel management panel
AFWX	Air Force weather team
AG	adjutant general
AGSC	aviation ground support equipment
AH	attack helicopter
AHB	assault helicopter battalion
AHC	attack helicopter company
AHS	Academy of Health Science
AIMI	Army intensively managed items
ALD	Aviation Logistics Division
ALO	air liaison officer; airland operations
ALOC	air lines of communication
AM	amplitude modulated
AMB	aviation maintenance battalion
AMC	Army Materiel Command
AMCO	aviation maintenance company
AMCP	aircraft maintenance collection point
AMDF	Army master data file

ammo	ammunition
ANMCS	anticipated not mission-capable, supply
AO	area of operation
AOAP	Army Oil Analysis Program
AOE	Army of Excellence
AP	antipersonnel
API	armor-piercing incendiary
APOE	aerial port of embarkation
APU	auxiliary power unit
AR	Army regulation
ARC	accounting requirements code
ARCSA	aviation requirements for the combat structure of the Army
ARI	aviation restructure initiative
ARIL	automatic return items list
ARK	aerial recovery kit
ARMS	Army Master Data File Retrieval Microform System
armt	armament
ARNG	Army National Guard
ARS	air reconnaissance squadron
arty	artillery
ASAM	aviation safety action messages
ASE	automatic stabilization equipment; aircraft survivability equipment
ASF	Army stock fund
ASG	area support group
ASI	additional skill identifier
ASL	authorized stockage list
ASMP	Army Strategic Mobility Program
ASP	ammunition supply point
assessor-	a trained maintenance technician whose function it is to assess aircraft battle damage
asst	assistant
AT	antitank
ATAS	air-to-air Stinger
ATC	Air Training Command
ATCOM	Aviation Troop Command
ATHS	airborne target hand-off system
atk	attack
ATKHB	attack helicopter battalion
ATKHC	attack helicopter company
ATKHR	attack helicopter regiment
ATP	Army Training Program
ATST	area TMDE support team
attn	attention
autm	automation
autmv	automotive

AUTOVON	automatic voice network
AVCRAD	aviation classification and repair activity depot
AVIM	aviation intermediate maintenance
avn	aviation
AVSCOM	Army Aviation Systems Command
AVUM	aviation unit maintenance
AWOL	absent without leave

back-up maintenance-maintenance performed by higher level maintenance because of a surge in lower level maintenance requirements

battle-damage assessment –the process used to determine if repair of a battle-damaged aircraft or system can be safely deferred either for a onetime evacuation flight of the aircraft or to return the aircraft to service for a limited number of flight hours; the three major tasks of battle-damage assessment are damage inspection, damage evaluation, and repair deferability assessment

BDA	battlefield damage assessment
BDAR	battle damage assessment and repair
bde	brigade
BDR	battle damage repair
BII	basic issue item
BIIL	basic issue item list
BITE	built-in test equipment
BMMA	brigade materiel management activity
BMO	battalion movement officer
bn	battalion
BOIP	basis-of-issue plan
BSA	brigade support area
btry	battery

c	chief; Celsius
C^2	command and control
C^3	command, control, and communications
C^3I	command, control, communications, and intelligence
C^4	command and control, communications and computers
CAB	combat aviation battalion
CAC	combat aviation company
CAGE	commercial and government entity
CALMIS	Calibration Management Information System
C&RS	calibration and repair support
cav	cavalry
CB	construction battalion
CBR	chemical, biological, radiological
cbt	combat
CBU	calibrate before use

CCAD	Corpus Christi Army Depot
CDA	US Army AMC Catalog Data Activity
cdr	commander
CE	communications-electronics
CEB	clothing exchange and bath
CECOM	Army Communications-Electronics Command
cen	center
CENI	command maintenance management inspection
CEO	communications-electronics officer
CEOI	communications-electronics operation instructions
CESO	communications-electronics security officer
CEWI	communications, electronic warfare, and intelligence
CGS	combat service group
CH	chaplain
CHAPS	climatic heat aircraft protective system
chem	chemical
CI	counterintelligence
civ	civilian
cl	class
clk	clerk
CM	combat maintenance
cmd	command
CMMC	corps materiel management center
CMMI	command maintenance management inspection
CNR	calibration not required
CofS	Chief of Staff
co, CO	company; commanding officer
coll	collection
comdt	commandant
COMINT	communications intelligence
comm	communication
COMMZ	communications zone
compo	component
COMSEC	communications security
con	control
const	construction
CONUS	continental United States
coop	continuity-of-operations plan
coord	coordination
COSCOM	corps support command
CP	command post
CPC	corrosion-preventive control
CPM	combat phase maintenance
CPR	Cardiopulmonary resuscitation

CPT	captain
CRC	crew chief; calibration and repair center
C&RS	calibration and repair support
CS	combat support
CSAC	combat support aviation companies
CSG	combat service group; corps support command
CSM	command sergeant major
CSS	combat service support
CSSCS	combat service support computer system
CTASC	corps theater ADP service center
CUCV	commercial utility cargo vehicle
CY	calendar year
DA	Department of the Army
DAAS	Defense Automatic Addressing System
DAMMS	Department of the Army Materiel Management System
DAO	division ammunition officer
DA pain	Department of the Army pamphlet
DCDR	division commander
DCSLOG	Deputy Chief of Staff for Logistics
DCSOPS	Deputy Chief of Staff for Operations and Plans
decon	decontamination
deferrable damage	damage whose repair can be postponed, allowing the aircraft to execute a onetime evacuation flight or to return to service for a limited number of flight hours
DESCOM	Depot Systems Command
det	detachment
DEW	directed-energy weapon
DF	disposition form
dir	director; directorate
DISCOM	Division Support Command
div	division
DLR	depot-level repairable
DMMC	division materiel management center
DMMO	division materiel management officer
DMRD	Defense Management Review Decision
DNVT	digital nonsecure voice telephone
DOC	document
doctrinal pass-back maintenance	–the divisional AVIM maintenance that is passed back to the corps AVIM because of the AOE definition of AVIM work load
DOD	Department of Defense
DODAAC	Department of Defense activity address code
DOS	days of supply
DR	deficiency report
DS	direct support

DS4	Direct Support Unit Standard Supply System
DSA	division support area
DSC	distribution of stockage code
DSU	direct support unit
DTOC	division tactical operations center
DX	direct exchange
EAC	echelons above corps
EAPS	engine air particle separation
EC	essentially code
ECAS	enhanced Cobra armament system
ECC	equipment category code
ECM	electronic countermeasures
EGT	exhaust gas temperature
EIC	end item code
EIR	equipment improvement recommendation
elec	electrical
ELINT	electronic intelligence
elm	element
EM	enlisted member
EMP	electromagnetic pulse
ENCOM	engineer command
engr	engineer
EOC	European operational cell
EPUU	enhanced position locating reporting system user unit
equip	equipment
ER	equipment readiness
ERF	European Redistribution Facility
ERFS	extended range fuel system
ERPSL	essential repair parts stockage list
Es	equipment status
ESSS	external stores support system
EW	electronic warfare
exam	examiner
ext	extension
F	Fahrenheit
FA	field artillery
FAA	Federal Aviation Administration
FARP	forward area rearm/refuel point
FASCO	forward area support coordination officer
FAX	facsimile
FC	fire control
FDC	fire direction center

FDU	force design update
FEBA	forward edge of the battle area
FHP	flying-hour program
FIFO	first in, first out
FIRST	fire support team
fld	field
FLOT	forward line of own troops
flt	flight
FM	field manual; frequency modulated
FMC	fully mission-capable
FO	financial officer
FOD	foreign object damage
FRAGO	fragmentary order
FROG	free rocket over ground
FSA	force structure assessment
FSB	forward support battalion
FSC	federal supply classification
FSCM	federal supply commodity manager
FSE	fire support element
FSO	fire support officer
fwd	forward
FY	fiscal year
G1	Assistant Chief of Staff (Personnel)
G2	Assistant Chief of Staff (Intelligence)
G3	Assistant Chief of Staff (Operations and Plans)
G4	Assistant Chief of Staff (Logistics)
G5	Assistant Chief of Staff (Civil Affairs)
GEN	general
gnd	ground
GS	general support
GSE	ground support equipment
GSR	general support reinforcing
GSU	general support unit
HAEMP	high-altitude electromagnetic pulse
HD	heavy division
hel	helicopter
hev	heavy
HF	high frequency
HHB	headquarters and headquarters battalion
HHC	headquarters and headquarters company
HHD	headquarters and headquarters detachment
HHSC	headquarters and headquarters service company

HHT	headquarters and headquarters troop
HICHS	helicopter internal cargo-handling system
HIT	health indicator test
HMMWV	high-mobility, multipurpose wheeled vehicle
HNS	host nation support
HOS	helicopter oxygen system
hosp	hospital
HQ	headquarters
hr	hour
HR	hand receipt
HSC	headquarters and service company
HSS	horizontal store support
HTF	how to fight
hvy	heavy
IAIC	immediate action interim change
IAW	in accordance with
I&S	interchangeability and substitutability
ICRC	installation calibration and repair center
ICS	intercommunications system
IDSM	integrated direct support maintenance
IEW	intelligence and electronic warfare
IHFR	improved high-frequency radio
IL	identification list
I-MARC	interim manpower authorization criteria
IMINT	imagery intelligence
IMRF	instrument master record tile
inf	infantry
insp	inspection
inst	instructor
int	intermediate
INTACS	Integrated Tactical Communication System
intel	intelligence
IOC	Industrial Operations Command
IPS	inlet particle separation; illustrative planning scenario
IR	infrared
km	kilometers
KVDT	keyboard video display terminal
LAN	local area network
LAO	logistics assistance office
LAP	Logistics Assistance Program
LASSO	logistics automation systems support office

ldr	leader
LIC	low-intensity conflict
LID	light infantry division
LIN	line item number
LM	logic module
LNO	liaison officer
LO	lubrication order; liaison officer
LOC	logistics operations center
log	logistics
LOGCEN	Logistics Center
LRO	logistics readiness officer
LRSD	long-range surveillance detachment
LRU	line replacement unit
LSE	logistics support element
lt	light
LT	lieutenant
LTC	lieutenant colonel
lv	leave

MAC	maintenance allocation chart
MACE	mobilization AVCRAD control element
MACOM	major Army command
maint	maintenance
maintenance authority–	the unit commander or representative designated to make decisions on maintenance priority for battle damage repair
MAIT	maintenance assistance and instruction team
MAJ	major
MARC	manpower authorization criteria
mat	materiel
MATCAT	materiel category
MBA	main battle area
MCC	movement control center
MCN	management control number
MCO	movement control officer
MCP	maintenance collection point
MCRL	master cross-reference list
MCSR	materiel condition status report
M-day	mobilization day
MDS	mission, design, and series
med	medical
MEDCOM	medical command
MEDEVAC	medical evacuation
MEDLOG	medical logistics
MEDSOM	medical supply optical and maintenance

MET	maintenance exchange team
METT-T	mission, enemy, terrain, troops, and time available
mfg	manufacturing
MFR	memorandum for record
mgt	management
MHE	materials-handling equipment
MI	military intelligence
mil	military
MILSTRIP	military standard requisitioning and issue procedures
mm	millimeter
MMC	materiel management center
MOAVCRAD	Missouri AVCRAD
MOC	maintenance operational check; materiel operations center
MOPP	mission-oriented protection posture
MOS	military occupational specialty
MP	military police
MPL	mandatory parts list
MPM	manufacturer part number
MRM	maintenance reporting and management
MRO	materiel release order
MRSA	materiel readiness support activity
MSB	main support battalion
MSC	major subordinate command
MSDDS	materiel safety data sheets
msl	missile
MSRT	mobile subscriber radio-telephone terminal
MSS	missile sight subsystem
MST	maintenance support team
MTDA	modification table of distribution and allowances
MTOE	modification table of organization and equipment
mtr	motor
mun	munition
mux	multiplex
mvmt	movement
MWO	modification work order
NA	not applicable
NAMP	night aircraft maintenance program
NATO	North Atlantic Treaty Organization
NBC	nuclear, biological, chemical
NBS	National Bureau of Standards
NCO	noncommissioned officer
NCOIC	noncommissioned officer in charge
NCS	net control station

NDI	nondestructive inspection
NDT	nondestructive testing
NEA	northeast Asia
NET	new equipment training
NG	National Guard
NICP	national inventory control point
NIIN	national item identification number
NIST	National Institute of Standards and Technology
NMCM	not mission-capable, maintenance
NMCS	not mission-capable, supply
NMP	national maintenance point
No.	number
NPT	nonproductive time
NRI	net radio interface
NSL	nonstockage list
NSN	national stock number
NTC	National Training Center
o&o	organizational and operational
OCM	on-condition maintenance
OCONUS	outside continental United States
ODS	Operation Desert Shield
ofc	office
off	officer
OH	on hand
OHR	operation hazards
OIC	officer in charge
OJT	on-the-job training
OOTW	operations other than war
op	operation(s); operator
OPFAC	operational facility
OPLAN	operation plan
OPORD	operation order
OPSEC	operations security
OPTEMPO	operational tempo
OR	operational readiness
ord	ordnance
ORF	operational readiness float
OSC	objective supply capability
OSHA	Occupational Safety and Health Act
OST	order-to-ship time
OT	overtime

PAC	personnel administration center
PAD	patient distribution
pam	pamphlet
PAO	primary action officer
para	paragraph
PB	property book
PBO	property book officer
PC	production control
PCE	protective clothing and equipment
pers	personnel
PERSCOM	Personnel Command
pet	petroleum
pkg	packaged
PLL	prescribed load list
PLRS	position locating reporting system
plt	platoon
PM	phase maintenance
PMC	partially mission-capable
PMCS	preventive maintenance checks and services
PMD	preventive maintenance daily
PMI	preventive maintenance intermediate
PMP	preventive maintenance periodic
PMS	preventive maintenance services
POD	port of debarkation
POE	port of embarkation
POL	petroleum, oils, and lubricants
POMCUS	pre-positioned materiel configured to unit sets
pos	position
Pow	prisoner of war
PPD	progressive phase daily
PPI	progressive phase inspection
PPM	progressive phase maintenance
PRAM	preliminary report of aircraft mishap
PRC	personnel reporting code
pre-phase test flight	the flight performed by maintenance test pilots before the aircraft is scheduled for maintenance
pri	priority
proc	procurement
psi	pounds per square inch
PT	productive time
PWIS	Pre-Positioned War Reserves Information System
QC	quality control
QDR	quality deficiency report

QM	quartermaster
QSS	quick supply store
qtr	quarter

quick-fix-an in-process file for active maintenance requests and records file jackets

RACO	rear area combat operations
RAOC	rear area operations center
RAP	rear area protection
RAS	regimental aviation squadron
RATT	radio teletypewriter
RBO	rear-battle officer
RC	recoverability code
RCF	repair cycle float
RD	Readiness Division
rec	record
REC	radioelectronic combat
Recd	received
recon	reconnaissance
recov	recovery
reg	regular
rep	representative; repair
req	request
retrans	retransmit
RF	radio frequency
rgmt	regiment
RO	requisitioning objective
ROP	reorder point
RPM	revolutions per minute
rpt	report
rqmt	requirement
rqn	requisition
RTAIS	Remote Terminal AMDF Inquiry System
RTT	radio teletype
RX	repairable exchange

S1	adjutant
S2	intelligence officer
S3	operations and training officer
S4	supply officer
SAILS	Standard Army Intermediate-Level Supply System
S&M	supply and maintenance
SAMS	Standard Army Maintenance System
SAMS–1	Standard Army Maintenance System-Level 1
SARSS	Standard Army Retail Supply System

SARSS-1	Standard Army Retail Supply System-Level 1
SARSS-2	Standard Army Retail Supply System-Level 2
S&S	supply and support
SB	supply bulletin
SCA	supply control activity
SC MC	supply category material code
SCS	stock control section
SDT	skill development test
sec	section
SEMA	special electronic mission aircraft
ser	serial
SFDLR	stock funding of depot-level repairable
SGT	sergeant
SIDPERS	Standard Installation/Division Personnel System
sig	signal
SIGINT	signals intelligence
SIMS-X	Selected-Item Management System–Expanded
SJA	Staff Judge Advocate
SKO	sets, kits, or outfits
SLAR	side-looking airborne radar
SLC	stockage list code
SOA	special operations activity
SOC	special operations command
SOF	safety of flight; special operations forces
SOP	standing operating procedures
sp	specialist
SPBS–R	Standard Property Book System-Revised
SPETSNAZ	Spetsialla'noye Naznayacheniye (Soviet special force)
SPO	security, plans, and operations
SPOE	seaport of embarkation
spt	support
sqd	squad
sqdn	squadron
SQT	skill qualification test
sr	senior
SRA	specialized repair activity
SRBM	short-range ballistic missile
SSA	supply support activity
SSC	senior service college
SSL	shop stock list
SSO	safety/security officer
SSSC	self-service supply center
STANAG	Standardization Agreement
STARPUBS	standard Army publications system

stor	storage
stn	station
STP	soldier training publication
subs	subsistence
sup	supply
SUPCOM	support command
supv	supervisor
surg	surgeon
svc	service
SWA	southwest Asia
swbd	switchboard
sys	system
TA	theater Army
TAA	total Army analysis
TAACOM	theater Army area command
TAAM	transportation Army aviation maintenance
TAC	Tactical Air Command
TACCS	Tactical Army Combat Service Support Computer System
TACP	tactical air patrol party
TACSAT	tactical satellite
TALSM	theater Army logistics system manager
TAMC	transportation aircraft maintenance companies
TAMCA	theater Army movement control agency
TAMMC	theater Army materiel management center
TAMMIS	Theater Army Medical Management Information System
TAMMS-A	The Army Maintenance Management System-Aviation
TAMP	Theater Aviation Maintenance Program
TARP	Theater Army Repair Program
TARRS	transportation aircraft repair shops
TASG	theater area support group
TASOC	theater Army special operations command
TB	technical bulletin
TBD	to be determined
TBO	time between overhaul
TCAE	technical control and analysis element
TDA	table(s) of distribution and allowances
TDMF	technical data master tile
TDY	temporary duty
TEAC	turbine engine analysis check
tech	technical; technician
tm	team
TM	technical manual
TMDE	test, measurement, and diagnostic equipment

TMDE-SP	test, measurement, and diagnostic equipment–support program
tng	training
TOC	tactical operations center
TOE	table(s) of organization and equipment
TRADOC	Training and Doctrine Command
trans	transport; transportation
trp	troop
TS	terminal service
TSO	TMDE support office
TUFMIS	Tactical Unit Financial Management Information System
TWX	teletypewriter exchange
UH	utility helicopter
U/I	unit of issue
UIC	unit identification code
ULC	unit-level computer
ULLS	Unit-Level Logistics System
ULLS-A	Unit-Level Logistics System-Aviation
UMARK	unit maintenance aerial recovery kit
UMCP	unit maintenance collection point
UMNIPS	Uniform Materiel Movement and Issue Priority System
UND	urgency of need
US	United States
USAMCC	United States Army Metrology and Calibration Center
USAPSL	US Army Primary Standards Laboratory
USASC	US Army Safety Center
USATSG	US Army TMDE Support Group
USS	unit supply system
UTM	universal transverse Mercator (grid)
v	volt
veh	vehicle
VHF	very high frequency
VSP	vertical stores pylon
WARCO	warranty control office
wo	warrant officer
wpn	weapon(s)
WSRO	weapons system replacement operations
wveh	wheeled vehicle
xo	executive officer
XPD	expediter

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TM 55-1520-400-14. *Transportability Guidance: Marine Transport of US Army Helicopters.* 28 Apr 78.
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TM 743-200-1. *Storage and Materials Handling.* 15 Jan 58.
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TM 750-244-1-4. *Procedures for the Destruction of Aviation Ground Support Equipment...to Prevent Enemy Use.* 12 Nov 71.
TM 750-244-1-5. *Procedures for the Destruction of Aircraft and Associated Equipment to Prevent Enemy Use.* 12 Nov 71.
TM 750-245-4. *Direct Support and General Support for Quality Control Inspector's Inspection Criteria.* 25 Jan 71.

REQUIRED DOCUMENTS

These documents must be available to intended users of this publication.

AFTO Form 43. *Air Force Technical Order.*
AFTO Form 187. *Resupply and Initial Distribution Form.*
DA Form 17. *Requisition for Publications and Blank Forms.* Oct 79.
DA Form 17-1. *Requisition for publications and Blank Forms (Continuation Sheet).* Oct 79.
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DA Form 1296. *Stock Accounting Record.* Jan 82.
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DA Form 2064. *Document Register for Supply Actions.* Jan 82.
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SF 91. *Operator Report on Motor Vehicle Accidents.* Oct 76.
SF 364. *Report of Discrepancy (ROD).* Feb 80.
SF 368. *Product Quality Deficiency Report.* Oct 85.

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These publications contain relevant supplemental information.

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AR 70-50. *Designating and Naming Defense Equipment Military Aerospace Vehicles.* 18 May 90.
AR 380-5. *Department of the Army Information Security Program.* 25 Feb 88.
AR 385-64. *Ammunition and Explosives Safety Standards.* 22 May 87.
AR 420-90. *Fire Protection.* 25 Sep 92.
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AR 700-141. *Hazardous Material Information System (HMIS).* 20 Jan 87.
AR 735-5. *Policies and Procedures for Property Accountability.* 31 Jan 92.
CDA Pam 18-1. *User Level Code Reference Guide for the ARMS Monthly AMDF and I&S History File.* 1 Oct 88.
CTA 8-100. *Army Medical Department Expendible/Durable Items.* 1 Aug 90.
DA Pam 25-30. *Consolidated Index of Army Publications and Blank Forms.* 1 Oct 93.
DA Pam 310-20. *Administrative Publications: Action Officers Guide.* 1 Dec 81.
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FM 10-69. *Petroleum Supply Point Equipment and Operations.* 22 Oct 86.
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FM 31-70. *Basic Cold Weather Manual.* 12 Apr 68.
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Guide to Aviation Resources Management for Aircraft Mishap Prevention (USASC publication).
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NEC 500,513. *National Electrical Code.*
NFC 410-8. *National Fire Code.*
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STANAG 2113. *Destruction of Military Technical Equipment.*
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TM 9-1055-460-13&P. *Operator's, Aviation Unit and Intermediate Maintenance Manual Including Repair Parts and Special Tools List for Hydra 70 Rocket Launchers (Formerly 2.75-Inch Rocket Launchers).* 8 May 81.
TM 9-1270-212-14&P. *Operator's, Organizational, Direct Support and General Support Maintenance Manual (Including Repair Parts and Special Tools List and Depot Maintenance Repair Parts and Special Tools) for Fire Control Subsystem, Helmet-Directed, XM128 and XM136.* 10 Jul 81.
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TM 9-1340-222-20. *Organizational Maintenance Manual (Including Repair Parts and Special Tools List): 2.75-Inch Low Spin, Folding Fin Aircraft Rockets: 66-MM, Light Antitank Weapon Systems; 3.5-Inch Rockets and M3A2E1 Rocket Motor (JATO).* 13 Jun 73.
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TM 9-4931-378-13&P. *Operator's, Aviation Unit and Intermediate Maintenance Instructions With Repair Parts and Special Tools List Including Depot Maintenance Repair Parts and Special Tools List for Test Set Fire and Flight Air Data Subsystem, XM142.* 8 May 81.
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TM 9-4933-224-13&P. *Operator's Aviation Unit and Intermediate Maintenance Manual With Repair Parts and Special Tools List (RPSTL) (Including Depot Maintenance Repair Parts and Special Tools) for Electronics System Test Set: XM137.* 9 Jan 86.
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