FM 3-04.500(1-500)

ARMY AVIATION MAINTENANCE

HEADQUARTERS, DEPARTMENT OF THE ARMY

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Army Aviation Maintenance

Contents

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Page

Page

Preface

Aviation maintenance activities are organized to provide commanders 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 AVUM on its assigned aircraft. Divisional and nondivisional AVIM units provide a single level of support maintenance between unit and depot levels. Divisional AVIM units (division aviation support battalion or organic AVIM battalion/company) provide support for aircraft assigned to the division. Nondivisional AVIM units are deployed on an area basis and assigned to the corps support command, ACR, or the TSC.

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. Appendixes A through 0 provide supplemental material on unit level logistics system-aviation, sample AVUM/AVIM internal SOP, sample AVIM external SOP, maintenance management tools, safety, recovery and evacuation of aircraft, special equipment packages, deployment, aviation maintenance commander's checklist, communications nets, calibration, site selection, reconstitution, environmental issues, and contractors.

The proponent for this publication is HQ TRADOC. Send comments and recommendations on DA Form 2028 (Recommended Changes to Publications and Blank Forms) to Commander, U.S. Army Aviation Center, ATTN: ATZQ-TDS-D, Fort Rucker, Alabama 36362-5263.

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

This manual has been reviewed for operations security considerations.

Chapter 1

THE BATTLEFIELD

This chapter covers the basic doctrine fundamentals of aviation units on the battlefield. It discusses the CSS needed by aviation units to function effectively and sustain combat capability. It also discusses the need for modularity in AVIM units, the combat mission for aviation maintenance units and the threat forces most likely to be used against them.

SECTION I – DOCTRINE FUNDAMENTALS

POWER PROJECTION

1-1. The dramatically changing world environment during the past several years has led to a revision of the national military strategy that calls for fewer forward deployed forces and greater reliance on CONUS-based contingency forces. Hence, the centerpiece for this new strategy is rapid force 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 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.

1-2. FM 3-0(100-5) is the Army's keystone doctrinal manual. It outlines how the Army will fight with CONUS-based contingency forces.

SUSTAINMENT IMPERATIVES

1-3. Sustaining the battle will require aviation commanders and staffs to adhere to the CSS characteristics—responsiveness, simplicity, flexibility, attainability, sustainability, survivability, economy, and integration. These characteristics apply to war, military operations other than war, and stability operations and/or support operations and are discussed in detail in FM 3-0(100-5) and FM 4-0(100-10).

RESPONSIVENESS

1-4. Responsiveness is the key characteristic of CSS. It means providing the right support in the right place at the right time, and the ability to meet changing requirements on short notice. Responsiveness includes the ability to anticipate operational requirements. 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. This

involves identifying, accumulating, and maintaining the minimum, assets, capabilities, and information necessary to meet support requirements. On the other hand, the force that accumulates enough material and personnel reserves to address every possible contingency usually cedes the initiative to the enemy. Additionally, 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.

SIMPLICITY

1-5. Simplicity means avoiding complexity in both planning and executing aviation maintenance and logistics operations in support of CSS operations. Mission orders, drills, rehearsals, and SOPs contribute to simplicity.

FLEXIBILITY

1-6. The key to flexibility lies in the expertise for adapting logistics structures and procedures of CSS to changing situations, missions, and concepts of operations. Logistics plans and operations must be flexible enough to achieve both responsiveness and economy. Flexibility may include improvisation. Improvisation is the ability to make, invent, or arrange for what is needed from what is at hand. Improvised methods and support sources can maintain CSS continuity when the preferred method is undefined or not usable to complete the mission. 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 bypassed. Extraordinary methods may be necessary to get things done.

ATTAINABILITY

1-7. Attainability is generating the minimum essential supplies and services necessary to begin operations. Commanders determine that minimum levels of support are acceptable to initiate operations.

SUSTAINABILITY

1-8. Sustainability is the ability to maintain continuous support during all phases of campaigns and major operations. Aviation logistics planners anticipate logistics requirements over time and synchronize the delivery of minimum sustainment stocks throughout the operation.

SURVIVABILITY

1-9. Being able to protect support functions from destruction or degradation equates to survivability. Robust and redundant support contributes to survivability, but may run counter to economy.

ECONOMY

1-10. Resources are always limited. Economy means providing the most efficient support to accomplish the mission. Commanders consider economy in prioritizing and allocating sources. Economy reflects the reality of resource shortfalls, while recognizing the inevitable friction and uncertainty of military operations.

INTEGRATION

1-11. Integration consists of synchronizing CSS operations with all aspects of Army, joint, interagency, and multinational operations. The concept of operations achieves integration through a thorough understanding of the commanders' intent and synchronization of the CSS plan. 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 logistics units must be organized to execute "fix forward" doctrine while providing the aviation commander the greatest possible freedom of action.

SECTION II – COMBAT SERVICE SUPPORT OF AVIATION OPERATIONS

PLANNING

1-12. 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 CSS units that will sustain the combat force. U.S. 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.

FLEXIBILITY

1-13. The fluid conditions of future battlefields will require that logistics supporters are 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.

COORDINATION

1-14. 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.

DOCTRINE MANUALS

1-15. Military operations doctrine requires that all leaders understand the concepts and requirements of any operation. FM 3-0(100-5) is the Army's manual that fully explains military operations doctrine. FM 3-50(100-7) is the Army's manual on how the Army supports the CINC. FM 4-0(100-10) is the Army's manual for CSS. FM 3-4.100(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.

COMBAT MISSION

1-16. 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

1-17. 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 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 preparation for the offense does not interfere with tactical plans and operations.

DEFENSIVE OPERATIONS

1-18. 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

1-19. 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.

STABILITY OPERATIONS AND/OR SUPPORT OPERATIONS

1-20. Stability operations and/or support operations will be the most challenging operation for aviation maintenance managers to support. Stability operations and/or support operations can range from support to federal, 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 AO 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 U.S. or allied bases. The local population attitudes may vary from friendly acceptance to open hostility toward the presence of U.S. 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

1-21. The Army must be prepared to fight a general war yet have the “flexibility” in force structure and organizational design to support limited war and stability operations and/or support operations. 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 stability operations and/or support operations, the maintenance organization design must contain sufficient redundancies in personnel and equipment to allow adjustment to implement “fix forward" doctrine.

AVIATION INTERMEDIATE MAINTENANCE DESIGN

1-22. A modular AVIM design is intended to link maintenance structure and approximate maintenance capability within maintenance units to specific aviation units being supported. Maintenance commanders, their staffs, and other logistics planners have to be intimately familiar with the organization and capability of their AVIM units to maximize the operational flexibility inherent to the AVIM modular organizational designs. While the TOEs and MTOEs reflect the organization and resources necessary to support general war, commanders no longer have to fight their units in this configuration. They have the capability of rearranging organizational modules to best satisfy operational requirements.

PLANNING

1-23. 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.

NONINTERCHANGEABLE AVIATION INTERMEDIATE MAINTENANCE UNITS

1-24. 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 incompatibilities 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.

RECONSTITUTION

1-25. 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. More information on reconstitution is covered in Appendix M.

SECTION III – THE THREAT TO AVIATION MAINTENANCE

AVIATION MAINTENANCE VULNERABILITY

1-26. 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 who face the same threat as the unit they are supporting.

CHARACTERISTICS OF THREAT FORCES

1-27. Aviation maintenance activities are susceptible to disruptions and are vulnerable to military actions in all levels of conflict. During major conventional wars, aviation maintenance units are likely to be located but may not be high-priority targets. During stability and/or support operations, 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 allied and U.S. 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.
- Threat forces worldwide will seek to narrow technology gaps with both regional and global powers. American, European, and former Soviet 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 U.S. forces through interdiction of lines of communication. Several regional powers have submarine forces, capable air forces, and SRBM. U.S. 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 workload while self-protection becomes an increased priority.
- Ground operations will emphasize mobility and depth of attack to disrupt AAs and destroy U.S. forces before they can be committed. Threat forces may be able to 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 CBR warfare agents against U.S. 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

1-28. Hostile forces will attack aviation maintenance through attempts to:

- Disrupt or negate C^3.
- Disrupt or destroy the maintenance facility, its personnel, and its equipment.
- Destroy or damage aircraft in the air and on the ground.
- Disrupt or destroy logistic supplies, fuels, and parts.
- Curtail or sever transportation links.
- Contaminate or render useless water, foods, fuels, oils, and soils.
- Neutralize or disturb electronic devices used to measure, communicate, navigate, and control.

FRIENDLY OR NEUTRAL

1-29. The growing complexity of modern warfare and the sophistication and lethality of weapons increase the problem of friendly fire. The requirement for camouflage, concealment, 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

1-30. Aircraft maintenance units may create large signatures for hostile intelligence, reconnaissance, surveillance, and target acquisition systems. Hostile forces may use missiles, artillery, fighter-bombers, armed helicopters, mobile armor forces, DEW, REC, or special operations units to attack aviation maintenance units. While the range of weapons decreases in stability operations and/or support operations, the lethality to our units remains high.

AIR THREAT

1-31. Aircraft and missile forces operating from land bases or seaborne platforms can deliver weapons ranging from NBC 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.

GROUND FORCES

1-32. 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.

ARTILLERY

1-33. 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 nonnuclear electromagnetic pulse rounds.

THREAT TO AIRCRAFT

1-34. Missiles, guns, directed-energy weapons, and electronic countermeasures represent threats against fixed- and rotary-wing aircraft used for logistics as well as combat aircraft. Aircraft entering the maintenance facility may contain unexploded ordnance or CBR contamination.

MISSILES

1-35. Tactical missiles can reach targets throughout the theater army area. 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

1-36. 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.

ARMOR

1-37. 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. 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 may attack aviation maintenance units.

INFANTRY

1-38. 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.

Chapter 2

AVIATION MAINTENANCE OPERATIONS

This chapter discusses how aviation maintenance operations are conducted in today's Army. It should be noted that some of these concepts will change as new systems are introduced into the aviation community. If the "two-level" maintenance system becomes a reality for the latest model helicopters, it will be covered in later revisions of this manual.

SECTION I – AVIATION MAINTENANCE

GENERAL

2-1. As discussed in FM 3-0(100-5), the U.S. 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 support operations and/or stability operations. 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.

THREE-LEVEL MAINTENANCE SYSTEM

2-2. The current Army aviation maintenance system is a three-level system—AVUM, AVIM, and depot level maintenance.

AVIATION UNIT MAINTENANCE

2-3. AVUM platoons or companies handle aviation operational maintenance. Operational maintenance provides quick turnaround through repair by replacement, minor repairs, adjustments, cleaning, lubricating, and servicing. These platoons or companies are organic to aviation organizations at all levels.

AVIATION INTERMEDIATE MAINTENANCE

2-4. The AVIM unit provides intermediate maintenance and limited backup AVUM support to supported units. AVIM units are either divisional or nondivisional. An AVIM company/battalion from the DISCOM provides AVIM for division-level aviation assets. These divisional AVIMs are structured to support the division's specific aircraft. Nondivisional AVIMs provide support to corps and echelons above corps nondivisional aviation units and backup support for the divisional AVIM units.

DEPOT

2-5. Depot level maintenance provides the ability to overhaul, repair, modify, retrofit, and modernize aircraft systems. Although depot maintenance is normally performed at fixed facilities within CONUS, support teams may be deployed for on-site repairs as necessary.

SUSTAINMENT MAINTENANCE

2-6. Army aviation maintenance operations and assets are integral to EAC and corps. 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.

ORGANIZATION

2-7. 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 3-4.100(1-100).

TRANSPORTATION ASSETS

2-8. 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.

SECTION II – AVIATION UNIT MAINTENANCE OPERATIONS

GENERAL

2-9. 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 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.

AVIATION UNIT MAINTENANCE FUNCTIONS

2-10. AVUM provides quick turnaround through repair by replacement, minor repairs, adjustments, cleaning, lubricating and servicing. It provides mobile responsive support through 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.

2-11. AVUM performs preventive maintenance repair and replacement associated with a high level of operational readiness. Maintenance inspections and services include daily, phase/periodic, progressive phase, and special inspections as authorized by the maintenance allocation chart or by higher headquarters. Phase/periodic 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 BITE or easy-to-use diagnostic and fault-isolation devices.

2-12. Worn or damaged modules or components, which do not require complex adjustments or system alignment, are replaced using available skills, tools, and equipment. 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. BDA and BDR are limited to combat operations as approved by the commander (see Appendix F).

MAINTENANCE CONSIDERATIONS

2-13. Some major considerations for aircraft maintenance at the AVUM unit location are the following:

- 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. This avoids 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 workload 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/PC) for repairs based on the type of aircraft and aircraft requirements for the battlefield.
- Basing QC and technical inspection requirements on achieving the standards in the appropriate TM 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 firmly controlled by SOP and be according to AR 750-1 and TM 1-1500-328-23. (see Chapter 6 for more information on controlled exchange)

MAINTENANCE SUPPORT TEAMS

2-14. Maintenance support teams from assets within the unit (both AVUM and AVIM) are used to repair aircraft on site or prepare the aircraft for evacuation. The AVUM commander/PC officer coordinates and schedules maintenance at the forward location of the AVUM unit. 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, the team repairs aircraft on-site rather than evacuating aircraft.
- 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 and Evacuation

2-15. In combat, there will be a great increase in flying hours and a great demand for operational aircraft. These increased requirements will be complicated by 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 and move an aircraft 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. (Refer to FM 3-04.513[1-513]).

Responsibility

2-16. 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.

Recovery Teams

2-17. Each AVUM organization should provide 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 FARP. Recovery aircraft will come from organic aircraft or be requested from higher echelons. These aircraft should be equipped with rigging equipment for each type aircraft in the unit and with quick-fix BDR 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 provides BDA teams. These will consist of MSTs and aircraft recovery and evacuation teams when repairs are not within the capability of the AVUM unit. Figures 2-1 and 2-2 provide examples of aircraft recoveries. Other ways may be employed. (See Appendix F and FM 3-04.513 [1-513] for sample aircraft recovery and evacuation SOP.)

Factors Affecting Recovery Operations

2-18. The maintenance and recovery team must consider the following factors to select the best course of action:

- Location of downed aircraft.
- Types of special equipment packages installed on the aircraft (see 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-TC).
- Weather.
- Assets available.

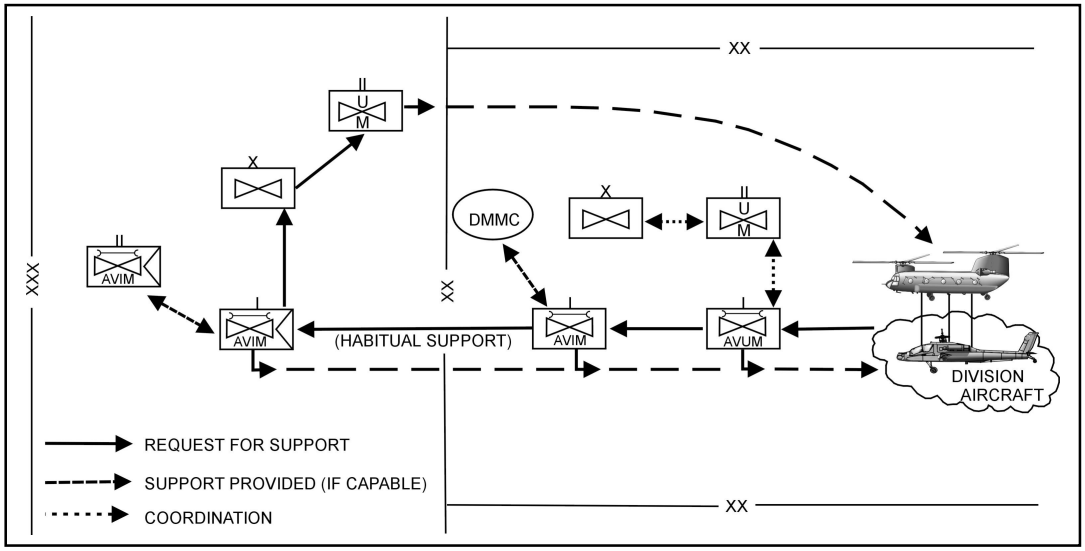


Figure 2-1. Example of Aerial Recovery of Division Aircraft

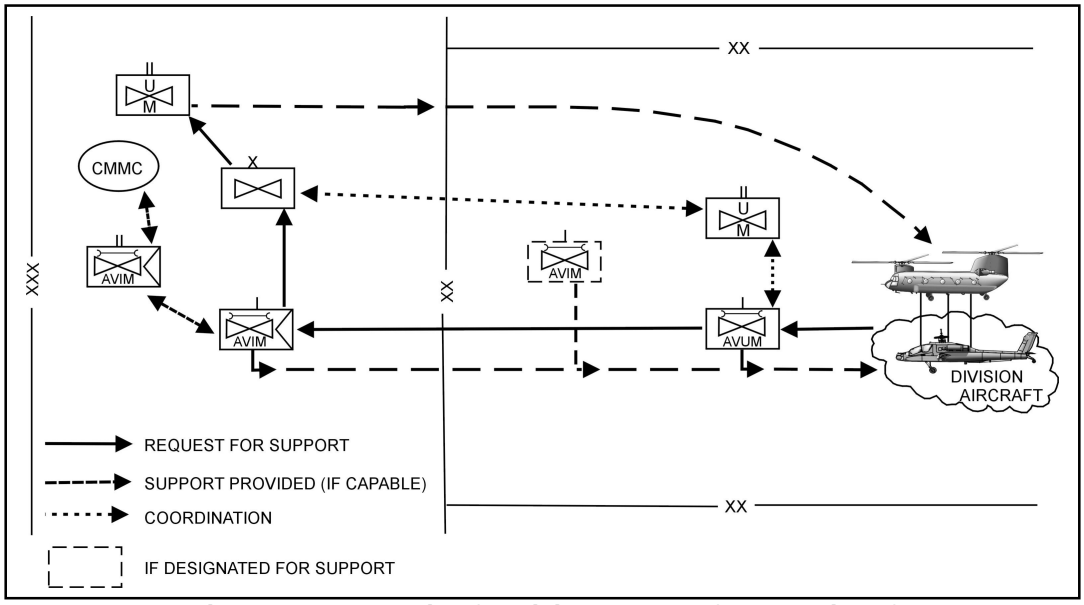


Figure 2-2. Example of Aerial Recovery of Corps Aircraft

Courses of Action

2-19. After evaluating the above factors, the team will determine a proper COA for the following:

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

(Also, see Appendix F or FM 3-4.513(1-513) for additional information on aircraft recovery.)

AVIATION UNIT MAINTENANCE REPAIR PARTS

2-20. The AVUM unit maintains both a PLL and bench stock for all supported aircraft systems and subsystems repair. See Figure 2-3 for Class IX air repair parts flow.

Requisition

2-21. Aviation elements submit repair parts requests to their supporting AVIM. 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 the train elements so the AVUM commander will coordinate with the brigade S4 to receive parts and AVIM support.

Distribution

2-22. The AVUM commander or the PC officer will have selective PLL items at the combat trains or FARP for quick-fix 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. ALOC must be established to provide repair parts for NMCS aircraft. This aerial resupply will "push" critical parts from corps and division 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

2-23. Shortages of repair parts, particularly AIMI, will require the AVUM unit commander or maintenance officer 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 and AR 750-1 for additional information.)

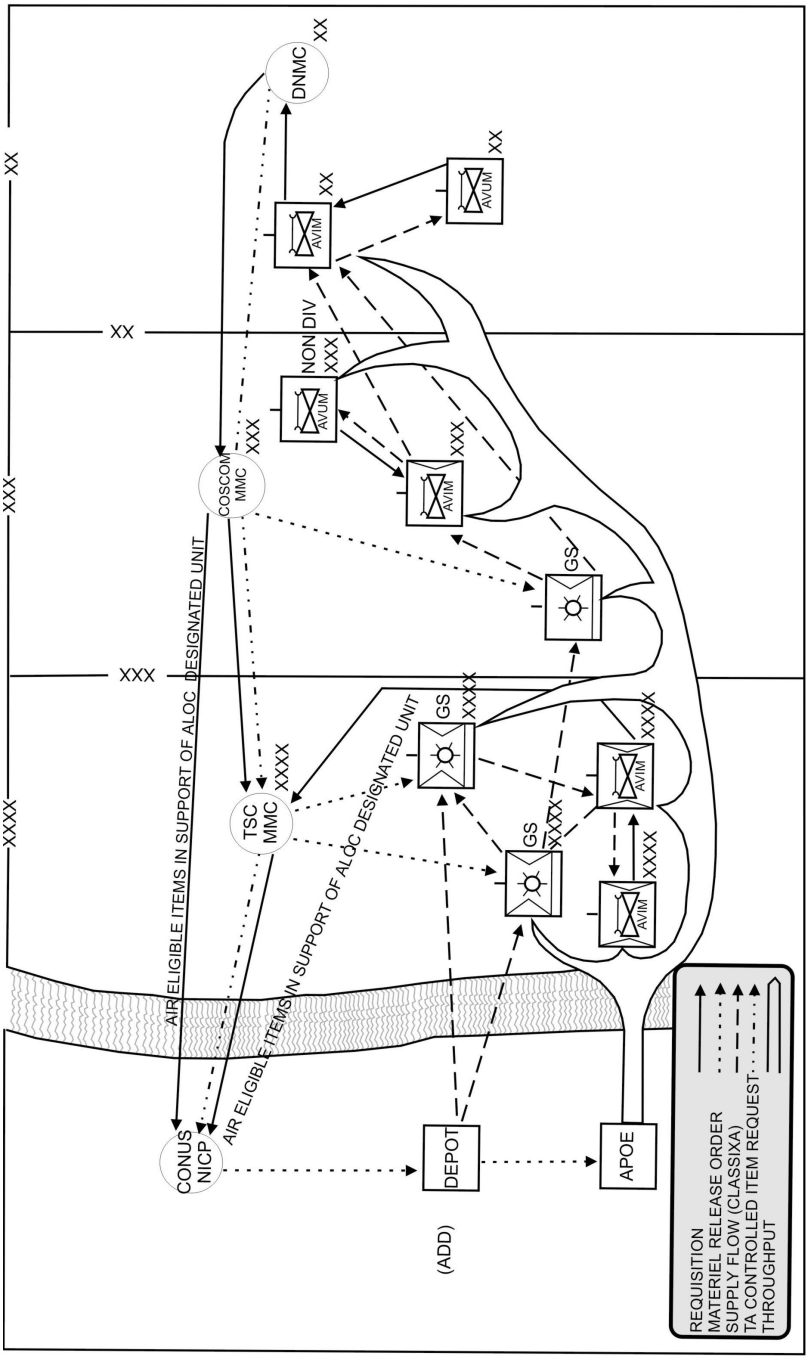


Figure 2-3. Requisition and Material Flow of Aircraft Repair Parts

AVIATION UNIT MAINTENANCE MOBILITY

2-24. The AVUM unit must be 100 percent transportable and be capable of transporting 100 percent of its TOE equipment in one lift, using organic vehicles. It is essential for AVUM operations to keep pace with the OPTEMPO of aviation in any combat operation. AVUM units must be able to move as frequently as every 24 hours.

SECTION III – AVIATION INTERMEDIATE MAINTENANCE OPERATIONS

2-25. AVIM organizations are found at the division, corps, and EAC levels. Figure 2-4 depicts the AVIM force design.

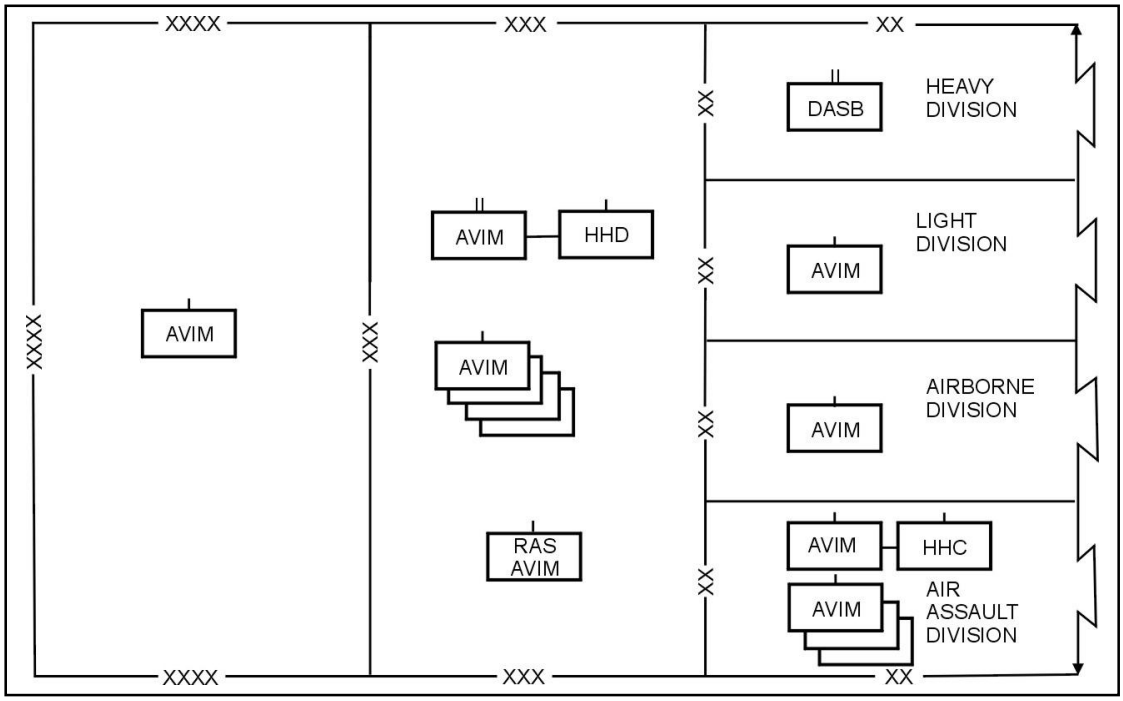


Figure 2-4. AVIM Force Design

DIVISIONAL AVIATION INTERMEDIATE MAINTENANCE COMPANY

2-26. A divisional AVIM company is either a subordinate company of a DASB or a separate company organic to the DISCOM. (The Air Assault Division has an AVIM Battalion with three AVIM companies.) The DASB consists of a headquarters and supply company, a ground maintenance company, and the AVIM company. Currently, the only authorizations for DASBs are in heavy divisions. FM 4-93.23(63-23) contains more information on the DASB. The role of the maintenance company is the same whether assigned as a separate company or as part of the DASB.

2-27. The mission of the divisional AVIM is to provide the following:

- 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.

DIVISIONAL AVIATION INTERMEDIATE MAINTENANCE FUNCTIONS

EMPLOYMENT

2-28. The AVIM company/battalion is normally located near the DISCOM area either at or adjacent to an instrumented landing facility, depending on METT-TC. The divisional AVIM company 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 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.

RESPONSIBILITIES

2-29. The AVIM support maintains an authorized operational readiness float of selected items such as radios and aircraft armament systems. Command, technical, supervisory, and mission coordination relationships involving this service support unit are somewhat unique. The AVIM company commander answers to the DISCOM commander (in the DASB AVIM company, the commander answers via the DASB 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 PC 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 DMMC. Routine daily supply and maintenance actions are coordinated directly between the AMCO and DMMC. The maintenance operations officer also serves as the aircraft recovery officer to obtain the tactical, maintenance, and lift assets required for the recovery.

Maintenance

2-30. 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 MACs 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 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 AVIM level performs all aircraft weight and balance inspections and other special inspections that 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 airframes.

Battle Mission

2-31. 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. An adequate available stock 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 recovery 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.

Stability and/or Support Operations

2-32. During stability operations and/or support operations the AVIM may not be in the same AO as the maneuver aviation unit. This, however, does not significantly alter the mission/operation of the AVIM. The amount of support required for these operations will vary from mission to mission. MSTs may have to be deployed to support the task force, but the same procedures that apply during war operations will apply.

AIRCRAFT RECOVERY AND EVACUATION

2-33. The divisional AVIM may be tasked to assist the AVUM unit with recovery operations. See discussion of AVUM functions in this chapter, Appendix F, and FM 3-04.513(1-513).

AVIATION INTERMEDIATE MAINTENANCE REPAIR PARTS

2-34. Repair parts supply procedures for the AVIM units are in ARs 710-2 and 725-50 and DA Pamphlets 710-2-1 and 710-2-2. The types of loads managed at the AVIM level are Class IX, operational, 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 a record of demands is 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.

2-35. The AVIM company establishes, controls, and operates a Class IX SSA or DSU 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.

DIVISIONAL AVIATION INTERMEDIATE MAINTENANCE MOBILITY

2-36. The doctrinal mobility for the divisional AVIM is the capability of transporting 50 percent of its TOE equipment in one lift, using its organic vehicles. The number of organic vehicles, the requirement to transport large quantities of Class IX, ASL, TMDE, and special tools limits mobility. 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 materials-handling equipment which must, for the most part, be moved by division or area transportation units. The divisional AVIM company/battalion (not DASB) is normally located in the DSA with the DISCOM due to the administrative support it receives. The DASB AVIM company is normally located with the battalion HSC and the DS ground maintenance company in the DSA so it can receive the administrative support it needs from the battalion. However, in both cases the AVIM unit may be required to move with the same frequency as the DISCOM-every 3 to 7 days.

CORPS AVIATION INTERMEDIATE MAINTENANCE OPERATIONS

2-37. The mission of the corps AVIM company is to provide the following support:

- 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.
- RX parts support for divisional AVIM units.
- AVUM/AVIM overflow maintenance support to divisional AVIM units.

EMPLOYMENT

2-38. Four corps AVIM companies are normally assigned to an AVIM AMB, which is organic to the corps support command. The RAS AVIM company is organic to the ACR (located in the support squadron and is not in the corps AVIM maintenance battalion). The employment of the companies is the same as for the division AVIM company except the following:

- They are located in the vicinity of the COSCOM area, either in or adjacent to an instrumented landing facility, depending on METT-TC.
- 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 that exceed AVUM or divisional AVIM capability.
- The corps AVIM company commander answers to the corps AMB who in turn is responsible to the COSCOM commander for all AVIM in the corps (except AVIM company assigned to ACR support squadron).
- The PC element conducts the same functions as in a divisional AVIM but also interfaces with the SPO section of the AMB for aircraft maintenance planning, reporting, compiling, and interpreting data as a basis for AVIM management decisions. Routine daily supply and maintenance actions are coordinated through the AMB SPO to the CMMC aviation Class IX manager or aviation maintenance manager.

AIRCRAFT RECOVERY

2-39. The corps AVIM may be tasked to assist the AVUM unit or divisional AVIM with recovery operations. See discussion of AVUM functions in this chapter, Appendix F, and FM 3-04.513(1-513).

CORPS AVIATION INTERMEDIATE MAINTENANCE AIRCRAFT REPAIR PARTS

2-40. See discussion of aircraft repair parts under paragraph 2-34 above.

MOBILITY

2-41. The doctrinal mobility for the corps AVIM is the capability of transporting 50 percent of its TOE equipment 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 as the divisional AMCO: limited number of vehicles and 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 10 days.

CORPS AVIATION MAINTENANCE BATTALION HEADQUARTERS AND HEADQUARTERS DETACHMENT OPERATIONS

2-42. The HHD is organic to the aviation battalion (AVIM) of the corps and is attached to a CSG for direct support in the areas of supply, ground maintenance, field services, and transportation. The mission of the HHD is to provide AVIM C^2 to the corps aviation brigade by exercising logistics C^2 over its subordinate AVIM companies.

EMPLOYMENT

2-43. The HHD is deployed in the corps support area, normally near the aviation brigade HHC with one or more of its subordinate AVIM companies. It provides C^2 staff supervision of all corps AVIM operations in the corps AOs. The SPO and S3 plan all AVIM support operations and placement of each AVIM company to ensure sustained AVIM operations that will support the corps aviation brigade commander's tactical plan. Tactical considerations for employment of a corps AVIM company is dependent on the following:

- METT-TC.
- Location of the aviation brigade AVUMs that will satellite off each corps AVIM.
- Terrain.
- Airfield locations.
- LOCs (MSRs, ASRs, and communication nets).
- Aircraft type in supported units.

SUPPORT OPERATIONS

2-44. The SPO section provides logistics (maintenance and supply) AVIM C^2 for the corps. The SPO staff includes the OIC, NCOIC, and sections for attack aircraft, utility aircraft, scout aircraft, aircraft subsystems, armament, avionics/electrical, and supply. The SPO interfaces with the CMMC, aviation brigade maintenance officer, aviation brigade S4, corps support group SPO, corps support battalion SPOs, corps AVIM companies, and the theater AVIM unit.

MOBILITY

2-45. The doctrinal mobility for the corps HHD, AMB (AVIM) is the capability of transporting 50 percent of its TOE equipment in one lift, using its organic vehicles. This unit is normally located in the COSCOM support area. It has a requirement to move once every 8 to 10 days.

ECHELONS ABOVE CORPS AVIATION INTERMEDIATE MAINTENANCE OPERATIONS—THEATER SUPPORT COMMAND

2-46. An AVIM company may be assigned to an ASG of the TSC as required. The company is a flexible organization tailored to meet the specific needs of the supported force. The EAC AMCO is employed in the COMMZ. More specifically, it would be located in the vicinity of an instrumented landing facility depending on METT-TC. The remainder of the employment is basically the same as described for the divisional and corps AMCOs.

MISSION

2-47. The purpose of the EAC AMCO is to provide the following:

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

AIRCRAFT RECOVERY

2-48. The EAC AVIM may be tasked to assist the AVUM unit, corps AVIM or divisional AVIM with recovery operations. See discussion of AVUM functions in this chapter, Appendix F, and FM 3-4.513(1-513).

AIRCRAFT REPAIR PARTS

2-49. See discussion of aircraft repair parts under paragraph 2-34 above.

MOBILITY

2-50. The doctrinal mobility for the EAC AMCO is the capability of transporting 50 percent of its TOE equipment 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 EAC AMCO is normally located in the area support group. It is expected to move at least once every 30 days.

SECTION IV – AVIATION DEPOT, THEATER AVIATION MAINTENANCE PROGRAM, AND AVIATION DEPOT MAINTENANCE ROUND-OUT UNIT OPERATIONS

CORPUS CHRISTI ARMY DEPOT

MISSION

2-51. The mission of CCAD is the following:

- Overhaul, repair, modify, retrofit, and modernize aircraft systems and other systems as assigned.
- Maintain a mobilization and training base to provide capability for mission support during any contingency.
- Provide maintenance support services for aeronautical equipment worldwide.
- Provide project development and design service for special projects as assigned.
- Exercise command control over assigned activities.
- Provide worldwide telephone hot line and on-site technical assistance in the inspection, maintenance, and repair of customer aircraft and engines.

EMPLOYMENT

2-52. Depot maintenance is employed primarily in CONUS. However, it projects itself worldwide through maintenance support teams using organic assets and through contract programs.

MOBILITY

2-53. The depot is a fixed-base facility but can project itself as described above.

THEATER AVIATION MAINTENANCE PROGRAM

2-54. Under the AMC, two major subordinate commands, AMCOM and the IOC, developed the TAMP to accomplish the following missions:

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

2-55. The TAMP, as an organization, has many assets which include, but are not limited to: the ADMRU Program, contract field service representatives, logistics assistance representatives, special repair activities, contractor logistics support, engine repair facility, and a TA national inventory control point. When the LSE deploys OCONUS, the ADMRU element, on order, operates the TAMP. The ADMRU includes the ARNG Mobilization AVCRAD Control Element and the four AVCRADs. Tailored elements of the ADMRU are pulled to support LSE requirements in the theater's AO.

AVIATION DEPOT MAINTENANCE ROUND-OUT UNIT PROGRAM

MISSION

2-56. The mobilization mission of the ADMRU program and specifically the four AVCRAD is to:

- Support to CONUS deploying forces.
- Support to deployed forces (Theater Support).

- Provide OCONUS aviation maintenance support for contingency and stability and/or support operations.
- Expand aviation maintenance capabilities of CONUS depots.
- Classify and inspect aviation stocks and components.

ORGANIZATION

2-57. The ADMRU program consists of five TDA, fixed-base organizations that mobilize in place. The MACE is the C^2 headquarters for the four AVCRADs. The MACE is located at the Edgewood Area of Aberdeen Proving Grounds, MD. The four AVCRADs are at Groton, CT; Gulfport, MS; Springfield, MO; and Fresno, CA.

2-58. During premobilization, the National Guard Bureau Aviation Division, through their respective Adjutant Generals, operationally controls the four AVCRADs. They provide aviation maintenance support to the Army National Guard Fleet, the 50 states, the District of Columbia, Guam, Puerto Rico, and the Virgin Islands, on a day-to-day basis. Each AVCRAD supports 13 to 15 states or territories consisting of 500 to 600 aircraft each. Support provided includes the following:

- Back-up AVUM support.
- Back-up AVIM support.
- Limited depot-level maintenance support.

2-59. Upon mobilization, the MACE and the four AVCRADs transfer to AMCOM, a major subordinate command of the AMC. The AVCRADs mobilize in place, initially providing back-up AVIM and limited depot support to deploying FORSCOM aviation units within CONUS.

- As required, the MACE provides liaison to AMCOM, AMC and a supported theater of operations. The MACE can become a fully functioning entity of the HQ AMCOM Staff.
- As required, the AVCRADs provide support to a MTW or a contingency operation for back-up AVIM and limited depot level aviation maintenance.
- As required, the AVCRAD can shift to fully expand the AMCOM aviation capability to provide depot-level maintenance on critical aviation material for AMCOM and AMC in CONUS.
- As required and when necessary, the AVCRADs can be tasked to support the readiness division of a LSE. The LSE would then be deployed to a theater of operation to provide AMC logistics support to include an aviation maintenance slice, supported by the ADMRU. When the LSE deploys OCONUS, the ADMRU element operates the TAMP. As aviation material is retrograded from the battlefield, the LSE classifies and repairs critical aviation components before they enter the CONUS depot pipeline.

MOBILITY

2-60. The AVCRAD are fixed-base, limited depot facilities. The AVCRADs initially mobilize in place. The AVCRADs are capable of deploying to a theater of operations, given enough time for movement to the deployment location. Once mobilized and deployed, an AVCRAD provides its support primarily from a fixed base. The AVCRADs are able to project forward limited, task-organized support using maintenance contact

teams and classification support teams. Transportation within the theater must be provided from non-organic assets.

CAPABILITIES

2-61. The AVCRADs are capable of providing the following support to an MTW, contingency operation or from a CONUS fixed base facility:

- Limited depot level maintenance.
- Back-up AVIM maintenance.
- Back-up AVUM maintenance.
- Capability to manage the theater SFDLR supply channels.
- BDAR.
- ECOD assessments.
- Tailored maintenance contact teams to deploy forward.
- Engine repairs.
- Airframe repairs.
- Welding.
- Main rotor blade repair and balance.
- Composite material repairs.
- Electrical systems repairs.
- Avionics and armament repairs.
- Hydraulic components repairs and manufacture of lines.

Chapter 3

COMMAND, CONTROL, AND COMMUNICATIONS

This chapter covers how aviation commanders, aviation maintenance commanders, and their staffs communicate and control elements of their commands. 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. Planning and supporting elements will need to identify current and future operations to coordinate maneuver and support.

SECTION I – COMMAND AND CONTROL

AVIATION BRIGADE AND/OR BATTALION STAFF

3-1. 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 5-20(101-5). Key functions of S3 and S4 sections are briefly discussed below. The coordination between these sections is critical to aviation maintenance operations.

S3 SECTION

3-2. 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 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 XO in the TOC. The S3 will—

- Integrate fire support.
- Establish communications priorities.
- Maintain the troops list (FM 5-20[101-5]).
- Monitor and control tactical operations.

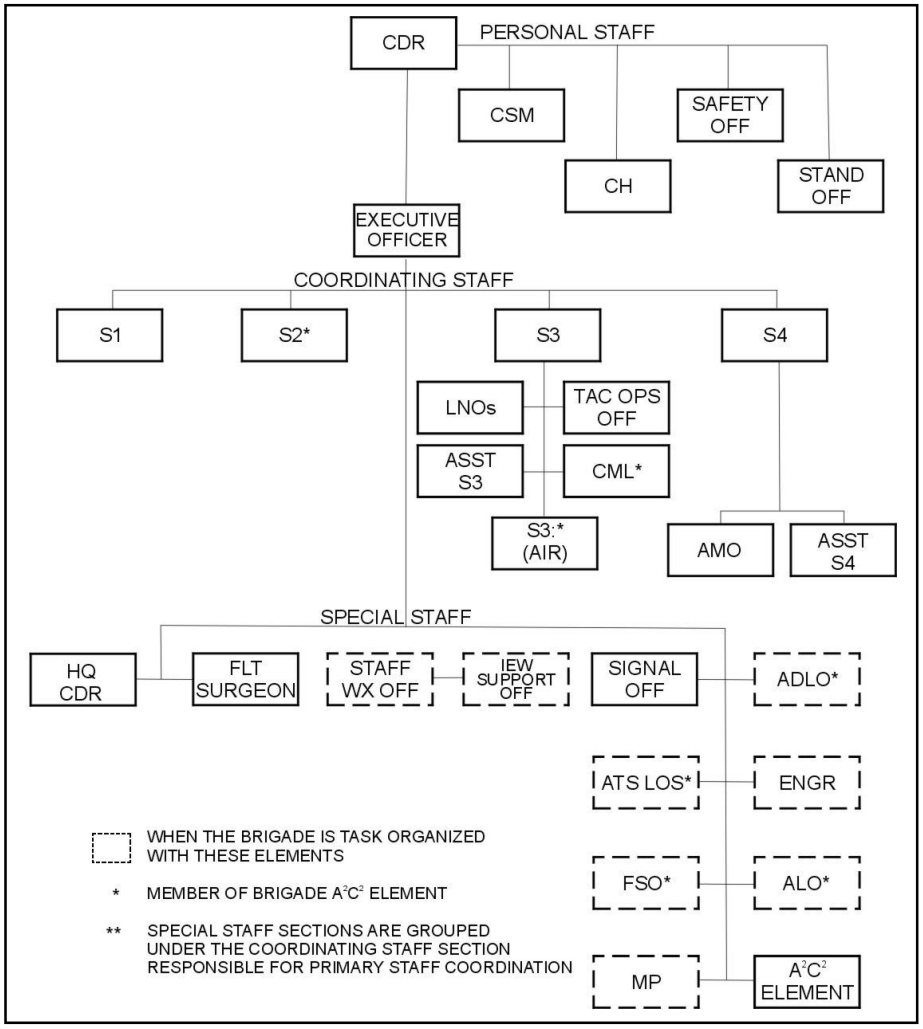


Figure 3-1. Aviation Brigade and/or Battalion Staff Structure

- Coordinate and supervise OPSEC (FM 4-93.1[63-1]).
- Plan and supervise EW activities (FM 2-19.3[34-10]).
- Develop and supervise training programs (FM 5-20[101-5]).
- Plan and supervise psychological operations (FM 4-93.1[63-1]).
- Develop and supervise deception requirements (FM 2-19.3[34-10]).
- Predict fallout from nuclear weapons (FM 3-11.3[3-3]).
- Select the general location for the TOC or CP.
- Prepare the tactical movement plan and supervise movements.
- Coordinate and supervise the rear operations area.
- Prepare operation estimates (FM 5-20[101-5], Chapter 5, and Appendix E).
- Coordinate unit replacements, attachments, or detachments (FM 5-20[101-5]).

- Coordinate and control civil-military operations (FM 3-57[41-10] and FM 5-20[101-5], Appendix A).
- Coordinate and publish OPLANs, OPORDs, and FRAGOs (FM 5-20[101-5], Chapters 6 and 7, and Appendix G).
- Advise the commander on combat and CS matters and on organization and training (FM 5-20[101-5]).

S4 SECTION

3-3. 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 logistics 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 brigade support area and with the S1 in the ALOC. In a heavy division, the S4 coordinates with the DASB SPO for all DS support. In divisions other than heavy, the S4 coordinates DS with the main support battalion SPO or the DISCOM SPO. The corps aviation brigade S4 coordinates with the corps support battalion SPO operating in the CSA. The S4 will—

- Plan field services.
- Maintain supply status.
- Plan and control administrative moves.
- Maintain maintenance status.
- Plan maintenance requirements (FM 4-93.3[63-3]).
- Plan and coordinate transportation requirements (FM 4-93.3[63-3]).
- Prepare logistics estimate (FM 5-20[101-5], Appendix E).
- Determine civilian labor requirements for logistics support (FM 5-20[101-5]).
- Collect and dispose of excess property, salvage, and captured material (FM 5-20[101-5]).
- Prepare logistics orders, plans, annexes, and paragraph 4 of OPORD or OPLAN (FM 5-20[101-5], Chapters 6 and 7, and Appendix G).

COMMAND POSTS

3-4. Aviation logisticians must know the organization and structure of aviation CPs, especially the rear CP. Figure 3-2 shows a typical C^2 network for the aviation brigade. The network will be modified to meet the situation. The brigade rear CP coordinates the CSS 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 AO.

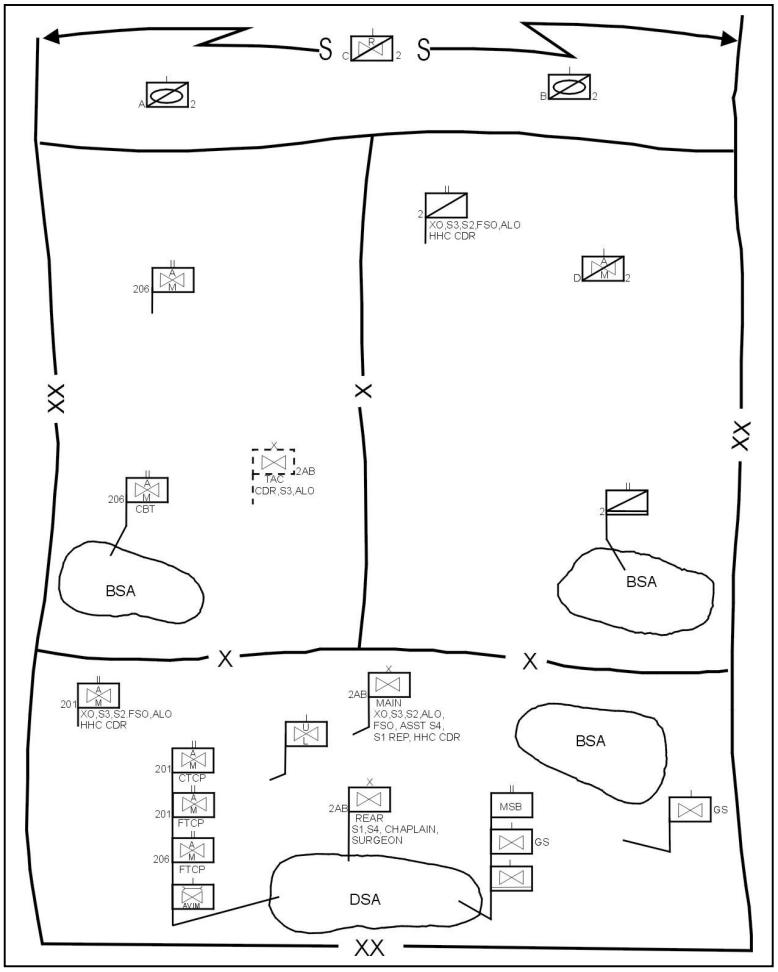


Figure 3-2. Typical Aviation Brigade Command and Control Network

3-5. 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. Refer to Figure 3-2 for a typical arrangement of the rear area.

SUPPORTING COMMANDS AND STAFFS

3-6. The responsibilities, functions, and relationships of support commanders, their staffs, and subordinate commanders are discussed in general in the following paragraphs. Specific details are provided in appropriate chapters of this manual or in other doctrinal FM identified in this manual.

AVIATION INTERMEDIATE MAINTENANCE BATTALION/COMPANY COMMANDER

3-7. The AVIM battalion/company commander performs the following duties:

- Advises and assists the TSC, COSCOM, or DISCOM commanders and staff on AVIM operations.
- Has oversite and responsibility for planning, executing, and evaluating all AVIM training according to FM 7-10(25-101).

- Advises and assists the support commander and staff in determining requirements for AVIM operations and support.
- AVIM material management is coordinated with the DMMC, CMMC, or TSC MMC.
- 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 aviation brigade or aviation taskforce commander and staff on AVIM operations that the AVIM battalion/company will support.

3-8. On routine matters, this officer may be 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 AVIM battalion/company commander must inform the support commander of all commitments made. See Appendix I for aviation maintenance commander's checklist.

COMMAND RELATIONSHIPS (AVIM CO/BN, DASB, AND AB)

3-9. While the AVIM CO/BN or DASB provide AVIM support to the AB, they remain under the command of the support commander (Figure 3-3). They give priority to AVIM support required by the AB. In this role the AVIM CO/BN or DASB—

- 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 (DISCOM OR COSCOM) AND AVIATION BRIGADE COMMANDER

3-10. 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.

3-11. The support commander provides the AB commander with AVIM support through the AVIM CO/BN or DASB. This includes aircraft armament and avionics repair, aircraft repair parts supply, and aircraft recovery and evacuation. The AVIM CO/BN or DASB also operates an aviation repairable exchange and maintains operational readiness floats for selected aviation items.

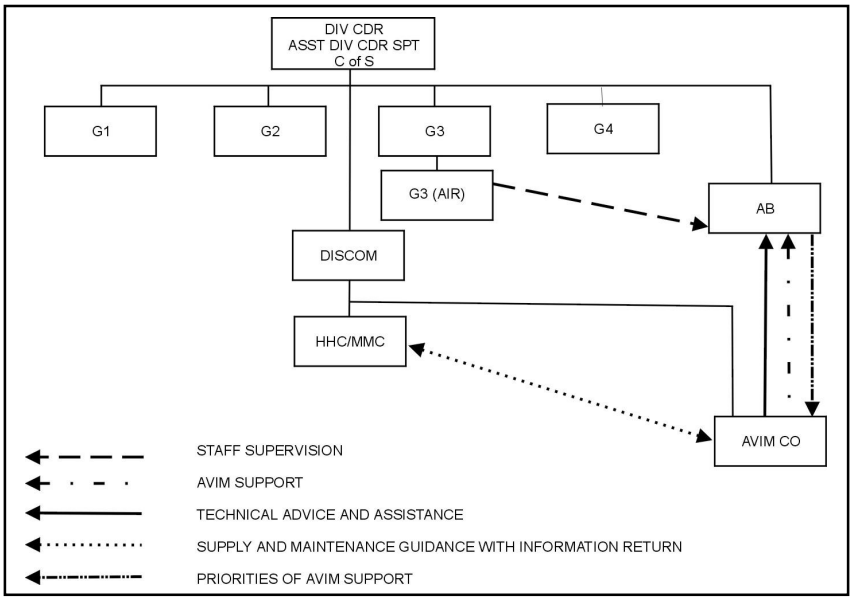


Figure 3-3. Division Support Command Relationships

3-12. The AB AMO is the principal staff officer for the AB commander in matters of aircraft maintenance. AVIM CO/BN or DASB PC officers and SPOs routinely provide advice and assistance to the AB AMO. As the aircraft maintenance planner, the AB AMO maintains close, continuous coordination with AVIM CO/BN or DASB PC officers and SPOs. The AB AMO is the focal point for planning and coordinating aircraft maintenance support for the AB within the AB commander's priorities and allocation of support. The AVIM CO/BN or DASB provides AVIM according to priorities set by the AB commander.

3-13. The AB commander must ensure that the AB AMO works closely with the support command's SPO or AVIM PC for AVIM planning and execution.

3-14. Technical advice and assistance are available to the AB AMO from the AVIM CO/BN or DASB SPOs and PC officers to assist in planning AB aircraft maintenance operations. Similarly, AVUM units can obtain technical advice and assistance from the AVIM CO/BN or DASB to execute plans developed by the AB AMO.

3-15. AB AVUM units have a day-to-day working relationship with the AVIM CO/BN or DASB PC officers. The AVIM PC officers routinely keep the AB AMO informed of their respective AVUM workloads. In this manner, the AB AMO always knows the aircraft maintenance posture of the AB.

3-16. The AB employs its aviation assets throughout the entire division or corps AO. AB elements, therefore, require area support of logistics and medical functions while supporting the division or corps commander's intent or scheme of maneuver. This area support requires close coordination between the support command and the AB. For example, the heavy division AB and its subordinate battalions receive their DS CSS from the DASB. In divisions other than heavy, the AB and its subordinate battalions receive their DS CSS from the main support battalion in the DSA. In some situations within the division AO, an attack or lift battalion may receive their DS CSS from a FSB in a nearby BSA. The divisional cavalry squadron usually receives its DS support from the closest

FSB and AVIM support from an AMCO or DASB in the DSA. In the corps AO, the corps AB and its subordinate aviation battalions receive their DS CSS from a supporting DS CSB. The ACR air squadron operating in the division AO receives its DS CSS from a CSB or from corps MSTs tailored to meet its needs in the forward areas.

3-17. The divisional AB XO or S4 usually coordinates with the MSB or DASB SPO for DS logistics support. The corps AB XO or S4 coordinate with the CSB SPO for DS logistics support.

3-18. The division or corps commanders, through their G4s, establish CSS priorities for all brigade size units. The most critical logistics functions for the aviation brigades are FIX (aircraft maintenance, recovery, and evacuation), fuel (Class III), and armament (Class V).

SECTION II – COMMUNICATIONS AND/OR DATA

COMMUNICATIONS

3-19. 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, e-mail, cordless telephones, and visual communications. Although all of these may be 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 C^2. 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 TOE.

NETWORKS

3-20. Effective, reliable communications are essential for commanders and their staffs to C^2 their assets. Communications are composed of external nets and internal nets, including telephone systems.

External

3-21. Personnel with aviation logistics responsibilities and functions access the communications system through—

- Multichannel radio.
- Single-channel radio, including AM and FM.
- NRI.
- Mobile Subscriber Equipment.
- Messenger.
- Command and/or 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 and/or Logistics. 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; the echelon G2 controls it. The net is used for passing intelligence data and as a backup for the command net.
- Operations high-frequency (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.
- Operations FM or improved high-frequency radio. This net is used to pass orders and information to control rear operations. The NCS of this net is the rear area operations center. This net structure will extend from existing nets below brigade level.

Internal Radio

3-22. Internal radio nets are established and controlled by the parent element (battalion controls companies; company controls platoons). They meet command, control, and logistics requirements within the organization and its subordinate units.

3-23. **Command and/or 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.

3-24. **Administrative and/or Logistics.** The S1s, S4s, CEOs, and AMCOs enter this FM net. The net is used to exchange administrative or logistics requests with subordinate units.

3-25. **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 (multi-channel) provides necessary communications from the AMCO to the DISCOM and AB switchboards.

AUTOMATIC DATA PROCESSING CONTINUITY-OF-OPERATIONS PLAN

3-26. Specific guidance for each functional computer system is in the user's manual for the system. These manuals require the development of COOP. The developer of a COOP will usually consider threat and risk analysis; work load priorities; protection of files, programs, and documentation; and alternate site operation.

THREAT AND RISK ANALYSIS

3-27. 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

3-28. 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. In addition, note that turnaround time will be longer and user missions may change.

PROTECTION OF FILES, PROGRAMS, AND DOCUMENTATION

3-29. There should be at 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

3-30. The use of compatible automatic data processing equipment 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.

3-31. 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

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 experienced managers who understand the complexities of the Army's aviation assets and the value of these assets to battlefield mobility must operate an effective maintenance program.

SECTION I – MAINTENANCE MANAGEMENT PHILOSOPHY

GENERAL

4-1. 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

4-2. 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 CS. 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.

4-3. 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

4-4. 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 are the following:

- Each commander is responsible for the maintenance of equipment issued to the unit.
- Maintenance is accomplished at the levels prescribed by MAC and TMs. It is preformed at the lowest level consistent with the tactical situation, skill, time, repair parts, tools, and test equipment.
- 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.
- 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 to return the gaining end item to serviceable condition.
- Repairs are made under the OCM concept at all categories of maintenance (see TM 1-1500-328-23). 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 SOF. 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.

PUBLICATIONS AND REGULATIONS

4-5. 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. Technical publications provide guidance on use and operation of equipment and accessories. These publications include TMs, TBs, lubrication orders, and MWOs. They have specific instructions on the operation, maintenance, repair, modification, serviceability standards, testing, storage, issue, and inspection of equipment. The QC 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 QC section should obtain and use those regulations that pertain to maintenance operations. DA Pam 25-30 lists all applicable regulations.

MAINTENANCE RECORDS

4-6. 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. The ULLS-A provides an electronic means of completing maintenance forms and records. ULLS-A is now the primary means of aviation maintenance management (see Appendix A).

METHODS OF PERFORMING MAINTENANCE

Crew Chief

4-7. 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

4-8. 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

4-9. 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 fixed location.

LOGISTICS PREPARATION OF THE THEATER

4-10. The logistics preparation of the theater 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 to be prepared for any maintenance situation that may affect his unit’s maintenance posture. Areas that should always be addressed are aircraft recovery, AMCPs, Class IX resupply, BDAR, and responsibility.

AIRCRAFT RECOVERY AND EVACUATION

4-11. 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. (Appendix F of this manual and FM 3-04.513(1-513) further discuss recovery operations.)

AIRCRAFT MAINTENANCE COLLECTION POINTS

4-12. A maintenance collection point is a point established to collect equipment awaiting repair, controlled exchange, cannibalization, or evacuation. The lowest level a maintenance 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.

CLASS IX RESUPPLY

4-13. 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 Class 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

4-14. BDAR can be divided into two separate but mutually supporting functions—battlefield damage assessment and battle damage repair.

Battlefield Damage Assessment

4-15. 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.

Battlefield Damage Repair

4-16. 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—

- 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.

4-17. BDAR teams must be trained, equipped, and organized before the start of any aircraft mission.

RESPONSIBILITY

4-18. The S4 is the primary logistic manager for an organization. For this reason, close coordination must be maintained with the S4. The maintenance officer, however, is responsible for the aircraft maintenance program and needs to ensure that all aspects of aviation maintenance have been considered before any operation.

SECTION II – MAINTENANCE MANAGEMENT FUNCTIONS

AVIATION UNIT MAINTENANCE/AVIATION INTERMEDIATE MAINTENANCE PLATOON/SECTION DUTIES

PRODUCTION CONTROL

4-19. 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 PC section will—

- Act as single point of contact for their unit or 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.
- Coordinate with the flight companies/platoons and flight operations on scheduling of aircraft to meet mission and training requirements.
- Monitor the progress of work in the various maintenance sections to ensure a balanced workload.
- 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 QC elements.
- Monitor management of the aircraft PLL and other repair parts.
- Monitor the operation and maintenance of power generation and ground support equipment.
- Monitor aircraft time-change component schedule to ensure replacement components are ordered according to flying-hour requirements.
- Supervise the controlled exchange program. (Note: The commander or his designated representatives are the only individuals authorized to approve controlled exchanges.)
- 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) or computerized equivalent and the in-progress file.
- Maintain the PC board according to the unit's procedures. (See Appendix D for additional information on the PC 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

4-20. QC activities complement those of PC. QC management is coordinated with all phases of PC management to ensure maximum productivity. Properly designed QC procedures can ensure an acceptable level of quality while reducing inspection requirements and management efforts. However, QC 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 QC element are to—

- Establish and maintain a complete technical reference library for assigned or supported aircraft and systems.
- Ensure all maintenance sections maintain a technical data familiarization chart for their section's maintenance personnel.
- Inspect the accuracy of equipment records required by DA Pam 738-751. This responsibility includes the proper use, preparation, and disposition of these records.
- Ensure full participation in the PQDR program.
- Monitor the application of MWO.
- Ensure compliance with the AOAP.
- Monitor and maintain the aircraft time-change component schedule and ensure that PC is given adequate notice (100 flight hours for time change, 2 months for calendar change) of upcoming component-change requirements.
- Review and update all shop standard inspection procedures files to incorporate new inspection techniques and to establish procedures for new equipment.
- Monitor nondestructive inspections of aircraft components and airframe structural members as described in TM 55-1500-335-23.
- Establish and maintain calibration schedules for TMDE (see Appendix K).
- Perform required technical inspections of aircraft, components, and related systems.
- Inspect all areas where aircraft maintenance is performed to ensure that maintenance operations are completed in a safe manner.

4-21. 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 ELEMENT

4-22. 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

4-23. To effectively perform its mission, the aircraft maintenance section must perform the following scheduled maintenance tasks:

- Perform scheduled phase/periodic maintenance inspections assisted by the crew chief and aircraft component repair section personnel.
- Comply with SOF or unit-level TBs requiring onetime or recurring inspections of aircraft in coordination with the QC element.
- Perform operator maintenance on GSE assigned to the section.

Unscheduled Maintenance

4-24. 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 UH-60 main module. 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

4-25. Minor faults noted during daily inspections that do not affect mission readiness or the safe operation of the aircraft may be deferred until the next scheduled inspection. The more faults deferred, however, the more delays when the aircraft receives scheduled maintenance. Minor faults deferred due to shop backlog or awaiting replacement parts will be reentered from DA Form 2408-13-1 (Aircraft Maintenance and Inspection Record) or DA Form 2408-13-3 (Aircraft Technical Inspection Worksheet) to DA Form 2408-14-1 (Uncorrected Fault Record [Aircraft]) 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

4-26. Aircraft maintenance element personnel may also provide maintenance support teams as required and assistance in maintaining GSE.

SHOP SECTION/COMPONENT REPAIR

4-27. 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 the power plant section, structural repair section, pneudraulic section, avionics section, electrical section, armament section, and power train section.

Power Plant Section

4-28. MOS 68B personnel in this section service and repair power plants. They perform the following duties:

- 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, TMs, and safety procedures.
- Assist in troubleshooting engines and rigging engine controls.
- Assist with maintenance operational checks.

Structural Repair Section

4-29. MOS 68G personnel in this section repair and maintain airframes. They perform the following duties:

- 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 and 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, TMs, 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

4-30. MOS 68H personnel in this section maintain, repair, and troubleshoot pneudraulic systems. They perform the following duties:

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

Avionics Section

4-31. MOSs 35L, 35R, 35Q, 35P, 68N, 68S, and 68Y personnel in this section service and maintain avionics systems. They perform the following duties:

- Make operational checks and adjust avionics 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, ICS, and antennas.
- Use portable and shop equipment for installation, radio-frequency power output measurements, alignment, and adjustment.

Electrical Section

4-32. MOSs 68F, 68S, 68X, or 68Y personnel in this section maintain, repair, and troubleshoot aircraft electrical systems. They perform the following duties:

- 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

4-33. MOSs 68S, 68X, or 68Y personnel in this section maintain and service armament systems for attack helicopters. They perform the following duties:

- Ensure that weapons are rendered safe.

- Remove, install, disassemble, and assemble fire-control system electrical and electronic components and subsystems according to TMs, 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 fire-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, TMs, 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.
- 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.

Power Train Section

4-34. MOS 68D personnel in this section repair and maintain power train and rotor systems. They perform the following duties:

- 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 TMs, 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 all required nondestructive inspections on selected aircraft components and related items.

AVIATION UNIT MAINTENANCE RESPONSIBILITIES

4-35. 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

4-36. 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 the following:

- 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.
- The pilot and crew chief perform a thorough postflight check or inspection 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 2408-14-1 is checked for delayed faults that can be corrected during the available downtime.
- DA Form 2408-18 (Equipment Inspection List) 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, 2408-13-2 (Related Maintenance Actions Record), 2408-13-3, and 2408-14-1 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 knowledge of the aircraft, 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/periodic inspection is due. If it is within the inspection windows given in TM 1-1500-328-23, 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 is completely familiar with aircraft TMs and with 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.

4-37. 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.

COORDINATION OF AIRCRAFT SCHEDULING FOR MISSIONS

4-38. A close working relationship between maintenance, operations personnel, and flight company commanders is essential to aviation units. PC works with the flight company platoon leaders/sergeants, operations personnel, and flight company commanders to provide tail numbers of mission-capable aircraft to be used each day to complete assigned missions. PC may give block times (hours) to be flown on assigned aircraft and let the commander assign tail numbers to missions. The PC officer, operations personnel, and flight company commanders work together in resolving problems that arise in meeting daily mission requirements. Aircraft requiring BDAR may cause fluctuations in availability. Frequent updating, however, will help to smooth scheduling and ensure support of maneuver elements.

AVIATION INTERMEDIATE MAINTENANCE RESPONSIBILITIES

4-39. AVIM units are responsible for providing AVIM level maintenance as well as back-up AVUM 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

4-40. 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 for turn-in of equipment 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 commanders to better plan and manage unit maintenance.
- The supporting unit commanders to program and manage the support work load, anticipate repair parts requirements, and request assistance when needed.
- The supported unit commanders to predict more accurately the availability of operational equipment over a sustained period.

TIME LIMITATIONS

4-41. 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 workloads 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

4-42. 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 TBs developed by the FSC group for end items and selected repair parts and assemblies, and in pertinent SBs dealing with repair and serviceability criteria. Maintenance standards are also in technical publications pertinent to the items of equipment involved.

4-43. Before an unserviceable item is repaired, a classification inspection may be made to determine maintenance man-hour reparability. 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 AMCOM 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.

4-44. 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. For additional details on man-hour determination and application of repair limits, refer to AR 750-1.

SHOP OPERATIONS

4-45. 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.

WEIGHT AND BALANCE

4-46. 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 95-1, TM 55-1500-342-23, the aircraft operator's manual, and the aircraft maintenance manual for information. Specific weight and balance data are 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.

AVIATION INTERMEDIATE MAINTENANCE PRODUCTION METHODS

4-47. 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

4-48. 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

4-49. 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.

OPERATIONAL READINESS FLOAT AIRCRAFT

4-50. 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 AVIM 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. The equipment not included on the

aircraft BIIL is maintained by separate accountability. TOE weapons systems and COMSEC equipment will be removed before exchange.

4-51. The MACOM commander will establish criteria for providing an ORF aircraft to a unit. The 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.

SECTION III – AIRCRAFT MAINTENANCE

SCHEDULED AIRCRAFT MAINTENANCE

4-52. Scheduled aircraft maintenance includes PMCS, which cover inspections, services, testing, classification, and special scheduled inspections. 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.

4-53. Several types of inspection methods are used on Army aircraft. These methods include phase maintenance, progressive phase maintenance, combat phase maintenance, periodic, and combat periodic inspections. Most Army aircraft are also subject to special recurring inspections. All of these methods fall under the aircraft preventive maintenance system. (See TM 1-1500-328-23 for specific details on the preventive maintenance system.)

PHASE MAINTENANCE INSPECTION METHOD

4-54. The phase maintenance inspection method is the most used maintenance inspection system. The two elements included in this method are the phase maintenance inspection and the preventive maintenance daily or preventive maintenance service.

Phase Maintenance Inspection

4-55. The PM inspection is a thorough inspection, which includes partial disassembly of the aircraft. 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 Table 4-1. (See the applicable TM for current cycles.)

Preventive Maintenance Daily/Preventive Maintenance Service

4-56. The PMD is a daily inspection, which 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 under this system 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 TM. The removal of cowling and inspection plates should be

Table 4-1. Examples of PM/PE/PPM Inspection Times

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	1,000
CH-47	4	200	800
UH-1H/V	6	150	900
OH-58A/C	4	300	1,200
OH-58D	THIS AIRCRAFT IS ON THE PPM INSPECTION SYSTEM		
UH-60	THIS AIRCRAFT IS ON A 500-HOUR PE INSPECTION SYSTEM		

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 air-worthy until this inspection is completed and noted on DA Form 2408-13-1.

4-57. A PMS inspection is similar to a PMD inspection. Instead of being due after the last flight of the mission day, this inspection is due when a specified number of flight hours or calendar days elapses. The complete requirements for this inspection are in the applicable aircraft TM.

PROGRESSIVE PHASE MAINTENANCE METHOD

4-58. The PPM 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. Aircraft checklist inspection requirements are distributed into equalized checklist sections, which together constitute a complete PPM cycle. Specifics of checklist use, completion, and disposition are in the applicable aircraft PPM TMs. An automated aircraft maintenance management system complements the effectiveness of PPM. (See TM 1-1500-328-23 for a more detailed discussion of PPM)

PERIODIC MAINTENANCE METHOD

4-59. The two elements included under the PE inspection method are the PMS-1 and the PMS-2. (Do not confuse these with the PMS of the phase maintenance method.)

Preventive Maintenance Service-1

4-60. The PMS-1 is a 10-hour/14-day inspection like the preventive maintenance daily of the phase maintenance method. It entails a visual inspection with some operational checks. The aircraft is not disassembled, although some inspection panels and screens are removed. The primary difference between the PMS-1 and a PMD is when the inspection is due. A PMS-1 is completed after completion of 10 flight hours or 14 days (which ever comes first).

Preventive Maintenance Service-2

4-61. The PMS-2 is a thorough inspection of the aircraft like the phase maintenance inspection. It requires some disassembly of the aircraft. Unlike the phase maintenance inspection, the inspection requirements of the PMS-2 stay the same each time.

COMBAT PHASE MAINTENANCE OR COMBAT PERIODIC INSPECTION

4-62. During combat operations, the unit commander has the option of completing a CPM or CPE inspection instead of a standard PM/PE 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. They will be performed according to TM 1-1500-328-23.

SPECIAL RECURRING INSPECTIONS

4-63. Special recurring inspections occur at specific aircraft hours and/or calendar dates. 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 TM. They are written up as due and signed off on a DA Form 2408-13-1. After completion, the DA Form 2408-18 in the individual aircraft logbook is updated with the next due time or date.

UNSCHEDULED AIRCRAFT MAINTENANCE

4-64. Unscheduled aircraft maintenance includes unscheduled special inspections and unforeseen work requirements.

UNSCHEDULED SPECIAL INSPECTIONS

4-65. These inspections are required due to specific incidents such as hard landings, overspeeds, sudden stoppage, ASAM, or SOF messages. These special inspections are required by the aircraft -23 TM or by TWX notification. Normally, these inspections ground an aircraft and must be performed before the next flight or before a specific date or aircraft time.

UNFORESEEN WORK REQUIREMENTS

4-66. 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 workload. When planning a maintenance task, the maintenance officer and PC personnel must realize that these requirements are difficult to control. Flexibility in response is the key to achieving unforeseen requirements effectively.

TENETS OF PHASE AND/OR PERIODIC INSPECTIONS

PLANNING

4-67. The AVUM PC officer determines which aircraft will be scheduled into phase next. He establishes a workflow based on known phase/periodic 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.

4-68. 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 FHP for each specific type of aircraft assigned by the aircraft phases or periodic inspection interval. Example: UH-60 FHP = 6,000. 6,000 divided by 500 equals 12 periodic inspections. Without preplanning, simple tasks can delay availability. The following factors 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.
- Non-related duties. Crew chiefs and repairers must maintain proficiency in common and collective soldier tasks. They may also get tasked for guard duty or other details.
- 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-TC and the organizational setting. In some cases, just one key resource (over-head hoist or a test set) may bottleneck a phase inspection. At the other extreme, completing deferred maintenance may require many resources, most of which are available in fixed, limited amounts. Scheduling activities so that resource availability is not exceeded and priorities are not violated is exceedingly difficult for most PM/PE 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, technical inspector, facilities, components, test equipment, 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/AVIM support to perform phase maintenance inspection.

PREPARATION

4-69. 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.
- Remove all articles from interior of aircraft to include mission equipment, passenger seats, manuals, and soundproofing.
- Clean aircraft.
- Complete an inventory to ensure accountability of equipment.

4-70. The aircraft is now ready for phase inspection. The PC officer should ensure all necessary tests and GSE are available.

COORDINATION

4-71. Internal coordination between PC, QC, shops, tech supply, the aircraft crewchief, and the phase team is crucial to ensure a smooth work flow during a phase inspection. PC must coordinate any external support required.

PERSONNEL

4-72. 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. A maintenance element within the AVUM 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.)

4-73. Subsystems repair personnel must be scheduled for optimum use. During the phase maintenance inspection, MOS 68 repairers complete separate work requests. A TI should be assigned as the phase TI and inspects repairs while work is in progress.

WORKLOAD OPTIONS

4-74. When a phase maintenance inspection falls behind, the following 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 workload.

- Reduce nonproductive time. Exempt phase team members from other duties during the inspection. Reduce maintenance distracters such as equipment shortages or insufficient publications.
- Extend hours of operation. This may include establishing a night shift.
- 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.

ORGANIZED APPROACH

4-75. The PM/PE inspection should be completed in a systematic matter. This includes an initial inspection, in-progress inspections, and a final inspection.

Initial Inspection

4-76. Only those panels/components necessary to complete the inspection should be removed. The crew chief and/or maintenance personnel inspect the entire aircraft, using the current phase checklist, and enter all faults identified in the phase book. This process may take several hours or days 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. If any discrepancy requires a repair part not on hand, the part should be ordered immediately.

In-Progress Inspections

4-77. During the phase, work requiring technical inspections should be inspected as soon as practical following work completion. Deferring in-progress inspections until the end of the PM/PE inspection can result in delays. Discrepancies are often discovered that require unavailable parts or components to be removed for repair.

Final Inspection

4-78. Once the phase is completed, a final inspection will be performed. When the final inspection is complete, the logbook is closed out, historical records updated, and the aircraft made ready for operational checks and test flight. If possible, the same test pilot that performed the prephase test flight should perform the postphase test flight.

SECTION IV – REPORTS AND ESTIMATES

REPORTS

4-79. Maintenance reports provide information for identifying readiness deficiencies, fixing those deficiencies, and sustaining readiness improvement.

LOCAL UNIT DAILY AIRCRAFT STATUS REPORT

4-80. 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 report to determine daily work priorities by identifying aircraft on red-X status and other critical requirements such as part shortages or time constraints. Second, PC personnel may use the report for

information, together with the PM/PE 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 (Daily Aircraft Status Record).

4-81. 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 4-1 for a sample of a typical unit daily aircraft status report.

DAILY AIRCRAFT STATUS REPORT
DATE 12 Mar 99 PLATOON 2nd

ACFT TAIL NUMBER	TOTAL ACFT HRS	STATUS	HRS TO SERVICE	HRS TO PHASE	
878	1998	X	—	—	PMS 2 66% COMPLETE
973	1345	/	5	155	
975	1509	/	14	491	
278	1227	⊗	23	273	REST FROM NIGHT FLIGHT
073	1866	/	9	134	

SAMPLE

Figure 4-1. Sample Daily Aircraft Status Report

AIRCRAFT MATERIAL READINESS REPORT

4-82. Units using the ULLS-A system use the management tools and the AMSS of ULLS-A for tracking aircraft status and monthly reporting of operational data. Organizations and activities not using ULLS-A 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 (Army Aircraft Inventory, Status and Flying Time). 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 AR 700-138.

4-83. The general objective of aircraft readiness is to achieve a 75-percent FMC goal at all times. There is, however, a wide divergence in complexity and logistic supportability of aircraft systems by MDS and by priorities given to units. Therefore, certain readiness goals are not prescribed at 75-percent FMC. Normally, 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.

MISSILE MATERIAL READINESS REPORT

4-84. Units owning tactical missile systems and subsystems, such as HELLFIRE or TOW, 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 [LRA]) for systems having NMC time during each reporting period. The daily missile material condition status report work sheet is used to track missile system NMC time and prepare DA Form 3266-1 (Army Missile Material Readiness Report) at the end of the report period. Detailed procedures for preparing missile status forms are in Chapter 4, AR 700-138.

ESTIMATES

4-85. Performance estimates aid in planning to meet future maintenance requirements. 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

4-86. One of the most significant areas that a unit maintenance manager at all levels faces is use of manpower. Maintenance managers must devise a simple yet informative means of tracking unit manpower with minimum assistance. Figure 4-2 shows one way that management personnel can track unit man-hours. Table 4-2 shows computation formulas for man-hours.

NAME:_____ MONTH/YEAR:_____

MAN HOUR DATA SHEET
SECTION I PRODUCTIVE TIME
(DATE)

SEC/DIV/DIR:_____ DUTY POS:_____

TASK (REG TIME/OT)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.															
2.															
3.															
4.															
5.															
6.															
7.															
8.															
TOTAL PT															
SECTION II - NON PRODUCTIVE TIME															
1. ANNUAL LEAVE															
2. SICK/QTR/HOSP															
3. TDY (NONMISSION)															
4. MIL TNG / DETAIL															
5. OTHER															
6.															
7.															
TOTAL PT															

SECTION I - PRODUCTION TIME (CONTINUED) (DATE)

TASK #	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	TOTAL REG	TOTAL O/T
1.																		
2.																		
3.																		
4.																		
5.																		
6.																		
7.																		
8.																		
TOTAL																		
SECTION II - NONPRODUCTIVE TIME (CONTINUED)																		
1. AL																		
2. SL																		
3. TDY																		
4. TNG																		
5. OTHER																		
6.																		
7.																		
TOTAL																		

SECTION III - PERSONNEL WRAP UP AS OF: PER CAT: CLK/ PROF/ SUPR/

ASSIGNED: OFF/ WO/ ENL/ CIV/ TOTAL OTHER: OFF/ WO/ ENL/ CIV/ TOTAL

Figure 4-2. Sample Form for Tracking Unit Man-Hours

Table 4-2. Computation Formulas

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, month, etc.)

CATEGORIES OF MAN-HOURS

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

UNIT EFFICIENCY

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

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, month, etc.)
P = Percentage of time personnel are available
(available man-hours as a percentage of assigned man-hours)
E = Percentage of productive effectiveness
C = Capability

ASSIGNED MAN-HOURS

4-87. 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). Assigned man-hours exclude supervisory personnel. The total number of assigned man-hours can be broken down into one or more of four categories—direct productive, indirect productive, nonproductive available, and nonproductive nonavailable.

Direct Productive

4-88. 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, workload factor, or against a group of products without undue effort or expense.

Indirect Productive

4-89. These are man-hours used for the normal performance of maintenance tasks. They 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 FOD checks. These man-hours cannot be credited against a particular work unit without undue effort or expense.

Nonproductive Available

4-90. These man-hours 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

4-91. These man-hours 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

4-92. 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 MOS with another 68-series MOS. It is important to remember that supervisory personnel are not counted when computing man-hours.

PRODUCTIVE EFFECTIVENESS

4-93. To more accurately portray the effectiveness of those available for work, subtract the nonproductive, nonavailable, 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.

4-94. The percent of direct productivity indicates the productivity of assigned workers, while the percent of productive effectiveness indicates the productivity of those available for work.

FLYING-HOUR PROGRAM

4-95. The Department of the Army has developed a worldwide flying-hour program for preparing budgets and planning aircraft logistics support. To estimate the number of maintenance man-hours needed to support your unit's flying hour program, use the following formulas:

Maintenance Man-Hour-to-Flight-Hour Ratio

4-96. In AR 71-32, 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/AMSS Report). Direct productive man-hours must be accounted for by whatever data collecting means the unit devises.

Monthly Maintenance Man-Hour Requirement

4-97. 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. In addition, man-hours expended in the field will differ from those expended in garrison or at a fixed facility.

MAINTENANCE MAN-HOUR CAPABILITY

4-98. 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.

4-99. 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).

4-100. 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.

4-101. 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).
- 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.

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 maintenance activities.

SECTION I – MISCELLANEOUS ACTIVITIES

ARMY WARRANTY PROGRAM

5-1. 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 (Maintenance Request) and DA Form 2407-1 (Maintenance Request-Continuation Sheet) to file warranty claim actions. AR 700-139 governs the warranty program.

5-2. Aviation components covered by the Army warranty program require special handling during the warranty period to keep the warrant valid. Details concerning warranty provisions are published in supply letters. The WARCO or 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

5-3. The AOAP is an Army-wide 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 QC section normally oversees day-to-day operations of the program.

GROUND SUPPORT EQUIPMENT

5-4. 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 equipment (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 must learn to maintain the equipment through an on-the-job training program.

AUTHORIZATION

5-5. The primary documents allocating GSE are TOEs, MTOEs, and TDAs (TOEs are requirements documents and MTOEs are authorizations documents). The MTOE lists equipment authorized for each section by paragraph and LIN. A recapitulation table shows totals of equipment listed in the MTOE 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 MTOE. 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 TM for that aircraft. For a complete authorization of GSE, one must consult the unit's MTOE 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

5-6. AR 710-2 states that, as a minimum, all property will be inventoried annually. Accountability will include procedures from the SPBS-R. Inventories should be conducted periodically. Mechanics or supervisors will inventory sensitive items and toolboxes at least monthly using the property book or hand receipts and appropriate supply catalogs. Mechanics' toolboxes should be inventoried after each maintenance task to help control FOD.

FORMS AND PUBLICATIONS

5-7. 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 the followingECC:

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

5-8. 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, TBs, TMs, and supply catalogs.

REPAIR PARTS AND SUPPLY

5-9. Units must maintain a PLL for GSE as specified in the appropriate TMs. Each unit is responsible for preparing its PLL and providing a copy to the supporting activity.

5-10. 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 units 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.

GROUND SUPPORT EQUIPMENT STORAGE

5-11. 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 not used for over 90 days must be processed for storage, then reprocessed when removed from storage. (See TM 1-1500-204-23-9.)

MAINTENANCE

5-12. 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 1-1500-204-23-9 provides criteria and technical data for serviceability inspections, storage and shipment, and general maintenance procedures. Specific TMs 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 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

5-13. Sometimes aviation units need GSE other than that authorized or required by TOE, MTOE, and TDA. Tropic, desert, or arctic environments often necessitate additional equipment to supplement that authorized in the MTOE. 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.

5-14. 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.

SECTION II – LOGISTICS AND/OR MAINTENANCE ASSISTANCE

LOGISTICS ASSISTANCE PROGRAM

5-15. The LAP, which is detailed in ARS 700-4, 700-138, and 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.

RESPONSIBILITY

5-16. The LAP 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.

5-17. Commanders may be confronted with real or potential logistics problems that are 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).

FUNCTIONS

5-18. 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 LAP 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.
- Advise both technical and nontechnical personnel.
- Help users evacuate and replace unserviceable equipment that cannot be repaired.
- Visit AVUM and AVIM activities to help improve supply, repair parts, and maintenance support for using organizations.

- Help units locate deficiencies in supply and maintenance capabilities.
- Collect, evaluate, and exchange technical information.
- Instruct units in records management and in preparing unit supply records, PLLs, and authorized stockage lists.
- Instruct units in preparing equipment for field exercises and overseas deployment.
- Provide assistance on the care and preservation of stored material.

PERSONNEL AND SERVICES

5-19. LAP 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 AMC.

Contract Plant Services

5-20. Trained and qualified engineers or technicians employed by the manufacturer provide these services in the plants and facilities of the manufacturer. Through contract plant services, Army personnel are taught to install, operate, and maintain the manufacturer's equipment.

Contract Field Services

5-21. Qualified contractor personnel provide these services on site. Normally, they provide DA personnel with information on the installation, operation, and maintenance of new DA weapons, equipment, and systems.

Field Service Representative Services

5-22. 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.

UNITED STATES ARMY AVIATION AND MISSILE COMMAND

5-23. The AMCOM is one of the major subordinate commands of the AMC. 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.

NEW EQUIPMENT TRAINING TEAMS

5-24. The Logistics Assistance and NET Division is one of the subordinate divisions of the Directorate for Readiness. Its mission is staff supervision and operational control of worldwide LAPs 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 AMCOM 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 AMCOM.

MAINTENANCE ASSISTANCE AND INSTRUCTION TEAM

5-25. The 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 CENI teams. Specific guidance on the MAIT program is in AR 750-1, which complements ARs 350-35, 700-4, and 700-138.

5-26. MAIT assistance may be asked for by anyone at any time, but normally AVIM assistance should be sought first.

AVIATION RESOURCE MANAGEMENT SURVEY

5-27. The ARMS Program is a FORSCOM program designed to provide aviation personnel with expert technical assistance and on-site evaluations as mandated by AR 95-1. Key proponent areas of the ARMS include, but are not limited to, the following:

- Maintenance.
- Supply.
- Safety.
- Petroleum, Oil, and Lubricants.
- Aviation Life Support Equipment.
- Operations.
- Aviation Medicine.
- Standardization.
- Training Management.

5-28. Additional information, assistance, and ARMS Commander's Guides may be obtained at www.forscom.army.mil/avn/.

AVIATION INTERMEDIATE MAINTENANCE LOGISTICS ASSISTANCE

5-29. One capability of AVIM units is informal technical and training assistance using 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

5-30. 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.

5-31. A unit commander obtains logistics assistance for supply or maintenance 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.

5-32. 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.

Chapter 6

SUPPLY AND MATERIEL OPERATIONS

This chapter covers repair parts for 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. Supply procedures and policies are addressed in AR 710-2, DA Pam 710-2-1 and DA Pam 710-2-2.

SECTION I – SUPPLY TERMS AND DEFINITIONS

CLASSES OF SUPPLY

6-1. There are 10 established classes of supply. The following are definitions and examples of each class of supply:

- CLASS I. Subsistence items and gratuitous health and welfare items (B–rations, MREs, and fresh fruits and vegetables).
- CLASS II. Equipment, other than principal items, prescribed in authorization and allowance tables (individual equipment, clothing, tentage, tool sets, and administrative supplies).
- CLASS III. POL, further defined as packaged and bulk POL. Class III (packaged) includes hydraulic and insulating oils, chemical products, antifreeze compounds, and compressed gases. Class III (bulk) includes multifuels and gasoline.
- CLASS IV. Construction and barrier materials (lumber, sandbags, and barbed wire).
- CLASS V. Ammunition such as small arms, artillery projectiles, antitank missiles, explosives, mines, bombs, and special ammunition including chemical and nuclear munitions.
- CLASS VI. Personal–demand items normally purchased through the exchange system such as candy and cigarettes. Class VI items are normally requisitioned and distributed with Class I items.
- CLASS VII. Major end items (vehicles, self–propelled artillery pieces, missile launchers, aircraft, and major weapon systems).
- CLASS VIII. Medical material (medicine, stretchers, surgical instruments, and medical equipment repair parts).
- CLASS IX. Repair parts and components, including kits and assemblies, and items required for support of all equipment (batteries, spark plugs, and fuel lines).
- CLASS X. Materiel required to support civil affairs operations such as a commercial–design tractor for use by local civilians. Supplies are further divided into subclasses. These subclasses denote requirements, such as aviation parts—

designated as Class IX (A)—used by system–specific assets. Class IX (A) repair parts are used to facilitate aircraft maintenance.

CATEGORIES OF SUPPLY

6-2. Supplies are requested and issued using three categories of supply—scheduled, demanded, and regulated.

SCHEDULED

6-3. Scheduled supplies may be reasonably predicted. Requisitions usually are not required for replenishment. Requirements are based mainly on troop strength, equipment density, forecasts, or daily usage or a combination of these factors. Scheduled supplies normally are shipped to users based on preplanned distribution schemes. Classes I, III (bulk), V, and VI are typically scheduled supplies. Classes I and VI are based on troop strength. Class III (bulk) is based on long–range forecasts, equipment densities, and historic usage factors. Class V is based on densities of weapons and the mission.

DEMANDED

6-4. A requisition must be submitted for demanded supplies. Items in Classes II, III (packaged), IV, VII, and IX are considered demanded supplies. Aviation repair parts are in this category and must be requisitioned.

REGULATED

6-5. Regulated supplies may be scheduled or demanded. However, the commander and his staff must closely control these supplies because of scarcity, high cost, or mission needs. Any item or group of items may be designated as regulated; normally some items in Classes II, III (bulk), IV, V, and VII are regulated. If an item is regulated, the commander who so designated it, must approve its release before it is issued. Items designated as command–regulated are identified in operation plans and orders.

TYPES OF SUPPLY

6-6. For accountability purposes, all Army property (except real property) is classified as expendable, nonexpendable, and durable.

EXPENDABLE

6-7. An “X” in the ARC column of the FEDLOG identifies these items. This category includes all Class IX repair parts and all items that are consumed in use, regardless of price.

NONEXPENDABLE

6-8. An “N” in the ARC column of the FEDLOG identifies these items. Nonexpendable supplies include all Class VII items, all items assigned a line item number in EM 0007, FEDLOG and selected Classes II, IV, and X end items.

DURABLE

6-9. A “D” in the ARC column of the FEDLOG identifies these items. The PBO at the appropriate level of command will designate the level of responsibility that will maintain the durable document register.

METHODS OF DISTRIBUTION

6-10. DMCs, under the support operations sections of the TSC, COSCOM, and DISCOM, manage distribution of all resources in their areas of responsibilities. They provide staff supervision of MMCs and movement control elements. Supplying units distribute supplies to using units by different types of distribution methods—supply point distribution, unit distribution, and throughput. Aviation units use all methods.

SUPPLY POINT DISTRIBUTION

6-11. In supply point distribution, the supplying unit issues supplies from a supply point to a receiving unit. The receiving unit must go to the supply point and use its own transportation in moving the supplies to its area.

UNIT DISTRIBUTION

6-12. In unit distribution, the supplying unit issues supplies and delivers them to the receiving unit's area in transportation assets that the supplying unit has arranged.

THROUGHPUT

6-13. Throughput is a method of distribution in which shipments bypass intermediate supply points or installations. Throughput eliminates the need for double handling. Thus, throughput reduces exposure to pilferage and damage. It results in more efficient use of transportation assets; it is also more responsive to the needs of users.

EXCHANGE SYSTEMS

REPARABLE EXCHANGE

6-14. 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 (Request for Issue or Turn-in) and DA Form 2765-1 (Request for Issue or Turn-in) are prepared and hand-carried, along with the unserviceable items, to the AVIM RX section for exchange for a serviceable item.

6-15. 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

6-16. 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 NMCS; NMCM; or 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 as per TM 1-1500-328-23 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 file 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.

6-17. A record of removed parts must be maintained and aircraft records annotated for each item removed. The commander of the unit that owns the aircraft is the only approval authority for controlled exchange. Controlled exchange at the DS and GS levels are approved by the DS or GS commanders, IMMO, or his designated representative. The exchange decision should be a maintenance team effort involving the PC officer, QC 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

6-18. 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 peace-time. The two types of float are repair cycle float and operational readiness float.

Repair Cycle Float

6-19. 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 fill MTOE/MTDA or RCF shortages when other assets are not available.

Operational Readiness Float

6-20. 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.

STOCK FUNDING OF DEPOT-LEVEL REPAIRABLE

6-21. The DOD, through DMRD 904C, directed the Army to implement the SFDLR program that converts DLR from direct appropriation funding to stock funding through the 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.
- Allow programming and adjusting of available funds to meet changing demands.
- Identify the most cost associated with weapons systems more easily.

AVIATION INTENSIVELY MANAGED ITEMS

6-22. The AIMI program was developed to intensively manage selected aviation items that 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.

6-23. Major commands will establish levels of AIMI items through negotiations on a semiannual 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 following conditions:

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

SECTION II – SUPPLY PROCEDURES

TYPES OF AUTHORIZED AVIATION REPAIR PARTS STOCKAGE

BENCH STOCK

6-24. Bench stocks are authorized at both AVUM and AVIM level units. Bench stocks are composed of low-cost, high-use, consumable Classes II, III (packaged), IV, and IX (less components) items. Examples of these items are common hardware, resistors, transistors, capacitors, wire, tubing, hose, ropes, webbing, thread, welding rods, sandpaper, gasket materiel, sheet metal, seals, oils, grease, and repair kits. The criteria for an item to qualify for bench stock are listed in AR 710-2. The maintenance officer must approve the bench stock list semiannually.

6-25. Bench stocks are not demand supported—units do not need a certain number of demands for an item to keep it on bench stock. Maintenance activities with a collocated SSA stock 15 days' supply of bench stock. Those without a collocated SSA or DSU system stock a 30 days' supply.

PRESCRIBED LOAD LIST

6-26. AVUM level units are required to stock a PLL. A PLL consists of unit maintenance repair parts that are demand supported, nondemand supported (must be approved by first general officer staff level in chain of command), and initial stockage repair parts for new end items. These PLLs allow the units to have on hand high–usage, high–demand items;

thus, quick repairs can be made. Most of the items stocked in PLL are demand supported—they must have a set number of demands within a certain control period. The rules for maintaining a PLL are covered in AR 710-2.

SHOP STOCK

6-27. Shop stocks are demand-supported repair parts and consumables stocked within a support-level maintenance activity (AVIM for aviation parts), with a support-level maintenance mission authorized by a MTOE, TDA, or JTA. These repair parts are used internally by the AVIM to accomplish maintenance requests or programmed repair. Criteria for the number of demands required and the items authorized for stockage on shop stocks are covered in AR 710-2.

AUTHORIZED STOCKAGE LIST

6-28. An ASL of repair parts is maintained at the DS or AVIM level. The ASL is a list of all items authorized to be stocked at a specific level of supply. This ASL becomes the supply point from which the units can maintain their stockage of PLL items at authorized levels. These supply units also provide a direct exchange service for repairable components.

AUTHORIZED STOCKAGE LIST STOCKAGE SELECTION

6-29. 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 EIC. At the supply activity, demand frequency files 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.

6-30. Essentiality is a primary consideration when determining the range of items for the ASL. The EC for each NSN can be found in the FEDLOG. Repair parts selected for stockage will be restricted to essentiality codes C, D, E, and J. Where a QSS is established, E, C, and G items are authorized for stockage.

ADMINISTRATION

STANDING OPERATING PROCEDURES

6-31. The Class IX repair parts SOP must be written and kept updated to incorporate the latest changes. Normally, the PLL/ASL 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. AR 710-2 is helpful when writing a SOP.

PUBLICATIONS

6-32. 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:

- AR 725-50.
- EM 0007, FEDLOG; SB 708-43.
- Commercial and government entity codes.

- FEDLOG.
- DA Pam 710-2-1.
- AR 710-2.

IDENTIFICATION LIST

6-33. 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 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.

FEDERAL LOGISTICS INFORMATION

6-34. Cataloging for all services has been consolidated under the DLIS. DLIS is responsible for the FEDLOG. FEDLOG is a database of supply system information for the Federal government. FEDLOG includes supplier names, addresses and phone numbers, as well as manufacturers, part numbers, NSNs, and ordering and pricing information for over 12 million supply items on four CDs. Data from the monthly FEDLOG are used to process and edit requests, update stock records, receive inventory, ship supplies, and process reconciliation. To request a subscription of the FEDLOG, send the following information to the address below.

- Your old AMDF account number (a six digit number beginning with a "0" on the upper right corner of your AMDF mailing label) or request that an account be established.
- Your complete military mailing address.
- Make, model, and serial number of the computer and the CD-ROM drive for each copy you request.
- POC including name and phone number.
- Mail your request to Commander, USAMC Logistics Support Activity, ATTN: AMXLS-MLA, Building 3623, Redstone Arsenal, AL 35898-7466.

DOCUMENT REGISTER

6-35. 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. Only units authorized to submit supply requests to a DSU use the expendable register. The PBO designates by a memorandum those elements within a unit authorized to request expendable supplies. The memorandum will specify the class of supply, the DOD activity address code, 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

6-36. The office management files must have a copy of the assumption of command orders or the appointing memorandum. 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 Supplies) 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.

REQUISITION

6-37. Class IX requisition begins with the unit filling requisitions from its PLL. If the item is not stocked on the PLL or is at zero balance, the requisition is passed to the supply unit. This unit will fill the request from the ASL stocks or pass the requisition to the MMC. The ASL Class IX for ground equipment is normally maintained by the light maintenance company of the maintenance support battalion. The AVIM company maintains the Class IX (A) ASL for aviation repair parts.

6-38. Units must submit all requests for supplies, regardless of source, to the specific DSU that supports the unit for the class of supply requested.

COORDINATION

6-39. Sound supply management has a positive impact on maintenance operations. It helps ensure their success. The PLL section, PC, and flight operations need to coordinate efforts when making supply management decisions. The following questions will assist in determining 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 2408-14-1 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?

PRIORITY

6-40. Before repair parts are requested, the UMNIPS must be determined. The unit's FAD (found in the permanent orders activating the unit) and the UND designator then determine the importance of the request. Commanders are responsible for the accurate assignment of priority designators. The commander will personally review or delegate in writing specific personnel the authority to review all requests with UNDs of A or B. The tables in Chapter 2 of DA Pam 710-2-1 should be used.

SCREENING AUTHORITY

6-41. 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. The authorized individual, who initials the DA Form 2064 and the request (DA Forms 2765 or 2765-1) must approve all high-priority (01-08) requests. During the screening process,

commanders must first ensure that the correct UND is used to meet the maintenance requirement, that is, NMC, supply; ANMCS; or routine. They must also ensure that the PLL clerks have reviewed the I&S file of the FEDLOG 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) (not used with an automated supply system). 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).

SUPPLY STATUS

6-42. 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, listings, or diskette. Supply status is given in the form of status codes. These codes are in Appendix C of DA Pam 710-2-1.

6-43. 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.

SUPPLY MANAGEMENT

6-44. 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.

SYSTEM COORDINATION, REVIEW, AND INPUT

6-45. The effectiveness of system operations depends on timely, accurate processing of transactions and issuing of repair parts. ALOC should be established to increase combat readiness.

Customer

6-46. Customers originate requests for issue, document modifiers, follow-ups, cancellations, and turn-ins. Customers review and respond to system-generated listings and reports to improve accuracy and compatibility of unit and system files.

Direct Support Unit

6-47. To increase supply responsiveness, DSU personnel review customer input transactions for clarity and completeness while the customer's representative is present.

Storage Activity

6-48. 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 SARSS file maintenance procedures.

Material Management Center

6-49. The manager controls SARSS 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 SARSS stockage recommendations and automatic stockage adjustments. PLL and ASL items may be delivered by ALOC due to cost or criticality of maintaining combat effectiveness.

PRESCRIBED LOAD LIST/SHOP STOCK LIST MANAGEMENT

6-50. Although the automated supply system 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. Based on accumulation of demand history, SARSS generates a PLL change list for each customer. This list shows proposed additions, changes, and deletions to a unit's PLL.

6-51. 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 SARSS 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.

Automated Records

6-52. Although the automated supply system supports PLL maintenance, it does not eliminate the need for unit management (accountability), as stated below.

- DA Form 2063-R (Precribed Load List) has been replaced by the PLL, PCN AGL-C34. This list provides space for entering on-hand 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.
- SARSS-1 provides the Unit Demand Summary List, PCN AGL-C39, 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.
- Each quarter the PLL computation sub-process of the demand analysis process generates a PLL change list, PCN AGL-C35, 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. NSNs and MCN are in NIIN sequence. MCNs are in full stock number sequence.

Command Decisions

6-53. For recommended additions, deletions, and changes to PLL stockage levels, unit commanders have three choices—approve, disapprove, or modify the recommendations.

AUTHORIZED STOCKAGE LIST MANAGEMENT

6-54. 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. SARSS considers an item qualified for stockage when it is demand-supported, an ORF item specifically authorized for incorporation, an initial provisioning item, and mission-essential or mandatory stockage.

6-55. SARSS considers ASL items not receiving sufficient demands during a 180-day period for a 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 RO and 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 OST and controls system OST deviations.

REPARABLE ITEMS MANAGEMENT

6-56. Commanders assign responsibility for managing reparable items to an accountable officer. The items required at the DS maintenance facility are called DSU-reparable items. Items selected for repair above the DS level are called non-DSU-reparable items.

6-57. 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 DSC of 3. Items selected for addition or retention as DSU-reparable items must—

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

QUICK SUPPLY STORE MANAGEMENT

6-58. 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 that 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.

6-59. 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

6-60. Reconciliation enables the manager to verify due-ins from the higher source of supply and due-outs to supported customers. Twice a month the 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 SCA to update DSU files.

PERFORMANCE INDICATORS

6-61. Proper use and control of the automated supply system will enhance its capability to support its customers. Commanders at all levels should review the following:

- Total time for customers to receive items after a request has been submitted.
- Percentage of PLL/ASL lines 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.

6-62. 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-R (Unit Status Report [LRA]) should be checked to ensure accurate data are provided so that proper attention can be drawn to critically required items for intensive management.

6-63. At the MMC a number of output listings indicate the efficiency and effectiveness of the supply system. These listings are the following:

- DSU ASL lines with dues-out.
- Controlled item requisition verification list.
- Cyclic input transaction statistics. Delinquent count card list.
- Periodic 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.
- Transactions register.
- ASL status review list.
- Excess report.

SECTION III – AUTOMATED SUPPLY MANAGEMENT SYSTEMS

UNIT LEVEL LOGISTICS SYSTEM

6-64. There are three versions of ULLS that appear in different types of units. Each performs slightly different functions. The three versions are ULLS-G, ULLS-A, and ULLS-S4.

UNIT LEVEL LOGISTICS SYSTEM-GROUND

6-65. ULLS-G is located at any unit that has an organizational maintenance facility. It automates vehicle dispatching, PLL management, and TAMMS. ULLS-G interfaces with SARSS-1, SAMS-1, IVIS, vehicle sensors, and ULLS-S4. The AIT Interrogator is connected directly to the ULLS-G. ULLS-G is linked to the wholesale supply system through OSC.

UNIT LEVEL LOGISTICS SYSTEM-AVIATION

6-66. ULLS-A is located in all aviation units. It performs those functions for aviation that ULLS-G performs for ground units. It automates procedures for managing unit level repair parts, equipment dispatching and return, equipment management and reporting, and aviation unique TAMMS functions. (See Appendix A for more information on ULLS-A.)

UNIT LEVEL LOGISTICS SYSTEM-S4

6-67. ULLS-S4 is located at unit level supply rooms, as well as battalion and brigade level S4 staff sections. ULLS-S4 automates the supply property requisitioning/document register process, hand/subhand receipts, component, budget, and logistics planning activities at the Unit Supply, Battalion, and Brigade S4 levels. It also receives and produces AMSS Reports generated by ULLS-G/A systems or by another ULLS-S4 system. The AIT Interrogator is connected directly to ULLS-S4. ULLS-S4 interfaces with the SPBS-R, ULLS-G and ULLS-A (for budget and AMSS data transferring), SAAS, SARSS-O at the Direct Support Level, the SAILS, the OSC SARSS Gateway and the CSSCS.

STANDARD ARMY MAINTENANCE SYSTEM

6-68. The SAMS increases the productivity of maintenance shops, and provides commanders with accurate and timely maintenance management information. It provides visibility of inoperative equipment and required repair parts, selected maintenance, equipment readiness, and equipment performance reports. It also provides completed work order data to the LOGSA for equipment performance and other analyses. SAMS is divided into two levels—SAMS-1 and SAMS-2.

STANDARD ARMY MAINTENANCE SYSTEM-LEVEL 1

6-69. SAMS-1 operates at the AVIM level. It tracks all work orders and repair parts, and processes information received from supported units. SAMS-1 interfaces with ULLS-G/A, SAMS-2, and SARSS-1. It operates on the SAMS-1 rehost program hardware. It processes maintenance data to improve control of work load, manpower, and supply. For more details refer to ADSM 25-L21-ZZZ-EM SAMS-1, User Manual.

6-70. 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

6-71. SAMS-1 rehost program hardware is located in the maintenance control section of the maintenance company. Each site has two KVDT wired to a 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.

Data Base

6-72. Only information necessary for effective management or reporting is entered into the database. Data are then passed to each successive management level on an exception or summary basis. The management level has direct access to detailed data in the database for which it has primary responsibility. For example, if the MMC requires SAMS-1 detailed data, it requests it from the shop officer instead of taking it from the SAMS-2 database. The two general types of information flowing through the system are equipment performance and maintenance performance. Data for maintenance managers are limited to their needs. Equipment performance data are sent as directly as possible via SAMS-2 to the wholesale level. Maintenance performance data pass up through the maintenance system in consolidated form.

STANDARD ARMY MAINTENANCE SYSTEM-LEVEL 2

6-73. SAMS-2 operates at the command levels above AVIM such as the MMC, division support command, corps support command, and EAC management levels. It collects, stores, and retrieves maintenance information from SAMS-1 sites and allows managers to coordinate maintenance workloads.

STANDARD ARMY RETAIL SUPPLY SYSTEM-OBJECTIVE

6-74. The SARSS-O is a multiechelon supply management and stock control system designed to operate in tactical and garrison environments. SARSS-O is comprised of four integrated systems: SARSS-1 at the SSA level, SARSS-2AD at the MMC of the division, separate brigade, or ACR, SARSS-2AC/B at the MMC of Corps and Theaters, and SARSS-Gateway, formerly known as the OSC. SARSS-O also provides supply related data to the ILAP system at various functional levels. SARSS-O supports ULLS-G, ULLS-A, ULLS-S4, SAMS-1, SPBS-R STAMIS, nonautomated customers, and the Split Operations Concept. The SARSS-O application software operates on PM, STACOMP centrally procured NDI computer platforms and AIT peripheral devices. SARSS-O is fully integrated from the user through theater Army level. It has the capability to support worldwide deployment of combat forces in various scenarios and AO, ranging from low to mid to high intensity conflict including support operations and/or stability operations.

STANDARD ARMY RETAIL SUPPLY SYSTEM-LEVEL 1

6-75. SARSS-1 is found at most SSAs. This includes nondivisional SSAs, main support, and forward support SSAs in divisions, separate brigades, and armored cavalry regiments. It is the primary automation for the support company, supply and service company, and the AVIM company operating in the brigade and division areas. SARSS-1 processes customer requests for supplies from ULLS, SAMS, and SPBS-R sites. It also processes follow-ups, cancellations, and modifications for Classes II, III (P), IV, VII, and IX requests and releases these items to customers on its support list. It maintains accountable stock record balances and reports them to either SARSS-2AD or SARSS-2AC/B, as applicable, to allow them to maintain visibility of stockages for their SARSS-1 sites. SARSS-1 interfaces with SARSS-2AD, SARSS-2AC/B, SPBS-R, ULLS-S4, SAMS-1, and SAMS-I/TDA.

STANDARD ARMY RETAIL SUPPLY SYSTEM-LEVEL 2AD

6-76. SARSS-2AD is found in MMCs of divisions, separate brigades, and armored cavalry regiments. It performs the time-sensitive functions involved with Classes II, III (P), IV, VII and IX to supply the force. It routes requisitions, releases controlled items (such as critical Classes IV and IX items), and generates disposition instructions for all classes of supply. It provides the MMC with asset visibility, allowing SARSS-1 sites to obtain items from other SARSS-1 locations. SARSS-2AD also checks balances on hand before sending the request forward for action. SARSS-2AD performs time-sensitive management. Major functions executed in SARSS-2AD include management support, financial adjustment, DODAAC and parameter maintenance, and housekeeping.

STANDARD ARMY RETAIL SUPPLY SYSTEM-LEVEL 2AC/B

6-77. SARSS-2AC/B is found at the TSC MMC, Corps MMC, and National Guard USP&FO. This system supports the corps through fill of subordinate SARSS-1 requisitions from the corps area and fill of SARSS-2AD requisitions from the division areas. It also provides corps wide supply support in Classes II, III (P), IV, VII and IX in

the functional area of supplying the force. The SARSS-2A/B function of SARSS-2AC/B operates the nontime sensitive portions of stock management. The SARSS-2AC function of SARSS-2AC/B, at the Corps MMC, has asset visibility of all the SARSS-1 activities in the Corps, via a custodial ABF. This includes those nondivision SARSS-1 activities as well as the SARSS-1 activities in the subordinate divisions. Its processes include all of the SARSS-2AD functions, plus SARSS-2A/B nontime sensitive actions such as catalog, document history, demand history, and interface with the financial systems. Corps-controlled supply storage locations are managed through the automation of this level of SARSS. Managers use the SARSS-2AC/B to access the demand history of all levels of supply.

STANDARD ARMY RETAIL SUPPLY SYSTEM-GATEWAY

6-78. SARSS-Gateway is the computer and communication network interaction that allows total asset visibility for repair parts within a geographic area. It consists of a relational database using specific processing logic (formerly known as OSC) that interfaces with existing Army STAMIS to provide a near real-time supply system to unit level supply and maintenance activities. The requests/requisitions are electronically transmitted from customers to the Gateway computer where lateral search/issue decisions are made based on a resident ABF, which is uploaded by the STAMIS and maintained at the Gateway. This central computer, known as the OSC SARSS-Gateway, maintains constantly updated files of the on-hand assets available to all support activities in a geographic area. SARSS-Gateway shortens the time units wait for parts by directly transmitting part requests from unit or support maintenance shops to a central computer. If insufficient assets are available, the Gateway determines whether to send replenishment or dedicated requisitions to the wholesale SOS, and provides status to customers on the action taken. The objectives of SARSS-Gateway are to—

- Provide same-day processing of requisitions.
- Provide visibility of assets within a geographical area.
- Provide for lateral distribution of assets.
- Provide for near real-time status to the user.
- Reduce the order segment of the order ship time.
- Optimize automation and communications.
- Create the image of a single seamless supply system.

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

RADIO FREQUENCY AUTOMATIC IDENTIFICATION TECHNOLOGY

6-79. This system allows the use of electronic devices to track materiel in the pipeline (intransit visibility), and to do away with the requirement to manually enter most receipt and selected inventory transactions into automated systems.

6-80. This device exists at direct support supply activities, direct support maintenance activities with a supply mission, CRPs, and at selected points within transportation networks. The AIT data interrogator transmits queries to and receives data from all RF Tags in its area. It is connected directly to SARSS-1, SAMS-1, ULLS-S4, and ULLS-G. It also passes data to transportation systems such as TC ACCIS and TC AIMS II.

GLOBAL COMBAT SUPPORT SYSTEM-ARMY

6-81. The GCSS-Army, previously named the ICS3, will be the principle and comprehensive business automation enabler for the Total Army for interfacing and integrating information and enterprise systems across the CSS mission area. The GCSS-Army supports the CSS functions of manning, arming, fixing, fueling, moving, funding, and sustaining soldiers and their systems at all echelons. The program will follow a three-tier development strategy with all 3 tiers working in parallel. Tier I will provide an initial operational capability using those functions currently employed by legacy systems, such as SARSS, ULLS, and SPBS-R. Tier II will produce a seamless integrated wholesale and retail community. Tier III will be completed by implementing all required interfaces with AIS of the joint community, national sustaining base systems, and applicable allied systems.

6-82. GCSS-Army will streamline CSS information management by eliminating duplicative systems, consolidating baseline logistics functionality, and implementing more data sharing. The system will be a modular design where users will have only the system applications and software tools needed to perform mission tasks at their location. Some of the key design features are"common look and feel" based on GUI "point and click" methodology, interactive/real time processing, catalog availability, one-time data entry, and near transparent communications.

SECTION IV – MATERIEL MANAGEMENT CENTERS

DIVISION MATERIAL MANAGEMENT CENTER

6-83. 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.

6-84. The DMMC 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.

6-85. 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 4-93.2(63-2) for more information on the DMMC.

AVIATION BRANCH

6-86. 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

6-87. 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 overload, this officer coordinates with the corps MMC for assistance.

Aircraft Maintenance Manager

6-88. The aircraft maintenance manager supervises aircraft maintenance. He also applies PC principles and procedures to AVIM operations, using reports generated from SARSS and SAMS.

SUPPLY PROCEDURES

6-89. 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.

6-90. For most Class IX supplies, using units submit their requests 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 some cases, controlled exchange and cannibalization may be required to obtain Class IX supplies.

6-91. AVUM customers in the BSA submit their Class IX air requisitions through their ULLS-A system to the supporting AVIM DSU Class IX SARSS-O system. For ground Class IX, all customers in the BSA submit their Class IX ground requisitions through their ULLS-G system to the supporting DSU Class IX SARSS-O system. All Class IX, air or ground, requisitions are either filled at the supporting DSU or passed to DMMC and referred to another divisional DSU (Class IX ground only). If a Class IX requisition (air or ground) cannot be filled within the division it is passed to CMMC and referred among the Corps DSUs (includes Corps AVIMs). This permits the DMMC to update required records, cross-level stocks, and process requests to the Corps MMC. Once a requisition hits the CMMC the MMC SARSS-2A/B systems search across all Corps Class IX DSUs before referring a requisition to the TSC or back to a NICP.

6-92. Due to SARSS-O, all Class IX items arriving in the division are shipped directly to the ordering DSU. Once the DSU receipts all arriving Class IX into their SARSS-O system, it is reported to DMMC or CMMC during the daily closeout and data transfer. DSUs operating in the BSA, DSA, or CSA store Class IX items and issue them to their customers via supply point distribution. All issues are reported to the DMMC and CMMC

for updating of records. Turn-ins are handled in the same manner as receipts; they are also reported to the DMMC and CMMC.

6-93. Class IX Air items are stocked by the AVIM DSU located in the DSA or CSA and are distributed to—

- AVUM customers by supply point distribution.
- Forward AVUMs located in the BSA by division or nondivision aircraft in emergencies. (ALOC must be established for NMCS or AOG repair parts.)

CORPS SUPPORT COMMAND MATERIEL MANAGEMENT CENTER

6-94. The COSCOM MMC is the heart of the corps-level supply and maintenance management system. 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.

6-95. The MMC consists of materiel management divisions that are aligned with those of the TSC MMC 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 aviation materiel management. See FM 4-93.22(54-23) for additional information on the corps MMC.

AVIATION DIVISION

6-96. 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.

6-97. The aviation division is organized and functions as 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

6-98. 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.

6-99. The chief aviation materiel sergeant is the senior NCO in the division. Responsibilities of the senior NCO include maintaining suspenses, maintaining administrative files, and accounting for personnel.

Aviation Equipment Supply Branch

6-100. The aviation equipment supply branch manages aviation equipment supply for the corps. This branch manages day-to-day aviation equipment supply support for aircraft and airdrop, avionics, aircraft armament, and related test equipment. Personnel resources are subject to change. Check the latest TOE or MTOE for current staffing.

6-101. 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 perform the following duties:

- 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 (SARSS) and establish mandatory stockage levels for items that are not automatically stocked, stored, and issued through the SARSS 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.

6-102. The aviation equipment supply branch manages Class VII requisitions for TOE equipment. They perform the following duties:

- Process requisitions on a daily basis and follows up on them as required.
- Assist the equipment authorization branch, service support division, by cross leveling aviation equipment already in the corps.
- Recognize TOE or MTOE shortages and fills requisitions.
- Coordinate with TSC MMC and NICPs to fill requisitions.
- Handles corpswide distribution problems.

Aviation Parts Supply Branch

6-103. The aviation parts supply branch manages day-to-day supply actions for aviation equipment. Personnel resources are subject to change. Check the latest TOE or MTOE for current staffing.

6-104. Branch personnel implement policies and plans of the COSCOM ACofS, Materiel; the MMC commander; and the chief, aviation division. They perform the following duties:

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

6-105. The aviation parts supply branch is responsible for the following:

- 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 SARSS transactions.

6-106. Corps AVIM units and DISCOM MMCs initiate requisitions for repair parts. 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 TSC MMC flow to the TSC MMC.)

Aviation Maintenance Branch

6-107. 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. Personnel resources are subject to change. Check the latest TOE or MTOE for current staffing.

6-108. Branch personnel implement policies and plans of the COSCOM ACofS, Materiel; the MMC commander; and the chief, aviation division. Aviation maintenance branch personnel are responsible for the following:

- 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 ADPC, which provides shipping instructions to the AVIM units.
- Provide guidance to C^2 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 SUPPORT COMMAND MATERIEL MANAGEMENT CENTER

6-109. The MMC is assigned to the TSC under the staff supervision of the DMC. It serves as the control center for materiel activities in the TSC through daily monitoring of supply and maintenance actions. The MMC performs integrated supply and maintenance management in the TSC for all classes of supply except medical supplies. It also manages maintenance activities for which the TSC is responsible. The aviation division manages aviation materiel.

6-110. The MMC coordinates materiel activities with movement control elements and the functional directorates of the TSC support operations section. It maintains links to the CONUS base as well as tactical level MMCs. FM 4-93.4(63-4) has additional details on the TSC and its MMC.

Chapter 7

AVIATION MAINTENANCE IN UNUSUAL ENVIRONMENTS

Often, maintenance procedures used in one environment will not be appropriate for another. 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.

SECTION I – DESERT, JUNGLE, MOUNTAIN, AND COLD WEATHER

GENERAL

7-1. Operations may be conducted in many different types of environments. This includes desert (hot), jungle, mountain, or extremely cold climates. Conducting aircraft maintenance in these types of environments can be challenging. In general, commanders must look at factors such as the following:

- Modifications to normal repair part 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.
- Communications restrictions.
- Special shelter requirements.
- Modifications to normal scheduled and preventive maintenance.
- Specialized equipment and clothing requirements.

DESERT OPERATIONS

7-2. Sand, heat, wind, 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.

EFFECTS OF SAND AND DUST

7-3. 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

7-4. 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.

7-5. 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 fit 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 is a camouflage screen designed to protect the aircraft. This system will not weather a full-fledged blowing dust storm.

7-6. On those systems which have a pressurized air system for cooling, extra filtration and decreasing cleaning intervals will solve most problems.

7-7. 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.

MAINTENANCE SHELTERS

7-8. 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 large area maintenance shelter commonly called a “clam shell”, which is a commercial hangar that has many available options. This shelter, available through AMCOM, 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.

INCREASED MAINTENANCE

7-9. The two most significant areas of increased maintenance are rotor blades and turbine engines. These items will multiply the maintenance workload 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.

Engines

7-10. Many systems rely on an inlet particle separator 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 AMCOM 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

7-11. 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.

Bearings

7-12. 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 AMCOM.

Aircraft Survivability Equipment

7-13. The AN/ALQ 144 is very susceptible to main bearing failure in a sandy environment. ASE should be covered whenever the aircraft is not in use.

INCREASED SUPPORT

7-14. AVUM requirements for assistance from AVIM units may increase. The QC mission broadens to train all flight crew personnel in the additional inspection requirements. Flying crews will also be training on desert flying techniques that will complement the maintenance effort.

7-15. 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 GPS receiver.

REVERSE CYCLE

7-16. 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.

7-17. Many lessons learned are available from units that have participated in NTC rotations, Bright Star exercises, and Operations Desert Shield and Desert Storm. Remember that there is sand in the desert. It is not business as usual. For more information on desert operations, refer to FM 3-97.3(90-3).

JUNGLE OPERATIONS

EFFECTS OF HEAT AND MOISTURE

7-18. In jungle operations, 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.

MAINTENANCE

7-19. 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.

MOVEMENT

7-20. 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 MSTs to the AVUM location will be used whenever practical. Aircraft may be required to deliver repair parts and evacuate materiel.

INCREASED SUPPORT

7-21. 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.

FIELD SITES

7-22. 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 3-97.5(90-5).

MOUNTAIN OPERATIONS

LIMITATIONS OF MOUNTAIN OPERATIONS

7-23. 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.

MAINTENANCE

7-24. 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 3-97.6(90-6).

COLD WEATHER OPERATIONS

EFFECTS OF COLD WEATHER

7-25. 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.

7-26. 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. Mud, muskeg, swamp, marsh, and open water hamper all ground movement 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.

7-27. Extreme climatic conditions hamper on-site maintenance operations and curtail personnel effectiveness. Therefore, 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.

SPECIAL EQUIPMENT

7-28. 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. For more details on operations in northern regions, refer to FMs 3-05.70(31-70) and 3-05.71(31-71).

SECTION II – NIGHT AIRCRAFT MAINTENANCE

DOCTRINE

7-29. Battle doctrine calls for around-the-clock aviation operations. These operations, in turn, need fully 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

7-30. Light discipline is, of course, imperative to night maintenance activities on the battlefield. The closer to the MBA a unit operates, the more restrictive light suppression precautions must be. Units operating relatively close to the MBA 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 sufficient internal lighting can be provided without using noise-producing power generators.

MISSION, ENEMY, TERRAIN, TROOPS-TIME AVAILABLE AND CIVILIAN CONSIDERATIONS

7-31. 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 workload will have to be handled outside available shelters.

7-32. METT-TC will play a major role in determining the extent of night maintenance that can be used safely and effectively. 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.

7-33. 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.

7-34. 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 open terrain, its night maintenance considerations will differ considerably from when it moves rearward into a closed environment.

PREPARATION

7-35. 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.

EFFECTS ON PERSONNEL AND MAINTENANCE

PRODUCTION CONTROL

7-36. Systematic PC 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.

QUALITY CONTROL

7-37. QC procedures for night maintenance must be especially rigid. The potential for "missing something" increases as the adequacy of the work environment diminishes and the fatigue level of night workers increases. Of particular concern are the visual restrictions associated with working in subdued (red, green) lighting as opposed to white

light. Also, it is a fact that workers who are on night shift generally perform only about 70 percent as well as day workers because of the mental fatigue associated with disruptions in the body's internal clock (a condition called shift lag). QC tasks requiring maintenance operational checks or test flights may have to wait until daylight for sign-off. Procedures and criteria for the NAMP must be developed. The main concern is that quality and SOF standards are maintained at the same level as for daytime maintenance.

WORK SCHEDULE

7-38. 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.

TRANSITION BETWEEN SHIFTS

7-39. 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

7-40. 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. Personnel working at night often suffer from fatigue-related difficulties making decisions and performing even simple mental tasks more difficult. Also, because of general feelings of tiredness and sluggishness, they perceive routine jobs to be more taxing than usual, and as a result, they may tend to save tough jobs for the daytime crew. This is particularly true during low-intensity operations, and many other examples could be cited. Physiological factors that must be considered in night aircraft maintenance are the following:

- The eyes normally require about 40 minutes to fully adapt to darkness.
- Adjustment to a new work schedule requires about 1 day for each hour of shift change.
- Forward shift rotations (days to evenings to nights) allows faster adjustment than backward rotations (nights to evenings to days).
- Because the body's clock is set by exposure to the daylight, most night workers never fully adjust.

- Fatigue affects a repairer's night vision, muscular actions, and mental abilities.
- 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.
- Diet affects night vision. Individuals should eat only highly nutritious foods.

SECTION III – NUCLEAR, BIOLOGICAL, AND CHEMICAL OPERATIONS

NUCLEAR, BIOLOGICAL, AND CHEMICAL THREAT

7-41. This section addresses the different types of NBC operations, their effects on the unit's mission, and proper decontamination procedures for personnel and equipment. Threat forces around the world have inventories of NBC munitions and agents. 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.

7-42. The use of chemical or biological agents against U.S. 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. For more detailed information on decontamination procedures, refer to FM 3-11.5(3-5).

AIRCRAFT DECONTAMINATION

7-43. 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 decontaminant 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 decontaminants and decontamination procedures currently in use will ruin many types of aviation equipment and materiels. See FM 3-11.5(3-5), Chapter 7 for decontaminants that are approved for use on selected parts of aircraft.

M17 SANATOR

7-44. Decontamination efforts can be greatly assisted by the M17 (SANATOR) heater/pump found in chemical companies, Aviation Battalion/Brigade HHCs, and AVIM Battalions. This equipment will quickly wash all aircraft and vehicles. The most

significant planning consideration is water storage capacity. The M17 is fielded with a 1,580-gallon collapsible water tank. New systems are upgrading this storage capacity to 3,000 gallons.

7-45. The U.S. Army Edgewood Research Development and Engineering Center and the U.S. Army Chemical School are developing detailed procedures on the best-suited decontaminates for paint for each type of aircraft surface—plastic, fiberglass, or composite.

CONTAMINATION AVOIDANCE

7-46. 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 3-11.3(3-3) for information on contamination avoidance.) The following are measures that avoid contamination:

- Know what areas are contaminated and avoid these, if possible.
- If aircraft must land in contaminated areas, pick landing zones that will have a reduced splash effect.
- Limit the spread of contamination into the aircraft from outside. For example, ground crews at the FARP should conduct arming and refueling without requiring the aircrew to exit the aircraft.
- Contaminated crews should conduct inspections without touching or shaking items. Many inspection points can be inspected visually.
- Increase the use of covers when not flying. Use engine covers, flyaway gear, and hatches. If possible, provide overhead cover for parked aircraft.
- Limit the number of aircraft that must operate in a contaminated area or use aircraft already contaminated.
- When carrying contaminated personnel or casualties, lining the troop compartment with plastic is a field expedient way to limit the spread of contamination. A plastic curtain can be fastened between the troop compartment and the flight compartment with tape or velcro to limit contamination transfer. The aircraft's heater can be used with the curtain to create an overpressure in the pilot's compartment. This will limit vapors from entering the compartment.
- Apply M9 paper to the landing gear of the aircraft. FARP personnel should always check the M9 paper before servicing the aircraft. Another piece of M9 paper can be placed on the windscreen where the aircrew can see it.

DECONTAMINATION PROBLEMS FOR AVIATION EQUIPMENT

7-47. 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 operational decontamination. Surfaces are

washed with decontaminants 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.

DECONTAMINATION SITES

7-48. Operational aviation decontamination is normally done in the FARP and AVUM areas. To a limited extent, they are also done in divisional and nondivisional (corps) AVIM areas. Thorough 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

PLANNING

7-49. 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. Pressurized 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 immediate 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 EMP).
- Responsibilities and procedures for establishing and operating a contaminated-equipment holding area.

CONTAMINATION HAZARDS

7-50. The following are some special hazards that can occur when 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 protective suit. Mechanics must keep themselves as clean as possible. Extra protective suits should be on hand to replace dirty ones.
- Wet-weather gear helps keep protective suits 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

7-51. Contamination must not be spread. Contaminated equipment must not be taken into a clean shop. Maintenance teams should make every effort to repair contaminated equipment in a contaminated MCP. Repaired, but contaminated, equipment must be returned to contaminated units, whenever possible. Even if equipment has gone through unit immediate decontamination, 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.

7-52. 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, a 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.

7-53. Contaminated tools and equipment will be used to repair contaminated equipment. 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 uncontaminated tools. Protection from contaminated equipment must be provided. 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 decontamination 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

7-54. 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.

7-55. If contamination is detected after an assembly is opened, it can be decontaminated quickly by flushing with jet fuel, diesel fuel, or motor gasoline. The unserviceable component must then be marked and taken to the contaminated holding area. In that area, it can weather or undergo a thorough decontamination. 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 decontamination site or disposed of per unit SOP.

7-56. 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 be exposed to 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.

Aircraft Marking

7-57. 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 decontamination has been verified by a detailed inspection. Contamination signs on aircraft and equipment contaminated with persistent agents will not be removed even after decontamination.

MAINTENANCE SUPPORT OPERATIONS

7-58. 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.

DISPOSITION OF CONTAMINATED EQUIPMENT

7-59. 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 decontaminate 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 perform unit restoration decontamination before any repairs are made. 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 decontaminate and repair one heavily contaminated utility helicopter. Decisions like this require coordination between maintenance and operational staffs.

7-60. Decontamination 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.

CONTAMINATION CONTROL

7-61. 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 decontamination site or contaminated MCP by other contaminated vehicles or aircraft.

7-62. 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 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 decontamination 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 decontaminants for this purpose. The objective is to limit transferring liquid contamination from the equipment being repaired to the maintenance or recovery team or their equipment.

7-63. 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 decontamination, 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 decontamination. After a rest, the newly decontaminated team rotates forward and relieves the contaminated team.

7-64. 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

7-65. 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 4-93.3(63-3) for more details.

Chapter 8

QUALITY CONTROL AND PUBLICATIONS

This chapter covers technical inspections—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.

SECTION I – QUALITY CONTROL OPERATIONS

TECHNICAL INSPECTOR

8-1. A TI is responsible to the QC NCOIC, the maintenance or QC officer, and ultimately the unit commander. The TI is the commander's representative in aircraft SOF areas; otherwise, a conflict of interest will arise that will sacrifice objectivity. For this reason, the TI's rating official must 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 (normally troop/company) XO or commander rates the TI. However, if either the unit XO or maintenance officer also serves as the PC officer, that officer will not rate the TI.

8-2. TIs are under the operational control, not supervision, of the maintenance officer. The maintenance officer establishes priorities for TI work assignments but does not supervise the work. The OIC or the NCOIC distributes the work and supervises the TIs to meet the maintenance officer's work assignments.

QUALITY CONTROL DUTIES

8-3. QC 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 workload 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 TIs do the actual inspecting.

8-4. TIs 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

8-5. 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

8-6. Because TIs 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, TIs ensure that they are ordered.

Aircraft Technical Compliance (Technical Bulletins)

8-7. TIs ensure that all requirements of applicable aircraft TBs are met and required entries are made on applicable DA forms. TIs are also responsible for two actions—grounding an aircraft if required by the TB (refer to AR 95-1) and submitting reports required by AR 95-1 to report compliance with TBs.

Army Oil Analysis Program

8-8. TIs 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. TIs ensure the following:

- 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.

MONITOR COMPONENT TBO AND RETIREMENT LIFE

8-9. 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.

8-10. TIs ensure 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 NCOs when 100 hours remain until replacement of hourly components and when 2 months remain until replacement of calendar components. This allows adequate time for advance ordering of replacement parts.

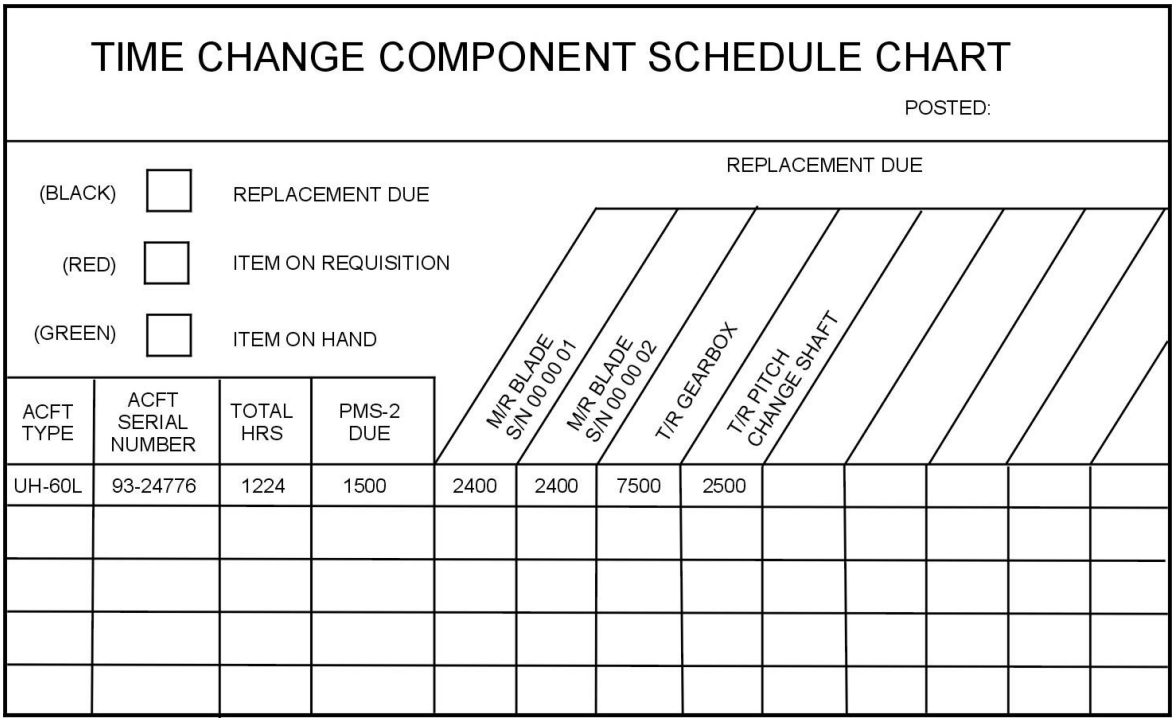


Figure 8-1. Sample Format for a Time-Change Component Schedule Chart

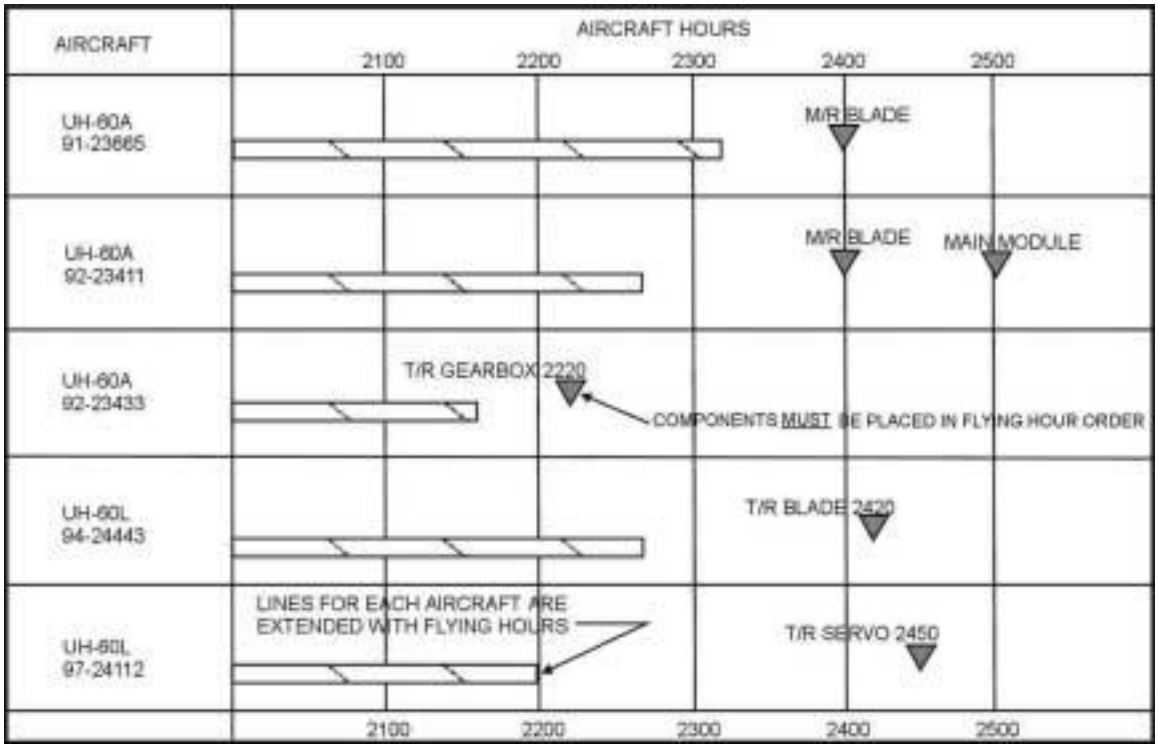


Figure 8-2. Sample Format for a Time-Change Bar Graph Component Schedule Chart

2408-16 COMPONENT PROJECTION REPORT

PCN:AVAHRIGA

REPORT DATE: 12-MAY-94 **UIC: WG31A8**

AIRCRAFT SERNO: 6916148 **CURRENT HOURS: 3576.8**

PROJECTED HOURS: 988

WUC	PART NUMBER	NSN	NOMENCLATURE	SERIAL NUMBER	AIRCRAFT HOURS TBO DUE	AIRCRAFT HOURS UNTIL DUE
85A81H84	286-811-148-1	1615818386653	RETENTION STRAP FITTING	A-4583	3695.0	118.2
85A81H84	286-811-148-1	1615010306653	RETENTION STRAP FITTING	A-1948	3695.0	118.2
85A81H83	286-818-123-3	5315000919358	RETENTION STRAP PIN	A19-38098	3695.0	118.2
85A81H83	286-818-123-3	5315000919358	RETENTION STRAP PIN	A19-38060	3695.0	118.2
85A81H	286-811-154-101	1615010631268	RETENTION STRAP	LK-11923	3695.0	118.2
85A81H	286-811-154-101	1615010631268	RETENTION STRAP	LK-11919	3695.0	118.2
84A85C	6895653	2915010444551	PUHP ASSY, FUEL	PE6398	4010.0	433.2
84A85G	2524912-2	2915011799734	GOVERNOR ASSY	86168686	4288.0	711.2
84A85A	2524911-3	2915012510688	FUEL CONTROL	337434	4473.0	896.2

Figure 8-3. Sample Format for a Computerized Time-Change Component Printout

SHOP INSPECTION

8-11. This QC inspection includes two areas—facility and equipment (shop safety) and test equipment (calibration).

Shop Safety

8-12. When performing the facility and equipment inspection, TIs check the shop and shop equipment for proper layout, clear fire lanes, fire extinguisher serviceability, and installation and use of equipment safety devices. A shop that is below standard cannot put out quality work. TIs conduct informal inspections of the various shops periodically and bring any deficiencies or safety hazards found to the attention of shop supervisors. Keep a file of all safety inspections in the QC section and a file copy in the subject area inspected.

8-13. The USASC publication, Guide to Aviation Resources Management for Aircraft Mishap Prevention, outlines safety procedures. It has guidance on inspection requirements for the TI. Get copies from the unit safety officer. Minor changes to the guide appear in the USASC publication, Flightfax, which is distributed monthly to all aviation units. Other publications outlining specific safety precautions are FM 4-20.12(10-67-1) and TM 1-1500-204-23 series. See Appendix E for a sample shop safety inspection checklist.

Test Measurement and Diagnostic Equipment

8-14. TMDE includes testers, test sets, and other test equipment used to verify that aircraft systems are functioning properly or that they are malfunctioning. TMDE may be portable or fixed in place, depending on the design. Whether or not a unit contains specific items of equipment depends on its category of maintenance (AVUM or AVIM) and its TOE. Detailed description and operating instructions for the most common test equipment can be found in the TM 1-1500-204-23-series manuals.

8-15. TMDE 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. QC inspectors use TMDE to monitor maintenance procedures. Safe, economical operation of Army aircraft depends on the skilled use of TMDE in a comprehensive maintenance program. TIs ensure the following:

- 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).
- A DA Form 7372 (TMDE Calibration and Repair Data) 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.
- A DA Label 80 (US Army Calibrated Instrument) or DA Label 163 (US Army Limited or Special Calibration) 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

8-16. 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.

8-17. Upon receipt of a new index, DA Pam 25-30 (published quarterly on CD), the TI reviews publication files (technical libraries) throughout the maintenance activity for completeness and currency. TIs also assist in preparing recommendations for changes to publications on DA Form 2028 or DD Form 173/3(OCR) (Joint Message Form [Blue]) (Cat I Deficiency Report only). The TI establishes and maintains a file of recommended changes (AR 25-400-2).

Familiarization Chart

8-18. 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. 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. TIs check the charts or printouts during publication review to ensure the following:

- 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 25-40.

* Quality Control

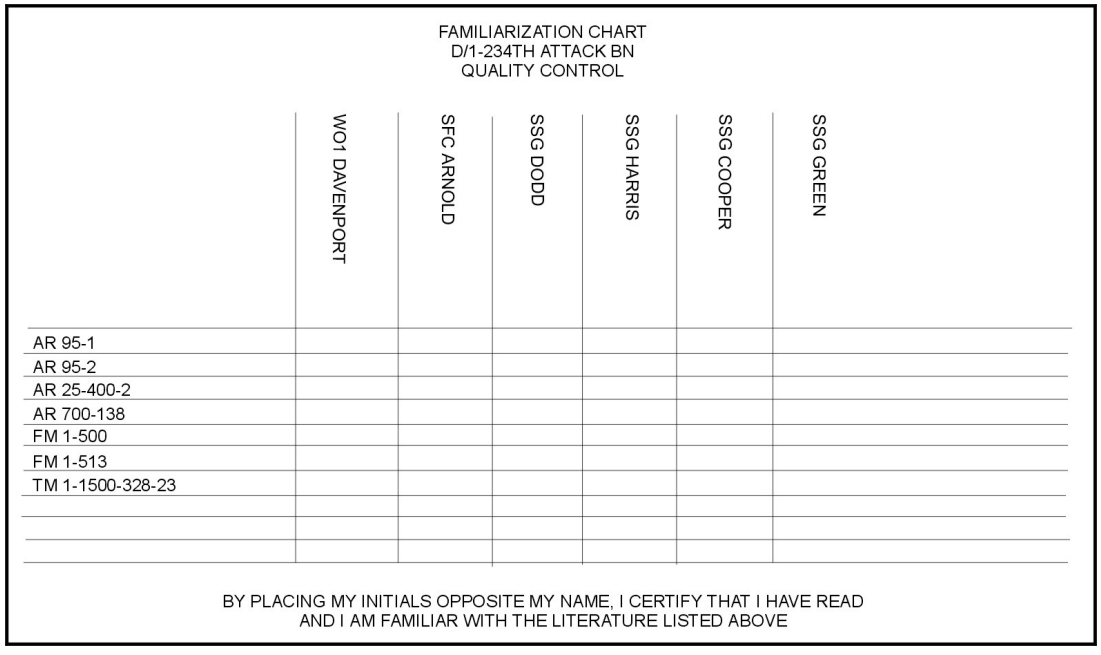
TECHNICAL DATA FAMILIARIZATION CHART

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				
1-1500-204-23 SERIES		L	M		G			M					K				
1-1500-328-23		L	M		G			M				W	K				
1-1500-344-23		L	M		G			M									
1-1520-238-10		L	M		G			M		K							
1-1520-238-23 SERIES		L	M			H		M									
1-1520-238-23P SERIES		L	M	B		H		M									
55-1500-335-23		L	M	B		H	W	M	K		F						
55-1500-342-23		L	M	B				M									
55-6670-200-14&P		L	M	B				M	K								
750-245-4		L	M	B			W	M									
AR 95-1		L	M	B				M									
AR 95-2		L	M	B	G	H		M		K	F						
AR 700-138		L	M	B	G	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. Sample Format for a 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 25-400-2						
AR 700-138						
FM 1-500						
FM 1-513						
TM 1-1500-328-23						

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. Sample Format for a Computer Printout of Familiarization Chart

Files Management

8-19. 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/ASAM messages and maintenance and technical advisory messages. For more guidance on files management and SOF/ASAM messages, refer to ARs 95-1 and 25-400-2.

FORMS AND RECORDS

8-20. TIs monitor all forms and records for accuracy and completeness. They monitor aircraft historical records, weight and balance records, aircraft maintenance records, blank forms, and PQDR.

Aircraft Historical Records

8-21. TIs maintain historical records for each aircraft assigned to their unit according to Chapter 4 and Appendix D of DA Pam 738-751. TIs must ensure all essential historical records are on file and updated as required.

Weight and Balance Records

8-22. The assigned technician maintains the aircraft's weight and balance records. TIs coordinate with the technician anytime that maintenance on the aircraft could affect weight and balance. Refer to AR 95-1, 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.

8-23. Before an aircraft is delivered, the manufacturer inserts all aircraft-identifying data on the various charts and completes all forms. DD Form 365 series, charts, and any other pertinent data about the aircraft's weight and balance are maintained in a permanent binder. The binder and all forms list the aircraft's designation and serial number. TI annotates any changes that affect the aircraft's weight and balance on these forms.

8-24. Weight and balance forms for each aircraft will be safeguarded and maintained. Each aircraft serial number and information to be inserted on the charts or forms apply only to the individual aircraft. Individual weight and balance forms serve various purposes; therefore, their retention periods vary. Standard forms will be used with this data to provide an effective system for weight and balance control. The weight and balance data and related forms for each aircraft will be maintained according to AR 95-1 and Chapter 4 of TM 55-1500-342-23.

Aircraft Maintenance Records

8-25. TIs monitor all records used in aircraft maintenance for accuracy and completeness as per DA Pam 738-751. TIs check the accuracy of these records each time they signoff a deficiency and as the completed forms are turned into their office. Many units also establish reconciliation between the flight platoons and QC to assist in monitoring the accuracy of these records. See paragraphs 8-48 through 8-59 below for procedures on inspecting aircraft forms and records.

Blank Forms

8-26. TIs ensure that a 30-day supply of blank forms is on hand in the maintenance section.

Deficiency Reports

8-27. TIs are responsible for maintaining a PQDR file (AR 25-400-2), assigning PQDR control numbers, and establishing a PQDR log (see example at Figure 8-6). TIs check all submitted PQDRs for accuracy and completeness and assist in determining the category. If an exhibit is needed, they ensure that all applicable forms and records accompany the exhibit (DA Pam 738-751). TIs review the TB 43-0001-series of equipment improvement and maintenance digests before submitting the PQDR.

8-28. The TI investigates any deficiency that occurs on a continuing basis. If a materiel defect is involved, the TI submits a PQDR informing AMCOM of the problem. If the defect is due to workmanship, the TI informs all maintenance personnel of the problem, its possible effects, and how to correct it.

CONTROL NUMBER	SUBJECT & CATEGORY	EXHIBIT Y OR N	DATE OF SUBMITTAL	DATE OF REPLY
8TZFFF 940003	OH-58 PUMP, SUBMERGED, RUBBER CHECK VALVE MISSING FROM TOP OF FUEL BOOST PUMP HOUSING (CAT 1)	YES	23 JUN 94	25 NOV 94

Figure 8-6. Sample Format for a Deficiency Report Log

GENERAL TECHNICAL INSPECTION PROCEDURES

8-29. 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

8-30. The TI 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 or on DA Form 1687) by the owning unit commander. This provides the name, rank, and duty position of the TI and authorizes him to inspect and sign off red-X and circled red-X conditions on specific aircraft models and components. Only the TI's initials and signature are required to release an aircraft for flight. A sample signature and initials help eliminate unauthorized use by other personnel.

8-31. A TI or maintenance supervisor who works on a red-X or circled-red-X fault cannot sign off the work as his own TI. 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 TI 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 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

8-32. 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) or DA Form 1687. TOE/TDA units maintain a memorandum, as applicalbe, of the following designated representatives:

- Aviators appointed as maintenance test pilots (AR 95-1 and TM 1-1500-328-23).
- Personnel entering deferred maintenance on DA Form 2408-14-1 (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 one-time 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 95-1).
- 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 25-33).
- 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).

8-33. Whichever form is used, it states the function that is delegated. Completed forms will be kept on file in the QC office. Changes or revisions to subsequent Army

publications affecting the above designations will be reviewed. Additions or deletions of orders will be made at that time.

INSPECTION STAMPS

8-34. An inspection stamp will be used to indicate a satisfactory condition. It carries the same authority as a TI'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 TI's number. The stamp will be obtained 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.

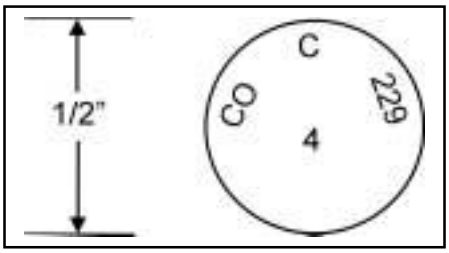


Figure 8-7. Inspection Stamp Sample

STAMP NUMBER*	ASSIGNED TO	DATE ASSIGNED	DATE RELIEVED
1	JERRY H. BROWN SSG	16 FEB 97	
2	JOHN W. DOE	23 AUG 97	3 DEC 98
3			
4			
5			
6	STAMP DESTROYED (LOST)		
2	DAVE E. HONEYCUTT SFC	4 JUN 99	

*ALL STAMP NUMBERS MUST BE INCLUDED AND ACCOUNTED FOR

Figure 8-8. Sample Inventory/Register of Inspection Stamps

STATUS SYMBOLS

8-35. For a discussion of status symbols for aircraft defects, refer to DA Pam 738-751.

NONDESTRUCTIVE INSPECTION

8-36. Nondestructive inspection is a tool of QC inspection. Aircraft components may have suspected metal flaws that 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 TI must evaluate the defect. That is when the TI turns to nondestructive inspection.

8-37. Nondestructive inspection testing methods are used to determine the composition, integrity, dimensions, or properties of a component or structure without causing damage to the item. Some nondestructive inspection methods include liquid penetrant, magnetic particle, electromagnetic, ultrasonic, and penetrating radiation methods. Nondestructive inspection details and procedures are fully discussed in TM 1-1500-204-23-7 and TM 55-1500-335-23.

QUALITY CONTROL AIRCRAFT INSPECTIONS

8-38. Aircraft are inspected to ensure that published specifications are followed, maintenance requirements are complied with, and quality work is completed efficiently. Many times a TI is not completely familiar with the area or item being inspected. If this is the case, the TI reviews the manuals on the subject area or item. In general, the TI monitors maintenance procedures to ensure the following:

- 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.

8-39. TIs perform some aircraft inspections at specific times. These inspections include initial, 100-percent, in-progress, and final inspections.

INITIAL INSPECTION

8-40. AVIM inspectors perform an initial inspection before the aircraft enters the shop for maintenance to verify that aircraft or components meet specifications of published maintenance manuals. This inspection determines deficiencies, work required, economical repair of aircraft and components and accountability of equipment.

NOTE: Minor AVUM deficiencies will not justify refusal to accept an aircraft into the AVIM shops.

8-41. All deficiencies are entered on DA Form 2408-13-3. The form(s) are returned to PC after the inspection. Only those cowling and access panels necessary to inspect the faults listed on DA Form 2407 by the AVUM unit are removed.

ONE-HUNDRED PERCENT INSPECTION

8-42. AVIM or AVUM TIs perform a 100-percent inspection. This type of inspection is usually performed if numerous faults are found during other inspections (such an initial

inspection). The QC personnel should coordinate with the PC or maintenance officer before performing a 100-percent inspection.

8-43. The TI performs the 100-percent inspection by removing all cowling and access panels and inspecting the entire aircraft, including all systems and components. Items to look for during the inspection are the following:

- Correct assembly.
- Proper safety techniques (for example, use of safety 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

8-44. The in-progress inspection is a continuing inspection performed periodically while the aircraft or component is in the shop (especially important during phase/periodic inspections). The TI 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. AVUM and/or AVIM TIs perform this inspection. It ensures that the final product is reliable, areas are inspected before they are covered with access panels or components, and mistakes are discovered and corrected on the spot.

8-45. Before performing an in-progress inspection on aircraft in phase/ periodic maintenance, the TI reviews all logbook forms and records that are completed by the maintenance crew. Enter deficiencies missed by the maintenance team on DA Form 2408-13-1.

FINAL INSPECTION

8-46. A final inspection is a complete inspection and functional test (if required) of all aircraft or components released from the shop after maintenance. This inspection determines the following:

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

8-47. Major (red-X) deficiencies will be corrected before the aircraft or component leaves the shop. Minor (red-diagonal) shortcomings will be corrected 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.

FORMS AND RECORDS INSPECTION

8-48. 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. Some items to look for when inspecting forms are listed below.

DA FORM 2408-12

8-49. TIs ensure that hours and landings are correctly totaled.

DA FORM 2408-13 SERIES

8-50. TIs ensure that the following actions are completed::

- Hours and landings are correct and correctly carried forward from DA Form 2408-12 (Army Aviator's Flight Record).
- Current aircraft hours, landings, autorotations, and APU history and rounds fired, if applicable, are correctly carried forward from previous DA Form 2408-13 (Aircraft Status Information Record).
- Status in Block 10 reflects the most serious uncorrected fault listed on DA Forms 2408-13-1, 2408-13-2, 2408-13-3, and 2408-14-1.
- All corrected red-X and circled-red-X corrective actions were inspected by an authorized inspector.
- All uncorrected 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 2408-14-1

8-51. TI ensure the following actions are completed:

- Faults are transcribed word for word from DA Forms 2408-13-1 or 2408-13-3.
- Reasons for delay are valid (work order number, document number, or awaiting phase in Block 6).
- Individual’s signature (Block 8) is an authorized signature, as designated in writing.

DA FORM 2408-18

8-52. TIs ensure that all required inspection items are entered. They will enter any inspection that is due on DA Form 2408-13-1.

DA FORMS 2408-5 (EQUIPMENT MODIFICATION RECORD) AND 2408-5-1 (EQUIPMENT MODIFICATION RECORD)

8-53. TIs ensure the following actions are completed:

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

DA FORMS 2408-15 (HISTORICAL RECORD FOR AIRCRAFT) AND 2408-15-2 (AIRCRAFT VIBRATION RECORD)

8-54. TIs ensure the following actions are completed:

- 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 FORMS 2408-16 (AIRCRAFT COMPONENT HISTORICAL RECORD) AND 2408-16-1 (HISTORY RECORDER, COMPONENT, MODULE RECORD)

8-55. TIs ensure the following actions are completed:

- 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 (AIRCRAFT INVENTORY RECORD)

8-56. TIs ensure the following actions are completed:

- 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 FORMS 2408-19 (AIRCRAFT ENGINE TURBINE WHEEL HISTORICAL RECORD), 2408-19-1 (T53/T55 TURBINE ENGINE ANALYSIS CHECK RECORD), 2408-19-2 (T700 SERIES TURBINE ENGINE ANALYSIS CHECK RECORD), AND 2408-19-3 (ENGINE COMPONENT OPERATING HOURS RECORD)

8-57. TIs ensure that these forms are properly completed and on hand for each gas turbine and engine turbine wheel.

DA FORM 2408-20 (OIL ANALYSIS LOG)

8-58. TIs ensure that a properly completed form is on hand for each aircraft component in the AOAP.

DD FORMS 365 (RECORD OF WEIGHT AND BALANCE PERSONNEL), 365-1 (CHART A-BASIC WEIGHT CHECKLIST RECORD), 365-2 (FORM B-AIRCRAFT WEIGHING RECORD), 365-3 (CHART C-BASIC WEIGHT AND BALANCE RECORD), AND 365-4 (WEIGHT AND BALANCE CLEARANCE FORM F-TRANSPORT/TACTICAL)

8-59. TIs ensure that these forms are on hand and up-to-date as required by AR 95-1 and TM 55-1500-342-23.

TECHNICAL COMPLIANCE

8-60. The TI monitors and ensures compliance with MWOs, TBs, SOF messages, ASAM, and aviation safety action messages.

MODIFICATION WORK ORDERS

8-61. Upon receipt of an MWO that applies to the serial-numbered aircraft assigned to your unit, TI enters MWO information on DA Form 2408-5 (refer to DA Pam 738-751). This includes MWOs directed by a higher commander. TI also enters MWOs that apply only to aircraft based at specific locations. If the aircraft serial numbers are included, the TI lists 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).

8-62. If the MWO is not applied by the specified date, TI enters the MWO on DA Form 2408-13-1. For an overdue normal MWO, TI reenters it on DA Form 2408-14-1 (refer to DA Pam 738-751).

TECHNICAL BULLETINS

8-63. TBs direct one-time inspections of an aircraft or component. DA Forms 2408-13-1, 2408-15, 2408-5-1, 2408-16, and 2408-18 are used to ensure compliance with TBs.

DA Form 2408-13-1

8-64. TI or crew chief uses this form to enter the one-time inspection due on the aircraft or aircraft component. Technical inspections are performed according to the TB. Normally, if a TB is not applied within the specified period, the aircraft is grounded. If no defects are found, the inspection due is signed off on DA Form 2408-13-1. If defects are found, they will be entered on DA Form 2408-13-1. Maintenance personnel are notified for corrective action. After the defect is corrected, the corrective action is inspected and the inspection due is signed off on DA Form 2408-13-1.

DA Form 2408-15

8-65. TIs enter a one-time inspection of an aircraft airframe and related systems and subsystems on this form.

DA Form 2408-5-1

8-66. TIs enter TBs that apply to components on DA Form 2408-5-1 (see DA Pam 738-751). The procedure is the same as for MWOs.

DA Form 2408-16

8-67. If a TB applies to a component on which DA Form 2408-16 is maintained, the TI enters TB compliance in Block 7. DA Pam 738-751 and TB 1-1500-341-01 for each MDS of aircraft list all components that require DA Form 2408-16.

DA Form 2408-18

8-68. A TB may require a recurring inspection at specified intervals. If so, TI enters this inspection on DA Form 2408-18 for the aircraft.

SAFETY-OF-FLIGHT MESSAGES/AVIATION SAFETY ACTION MESSAGES

8-69. TIs comply with SOF messages and ASAMs and log them on applicable DA forms according to DA Pam 738-751.

SECTION II – PUBLICATIONS

TYPES OF PUBLICATIONS

8-70. 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. TIs set up and maintain the master reference library consisting of many types of publications.

ARMY REGULATIONS

8-71. ARs provide policies and responsibilities that govern administrative procedures and ensure compliance at all levels. Section 4 of DA Pam 25-30 contains an index of ARs. Subject matter is identified by a basic number. For example, all ARs in the 95-series are about aviation. A subnumber preceded by a dash indicates additional information about the basic subject, (such as AR 95-1, Flight Regulation and AR 95-2, Air Traffic Control.

DEPARTMENT OF THE ARMY PAMPHLETS

8-72. DA Pams contain permanent information or reference material. Section 4 of DA Pam 25-30 contains an index of DA Pams. DA Pams are numbered in the same manner as ARs. A subnumber preceded by a dash distinguishes between DA Pams with the same basic number. For example, all DA Pams in the 25 series are about Army publications, such as the following:

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

FIELD MANUALS

8-73. FMs outline military doctrine, tactics, and techniques. They include instructions and reference material on training, operations, and maintenance management. Section 5 of DA Pam 25-30 contains an index of FMs. FMs are also numbered in the same manner as ARs. A basic number identifies the primary subject, and a subnumber indicates additional information. For example, all FMs in the 3-04 series (1 series) are about aviation operations—FM 3-04.111(1-111), Aviation Brigades and FM 3-04.500(1-500), Aviation Maintenance.

TECHNICAL MANUALS

8-74. TMs 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 TMs. TMs 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.

8-75. A dash and a four-digit number indicate the FSC code, including the equipment within the FSC. For example, -1510 represents fixed-wing aircraft, and -1520 represents rotary-wing aircraft.

8-76. A dash and a three-digit number indicate the MDS of a particular aircraft. For example, -238 represents AH-64A helicopters, and -248 represents OH-58D 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.

8-77. A serial number preceded by a dash or a slash is added when a TM is published in more than one volume; such as, -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 TM. Examples of these TMs are as follows:

- TM 1-1520-238-10, operator's manual for the AH-64A helicopter.
- TM 1-1520-238-23-1, AVUM and AVIM maintenance instructions for AH-64A helicopters.
- TM 1-1520-238-23P-1, first volume of repair parts and special tools list for AH-64A helicopters.

TECHNICAL BULLETINS

8-78. TBs contain technical information on equipment or professional management techniques. The most common TBs encountered by QC personnel direct one-time inspections of aircraft or components. Section 7 of DA Pam 25-30 contains an index of TBs. Urgent inspection requirements are initially sent to the units by a TWX. The subsequent TB then supersedes the TWX. TBs directing one-time inspections are classified by priority as urgent, limited urgent, and normal.

Urgent

8-79. Urgent TBs contain aircraft conditions that affect SOF. These conditions may cause damage or destruction to aircraft and death or injury to personnel. An urgent TB 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 TB.

Limited Urgent

8-80. A limited urgent TB allows the aircraft to be operated only under specific conditions or limitations. These conditions are listed in the TB.

Normal

8-81. Normal TBs are issued when problems occur that reduce equipment efficiency, life expectancy, or use of the aircraft. These TBs do not impose any operating limitations; however, maintenance must be accomplished within a specified time.

8-82. TBs for specific items of equipment are numbered in the same manner as TMs for that item. An added number preceded by a slash differentiates between TBs on the same item. The two-digit group indicates which category performs the TB maintenance. TBs pertaining to two or more different items of equipment within the same FSC have a zero for the third digit. An example of these TBs is the following:

- TB 55-1500-337-24:
  - -1500 refers to all aircraft.
  - The zero as the third digit indicates that this TB pertains to two or more different items of equipment within this FSC.
  - -24 indicates that this TB applies to AVUM through depot levels of maintenance.

MODIFICATION WORK ORDERS

8-83. MWOs are the only publications that authorize modification or alteration of Army equipment. MWOs are issued to—

- Provide compatibility with newer equipment.
- Prevent serious damage to equipment.
- Increase operational effectiveness.
- Reduce support requirements.

8-84. Each MWO contains specific instructions concerning the following:

- 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.

8-85. As with TBs, MWOs are assigned priorities. The priority classifications and numbering system are the same as for TBs. Section 6 of DA Pam 25-30 contains an index of MWOs.

SAFETY-OF-FLIGHT/AVIATION SAFETY ACTION MESSAGES

8-86. SOF 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. Examples of these messages are the following:

- GEN-96-4.
  - This is a general message that applies to all aircraft or maintenance facilities.
  - It was written in FY 96.
  - It was the fourth general message sent in FY 96.
- UH-60-96-14.
  - This is a specific message that applies to the UH-60-series aircraft.
  - It was written in FY 96.
  - It was the 14th UH-60 message sent in FY 96.

8-87. Three types of SOF messages are emergency, operational, and technical.

Emergency

8-88. These messages contain serious information. They usually denote hazardous aircraft conditions that cause aircraft damage or personal injury. Emergency SOF messages are later published as urgent TBs or MWOs.

Operational

8-89. These messages, issued by the USASC, impose operating limitations on aircraft.

Technical

8-90. 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 AMCOM and are later published as urgent action TBs or MWOs.

8-91. The three types of aviation safety action messages are maintenance mandatory, informational, and operational.

8-92. **Maintenance Mandatory**. These messages direct maintenance actions and/or update TMs.

8-93. **Informational.** These messages provide information of a maintenance technical or general nature.

8-94. **Operational.** These messages pertain to aircraft operations, flight procedures, limitations, or operational policies.

8-95. Every three months, AMCOM 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 SOF aviation safety action messages, refer to AR 95-1 and DA Pam 738-751.

SUPPLY BULLETINS

8-96. SBs provide important supply information to maintenance personnel. This information includes the following:

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

8-97. SBs are numbered in sequence by calendar year and usually have an expiration date. Section 6 of DA Pam 25-30 contains an index of SBs.

FEDERAL AVIATION ADMINISTRATION PUBLICATIONS

8-98. 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

8-99. 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 Pam 25-33 is necessary for the TI. This pamphlet explains the following:

- 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.

(**NOTE:** DA Pam 25-40 provides information on posting and filing publications.)

CHANGES

8-100. 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 IAIC. The IAIC is only printed once and is not stocked for reorder.

Posting

8-101. When posting changes, personnel will ensure the following procedures are followed:

- 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.

Interim Changes

8-102. 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, personnel will follow the procedures directed by the message. The message number and date are posted in the margin of the publication opposite the changed portions (for example, DA message 0614202 Mar 96).

8-103. A copy of the message is filed in front of the basic publication or the last printed change. If a copy is not available, a cross-reference sheet is inserted showing where a copy of the message can be found. When the next printed change or revision of the publication is received, the suppression notice is checked. If the notice states that the message is rescinded or superseded, the message or cross-reference sheet is removed and destroyed.

REVISIONS

8-104. A revision is a complete new edition of an existing publication. It supersedes the preceding publication, together with all changes, supplements, and appendixes.

SAFETY-OF-FLIGHT SUPPLEMENTS

8-105. SOF 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 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

8-106. Interim supplements are publication changes issued by TWX when loss of life or serious personal injury is involved.

Formal

8-107. 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

8-108. A publication is rescinded (canceled) when its material becomes obsolete. Destroy obsolete publications. DA Pam 25-30 contains a list of rescinded publications.

DISPOSAL

8-109. Publications will be discarded after they have been rescinded or superseded. Classified publications are discarded according to AR 380-5 and unclassified publications will be discarded according to instructions from the local disposal officer. However, do not discard old publications until new ones are reviewed. DA Form 12-series (Requirements for Distribution of Publications and Blank Forms) will be used to order the quantity of publications needed. If more publications are received than needed, the DA Form-12 series will be updated according to DA Pam 25-33. You will determine if other aviation units need the publications; if not, contact the post adjutant general publications officer for disposal instructions.

TECHNICAL LIBRARIES

8-110. 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 25-40 is required reading for TIs. It explains setting up, maintaining, and posting changes to technical libraries.

MASTER AND SHOP

8-111. TIs 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. TIs also check the master and shop libraries quarterly to ensure the following:

- 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 the status of publications on hand.
- No superseded or rescinded manuals are used.
- Classified manuals are controlled according to the AR 380 series.

FILING SYSTEM

8-112. AR 25-400-2 and DA Pam 25-40 will be used as master guides for maintaining the technical publications' files. DA Pam 25-30 contains an index of DA publications and forms. The status of publications will be verified 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.

8-113. If publications are received before they appear in the index, you will prepare and keep a list with the index. When these publications appear in the index, they will be deleted from the list. In addition, rescinded publications will be lined out 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. The following types of publications will be filed as described below:

- TMs—numerically, when letters are added to the publication number—numerically and alphabetically. For example:
  - TM 1-1500-204-23 series
  - TM 1-1520-238-10
  - TM 1-1520-238-23-1
  - TM 1-1520-238-23P-1
  - TM 1-1520-238-23P-2
  - TM 1-1520-238-PMS
- TBs—numerically, preceding or inside the front cover of the applicable TM (if related to a specific TM). TBs that do not pertain to a specific TM are numbered consecutively and filed alphanumerically, separately from TMs.
- MWOs—numerically, separately from TMs.
- Supply manuals—alphanumerically.
- Lubrication Orders—with manuals that they apply to (a lubrication order has the same number as the TM or TB that best covers preventive maintenance for the equipment).
- SBs—numerically.
- FMs—numerically.
- Supply catalogs—numerically by FSC, then alphabetically.
- DOD manuals—numerically by federal classification, then alphabetically.
- Supply letters—numerically, separated by CY.
- SOF supplements—alphanumerically immediately following the basic publication.

INTERSERVICE PUBLICATIONS ACCOUNTS

AIR FORCE PUBLICATIONS

8-114. 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 use the following procedures:

- 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/M-MDUB, Tinker AFB, OK 73145.

NAVY PUBLICATIONS

8-115. NPFC 2002 will be used to order Navy publications. This index is available only on microfiche. 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.

8-116. Once an account is established, Navy publications are ordered using DD Form 1348M (DOD Single Line Item Requisition System Document [Mechanical]). Requisitioning instructions are in 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 UIC is established, publications are mailed to the address on the DODAAC. Permanent distribution of publications is obtained by writing to Commanding Officer, Naval Air Technical Services Facilities, 700 Robins Avenue, ATTN: CODE 321, Philadelphia, PA 19111. Binders used to store publications are available through the same procedures.

8-117. Military specifications and standards are also available through the Naval Publications and Forms Center. DD Form 1425 (Specifications and Standards Requisition) is used to request a copy of the index. Once the initial index is received, all further orders are requested using DD Form 1425.

Appendix A

Unit Level Logistics System–Aviation

DESCRIPTION

A-1. ULLS-A is a computerized system that automates and integrates flight line, PC and QC, technical supply, and aircraft readiness/status reporting into a single standard Army management information system. ULLS-A automates the manual supply and maintenance forms and other unit level tasks that were accomplished in a manual mode. ULLS-A is now the system of record for all PLL and TAMMS-A operations at the unit level.

A-2. ULLS-A does not change logistics principles or modify regulations that pertain to an aviation unit. However, there will be changes in procedures related to records management and readiness reporting that will need to be specified in SOP. Ensuring the adequacy of the unit SOP is a command responsibility.

UNIT LEVEL LOGISTICS SYSTEM—AVIATION STRUCTURE

AVIATION UNIT MAINTENANCE

A-3. The AVUM company is the real nerve center for maintenance management through the use of ULLS-A. There is a four-system LAN at the AVUM company with work stations for the technical supply section, qc section, and PC office. The fourth terminal is not a workstation; 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, component/inspection projections, statistical data gathering, TBO listing, and historical records data.

FLIGHT COMPANY

A-4. Systems are placed with the crew chiefs at the flight company on small, portable, laptop computers. These computers maintain aircraft operational records, to include status of aircraft and parts demands. 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 up-date, and aircraft inventory records) flow 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.

AVIATION INTERMEDIATE MAINTENANCE

A-5. Aircraft sent to AVIM, on work order, are accompanied by two separate diskettes—an aircraft transfer diskette, and a support maintenance request diskette. The aircraft temporary transfer diskette holds a copy of all records for the customer's aircraft and provides the AVIM with the ability to manage operational and historical aircraft records.

The support maintenance request is managed in SAMS-1. The PC section of an AVIM unit maintains both the SAMS-1 and ULLS-A. ULLS-A provides the same electronic record keeping for customer and float aircraft. The system interacts with support maintenance through the SARSS and the SAMS-1. This interaction is done through diskette transactions. This is also a two-way information transaction, for example, AVIM also provides daily work order statuses to AVUM. AVIM additionally supports AMSS status tracking from organizational to support, and receives RX work orders from SARSS, which are managed on the SAMS-1 system.

DEPOT

A-6. Aircraft sent to the organic depot are accompanied by a transfer diskette that supplies a copy of all the records. After aircraft delivery, the depot inducts the electronic records into the production maintenance processes along with the aircraft in an effort to achieve a seamless data flow of updated TAMMS-A electronic documents back to the field. ULLS-A aircraft data are placed on a LAN connected server with approximately 50 user workstations inputting changes to records during the various stages of maintenance. Not all ULLS-A features are employed at the depot. The predominant depot interface is with historical process. As new or overhauled components are assembled to the airframe structure, the ULLS-A system data are updated on the LAN. Before ground run (MOC) and maintenance test flight, the latest ULLS-A data extracted from the LAN server are used to print a paper flight pack. Owning unit personnel receive an ULLS-A out-brief and transfer diskette at the time of aircraft pickup.

READINESS, SUPPLY, AND MAINTENANCE INFORMATION

A-7. This information is exchanged within each level of ULLS-A, and with other automated systems, via telecommunications and floppy diskette. The goal of ULLS-A is to help units achieve the highest level of readiness possible. Faster request and receipt of repair parts, immediate access to detailed aircraft status, maintenance, and supply information and increased knowledge of aircraft readiness contribute to overall unit readiness.

AVIATION UNIT LEVEL LOGISTICS SYSTEM—AVIATION INTERFACES AND TELECOMMUNICATIONS CAPABILITIES

A-8. ULLS-A exchanges data with other automated systems. These requirements to send data are called interfaces. Sometimes data are exchanged between the interfacing systems; at other times, the data flow in only one direction. The interfaces may be transferred by telecommunications or floppy diskette.

TELECOMMUNICATIONS

A-9. ULLS-A telecommunications capability uses either the tactical communications system employing MSE or the garrison/commercial telephone lines. The ability to send data via tactical communications may be limited by the feasibility to gaining access to the MSE SEN. SENs provide tactical voice and data telephone service to brigade and battalion level commanders and staff. When ULLS-A access to tactical telephone service is required, your unit must provide the TTA for MSE interface and run the field wire (WF-16) to the SEN. When using garrison/commercial telephone service, modems replace TTAs; installation dial central telephone systems replace field wire, junction boxes, and MSE equipment. Once tactical or garrison/ commercial telephone service is established, data can be sent in three ways—concentrator (Go-to-War), point-to-point, or

CAISI methods. ULLS-A processes are limited to garrison/commercial telecommunications: the OSC and the data transfer between AVUM and the flight companies. The ULLS-A modem dials up the DDN TAC and establishes contact through Gateway.

Concentrator

A-10. The go-to-war communications method employs the concentrator. The concentrator supporting a typical aviation brigade is usually established at the material management center or the closest support battalion. It is a computer that serves to receive files sent by customers and hold them until the intended receiver calls in to it and receives files through BLAST file transfer. ULLS-A users must coordinate with the concentrator operator in advance to determine appropriate concentrator phone numbers, addresses and passwords. ULLS-A parameters must be sent correctly for concentrator use. All systems employing the concentrator must use BLAST communications. This method of communications requires an interface device, such as modem or TTA, and appropriate telephone service (garrison or tactical) between each computer and the concentrator.

Point-to-Point

A-11. Point-to-point allows a computer, such as ULLS-A or TACCS, to send files directly to another computer. Both computers must use BLAST. This method of communications requires an interface device, such as Hayes modem or TTA, and appropriate telephone service (garrison or tactical) between the two computers. When sending or receiving via point-to-point, users must coordinate in advance to determine appropriate phone numbers, and to ensure the receiving system is waiting in the BLAST receive mode.

Combat Service Support Automated Information Systems Interface

A-12. The CAISI process will allow the user to transmit and/or receive any file via garrison or tactical telecommunications devices directly to/from another computer using the BLAST protocol. Any ULLS-A can send any file to any other computer that is also using BLAST and also connected to the same communications network. The Telecommunications interface process may be used to send or receive the file. Advance coordination is required between the ULLS-A and the other computer.

FLOPPY DISKETTE

A-13. The following interfaces are via floppy diskette, and are provided only as required:

- Active Army units receive the MMDF from SAMS-2, while National Guard units receive this update direct from LOGSA.
- All units receive the LCF direct from AMCOM. The LCF files are sent to Development Center Lee, Fort Lee, Virginia, for QC purposes, with the current ULLS-A baseline. Once the QC proves satisfactory, Fort Belvoir receives the LCF files and distributes them to ULLS-A fielded units.
- Any ULLS-A workstation can send the AMSS commander's statement to LOGSA by mailing the floppy diskette. This must be done monthly, at the end of the report period. Telecommunications is not to be used, as LOGSA is not set up to receive multifiles with the same name. The AMSS “End of Report Period” must be processed to identify status which did not meet DA goals. Annotations are made to the Commander’s Statement process and then printed and processed to diskette.

The diskette is mailed to LOGSA. If the commander's statement is not processed, the following month end-of-report-period can not be accomplished, since this action resets the report period date to the next period.

- Any ULLS-A workstation can send crew flight data to a computer in flight operations designed to process DA Form 759 (Individual Flight Record and Flight Certificate–Army) via floppy diskette. These data will be provided as required by the command.
- Supply catalog is sent to ULLS-A TS workstation by CD-ROM from LOGSA.
- Flight company tailored Class IX catalog is sent to each flight company ULLS-A from ULLS-A TS workstation.
- The 4 basic aircraft transfer situations are the following:
  - Aircraft can be transferred from one ULLS-A system to another within the flight company. This action is performed at the flight company and requires no UIC change or property book change.
  - The owning battalion can transfer aircraft from one flight company to another. This action is performed by PC and requires a UIC change and property book change.
  - Aircraft may be permanently transferred out of the organization. This action is performed by PC and requires a property book change, which completely removes the aircraft from the owning unit.
  - Aircraft may be "temporarily transferred" to support maintenance, for the sole purpose of operational/historical records management.

  Note: The flexibility allowed within the basic transfer situations provides ULLS-A with the capability to transfer aircraft "operational/historical" records to support the mission of "task organization."
- The aviation depot uses diskettes to transfer ULLS-A data in and out of field units.

DATA TRANSFER

A-14. ULLS-A is a network of multiple computers within an aviation battalion. The data transfer process keeps all parts of the network up to date by exchanging information, in file format, between flight company systems and the AVUM. The Data Transfer process must run daily to synchronize the data. Data transfer may be performed via telecommunications (modem and commercial telephone line) or by an exchange of diskettes between flight companies and the AVUM. Data transfer files are processed and maintained sequentially. A history of data transfer files is maintained within each system. This supports the recovery effort if the transfer diskette is lost or communications is interrupted during processing.

FLIGHT COMPANY

A-15. ULLS-A at the flight company exchanges operational aircraft records information, Class IX part demands, and readiness information data daily with the ULLS-A system at PC in the AVUM. This is accomplished using commercial/garrison telephone line and modem. Tactical telecommunications is not available for this interface due to the forward deployment of the flight companies, lack of tactical telephone access, and limited availability to TTAs. As an alternate method of interface, floppy diskettes may be exchanged.

PRODUCTION CONTROL

A-16. The AVUM ULLS-A PC workstation sends AMSS rollup data to the brigade ULLS-A using floppy diskette. The data should be sent daily/monthly, at the end of the reporting period, or upon request from the brigade. ULLS-A is capable of transmitting the AMSS data produced on diskette to brigade using telecommunications interface process. Through this two step process, telecommunications (garrison and tactical) is possible.

- The AVUM ULLS-A PC workstation processes support maintenance requests with SAMS-1, the AVIM PC. This can be accomplished via telecommunications (garrison and tactical) or by floppy diskette. Customer workorder status is processed to AVUM daily from the AVIM via modem or diskette.
- The AVUM ULLS-A PC workstation sends inoperative equipment report (XMJ records), customer workorder (XML records) and high priority parts report (XMK records) (AWAME125.DAT) to the SAMS-1 located at the AVIM PC. This can be accomplished via telecommunications (garrison and tactical) or by floppy diskette. AVIM PC processes customer workorder status (XMS Records) to AVUM. The reporting unit "AMSS reporting and history file", (AWAME130.DAT) is processed to SAMS-1 at the completion of each report period. This file is then processed to SAMS-2 and LOGSA.

TECHNICAL SUPPLY

A-17. The ULLS-A TS workstation exchanges supply information daily. It passes requests to SARSS-1 at the AVIM and receives request status back. This can be accomplished via telecommunications (garrison and tactical) or by floppy diskette. If the TS workstation becomes inoperative, PC may send and receive data from SARSS-1. If a modem is used at PC to receive status, SARSS-1 must change the dial up telephone number.

- The ULLS-A TS workstation exchanges supply information. It passes requests as required to the gateway and receives status, to be processed by OSC. This interface is only possible via modem and garrison/ commercial telephone line.
- TS can send financial expenditure data as required to the ULLS-S4 primarily via floppy disk or LAN. Telecommunications (garrison and tactical) is possible via the concentrator or point-to-point. The unit parameters must be set to accomplish this task.

COMMON ERRORS

A-18. Because daily data transfer is extremely critical to the successful operation of ULLS-A, you should be aware of common problems that can occur with data transfer. These problems include the following:

- Unit fails to establish a SOP for unit data transfer procedures that ensures consistent, uninterrupted daily transfer of data.
- User fails to perform daily transfer of ULLS-A data.
- User fails to perform backup of data prior to data transfer.
- User fails to properly label or protect diskettes.
- User fails to establish a proper diskette filing system for archived log files.
- User abnormally aborts out of the data transfer process.

- User is unable to respond to error/problem situations that may occur. User fails to refer to the EM.
- “HAYES” is not entered in the modem type field of the hardware parameters.

ARMY MATERIEL STATUS SYSTEM

A-19. AMSS has been developed to replace the manual readiness reporting requirements outlined in AR 700-138. As ULLS-A is fielded, the AMSS end-of-report-period file and Commander's Statement will replace the DA Form 1352. ULLS-A becomes the system of record, once fielded. The MMDF provides ULLS-A with standards and tables for readiness reporting. AMSS is also incorporated into ULLS-G and replaces DA Form 2406 and DA Form 3266-1. AMSS, in both ULLS-A and ULLS-G, replaces the manual readiness reporting requirements with a single automated readiness reporting system and will become the system of record for all materiel status reporting in the Army.

COMMANDER’S TOOL

A-20. AMSS is intended to become the commander's link to monitoring the supply and maintenance posture of the unit. AMSS has the capability to consolidate the "real time" materiel status information received from subordinate units and is used for the purpose of monitoring and reporting their materiel readiness status. AMSS accumulates NMC maintenance data, PMC maintenance data, and NMC parts information for all reportable end items, weapon systems and subsystems and has the capability to receive support and depot level NMC data from the SAMS-1. NMC time due to an equipment shortage (NMCE) is not included in AMSS at this time. AMSS does not track reportable subsystems not on-hand that affect reportable weapon system NMC time.

LOGISTICS SUPPORT ACTIVITY

A-21. The capability of maintaining required, authorized, and on-hand equipment data is also included in AMSS. The SAMS will be the data path used to transfer the AMSS data to LOGSA. Consolidated data will provide the Army with the capability of monitoring the materiel readiness status of the fleet and will also provide the visibility necessary to effectively manage the Army's weapons systems.

END OF REPORT PERIOD

A-22. This option will replace the DA Form 1352. This process does not print an automated DA Form 1352. It creates a data file that includes the accumulated NMC time for each reportable aircraft and weapon system from the 16th day of the previous month at 0001 hours through the 15th day of the current month at 2400 hours. If this process is executed prior to the 15 of the month, it will project the accumulated NMC time for each item based on the current status, to the end of the current report period. In addition, the system will reset the report period end date for the next report period. Because of this projection capability, it is strongly recommended that all statuses on open maintenance requests from SAMS-1 be posted prior to executing this process. Statuses on all open document numbers need to be as current as possible. Lastly, this process will generate two hard copy reports, the "Output Listing: AWAME130.DAT", and the AMSS required commander's statement, a listing of aircraft which require remarks on the commander's statement. This process can create the file on disk or transmit the file via telecommunications. See AR 700-138 for time frame in submitting EOM report.

DEFINITIONS AND REQUIREMENTS FOR ARMY MATERIEL STATUS SYSTEM

A-23. The definitions and requirements concerning the development of AMSS in ULLS-A were provided by USAMC and are listed below.

Reportable Aircraft

A-24. All Army aircraft will be reported according to AR 700-138. Individual aircraft readiness goals are defined in Chapter 3 of AR 700-138. Aircraft and flight simulators listed there are reportable.

Reportable Subsystems

A-25. Reportable subsystems are subsystems such as missile, armament, and communications systems identified by LOGSA with EIC. These EICs are found within the MMDF. Some weapon systems are firing weapons. For example, the AN/ARN-89B Direction Finder Set and the M272 Launcher Guided Missile are considered weapons in ULLS-A. Both the aircraft and the weapons must be operational for the aircraft weapons system to be rated FMC.

Primary Subsystems

A-26. Primary subsystems are the airframe on which the required subsystems are authorized/installed. In the case of an AH-64A Apache attack helicopter, the aircraft is designed as the primary subsystem and the aircraft's radios, navigational systems, missile launcher, and armament subsystems together form the weapons systems. Quantifying subsystems in this way allows PMC time to be linked to the aircraft weapons system.

SAGE DATABASE INQUIRY

A-27. ULLS-A contains a powerful database query system called SDI. All information stored in ULLS-A, except for user IDs and passwords, is accessible to any ULLS-A user through locally designed SDI reports. The SDI allows the user to search the database and, if desired, generate specialized reports. It enables the unit operator to create, save, and edit queries without the assistance of a programmer or extensive knowledge of the database structure. Once the operator has created his report, he can display the information on the screen, print the report, or create a file and copy it into a diskette.

SYSTEM SECURITY

A-28. In addition to the computer's built-in password, ULLS-A has security features designed to protect the integrity of the database according to AR 380-19. The security features include a warning banner indicating this is a DOD interest computer system for "Official Use Only" and is subject to monitoring. A system of user identification and password is used to control access to the program. User ID and passwords will be assigned by a TASO who should also be an ULLS-A administrator. Passwords will be updated every 180 days. Anyone trying to gain access will have three attempts to enter the correct data. After the third attempt, the system locks the user out. A special diskette must be used to reactivate the user ID. Users of ULLS-A will not have access to a DOS prompt. Finally, a C^2 audit program records each major event by user ID. Commanders must make sure security awareness training has been provided for each ULLS-A operator.

CONTINUITY OF OPERATIONS PLANNING

A-29. ULLS-A has a high level of reliability in garrison and in the field. However, operating conditions make it inevitable that ULLS-A systems will be replaced and restored under field conditions. Army regulation requires that every automated system be designed and operated in a manner that allows a unit to recover from battlefield damage and other catastrophic failures. The planning and standing operating procedures that assist the unit with recovery are referred to as COOP. Every commander using STAMIS, such as ULLS-A, is responsible to ensure that COOP plans are prepared and incorporated into unit SOP. Every ULLS-A user has a role in ensuring successful continuity of operations. COOP for ULLS-A requires daily backups created, labeled, and secured by operators. System support is needed to build replacement systems. ULLS-A administrators will assist system support and the unit in many ways to guide the successful restoration of unit data. After the systems are restored, ULLS-A operators should be directed to check the data and may be required to reenter some data lost due to the timing of the failure. Commanders should ensure that COOP is considered and that adequate procedures are documented in the unit SOP. The ULLS-A administrator should be appointed as the commander's representative on matters related to COOP.

ULLS-A PROCEDURES

A-30. The exact procedures for the use of ULLS-A will vary between units, so unit internal and external SOPs must discuss its use. The ULLS-A commander’s guide contains a sample ULLS-A internal SOP. The guide also contains a checklist for commanders to inspect the flight company operations, PC, QC, TS, brigade aviation maintenance office, and other general areas. The ULLS-A end user manual covers all aspects of the supply, maintenance, utility and AMSS operations performed by ULLS-A and should remain the primary source of information for system operation and maintenance.

Appendix B

Sample Aviation Unit Maintenance/Aviation Intermediate Maintenance Internal Standing Operating Procedure

Figure B-1 is a sample format for an AVUM/AVIM internal SOP.

1. NAME

Head the SOP with the name of the organization and the station, the date, and the SOP number.

2. PURPOSE

This SOP provides a standardized guide for maintenance support procedures used by this AVUM/AVIM unit in performing its mission. This SOP can be tailored for use by AVUM/AVIM units as appropriate.

3. 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; and to provide aircraft recovery support.

4. FUNCTIONS

The functions of this unit are as follows:

- 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.

Figure B-1. Sample Format for AVUM/AVIM Internal SOP

5. RESPONSIBILITIES

a. **Quality Control**. The success of this unit's maintenance effort and its reputation depend on the reliability and integrity of the personnel assigned to the QC section. TIs 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.

b. **Technical Training**. Specialized and technical training is needed for logistics 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.

c. **Technical Assistance**.

(1) Technical assistance is a command responsibility at all levels of maintenance and supply down to, and including, this unit. This unit provides maintenance and supplies 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 information:

- Date of visit.
- Unit visited and its location.
- Team members.
- Key personnel contacted.
- Observations and comments.
- Recommended actions.

(2) 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.

Figure B-1. Sample Format for AVUM/AVIM Internal SOP (Continued)

d. **Repair Parts Supply**.

(1) To improve the efficiency and effectiveness of supply support, this unit will perform the following duties:

- 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 repairables.
- 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.

(2) The supply section will 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 nonstock-list items.

e. **Status Report.**

(1) 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.

Figure B-1. Sample Format for AVUM/AVIM Internal SOP (Continued)

(2) As soon as PC 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.

(3) To assist a supported unit in preparing DA Form 1352, the blue copy of DA Form 2407 is annotated during the month the aircraft is returned to the owning unit with the following information "This aircraft was in AVIM maintenance from _____ thru _____. There were____ aircraft not mission capable maintenance and ____supply hours." These data must be accurate.

f. **Production Control.** Maximum production of shop maintenance operations will be established. Uniform flow of the aircraft and its associated components through the shops will be maintained and regulated. Records will be processed 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 PC office. The PC 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 PC office also maintains an MWO request register.

(1) Procedures for controlling the flow of DA Form 2407 are as follows:

- PC clerks date the work request and enter it on the PC board. DA Form 2407 and the logbook are then passed to the TI section, where a TI 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 TI also reviews and processes the following:
  - Faults (on DA Forms 2408-13, 2408-13-1, 2408-13-2, and 2408-14-1).
  - Type of work requested (on DA Form 2407). MWO requirements.
  - Faults that require reentering from DA Forms 2408-13 series and 2408-14-1.
- PC supervisor notifies the appropriate section chiefs (maintenance/allied shops and maintenance officers) of the work assignment, based on evaluation of estimates returned from QC. PC supervisor estimates the date/time of the work's completion. Maintenance officers evaluate current workloads and priorities of work to be done.
- Final TI is made on all work accomplished. A run-up and test flight are made, but only after a complete TI 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.
- PC computes total man-hours and cost figures as required and closes out work requests on DA Form 2407 when the work is completed. The PC 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. 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 Form 2407 is according to DA Pam 738-751/738-750.

Figure B-1. Sample Format for AVUM/AVIM Internal SOP (Continued)

g. **Quality Control.** Usually, the QC 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 DRs 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.

(1) The QC officer or another qualified person is appointed as the weight and balance technician as directed by AR 95-1. Appropriate records are completed as required by AR 95-1, the applicable operator's manual, and TM 55-1500-342-23.

(2) QC 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 PC section is furnished an information copy of this type of publication.

(3) 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 QC 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 with repair actions.

(4) The QC 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 the person or section recommending changes to DA publications routes suggestions through the QC section.

Figure B-1. Sample Format for AVUM/AVIM Internal SOP (Continued)

(5) The QC 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 distributed the QC section uses DA Form 17 (Requisition for Publications and Blank Forms) with DA Form 17-1 (Requisition for Publications and Blank Forms [Continuation Sheet]). A card file with the following information will be maintained:

- Publication number, date, and title.
- Quantity requested and for whom, if required.
- Dates of request and of due-out received.
- Date received.

(6) QC will review each publication center bulletin to determine those items for which a due out was received or shipped. If QC does not receive these items within 30 days of the publication date, a follow-up request will be submitted and so noted on the file card.

6. PROCEDURES

a. **Initial Receipt.** When this unit receives an aircraft on a work request, the work package is immediately routed to the QC supervisor. A TI 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:

- Records. 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. TIs 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 PC officer for acceptance. TIs will also check DA Form 2408-15 for proper entries. Review aircraft armament records, if appropriate.
- Work Request. DA Form 2407 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 TM. After the PC 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 was not properly prepared. The PC clerk will give the supported unit representative a blank form, if required, and will help prepare it correctly.
- Inventory. A loose equipment basic item issue list inventory is made on all aircraft that are admitted to the shop for maintenance.
- Emergency Maintenance. Emergency maintenance services are provided to any transient aircraft when service is within the capabilities or limitations of this unit. DA Form 2407 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. A SOF inspection is made by the TI section and the PC 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 TM is used as a guide in determining the category of maintenance required.

Figure B-1. Sample Format for AVUM/AVIM Internal SOP (Continued)

b. **Initial Inspection.** TIs will have a thorough knowledge of FM 3-04.500(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. TIs ensure that required modifications have been applied and that all faults are recorded on DA Forms 2408-13-1, 2408-13-2, or 2408-13-3. TIs have the applicable aircraft maintenance manuals with them during inspections and conduct inspections according to standards in those manuals.

c. **In-Progress Inspection.** The assigned TI 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 TI 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.

d. **Final Inspection.**

(1) When all maintenance work is done, the PC section routes the work package to the QC section. If possible, the responsible team chief accompanies the completed records. TIs 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, such as items due for retorque or inspection.
- Assist the team chief in properly preparing any required DA Form 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, such as 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 Forms 2408-13 and 2408-13-1 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 QC officer for corrective action. Record the final inspection on DA Forms 2408-13 and 2408-13-1 with time expended.

(2) 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 forms to the QC section. All 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 PC section for disposition.

Figure B-1. Sample Format for AVUM/AVIM Internal SOP (Continued)

e. **Functional Test Flight.**

(1) Prior to the functional test flight, the TI reviews the aircraft historical records and checks DA Forms 2408-13 and 2408-14-1 for correct entries according to DA Pam 738-751/738-750. 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.

(2) The TI 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 TI checks the MWO suspense file for any outstanding MWO requests for which kits are on hand or can be otherwise completed. DA Form 2407 is returned to PC with the work package. MWO kits, if required, are delivered to PC.
- 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 TI 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.

(3) Maintenance operational checks and functional test flights are conducted according to TM 1-1500-328-23, the applicable aircraft organizational maintenance manuals, and maintenance test flight manual.

Figure B-1. Sample Format for AVUM/AVIM Internal SOP (Continued)

(4) 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.

(5) 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 QC section. The number of crews appointed is held to a minimum in order to standardize functional test flights.

(6) Crew scheduling is coordinated with the flight operations section. Functional test flight crews are scheduled to preclude delays to the maintenance work schedule. QC personnel supervise test flights and brief the purpose of the flight to the crew before the flight.

(7) 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. QC 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 flight. 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 QC section. QC personnel review each completed work sheet and determines the adequacy of corrective action. After all review actions are completed, the complete set of maintenance documents is forwarded to the PC section.

f. **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.

Figure B-1. Sample Format for AVUM/AVIM Internal SOP (Concluded)

Appendix C

Sample Aviation Intermediate Maintenance External Standing Operating Procedure

Figure C-1 is a sample format for an AVIM external SOP.

1. NAME

Head the SOP with the name of the organization, the station, the date, and the SOP number.

2. 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 PC officer or NCO on problems involving maintenance support.

3. 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.

4. MAINTENANCE REQUESTS

a. **Coordination.** The maintenance officer should coordinate requests for maintenance with the PC 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.

b. **Scheduled Maintenance.** DA Form 2407 is normally used to request scheduled maintenance, such as 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.

Figure C-1. Sample Format for an AVIM External SOP

c. **Unscheduled Maintenance.** Request unscheduled maintenance in the same manner as above, except for the lead time requirements. Again, direct coordination is encouraged.

d. **On-site Maintenance.** On-site maintenance is a service extended to all supported units. Submit the request on DA Form 2407 and coordinate it through the PC section. The extent of maintenance required and the current workload of this unit govern on-site maintenance. If possible, limit on-site maintenance requests to component change and minor airframe repair. Do not submit such requests for phased-maintenance assistance.

e. **Special Maintenance.** 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.

5. WORK REQUEST PROCEDURES

a. Personnel submitting DA Form 2407 for aircraft or components will report to the PC office. The following procedures will implement the administrative and inspection requirements in processing a work request:

(1) Customer Responsibilities. 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 PC section for a complete records check. The customer will make the necessary corrections.
- Make a complete basic item issue list inventory jointly with the supporting unit. Representatives of both the customer and this unit will sign the inventory check sheet. The PC section will retain one copy of the check sheet, 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 according to DA Pam 738-750/738-751, identifying the specific problem.

Figure C-1. Sample Format for an AVIM External SOP (Continued)

(2) Acceptance Inspection. This unit will have a complete SOF inspection conducted by the QC section if the aircraft requires a test flight. After the SOF inspection, faults noted during the flight will be added to DA Form 2407. When the TI 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: The AVIM unit will perform all scheduled maintenance that becomes due while aircraft is in possession of the AVIM unit.

(3) Status Reporting.

(a) 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 DA Form 1352-1 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 DA Form 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.

(b) 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.

(4) Processing Avionics Components. All incoming equipment will have a DA Form 2407 (Maintenance Request) completed according to DA Pam 738-750/738-751. Class IX avionics components handled as a Class IX repair part in the 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 and the component. These inspections ensure that equipment is complete and that no controlled substitution has occurred.

- Repairable Exchange. 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 will be signed and returned to the unit.

- Pickup. 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.

(5) Processing Armament Components. Armament systems will be processed through this unit's PC section on DA Form 2407. 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.

Figure C-1. Sample Format for an AVIM External SOP (Continued)

(6) Submitting a Product Quality Deficiency Report. Procedures for submitting a PQDR are outlined in DA Pam 738-750/738-751. A single PQDR will not necessarily lead to a reevaluation study to determine if equipment or components should be redesigned. However, repeated PQDR submission on the same item is sufficient reason to investigate whether an item should be changed. Therefore, a PQDR must be submitted for each equipment failure. Disposition instructions for copies of the PQDR are in DA Pam 738-750/738-751.

6. AIRCRAFT TURN-IN REQUIREMENTS

a. 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.

b. A copy of DA Forms 2407 stating what components are missing, if any, will accompany the aircraft logbook to the PC 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 loss. The unit commander will sign the statement. All recovered items, even if damaged beyond repair, must be available for inventory.

c. 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 AMCOM.
- 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.

Figure C-1. Sample Format for an AVIM External SOP (Continued)

- 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/PQDR 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.

7. RESTRICTED SHOPS

Subsystems repair, shop supply, and QC shops are designed for the exclusive use of this unit. Admission to these shops may be secured only through the PC officer, the NCO, or the aircraft maintenance sergeant.

8. DISAGREEMENTS

Differences in the opinions of TIs or other reasons may create disagreement about the quality of work performed. The customer will immediately bring such matters to the attention of the PC officer, and the commanding officer of this unit will be notified.

Figure C-1. Sample Format for an AVIM External SOP (Concluded)

Appendix D

Maintenance Management Tools

The following paragraphs discuss some of the procedures/tools used by maintenance managers to ensure an efficient workflow throughout the unit. Some of these procedures/tools (tub file, DA Form 2405, manual flowchart) may be replaced by the automated management system-ULLS-A. ULLS-A provides maintenance managers with more and faster information, however, it does not guarantee good maintenance management. PC must ensure flight operations, flight companies/ platoons, maintenance, shops, QC, and technical supply work together to provide safe and reliable aircraft for missions.

PRODUCTION CONTROL MEETINGS

D-1. The PC officer should conduct daily aircraft PC meetings. Representatives from the flight platoons/companies (leader/sergeant/ maintenance officer) should attend. These meetings should also be attended by representatives from QC, technical supply, maintenance platoon, and shops. The major goal of each PC meeting is to identify any aircraft maintenance problems as soon as possible. PC must work with the flight platoon/company representative to 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 or supply support required for their aircraft by QC, shops, maintenance platoon, technical supply, or the AVIM company.

D-2. 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 and make minor changes to the schedule as needed. 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.

SCHEDULING SYSTEM

D-3. A scheduling system that promotes efficient workflow 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 workloads and priorities of the supported units, the availability of tools, and the supply of major components, parts, and hardware.

D-4. A successful PC operation requires a scheduling system and preplanned workflow. The PC element must track the following information to establish maintenance workweek priorities compatible with the unit’s mission:

- Mission requirements and priorities of supported commanders, to include numbers of aircraft and specific capabilities required for those aircraft.
- 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 progress and work deferred.
- AVIM-level work in progress and work deferred.
- Time-change requirements for components, by individual assigned aircraft tail number.

D-5. 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, 2408-13-3, and 2407, PC should coordinate closely with QC personnel. DA Forms 2408-13-2, 2408-13-3 and 2407 should specify in detail all work required or inspections to be performed. The following procedures apply to a typical PC section:

- Prephase Test Flight. Whenever practical, maintenance test pilots should perform a prephase test flight on aircraft scheduled for phase or periodic maintenance. The maintenance and the PC 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 TI assigned to make the phase inspection on the aircraft should accompany this test flight when possible.
- Aircraft Arrival. When the aircraft arrives at the maintenance activity, PC receives DA Form 2407 and the aircraft's equipment logbook assembly (records). PC personnel review the DA Form 2407. 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 and the logbook assembly, to the QC section. Units using ULLS-A will follow the procedures in the ULLS-A end user manual. AVIM units operating under the SAMS-1 will follow the procedures outlined in SAMS-1 end user manual.
- Paperwork Flow. PC personnel will complete Block 24 of DA Form 2407. A copy of the receipt and the carbon of the inventory sheet go to the supported activity's representatives. These personnel direct the workflow through the various shops, entering all maintenance requirements on the PC board. The records file jacket is placed in the PC section of the tub file. 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 PC shop. Faults are recorded on DA Forms 2408-13-1, 2408-13-2, 2408-13-3. PC personnel extract the necessary information from the completed intrashop maintenance requests and DA Forms 2408-13-1, 2408-13-2, and 2408-13-3 and enter it on DA Form 2407.
- Final Inspection. 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

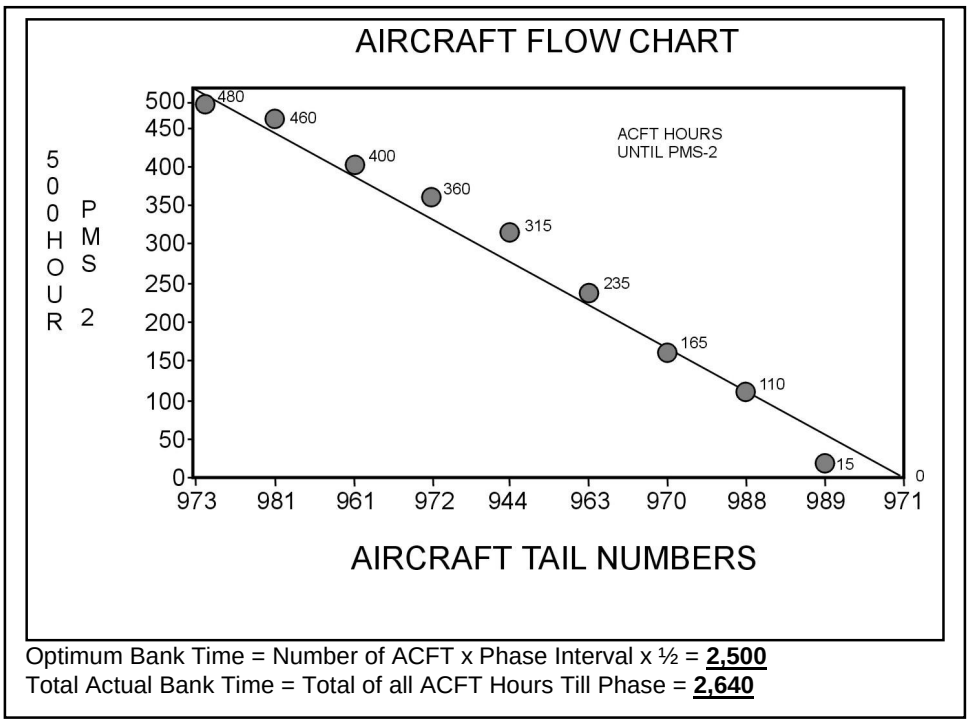
inspections, ensures quality maintenance and an airworthy aircraft. It also verifies that inspection plates and panels have been properly reinstalled and that the aircraft has been properly serviced and cleaned. QC personnel also check forms and records in the aircraft's equipment log assembly (records) to ensure that all entries are neat, correct, and up-to-date.

- After the final inspection, the TI signs or initials and enters the Julian date in Block 26 of DA Form 2407. 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 TI determines whether a test flight or MOC is required according to TM 1-1500-328-23 or appropriate aircraft manuals. If so, he notifies PC that a test flight is required. The basic issue item list 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.
- Post-Test Flight Inspection. If a test flight is performed, 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 PC shop. PC personnel notify the owning unit that the aircraft is ready for delivery.
- Release of Aircraft. 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. The supported activity's representative completes Block 27 of DA Form 2407 signifying acceptance and delivery of the aircraft.

SLIDING SCALE SCHEDULING METHOD (FLOWCHART)

D-6. Phase/periodic inspection planning is a critical part of mission readiness for aviation units. Aviation commanders/PC must ensure aircraft phases are planned well into the future. Although many factors influence the best time for accomplishing aircraft phases, training exercises and deployments can have a major impact on the unit's bank time. Flying more than one or two aircraft into phase at a time can severely reduce the unit's operational readiness. To alleviate crisis management, the unit's flying hour program, deployments, training, bank time, and the availability of resources (tools, maintenance personnel, repair parts, special equipment) must be carefully considered when planning phases.

D-7. The aircraft flowchart is an important tool for scheduling aircraft for phase and for deciding which aircraft should fly certain missions. Figure D-1 shows an example of a typical flowchart for a UH-60 unit. The diagonal line represents the optimum bank time, or time until phase, for each individual aircraft. This flowchart demonstrates a unit with good total actual bank time (above optimum) and good separation between phases (periodic inspections).



Optimum Bank Time = Number of ACFT x Phase Interval x ½ = **2,500**
Total Actual Bank Time = Total of all ACFT Hours Till Phase = **2,640**

Figure D-1. Flowchart with Good Bank Time

D-8. If every aircraft were exactly on the optimum line, this would be the ideal bank time, or 2,500 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 the next phase/periodic 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.

D-9. Figure D-2 shows a flowchart of a unit with less than the optimum bank time. This unit has 1 aircraft in phase (971) and 3 aircraft within 10 hours of phase (970, 988, 989). This unit has aircraft "stacked up" waiting for phase. Even though this unit may have a good operational readiness rate, it is unable to schedule certain aircraft for missions because of low hours. The effectiveness of the unit is reduced.

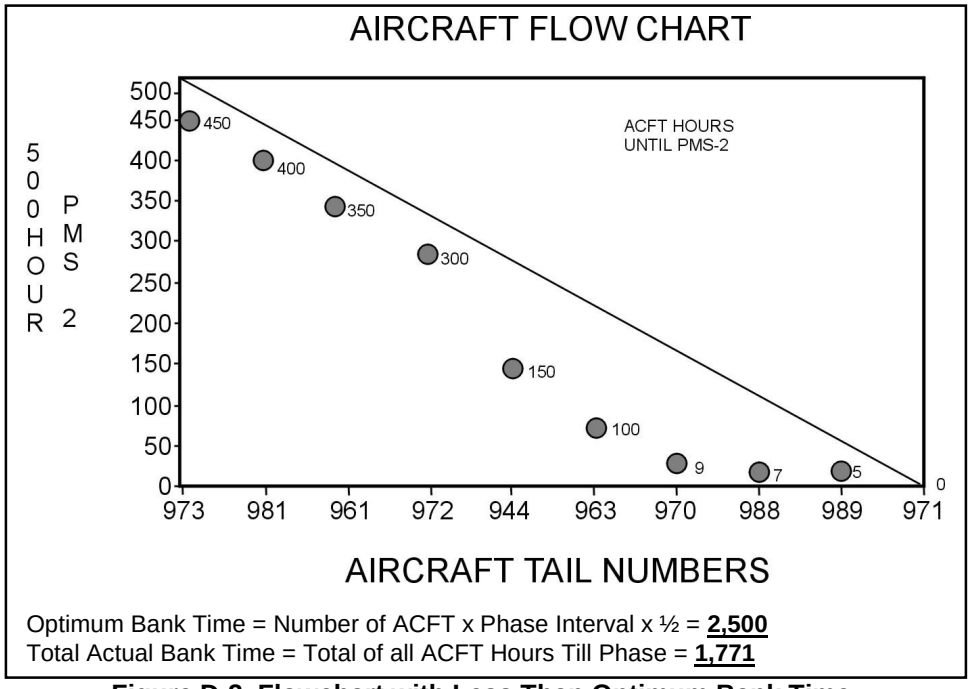


Figure D-2. Flowchart with Less Than Optimum Bank Time

D-10. The flowchart is a very simple, but effective method that has been used successfully by maintenance officers. ULLS-A provides a flowchart to assist maintenance managers in scheduling maintenance. The proper use of a flowchart—

- 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.

D-11. The following rules should be observed when using the sliding scale maintenance scheduling method (flowchart):

- Update the chart at least once each day that aircraft fly (if using ULLS-A, ensure aircraft data is sent to PC daily).
- 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.

BLOCK TIME SCHEDULING

D-12. 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 that 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.

D-13. 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: Find the average hours per aircraft by dividing the total number of hours to be flown by the number of aircraft to be flown. (Example: 180 hours to be flown divided by 9 aircraft equals 20 average 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-3).
- Step 3: Compute the difference between each aircraft's current position on the flow chart and the new parallel line (Figure D-4). These figures will now become the maximum amount of flight hours that particular aircraft can fly during the mission. (Example: Aircraft 955 is 26 hours above the lower optimum line (Figure D-4), so it will be given a block time of 26 hours to fly.)

D-14. The benefits of such a scheduling system are the following:

- 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 workload in advance versus having to react to everyday changes in missions and unscheduled maintenance.
- The flowchart posture should still look good after the operation.

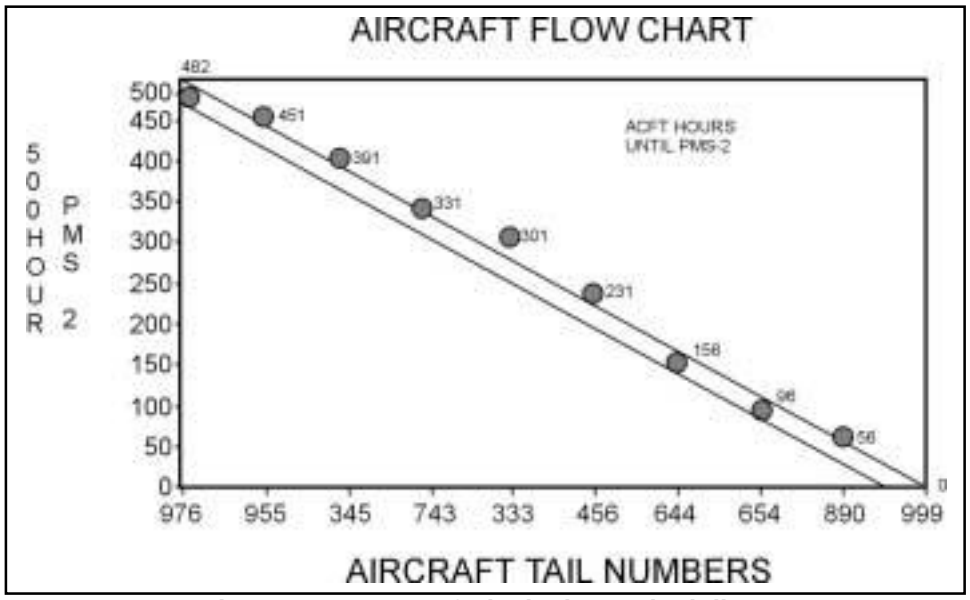


Figure D-3. Step 2 of Block Time Scheduling

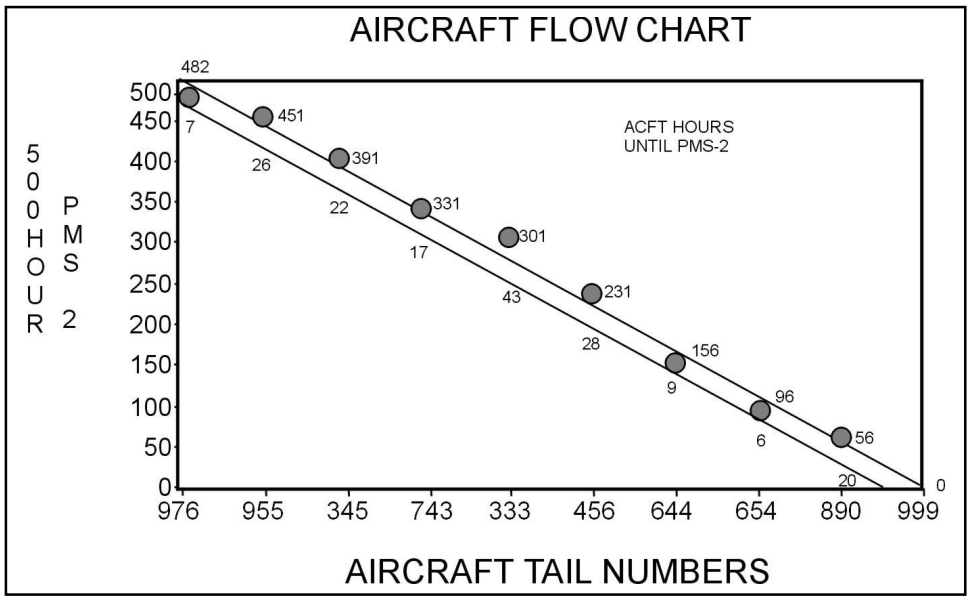


Figure D-4. Step 3 of Block Time Scheduling

PRODUCTION CONTROL BOARD

D-15. The PC board (Figure D-5) is a graphic that displays data concerning aircraft status or shop operations. Information recorded on the board is used to control current operations, plan anticipated work, and measure work performed. Although maintenance

managers have quick access to information through ULLS-A, a well-planned and informative PC board (equipment status board) can serve as a highly visible source of information for the commander and other key personnel (such as platoon leaders and section chiefs). It should provide them with information on the progress of work in other shops or sections in relation to work in their activities.

D-16. The design of the board should be simple and easy to work with. If a PC board is used, entries on the board must be accurate and prompt. The PC officer may organize the board for his own management style. Some suggestions for entries on the board are the following:

- Current aircraft status. (this must be updated throughout the day as the status of aircraft change)
- Priority of work.
- Status of special tools and equipment. (hoists, tugs, AGPUs, test sets, etc.)
- Reasons for stopped work.
- Work awaiting receipt of parts. (can be used to track status of parts for NMCS aircraft)

PRODUCTION CONTROL BOARD

ACFT	STATUS	REASON DOWN	PRIORITY OF WORK	PARTS STATUS	EQUIPMENT STATUS	
955	PMCS	PILOT'S VSI	2	SHIPPED 8237	AGPU	FMC
345	NMCM	XMSN LEAK	1		TUG	FMC

Figure D-5. Example of Production Control Board

MAINTENANCE REQUEST REGISTER (DA FORM 2405)

D-17. This form is used when an automated/computerized work request system is not available. It provides a written 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.

IN-PROCESS (TUB) FILE

D-18. The tub file is a manual system for keeping up with the current status of work requests in a unit. Units may use this system or an automated/computerized system to organize/track work requests. PC is responsible for ensuring an efficient system is in place for monitoring the status of all aircraft/component maintenance work within the unit.

D-19. The tub 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-6 shows how an in-process file is organized.

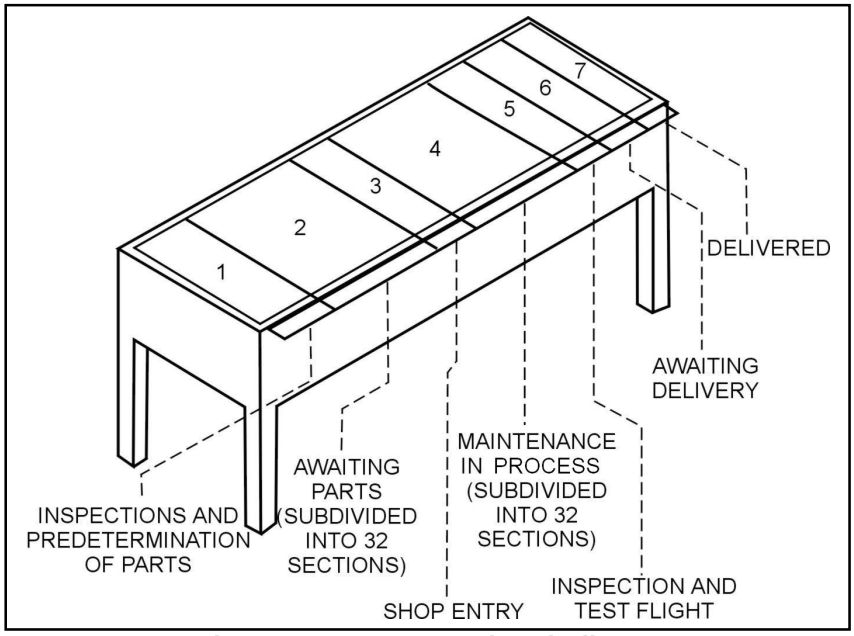


Figure D-6. In-process (TUB) File

COMPARTMENT 1 (INSPECTION AND PREDETERMINATION OF PARTS)

D-20. When initiated, the maintenance request in its records file jacket is placed in this compartment. The maintenance request remains in this compartment until the following actions have been taken:

- Initial inspection.
- Routing of intrashop maintenance requests and DA Forms 2408-13,- 2408-13-2, 2408-13-3 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 (WAITING PARTS)

D-21. 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 some administrative matter that must be resolved before work proceeds causes the delay, 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)

D-22. When the item is ready to enter maintenance, the file jacket is placed in this undivided compartment.

COMPARTMENT 4 (MAINTENANCE IN PROCESS)

D-23. This compartment is divided and numbered like compartment 2. When repairs actually begin, the file jacket is placed in the section that represents the estimated date of completion. This alerts PC that the job may not be completed as scheduled. As the scheduled date of completion approaches, PC analyzes the information on the PC 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)

D-24. When repair is completed, the file 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)

D-25. 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)

D-26. 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.

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.

ACCIDENT CAUSES

E-1. 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. The following areas require constant command attention to prevent aviation accidents:

- Human factors.
- Training education, and promotion.
- Equipment design, adequacy, and supply.
- Normal and emergency procedures.
- Maintenance.
- Facilities and services.
- Environment.

E-2. The USASC 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.

SAFETY REGULATIONS

E-3. AR 385-10 regulates overall safety. One important aspect of this regulation is that it integrates Occupational Safety and Health Act 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.

RESPONSIBILITIES

E-4. 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 QC section.

UNIT COMMANDER

E-5. 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 385-40, 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

E-6. 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 be held in the work area. The agenda should include the following:

- The overall job and the results 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

E-7. 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.

SHOP SAFETY

E-8. A shop that is below standard cannot put out quality work. Therefore, the TI conducts an informal inspection of the various shops periodically and brings any deficiencies or safety hazards to the attention of the shop supervisor. A file of all safety inspections is kept in the QC section and a file copy is kept in the subject area inspected.

E-9. The USASC publication, Guide to Aviation Resources Management for Aircraft Mishap Prevention, is one publication that outlines safety procedures. ARMS Commander's Guide is available at the following worldwide web address: http://www.forscom.army.mil/avn/. It has guidance on inspection requirements of the TI. Copies of the guide may be obtained from the unit safety officer. Minor changes to the guide appear in the USASC publication, Flightfax, which is distributed monthly to all aviation units. Other publications outlining specific safety precautions are FM 4-20.12(10-67-1) and TM 1-1500-204-23 series. The following safety questions should be considered by the TI during inspection.

- Aircraft operations.
  - Have pilots checked status of DA Forms 2408-13 and 2408-14-1? (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 4-20.12[10-67-1].)
  - Is smoking allowed within 50 feet of the aircraft? (Refer to AR 95-1.)
  - Are flashlights available for night preflight? (Refer to AR 95-1.)
  - Are flight and ground crews familiar with fuel servicing and defueling operations? (Refer to TM 1-1500-204-23-1 and FM 4-20.12[10-67-1].)
  - 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.)
- Petroleum, oil, and lubricants.
  - Are fuel servicing procedures followed? (Refer to FM 4-20.12[10-67-1] and FM 3-04.111[1-111] Appendix J.)
  - 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 FM 4-20.12[10-67-1].)

- Are aircraft tie-down anchors free of debris when used as refueling, servicing, or grounding points? (Refer to FM 4-20.12[10-67-1].)
- Are fuel servicing points and equipment properly maintained and regularly inspected? (Refer to FM 4-20.12[10-67-1].)
- 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 1-1500-204-23-1.)
- Are grounding points marked according to FM 4-20.12(10-67-1) and logs maintained to show identification of each rod, date tested, and electrical resistance in ohms? (Refer to FM 4-20.12[10-67-1].)
- Are refueling vehicles marked with the appropriate fuel grade? (Refer to FM 4-20.12[10-67-1], and TB 43-0209.)
- Do vehicles have chocks on board? Are they used during refueling? (Refer to FM 4-20.12[10-67-1].)
- Are fire extinguishers mounted on vehicle dispensing units? (Refer to FM 4-20.12[10-67-1].)
- 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 4-20.12[10-67-1].)

- Quality control shop.
  - Are aircraft maintenance publications up to date? (Refer to DA Pams 25-30 and 25-40.)
  - Do aircraft maintenance areas have sufficient quantities of manuals for assigned work? (Refer to FM 3-04.500[1-500].)
  - Are the appropriate publications used when working on aircraft? (Refer to FM 3-04.500[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 TI? (Refer to DA Pams 738-751 and 600-8.)
  - Does the unit maintain a SOF 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-progress inspections of products to assure reliability of the completed assembly? (Refer to FM 3-04.500[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 (Product Quality Deficiency Report) submitted for each preliminary report of aircraft mishap for materiel failure or malfunction? (Refer to DA Pam 738-751.)
- Are aircraft maintenance and flight forms and records properly completed 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 attached to DA Form 2408-13-1 for all test flights and the MTF recorded on DA Form 2408-13-1? (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 and health indicator test baselines performed, and are they recorded on DA Forms 2408-13, 2408-13-1, 2408-19-1, 2408-19-2, and charts? (Refer to DA Pam 738-751, applicable -23 TMs, and applicable -24 engine TM.)
- 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.)
- Is 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 1-1500-204-23-1, FM 3-04.500[1-500], and DA Pam 385-1.)
  - Is all stationary and portable shop electrical equipment properly grounded? (Refer to TM 1-1500-204-23-1 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, 385-95, and 385-40.)
  - Are equipment and vehicle operators thoroughly familiar with the equipment's operation, handling, care, and preventive

maintenance? (Example: Do operators have permits? [Refer to AR 600-55.]. Is the maintenance manual in proximity to equipment? [Refer to FM 3-04.500[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 04.500[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 1-1500-204-23 series.)
- 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 1-1500-204-23 series, and FM 4-20.12[10-67-1].)
- 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 1-1500-204-23 series and FM 04.500[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 3-04.500[1-500].)
- Are shops clean and floors grease-free? (Refer to FM 3-04.500[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 1-1500-204-23 series and ARs 40-5 and 385-10.)
- 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 1-1500-204-23 series, OSHA Standard 1910.244, and FM 3-04.500[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 1-1500-204-23 series and FM 3-04.500[1-500].)
- Are hydraulic, fuel, and oil lines protected from dirt while disconnected? (Refer to TM 1-1500-204-23 series.)
- Are all ammunition and pyrotechnics removed from aircraft before maintenance and before putting aircraft in hangars? (Refer to TM 1-1500-204-23 series.)
- Are engine, hydraulic, propeller and rotor, technical supply, and other work areas clean and well arranged? (Refer to TM 1-1500-204-23 series and FM 3-04.500[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 1-1500-204-23 series and National Fire Codes, Standard 410B.)
- Are sample bottles available to check fuel contamination in aircraft fuel tanks during preflight? (Refer to FM 4-20.12[10-67-1].)
- 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 and 13-1.)
- 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 1-1500-204-23 series.)
- Are unsealed hydraulic fluid containers considered contaminated and destroyed? (Refer to TM 1-1500-204-23 series.)
- 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 TM 1-1500-204-23 series.)
- 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? (Refer to TB 385-4 or ANZI Z35811)

- Is shower located within 25 feet of work area? (Refer to TB 385-4 or ANZI Z35811)
- Is the correct type of fire extinguisher located in work area? (Refer to TB 385-4 or ANZI Z35811)
- Is protective equipment provided in each tool kit (TK-90/6)?
- Does the safety board have the required items posted in shop? (Refer to TB 385-4 or ANZI Z35811)
- Is the battery tested for proper filler-cap operation? (Refer to TM 11-6140-203-23.)
- 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 a 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?
- Is a 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?
- Do qualified personnel check aircraft voltage regulators? 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 11-6140-203-23.)
- 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 11-6140-203-23.)
- 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 11-6140-203-23.)
- 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 TM 11-6140-203-23.)
- Are the discharge times strictly followed during the battery capacity test? (Refer to TM 11-6140-203-23.)
- Do maintenance personnel understand that cells from different manufacturers cannot be mixed in the same battery? (Refer to TM 11-6140-203-23.)
- 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 11-6140-203-23.)

- 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 Pams 25-30 and 25-40.)
  - 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 1-1500-204-23 series.)
  - Are test equipment and aircraft systems properly used? (Refer to TM 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 TM 1-1500-204-23 series.)
  - Is all test equipment properly grounded? (Refer to TM 1-1500-204-23 series; National Electrical Code, ART 250-45[d]; and TB 385-4.)
  - Are all physical hazards identified and appropriately color-coded? (Refer to TM 1-1500-204-23 series.)
  - Are compass systems properly calibrated? (Refer to TMs 11-4920-292-15 and 1-1500-204-23 series.)
  - 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 TM 1-1500-204-23 series.)
- Armament shop.
  - Are aircraft pyrotechnics (flares and signals) removed from the aircraft when not required? (Refer to TMs 9-1370-203-20, 9-1370-203-34, 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 applicable aircraft –23 series TM.)
  - Are jettison cartridges removed from the pylon stores ejection device before maintenance or storage of the aircraft? (Refer to applicable aircraft –23 series TM.)

- Are jettison cartridges marked on the cartridge base each time the cartridge is removed from the ejection rack? (Refer to applicable aircraft –23 series TM.)
- 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 safety precautions (Example: 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 3-25.60(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 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 TI 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 1-1500-204-23 series.)
  - Besides special inspections, are regular periodic inspections performed? (Refer to TM 1-1500-204-23 series.)
  - Is equipment free of mud and other debris? Is equipment receiving proper lubrication? Are seals that show definite leakage replaced? (Refer to TM 1-1500-204-23 series.)
  - For equipment with batteries, are battery terminals and posts tight, clean, and corrosion-free? (Refer to TM 1-1500-204-23 series.)
  - Are ignition systems clean, wiring correct, and coils and condensers operating properly? (Refer to TM 1-1500-204-23 series.)
  - Does ground support equipment meet performance and safety requirements? (Refer to TM 1-1500-204-23 series.)
  - If the ground support equipment is in storage, is there a prescribed interval of inspection? (Refer to TM 1-1500-204-23 series.)
  - Is the ground support equipment used on landing strips, taxiways, and other tight areas painted and reflectorized? (Refer to AR 58-1, FM 3-04.500[1-500], and TM 1-1500-204-23 series.)

- Are markings maintained on the ground support equipment? (Refer to TM 1-1500-204-23 series.)
- Is the proper polarity marked on all male and female electrical receptacles of APUs and aircraft? (Refer to TM 1-1500-204-23 series.)
- 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 1-1500-204-23 series.)
- Are required inspections of the three-wheel APU accomplished? (Refer to TM 1-1500-204-23 series.)
- Are maintenance workstand adjustable height and fixed 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 1-1500-204-23 series.)
- Are precautions taken to protect electrically and gasoline-driven air compressors from severe weather and extreme temperatures? (Refer to TM 1-1500-204-23 series.)
- Do compressors have belt and flywheel guards installed? (Refer to TM 1-1500-204-23 series.)
- Are air compressors inspected daily? Are they drained at least twice daily if they are operated in extreme moist conditions? (Refer to TM 1-1500-204-23 series.)
- 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 1-1500-204-23 series.)
- Is the high-pressure air pump in proper operating condition? (Refer to TM 1-1500-204-23 series.)
- Are aircraft jacks stenciled with the maximum lifting capacity? (Refer to TB 43-0142 and TM 1-1500-204-23 series.)
- Are the jacks periodically disassembled, cleaned, inspected, and reassembled when replacing defective rubber packings? (Refer to TM 1-1500-204-23 series.)
- Are daily inspections performed if engine- or motor-driven hydraulic test stands are used daily? (Refer to TM 1-1500-204-23 series.)
- Is preventive maintenance performed on the hydraulic test stands? (Refer to TM 1-1500-204-23 series.)
- 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 1-1500-204-23 series.)

- Is the electrical wiring insulation on the portable lighting equipment defective or frayed? (Refer to TM 1-1500-204-23 series.)

- 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 TM?
  - 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

Recovery and Evacuation of Aircraft

The loss of an aircrew and/or airframe affects the combat capability of aviation units. The psychological impact from the loss of an aircrew may be a severe detriment to unit morale. High loss rates can rapidly deplete available ORF assets. This appendix provides the relationship of CSAR to DARTs, and BDAR personnel augmentation to DART missions. Refer to FMs 3-04.513 (1-513) and 3-04.113(1-113) for additional information on CSAR and DART/BDAR mission specifics.

BATTLEFIELD MANAGEMENT

F-1. Historically, the effort at recovering aircrews or aircraft off the battlefield has been minimal and poorly coordinated at best. Today, CSAR and DART/BDAR provide the methods for retrieving aircrews and aircraft as well as regenerating those resources necessary to maintain momentum on the battlefield. FM 3-04.113(1-113), chapter 7, provides commanders guidance on CSAR missions. Army and Joint CSAR procedures can be found in JP 3-50.2 and in JP 3-50.21 Airspace control can be found in JP 3-52.

EXTRACTION/RECOVERY PRIORITIES

F-2. According to FM 3-04.113(1-113), the CSAR TF commander executes the extraction of personnel followed by the recovery of equipment. This is true when both personnel and equipment are at the same location. Aircraft extracting personnel (for example, UH-60 Black Hawk) should be cleared into the extraction site immediately after the area has been secured. Equipment recovery operations may be conducted simultaneously with the personnel extraction operation or delayed until the personnel extraction has egressed the extraction site. In either case, any aircraft ingressing the extraction/recovery site will remain off-station until specifically cleared for the approach by the CSAR TF commander. Conversely, any aircraft egressing the extraction/recovery site will remain at the site until cleared for departure by the CSAR TF commander.

F-3. Simply stated, the extraction and recovery priorities are recovery of the aircrew and simultaneous evaluation of the aircraft. Determine if the aircraft is still an asset. If so, secure the aircraft or area, evacuate the aircraft, and repair the aircraft.

DEFINITIONS

F-4. Acronyms used in the battlefield management of downed aircraft are defined as follows:

- **Combat Search and Rescue.** CSAR is the successful extraction of a downed aircrew and evacuation of the aircrew either to appropriate medical care or back to the unit. CSAR operations can be placed into separate categories—*immediate* and

delayed. Commanders must recognize and prepare for both immediate and delayed types of CSAR operations. Refer to FM 3-04.113(1-113).

- **Downed Aircraft Recovery Team.** The DART team normally comprises selected command personnel. (These personnel include technical inspector, maintenance test pilot or pilot, maintenance personnel, radio operator and security force). The team successfully extracts an aircraft from a downed location to a safe location, using aerial recovery kits, trained recovery team, and recovery aircraft. Augmentation of the DART mission with BDAR trained repair personnel can recover downed aircraft using BDAR measures. These measures expedite the recovery and return of aircraft to the TAA. In addition, they prevent the aircraft from falling into enemy hands and retain control of the aircraft for future use as controlled exchange program for other aircraft and induction into a BDAR program for eventual reintegration into the battle. Refer to FM 3-04.513(1-513).
- **Battle Damage Assessment and Repair.** BDAR is the use of specialized aircraft damage assessment criteria, repair kits, and trained personnel to modify peacetime aircraft maintenance standards. The concept includes the safe return of damaged aircraft to a safe location and eventually to battle as soon as possible. Refer to FM 3-04.513(1-513).
- **Maintenance Evacuation.** Maintenance evacuation is the physical act of moving an aircraft from one maintenance location on the battlefield to another. Movement is either by fly-out or aerial/ground recovery means. Evacuation is to effect repair, cross-level maintenance workloads, or relieve units of disabled aircraft during tactical moves.
- **Rescue Coordination Center.** The Army component commander plans, coordinates, and directs the execution of CSAR and DART operations and establishes an RCC within the commander's AO. The component commander may not directly establish an RCC. If an RCC is not established, the Army commander must designate an existing headquarters or staff section to perform the duties of the RCC.
- **Trigger.** According to FM 6-99.1(101-5-1), a trigger is an event or time-oriented criteria used to initiate planned actions directed toward achieving surprise and inflicting maximum destruction on the enemy. It is also a designated point or points (selected along identifiable terrain) in an EA used to mass fires at a predetermined range. A trigger, as it applies to this manual, would be an event or time-oriented criteria used to initiate planned actions toward achieving successful extraction of downed aircrew and the recovery of downed aircraft.
- **Assessor.** An assessor is one who can 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 one-time evacuation mission is feasible or that a quick-fix repair is possible is important. It may prevent a situation in which 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. An assessor can be one or a combination of the following: the aircrew of the downed aircraft; aircrew of another aircraft; the CSAR crew; the DART aircrew. The assessor's mission is to provide the commander with an initial assessment of the downed

aircraft. Based on METT-TC, the assessor can, when appropriate, provide a more detailed assessment.

AIRCRAFT RECOVERY

F-5. 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.

F-6. Aircraft recovery operations move inoperable aircraft from the battlefield to a 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-TC, necessary repairs to aircraft are beyond the capability of the lower echelon of maintenance.

PUBLICATIONS

F-7. FM 3-04.513(1-513) provides detailed procedures for preparing and performing aerial recovery operations for specific aircraft. FM 3-04.120(1-120) provides doctrinal guidance on the requirements, procedures, and C^2 tasks involved in planning, coordinating, and executing the airspace control function.

RESPONSIBILITY

F-8. 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.

PLANNING

F-9. 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.

SPECIAL ENVIRONMENTS

F-10. 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.

AIRCRAFT COMMANDER AND AIRCREW

F-11. 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 DART assistance. This information may be relayed through other aircraft operating in the area as time and security allows. 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 the following information:

- The following critical information is required:
  - Location of aircraft.
  - Assessment of site security.
  - Adaptability of the site, including existing weather conditions, for the insertion of a DART team with the option of augmenting with BDAR personnel.
  - 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 as part of BDAR.
  - Information provided by air traffic controllers.
- The following information is the minimum required for in-flight emergencies:
  - Aircraft identification and type.
  - Nature of emergency.
  - Pilot's desires.
  - Aircraft position (grid or latitude and longitude coordinates).
- Depending on the status of aircraft communications, the following items or any other pertinent information will be obtained from the pilot or aircraft operator:
  - Aircraft altitude.
  - Fuel remaining in time.
  - Pilot reported weather.
  - Pilot capability for IFR flight.
  - Time and place of last known position.
  - Heading since last known position.
  - Airspeed.
  - Navigation equipment capability.
  - NAVAID signals received.
  - Visible landmarks.
  - Aircraft color.

- Number of people on board.
- Point of departure and destination.
- Emergency equipment on hand.
- Weapons available.

INITIAL INSPECTION

F-12. The AVUM unit commander authorizes dispatch (normally airlift) of a DART team with manuals, recovery kit, BDAR kits, materials, and parts, as mission necessitates, 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:

- Augmentation of the DART with BDAR personnel and equipment.
- Rig aircraft for aerial or surface recovery and make necessary recovery arrangements (repair not feasible at repair site).
- Cannibalize critical components and abandon (recover at later time) or destroy aircraft (repair or recovery not feasible). The decision to destroy an aircraft will be based on the possibility of an abandoned aircraft falling into enemy hands (according to TM 750-244-1-5).
- Clear the aircraft for immediate return to battle, deferring minor 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 one-time evacuation mission back to a more secure and better-resourced MCP or maintenance area.

ASSESSOR

F-13. 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.

RECOVERY AND EVACUATION TEAM

F-14. Each AVUM organization will prepare for aircraft recovery contingencies by designating an aircraft recovery team. The DART 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.

F-15. The DART usually consists of maintenance personnel, a maintenance test pilot, an aircraft assessor, and a TI. (The TI may also be the assessor.) 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.

TEAM COMPOSITION AND MATERIALS

F-16. Aircraft recovery operations are time sensitive. AVUM and AVIM units form DARTs from within their personnel assets.

F-17. A DART may perform any of the following actions:

- Assess repair requirements.
- Repair the aircraft or prepare it for a one-time evacuation mission.
- Recommend recovery by aerial or ground means.
- Rig the aircraft for recovery.
- Serve as the ground crew for helicopter lift.
- Serve as the crew to secure the load aboard a vehicle.
- If the aircraft is not repairable, determine which parts, subsystems, or components can be salvaged and remove them.
- Destroy, or take part in the destruction of, a disabled aircraft that is to be abandoned (according to TM 750-244-1-5).

F-18. A DART may respond to the recovery of a downed aircraft from within the unit, a supported unit, an adjacent unit, or any aircraft that is disabled within a sector. Normally, the team is transported with their equipment by air to the scene of the disabled aircraft and extracted by air upon completion of the mission.

F-19. Aircraft that cannot be recovered and are in danger of enemy capture are destroyed according to TM 750-244-1-5. The authority for destruction will be included in SOPs and OPORDs. If possible, aircraft are cannibalized before destruction. The corps, on a mission basis, accomplishes recovery and evacuation of enemy, allied, and other US services aircraft using corps assets or by tasking division assets in sector.

F-20. Both delayed and immediate recovery missions normally are planned as a part of all flight operations, but are especially critical for cross-FLOT operations. Commanders may be required to use internal assets to conduct a delayed aircraft recovery from their own unit, with or without additional detailed planning time. General procedures typically are covered in unit SOPs. (For example, the unit SOP may specify a radio frequency to be used, a color of light or smoke to be used for recognition, and the last aircraft in the flight may be designated as the maintenance aircraft.)

BATTLE DAMAGE ASSESSMENT AND REPAIR

F-21. 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

F-22. 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.

F-23. 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 the following:

- Combat damage inspection and assessment techniques.
- Combat area maintenance serviceability and deferability criteria.
- Cannibalization techniques that permit quick, efficient removal of critical components and structures from unrepairable and nonrecoverable aircraft.

F-24. 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).

SURFACE RECOVERY

F-25. Surface recovery and evacuation uses ground equipment and wheeled vehicles to move disabled aircraft to a MCP or maintenance facility. Planning a surface recovery follows these logical steps:

- Evaluate the downed aircraft.
- Determine 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

F-26. 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. In addition, the threat of total loss of the aircraft during transport because of recovery equipment malfunction is low.

DISADVANTAGES

F-27. 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 RECOVERY

F-28. 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. All helicopters must be rigged according to applicable manuals (see FM 3-04.513[1-513]). 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

F-29. 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

F-30. 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 OF AIRCRAFT RECOVERY AND EVACUATION STANDING OPERATING PROCEDURE

F-31. Figure F-1 is a sample format for an aircraft recovery and evacuation SOP. (Refer to FM 3-04.513[1-513] for detailed example of aircraft recovery and evacuation SOP.)

1. **NAME**

Head the SOP with the names of the organization and the station, the date, and the SOP number.

2. **PURPOSE**.

This SOP establishes policies and procedures for aircraft recovery (surface and aerial) and for the evacuation of aircraft from one maintenance facility to another.

3. **RESPONSIBILITIES**

The responsibilities for aircraft recovery are as follows:

- ***Owning Unit.***
  - Commander
  - Maintenance officer
  - Recovery team
  - BDAR team
- ***Supporting unit (AVIM)***

4. **TRAINING REQUIREMENTS**

5. **RECOVERY OPERATIONS**

6. **SAFETY CONSIDERATIONS**

Figure F-1. Sample Format for an Aircraft Recovery and Evacuation SOP

Appendix G

Special Equipment Packages

GENERAL

G-1. The evolution of technology shifted with the introduction of the AH-64A/D, CH-47D, OH-58D, and UH-60A/L aircraft. With these 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 flight 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. Today's aircraft are capable of carrying several different special equipment packages.

UH-60 EXTERNAL STORES SUPPORT SYSTEM

G-2. The external stores support system for the UH-60 consists of airframe-fixed provisions, which are incorporated into the airframe, and a removable external stores support system. The ESSS consists of a HSS, two support struts, and two VSP on each side of the aircraft. The ESSS contains provisions for a stores jettison control panel and an AFMP for operating the external ERFS.

UH-60 EXTERNAL EXTENDED RANGE FUEL SYSTEM

G-3. The external ERFS for the UH-60 consists of removable fuel lines, bleed air lines, valves, electrical connectors, and either two or four 230-gallon or 450-gallon jettisonable fuel tanks. It is supported by the external stores support system. Fuel from these external tanks may be transferred to the main fuel tanks but cannot fuel the engines directly. Refueling is by gravity refueling only.

230-GALLON FUEL TANK

G-4. 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 API, the tanks are not self-sealing.

450-GALLON FUEL TANK

G-5. These tanks are larger versions of the 230-gallon tanks. Flight with 450-gallon ERFS tanks is prohibited unless operating under an Airworthiness Release from AMCOM.

BALLISTIC ARMAMENT SUBSYSTEM

G-6. A ballistic blanket made out of Kevlar is available for the UH-60. This blanket may be installed on the floor of the cabin and provides protection to 7.62mm.

M139 MINE DISPENSER (VOLCANO)

G-7. 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 M139 dispenser (LIN D30897), mounting hardware kit (one air system kit: LIN M78551, or one ground system: LIN M17999, 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). More information on the installation, operation, and maintenance of the Volcano can be found in TM 1-1520-237-10, TM 9-1095-208-10-1, TM 9-1095-208-23-1&P, and TM 9-1095-208-23-2&P.

HELLFIRE WEAPON SYSTEM

G-8. 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). Information on maintenance of the Hellfire system can be found in TM 9-1427-475-20.

AIRBORNE TARGET HANDOVER SYSTEM

G-9. The processor-interface unit is commonly known as the ATHS. It provides the aerial scout and advanced attack helicopters with the capability to process messages necessary for indirect Hellfire missions, general target handover missions, and airborne attack C^2.

AIR-TO-AIR STINGER

G-10. The 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 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.

G-11. 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. More information about the ATAS can be found in TM 9-1440-431-23 and TM 11-1520-228-20-1.

CH-47 HELICOPTER INTERNAL CARGO-HANDLING SYSTEM

G-12. The CH-47 HICHS consists of the following components:

- Ramp extension, which allows cargo to be loaded by cargo-handling equipment.
- Ramp rollers.
- Cabin floor roller.

G-13. 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, U.S. Air Force 463L pallets, and break-bulk cargo, thus enhancing aircraft cargo mission performance.

CH-47 EXTENDED RANGE FUEL SYSTEM

G-14. The CH-47 ERFS is a modular, interconnectable system consisting of up to four 600-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-47 as mission requirements dictate. More information can be found on the CH-47 EFRS in TM 55-1560-307-13&P.

FLOTATION KIT FOR ARMY HELICOPTER AIRCREW MEMBER/PASSENGER

G-15. 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 95-1.

HELICOPTER OXYGEN SYSTEM

G-16. The 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 missions, and military intelligence gathering missions.

M130 GENERAL DISPENSER

G-17. The M130 general dispenser consists of a single system (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 U.S. Army helicopters and fixed-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). More information on the maintenance of the M130 can be found in TM 9-1095-206-12&P and TM 9-1095-206-30&P.

GLOBAL POSITIONING SYSTEM

G-18. The GPS 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 systems will integrate this type of navigation technology.

INLET PARTICLE SEPARATION/ENGINE AIR PARTICLE SEPARATION

G-19. IPS/EAPS are available for all MDS for operation in desert environments.

Appendix H

Deployment

GENERAL

H-1. 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 POE; actions at the POE; and actions at the POD. The following references should be on hand in the unit:

- AR 220-10.
- FORSCOM Reg 55-1.
- FM 55-9.
- FORSCOM Reg 55-2.
- FM 55-12.
- TB 55-46-1.
- FM 55-30.
- TM 38-250.
- FM 55-65.
- TM 1-1500-344-23.
- TM 55-1520-400-14.

PREPARATION

H-2. 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 (Figure H-1).
- Prepare checklist to ensure vehicles are properly prepared for shipment (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 onetime-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 (Figure H-5).
- Designate and train load teams. Give each member specific duties and responsibilities (Figure H-6).

MOVEMENT TO PORT OF EMBARKATION

H-3. 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 the following:

- Coordinate support at en route airfields for aircraft flying to the POE. This includes services for any night maintenance and 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.

CMD & CONTROL

VEHICLE LOAD CARD

UNIT	BUMPER NO HQ 6	DATE COMPLETED

TYPE	LENGTH	WIDTH	HEIGHT	EMPTY WT	CB/CG IS_____ INCHES FROM
M998	180"	86"	72"	5200	

CARGO LOC NO	CARGO DESCRIPTION AND TYPE PACK (PC WT)		QUANTITY	WEIGHT
1	5 GAL WATER CAN	(40 lbs ea)	2	80 lbs
2	5 GAL FUEL CAN	(41 lbs ea)	2	82 lbs
3	5.56 mm BALL(A059)	(72 lbs ea)	2cs	144 lbs
4	5.56mm 4+1 (A064)	(64 lbs ea)	6 cs	384 lbs
5	7.62mm 4+1 (A131)	(79 lbs ea)	5 cs	395 lbs
6	FLARE TRIP (LA 95)	(62 lbs ea)	1 cs	62 lbs
7	60mm HE (B462)	(112 lbs ea)	2 cs	224 lbs
8	66mm LAW (H557)	(45 lbs ea)	1 cs	45 lbs
9	CAMO SUPPORT SYSTEM	(70 lbs ea)	1	70 lbs
10	CAMO SCREEN SYSTEM	(65 lbs ea)	1	65 lbs
11	ANT RC 292	(44lbs ea)	1	44 lbs
12	CANVAS ASSY W/DOORS		1	
13	MRE	(16 lbs ea)	14 cs	224 lbs
14	OVM		1	
15	DS2/M11		3	
16	GRENADE, FRAG (G551)	(51 lbs ea)	2 cs	102 lbs

SAMPLE

LOADED VEH WEIGHT	DRIVER(NAME AND GRADE)

LEGEND:

C/B = CENTER OF BALANCE
CG = CENTER OF GRAVITY
GAL = GALLON
LAW = LIGHT ANTITANK WEAPON
MM = MILLIMETER
OVM= ORGANIZATIONAL VEHICLE MAINTENANCE

Figure H-1. Sample Format for a Vehicle Load Card

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 tables 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. (K561/M792) Hull empty of oil and water.

B. Preparation for Air Movement:

_____1. (M561/792) 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 5,000-lb cargo tie-down straps.
_____4. NO METAL TO METAL CONTACT between metal fuel cans.
_____S. Vehicles reduced to 102" in height.
_____6. Antennas disassembled and stored in vehicle upon notification; otherwise remain up for daily communication checks.
_____7. Pioneer tools secured by two safety ties of 550 cord.
_____8. OVE present and secured according to 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 vehicles.
_____13. Chalk card filled out and mounted on driver's side f vehicle.
_____14. (M966) Tie antenna to missile rack with 50 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 frost 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-2a. Sample Format for a Vehicle Inspection Checklist

C. Trailers:

_____1. Trailer clean.
_____2. Shoring present M416 = I" x 3/4", M101 = 2" x 3/4".
_____3. Generator and lantern fuel levels according to TM 38-250.
_____4. Cargo secured with I/2" rope, CGU-I/B tie-down devices, and 5,000-lb cargo tie-doom 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 (Motor Vehicle Accident Report)
_____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 and matches actual load and is according to 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 lnspector/Unit)

_____
(Date)

LEGEND:
AMO = aircraft maintenance officer
C/B = center of balance
DRF = division ready force
FAW = forward axle weight
GWF = gross weight
OVE = organizational vehicle equipment
RAW = rear axle weight
TOW = tube-launched, optically tracked, wire-guided

Figure H-2b. Sample Format for a Vehicle Inspection Checklist (Continuation)

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. RELATED MAINTENANCE ACTIONS	10. ACTION	11. PID	12. CAT	13. MMH
	Pitot tube disconnected from mount.				
	UHF antenna removed.				
	FM antenna removed.				
	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 mound removed.				

DA FORM 2408-13-2, OCT 97 **RELATED MAINTENANCE ACTIONS RECORD**

DA FORM 2408-13-2, NOV 91, MAY BE USED For use of this form, see DA PAM 738-751; the proponent agency is DCSLOG

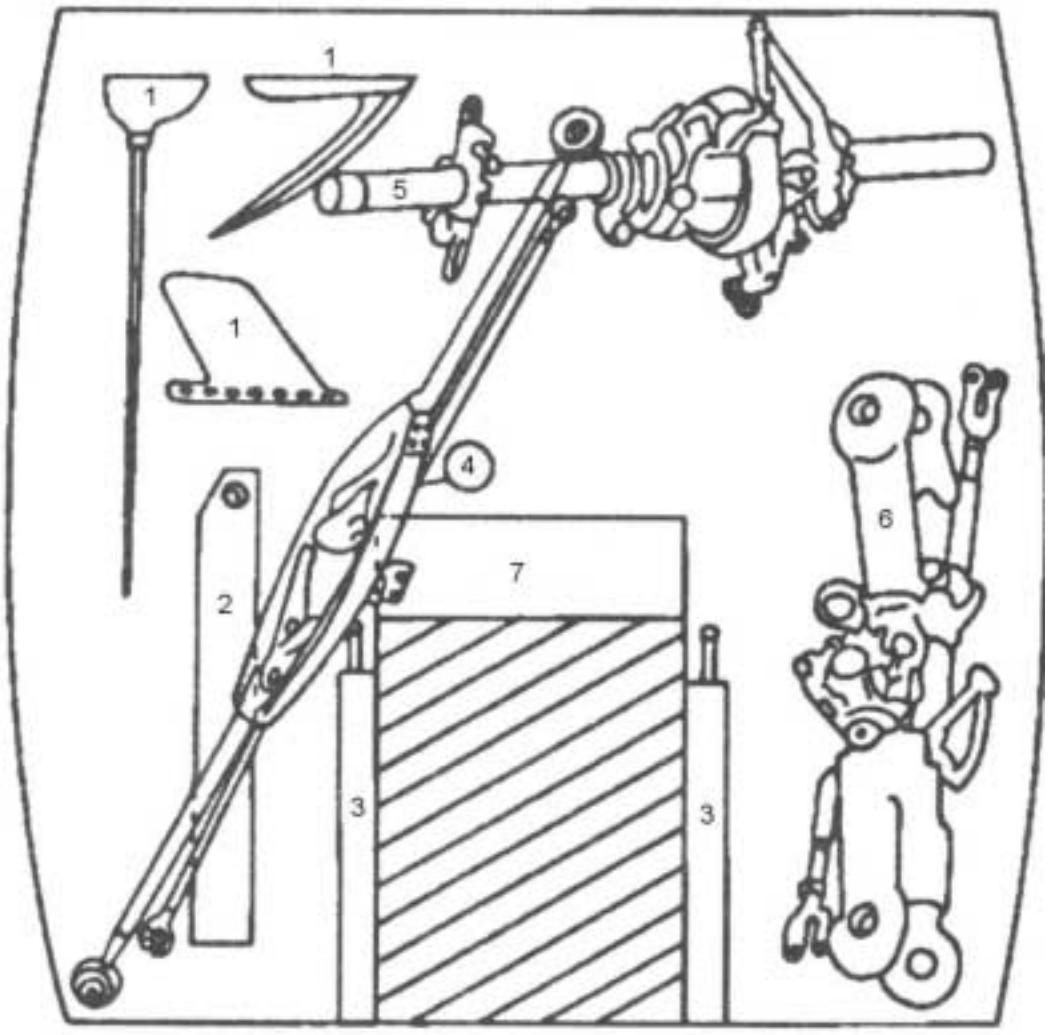
USAPA V1.00

Figure H-3a. Sample DA Form 2408-13-2 (front)

8. STA	9. RELATED MAINTENANCE ACTIONS	10. ACTION	11. PID	12. CAT	13. MMH
	R/H sync elevator s/n _____ removed.				
	L/H sync elevator s/n _____ removed.				
	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.				
	Insp due of internal load for compliance with load plan.				
	Insp due for placement of load plan on copilot window and shipment packet in				
	copilot's seat.				

REVERSE OF DA FORM 2408-13-2, OCT 97 USAPA V1.00

Figure H-3b. Sample DA Form 2408-13-2 (back)



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. TROOP SEATS & GUN MOUNT	

Figure H-4. Sample Format for an Aircraft Stowage Card

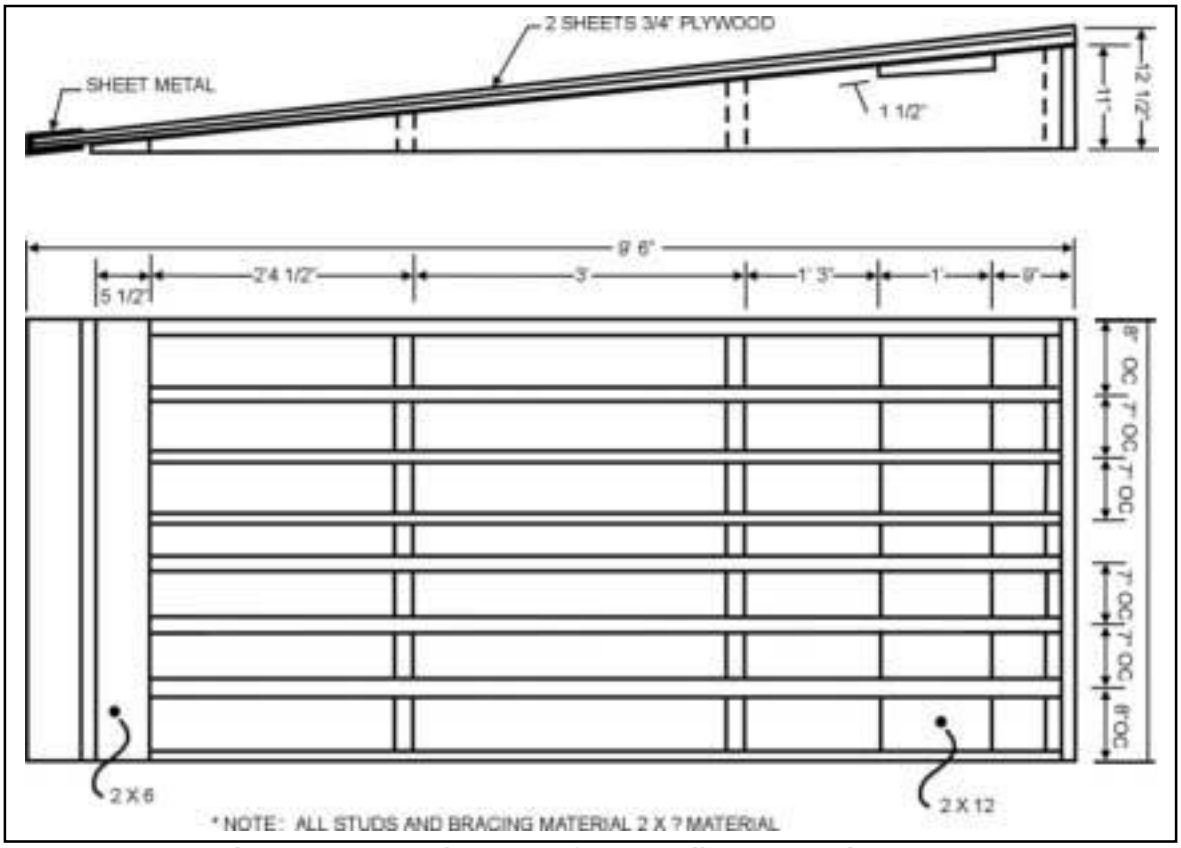


Figure H-5. Sample Format for a Loading Ramp Diagram

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 & 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 & 6 Men (Utilily 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.

S. Assist the load master in all tasks as necessary.

6. Assist in spotting and lashing the load.

Figure H-6. Sample Format for Load Team Duties

- 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 PORT OF EMBARKATION

H-4. Actions at the POE should be coordinated in advance with the departure airfield control group or seaport transportation officer. These actions include the following:

- Determine a staging area for vehicles and equipment.
- Arrange for an aircraft disassembly area.
- Distribute flyaway kits, component stowage plans, and overprinted DA Form 2408-13-2 for each aircraft to be shipped by air.
- Use organic equipment or obtain support for lifting rotors, masts, and so forth.
- Prepare vehicles for shipment. Use low profile. Leave keys in ignition or secured to steering column. Gas tanks should be secured according to the transporting agencies' instructions.

ACTIONS AT PORT OF DEBARKATION

H-5. Actions at the POD 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

H-6. 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 may be 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.
- 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 night 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 1-1500-328-23.
- 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.

Appendix I

Aviation Maintenance Commander's Checklist

MAINTENANCE MANAGEMENT

I-1. Aviation maintenance commanders can use the following checklist to improve maintenance management:

- Does the unit have an adequate MTOE/MTDA for its mission? (DA Staffing Guide.)
- Are all authorized positions filled with qualified personnel? (AR 750-1.)
- Are there adequate SOPs covering all aspects of the unit's function and mission? (AR 385-95.)
- Are all personnel aware of and complying with unit SOP? (AR 385-95.)
- Are the following duties and positions designated in writing and current:
  - TIs. (DA Pam 738-751, FM 3-04.500[1-500].)
  - Weight and balance technician. (AR 95-1.)
  - Oil analysis monitor. (AR 750-1, TB 43-0106.)
  - Safety officer (or director) and safety NCO. (AR 385-95.)
  - Test pilot. (TM 1-1500-328-23.)
  - Building manager. (AR 420-90.)
  - Controlled exchange authority. (FM 3-04.500[1-500], AR 750-1.)
  - FOD officer. (AR 385-95.)
  - CPC officer. (TM 1-1500-328-23.)
- Are there frequent technical assistance or maintenance assistance instruction team visits to subordinate units? (FM 3-04.500[1-500].)
- Are personnel properly assigned in their primary or secondary MOS? (DA Pam 611-21.)
- Are unqualified or inexperienced personnel receiving properly planned and documented OJT? (FM 3-04.500[1-500].)
- Is there an aviation safety bulletin board in the maintenance area? (TM 1-1500-204-23-series.)
- Does the shop officer emphasize accident avoidance measures in maintenance operations? (AR 385-95, FM 3-04.500[1-500].)
- Is there an operation hazards program in effect to encourage reporting of hazards, near accidents, unsafe shop practices, and so forth? (AR 385-95.)
- Are supervisors aware of proper procedures for securing parts analyses for accident investigation purposes? (DA Pam 385-95.)
- Are weight and balance records complete, current, and properly maintained? (TM 55-1500-342-23, AR 95-1.)

- Are controls established to preclude unauthorized cannibalization and controlled exchange? (AR 750-1.)
- Are personnel aware of radioactive hazards and materials associated with aircraft repair?

QUALITY ASSURANCE

I-2. The Aviation maintenance commander ensures QA by inspecting the following forms and records:

- Are aircraft maintenance and flight forms and records properly filled out and filed? (DA Pam 738-751, local SOP, FM 3-04.500[1-500].)
- 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 Forms 2408-13-1, 2408-13-2, 2408-13-3.)
- Are DA Form 2408-13-series forms retained in a maintenance organizational file for 6 months and then destroyed? (DA Pam 738-751.)
- Are DA Form 2408-16-series forms checked carefully for accuracy to prevent overflying the replacement times for aircraft components and subcomponents? (DA Pam 738-751.)
  - Are TBO charts or appropriate computerized equipment used to keep track of component replacement time? (FM 3-04.500[1-500].)
  - Are TBO charts kept current? (FM 3-04.500[1-500].)
- Does DA Form 1352-1 reflect the actual current status? (AR 700-138.)
- Does the unit maintain a safety-of-flight TWX file? (FM 3-04.500[1-500].)

I-3. The following calibration equipment and records are inspected to ensure QA:

- Is equipment calibrated in the specified time intervals and is it properly stored? (TB 43-180, TB 750-25, AR 750-43.)
- Are calibration records maintained by the unit and support activity? (TB 750-25.)

I-4. The following AOAP items are checked to ensure QA:

- Are all assigned aircraft under the AOAP? (AR 750-1, TB 43-0106.)
- Is the AOAP functioning according to appropriate regulations and directives?

I-5. The following safety items are checked to ensure QA:

- Are safety inspection and testing of lifting devices being monitored? (TB 43-0142.)
  - Are forms and records maintained? (TB 43-0142.)
  - Are items properly marked with load rating, next periodic inspection date, and internal load test? (TB 43-0142.)
- Does the unit actively participate in the submission of DR and EIR using SF 368 (Product Quality Deficiency Report)? (DA Pam 738-751.)
- Are aircraft inspected according to established aircraft maintenance procedures within required inspection intervals? (TM 1-1500-328-23.)
- Do QC personnel conduct in-progress inspections of products to assure reliability of complete assembly? (FM 3-04.500[1-500].)
- Are work area and hangar safety inspections being conducted by QC personnel periodically per FM 3-04.500(1-500)? (FM 3-04.500[1-500].)

I-6. The following publications are checked to ensure QA:

- Are aircraft maintenance publications current, available, and used? (DA Pam 25-30, FM 3-04.500[1-500].)
- Do aircraft maintenance areas have the appropriate quantities of applicable manuals for assigned work?
- Are DA Form 12-series forms available and up-to-date?
- Are appropriate publications used at all times when working on aircraft? (AR 385-95.)
- Are required publications carried aboard each aircraft? (AR 95-1.)
- Is there a policy requiring QC and maintenance personnel to familiarize themselves with publications, using a technical data familiarization chart or by initialing the TM? (FM 3-04.500[1-500].)

MAINTENANCE WORK AREA

I-7. The Aviation maintenance commander inspects the following area in the MWA:

- 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 3-04.500[1-500].)
- Do personnel using power tools (drills, grinders, lathes, torches, and so forth) wear PCE? (AR 385-10, OSHA.)
- Shop/hangar safety markings.
  - Are proper color-coded signs posted in hazardous areas? (TM 1-1500-204-23-series)
- Fire prevention.
  - Are smoking and no-smoking areas designated, and are no-smoking signs posted? (TM 1-1500-204-23-series)
  - Are the required number and types of fire extinguishers available in the shops and hangar? (TM 1-1500-204-23-series)
  - Are shop and hangar fire extinguishers inspected as required? (TM 1-1500-204-23-series.)
  - Are shop and hangar personnel trained in the use of fire-fighting equipment? (FM 3-04.500[1-500].)
  - Are there enough grounding points to adequately support the unit's aircraft parking areas and maintenance facility? (FM 4-20.12[10-67-1].)
  - Is the entire grounding system for which the unit is responsible inspected annually? (FM 4-20.12[10-67-1].)
  - Are all ground rods for which the unit is responsible tested every 2 years or when there is a possibility of mechanical damage? (FM 4-20.12[10-67-1].)
  - Does the unit keep a log that identities each rod the date tested, and the reading in ohms? (FM 4-20.12[10-67-1].)
- Foreign object damage prevention.
  - Is the FOD prevention annex to the unit SOP adequate? (AR 385-95.)

- Is a specified time established for policing aircraft parking areas, run-up areas, exhaust areas, run-ways, and taxiways? Is the policing done as established? (TM 1-1500-204-23-series, AR 385-95.)
- Are there enough FOD receptacles in all work areas for trash, ferrous and nonferrous scrap, safety wire, and so forth? (TM 1-1500-204-23-series, FM 3-04.500[1-500], AR 385-95.)
- Is a checklist of all maintenance areas completed? (AR 385-95.)

- General maintenance practices.
  - Are parts and items that have been removed from aircraft properly marked and stored? (DA Pam 738-751, FM 3-04.500[1-500].)
- Housekeeping.
  - Are shops and hangars kept clean and free of grease and oil on floors? (FM 3-04.500[1-500].)
  - Are shops, shop sets, and hangars well arranged and uncluttered? (FM 3-04.500[1-500].)
  - Are clean-up periods established and followed? FM 3-04.500[1-500].)
- 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 410.)
- Ground support equipment.
  - Are equipment and vehicle operators properly trained and thoroughly familiar with the operation, handling, care, and maintenance of equipment and vehicles? (AR 600-55, AR 385-95, FM 3-04.500[1-500].)
  - Are vehicle operators properly licensed? (AR 600-55.)
  - Are ground support equipment (APU, generator) operators properly licensed? (TB 600-1, TM 1-1500-204-23-series.)
  - Are maintenance and operator manuals located with the equipment? (TM 1-1500-204-23-series, FM 3-04.500[1-500].)
  - Are maintenance records kept on equipment? (DA Pams 738-750 and 738-751.)
  - Is ground-handling equipment reflectorized? (TM 1-1500-204-23-series.)
  - Is all GSE under a 180-day corrosion-preventive control program? (TB 1-1500-328-23, Section X.)
- Maintenance paint shop.
  - Are more paint and solvents stored in the paint shop than will be used during one work shift? (FM 3-04.500[1-500], TM 1-1500-204-23-series.)
  - Are fire extinguishers provided throughout the shop area? (FM 3-04.500[1-500], TM 1-1500-204-23-series, DA Pam 385-1, OSHA.)
  - Is all electrical equipment in the paint shop explosion-proof? (FM 3-04.500[1-500].)
  - Are smoking restrictions posted and enforced? (TM 1-1500-204-23-series.)
  - Are flammable liquid containers marked? (TM 1-1500-204-23-series.)

BATTERY SHOP MAINTENANCE

I-8. The Aviation maintenance officer ensures the following battery shop maintenance requirements are met:

- Training.
  - Are battery maintenance personnel formally trained (MOS 68F) in the care of nickel-cadmium batteries? (FM 3-04.500[1-500].)
  - Are battery maintenance personnel thoroughly trained in charging, discharging, and testing procedures? (TM 11-6140-203-23, TB 385-4.)
- Equipment. Are the following safety items available in or near the battery shop and used when needed:
  - Eyewash or shower within 25 feet of the work area? (FM 3-04.500[1-500], OSHA Std 1926.403[a][6].)
  - Correct fire extinguisher? (FM 3-04.500[1-500], TB 385-4.)
  - Aprons, rubber gloves, and face shield or goggles (all provided as part of tool kit, TK 90/16)? (TM 11-6140-203-23, TB 385-4.)
  - A safety board with all required items posted according to TB 385-4? (FM 3-04.500[1-500].)
- Ventilation
  - Is the battery-charging area adequately ventilated to prevent accumulation of explosive gases? (NFPA 410, TM 11-6140-203-23.)
  - 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? (NFPA 70 and NFPA 410.)
  - Do exhaust ducts lead directly to the outside, above roof level, where fumes cannot accumulate? (NFPA 410.)
- Safety. How have the commander, safety officer, and supervisory personnel ensured the following:
  - The battery shop has an operational SOP? (TB 385-4.)
  - Facilities are provided for flushing and neutralizing spilled electrolyte? (OSHA Std 1910.178[g][2].)
  - Arc-proof switches are installed? (OSHA Std 1910.178[g][11].)
  - 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 3-04.500[1-500], TB 385-4.)
  - All shop personnel remove all jewelry while working with batteries. (NFPA 410, FM 3-04.500[1-500].)
  - Necessary inspections, cleaning, and repairs are accomplished before charging, (FM 3-04.500[1-500].)
  - Charging equipment is energized after the battery has been connected to the circuit. (TM 11-6140-203-14-1.)
  - Water or electrolyte is added to the battery only when fully charged and stabilized for at least 30 minutes. (TM 11-6140-203-23.)

- 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].)
- Lead-acid batteries are stored separately from NICAD batteries. (TM 11-6140-203-23.)
- Acids are properly stored.
- Cell shorting straps are used to completely discharge cells to 0 volts. (TM 11-6140-203-23.)
- Maintenance personnel monitor the voltage of individual cells at regular intervals during charge and discharge cycles. (FM 3-04.500[1-500], TM 11-6140-203-23.)
- Discharge times are strictly followed during battery capacity tests. (TM 11-6140-203-23, FM 3-04.500[1-500].)
- MSDS are posted? (AR 700-141.)

AVIONICS/ELECTRICAL

I-9. The Aviation maintenance officer ensures the following avionics and/or electrical requirements are met:

- Training:
  - 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.)
  - Have electrical MOSs completed initial training in CPR with annual refresher updates annotated by installation safety officer?
- Test equipment.
  - Are calibration requirements for test equipment kept up-to-date? (TB 750-25.)
  - Is all test equipment properly grounded? (TB 385-4.)
- Safety. How does the commander ensure knowledge of and compliance with the following:
  - Does the unit have an adequate avionics maintenance SOP? (TB 385-4.)
  - A mounted safety board is present in the shop. (TB 385-4.)
  - Rubber floor mats or similar insulating materials are provided for repair positions. (TB 385-4, FM 3-04.500[1-500].)
  - All power attachment plugs and connectors are serviceable with no exposed current-carrying parts except the prongs. (OSHA Std 1910.305, FM 3-04.500[1-500].)
  - All physical and high-voltage hazards have been identified and marked according to TM 1-1500-204-23-series. (FM 3-04.500[1-500].)
  - Is the operational readiness float program established and maintained? (AR 750-1.)
  - Are unserviceable and nonrepairable items being turned in promptly? (AR 750-1.)

- Are technical inspections of repairable equipment being accomplished? (FM 3-04.500[1-500].)
- Are necessary technical publications on hand and current? (DA Pam 25-30, FM 3-04.500[1-500].)

TECHNICAL SUPPLY

I-10. The Aviation maintenance officer ensures the following technical supply requirements are met:

- Is the unit required to maintain a PLL? (DA Pam 710-2-1.)
  - Is the PLL properly computed and current? (DA Pam 710-2-1.)
  - Are PLL items replenished as used? (DA Pam 710-2-1.)
  - Is the unit's ASL current (reviewed within the last 6 months)? (AR 710-2.)
  - Are the document register and other documents current and posted correctly? (DA Pam 710-2-1.)
  - 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.)
  - Are supplies in open storage preserved to withstand exposure to elements? (TMs 743-200-1 and 743-200-3.)
  - 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? (TMs 743-200-1 and 743-200-3.)

Appendix J

Communications Nets

NET DIAGRAMS

J-1. This appendix contains external and internal communications nets (Figures J-1 through J-29) in which aviation logisticians and personnel who have an impact on aviation logistics participate.

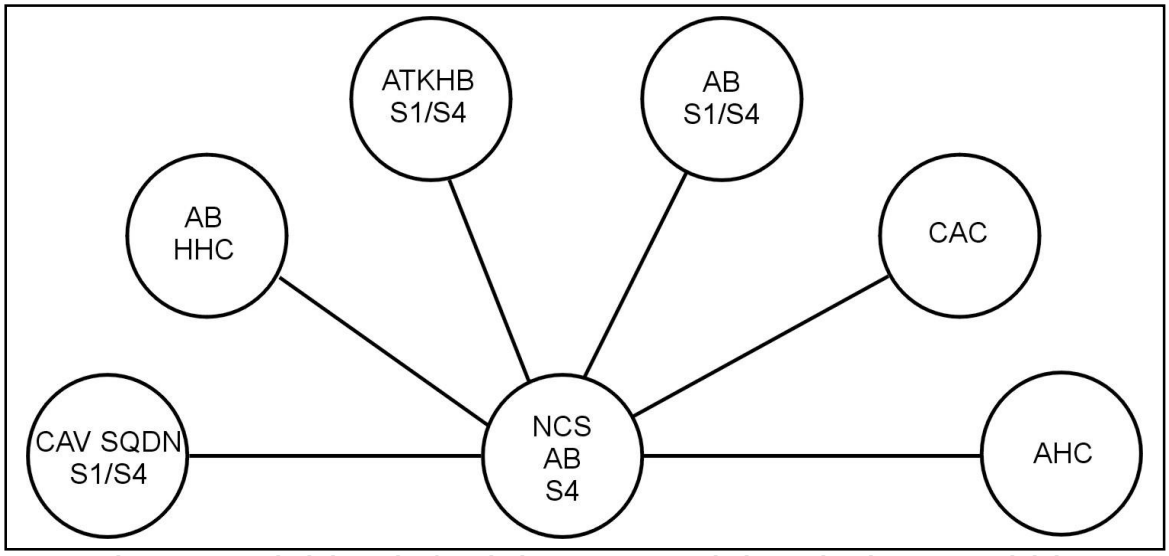


Figure J-1. Administrative/Logistics FM Net—Aviation Brigade, Heavy Division

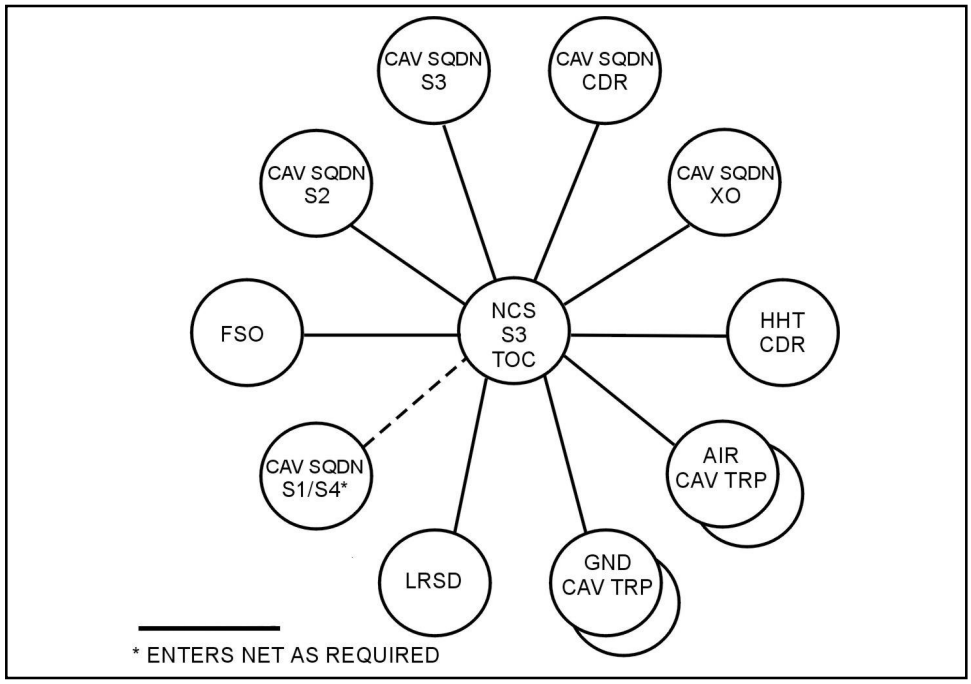


Figure J-2. Command/Operations FM Net—Cavalry Squadron, Heavy Division

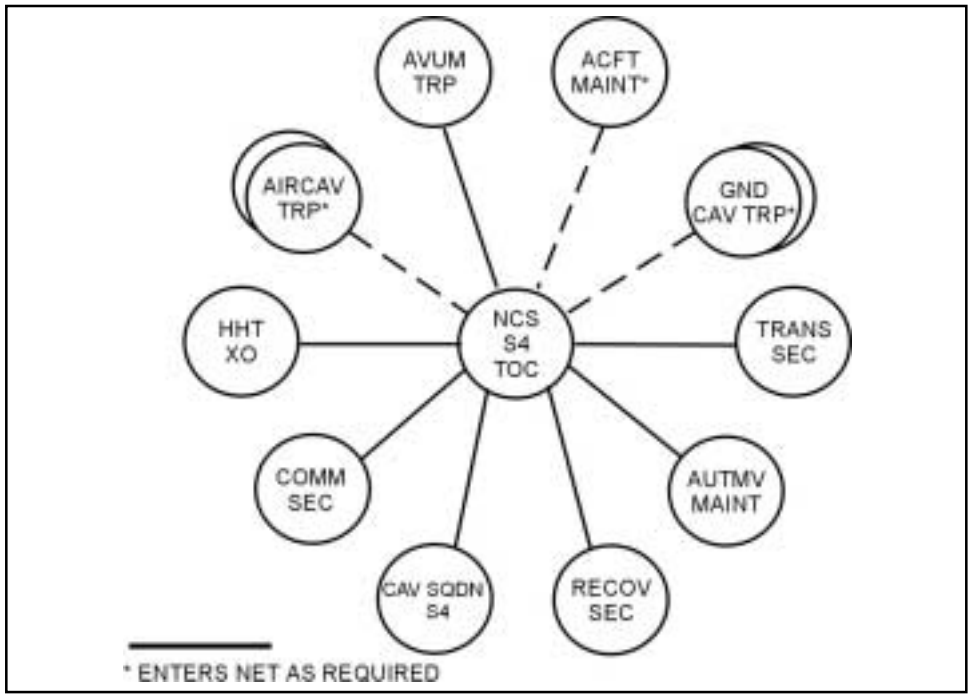


Figure J-3. Administrative/Logistics FM Net—Cavalry Squadron, Heavy Division

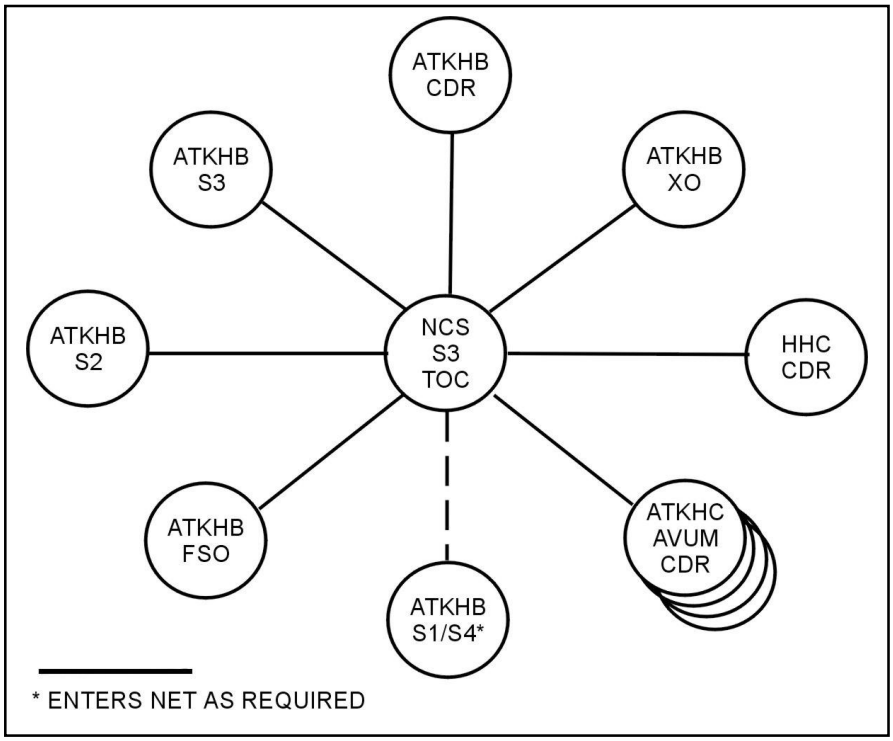


Figure J-4. Command/Operations FM Net—ATKHB, Heavy Division

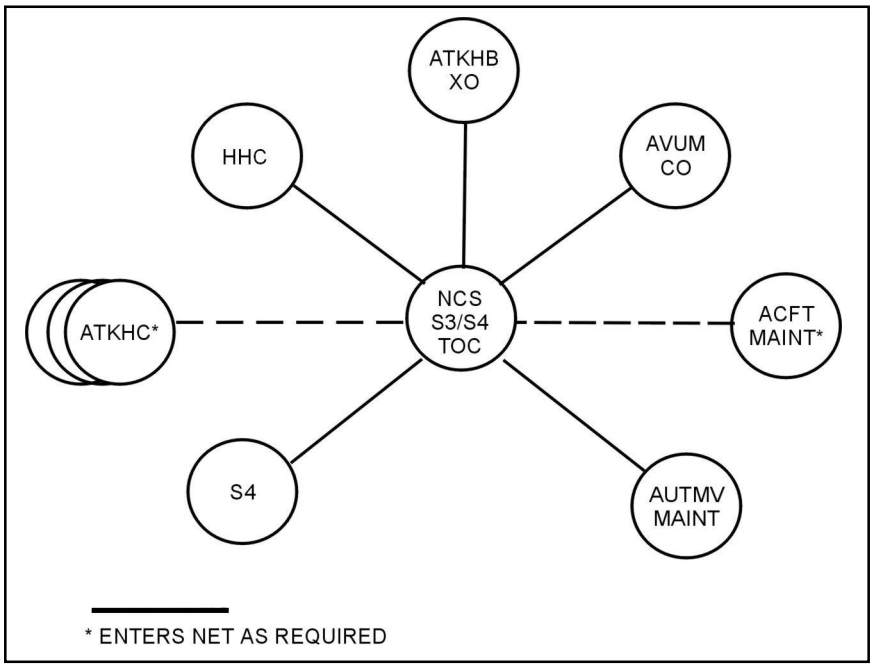


Figure J-5. Administrative/Logistics FM Net—ATKHB, Heavy Division

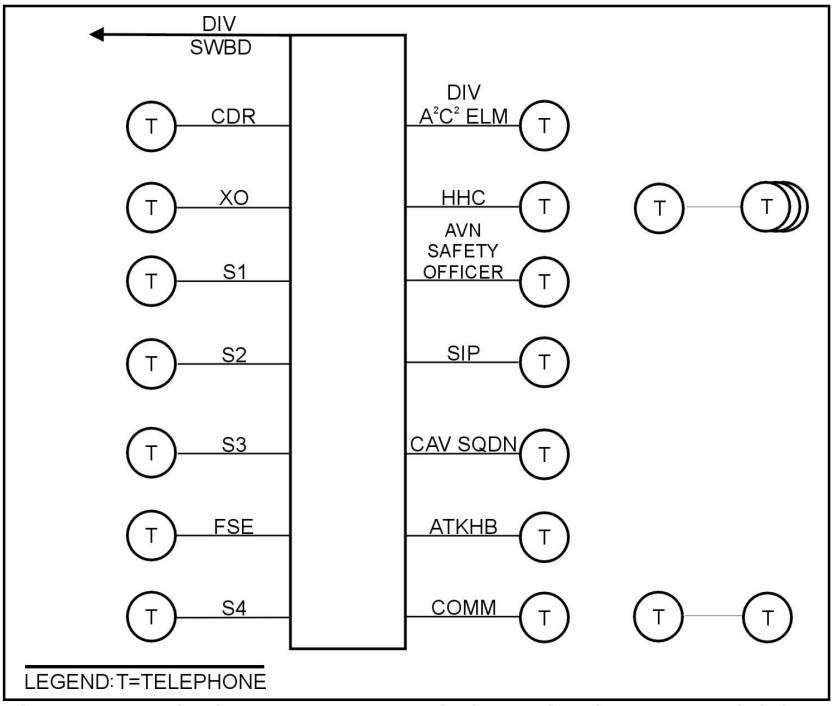


Figure J-6. Telephone System—Aviation Brigade, Heavy Division

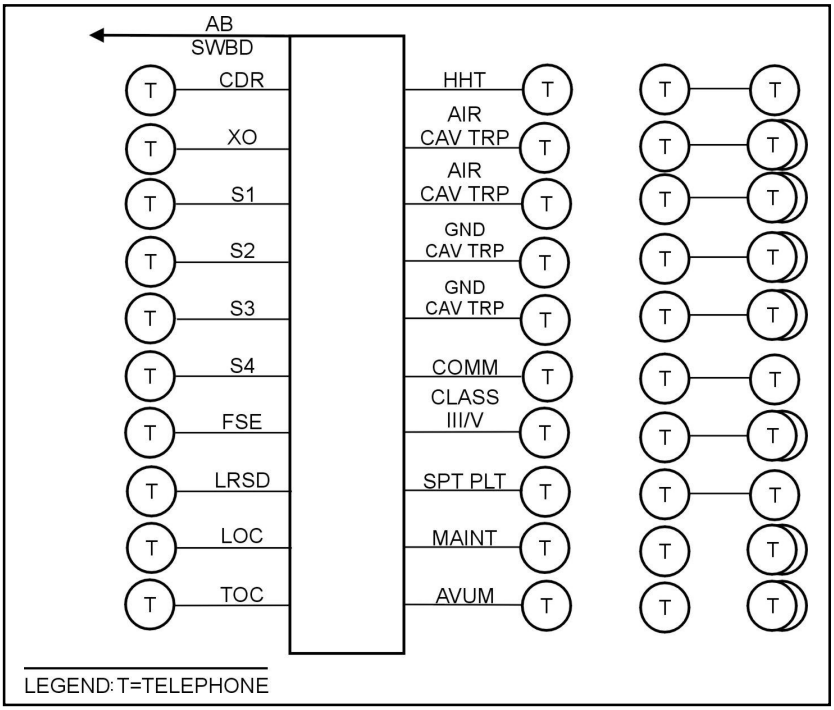


Figure J-7. Telephone System—Cavalry Squadron, Heavy Division

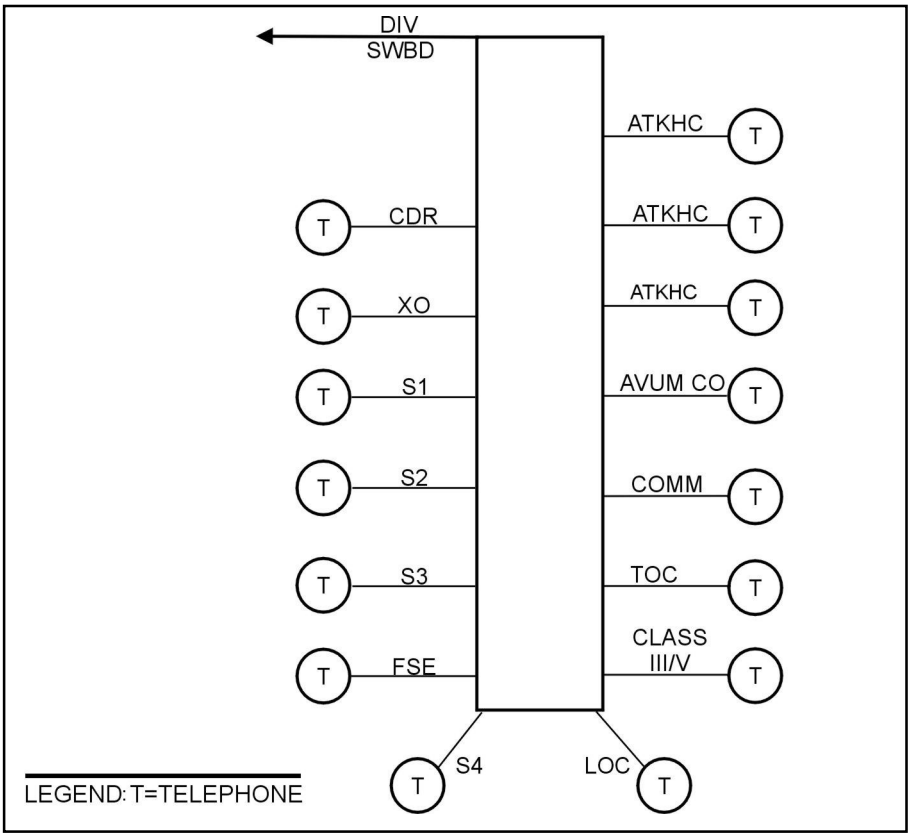


Figure J-8. Telephone System—Attack Helicopter BN, Heavy Division

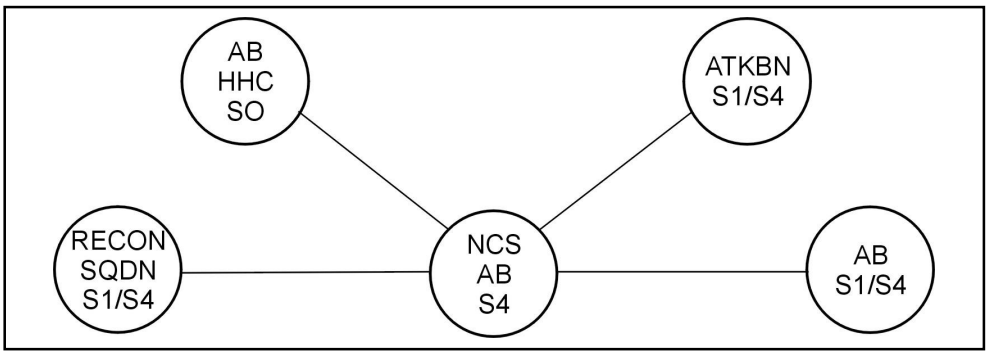


Figure J-9. Administrative/Logistics FM Net—Aviation Brigade, Light Division

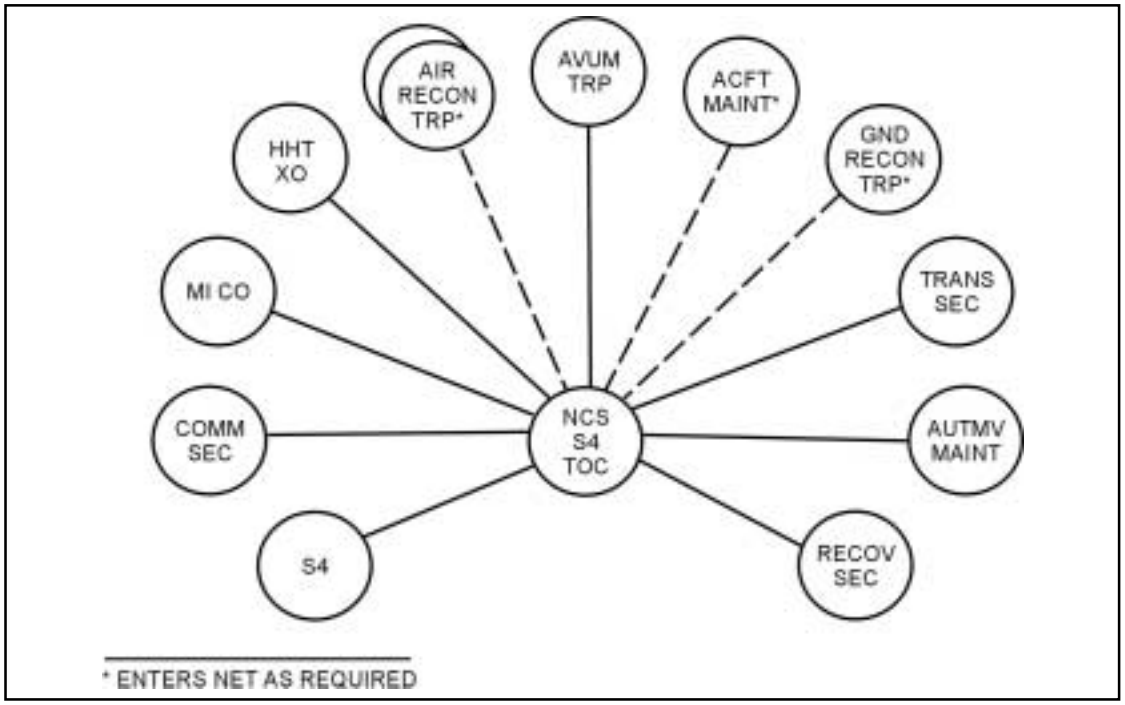


Figure J-10. Administrative/Logistics FM Net—Reconnaissance Squadron, Light Division

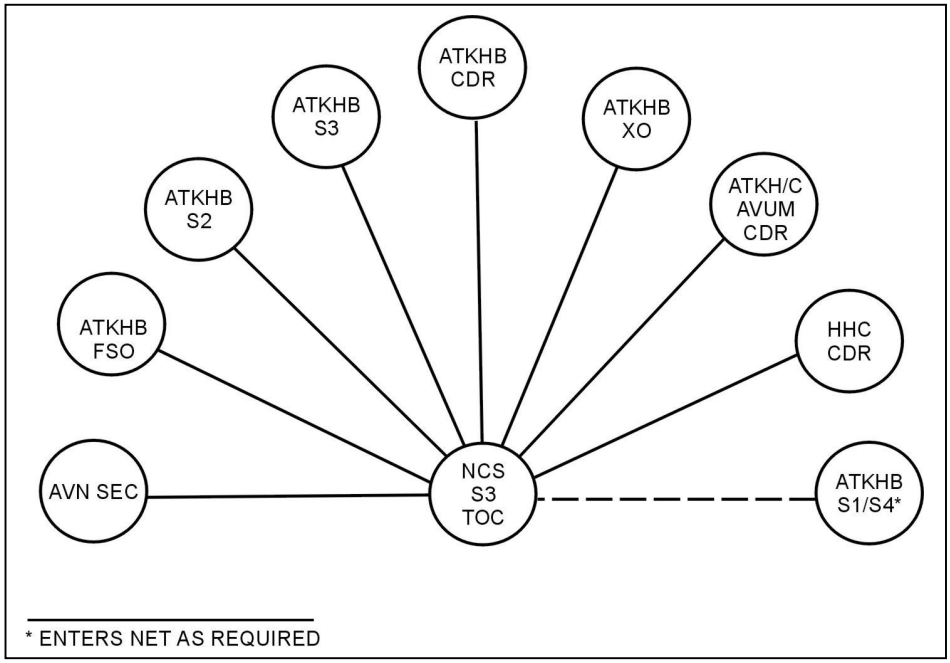


Figure J-11. Command/Operations FM Net—ATKHB, Light Division

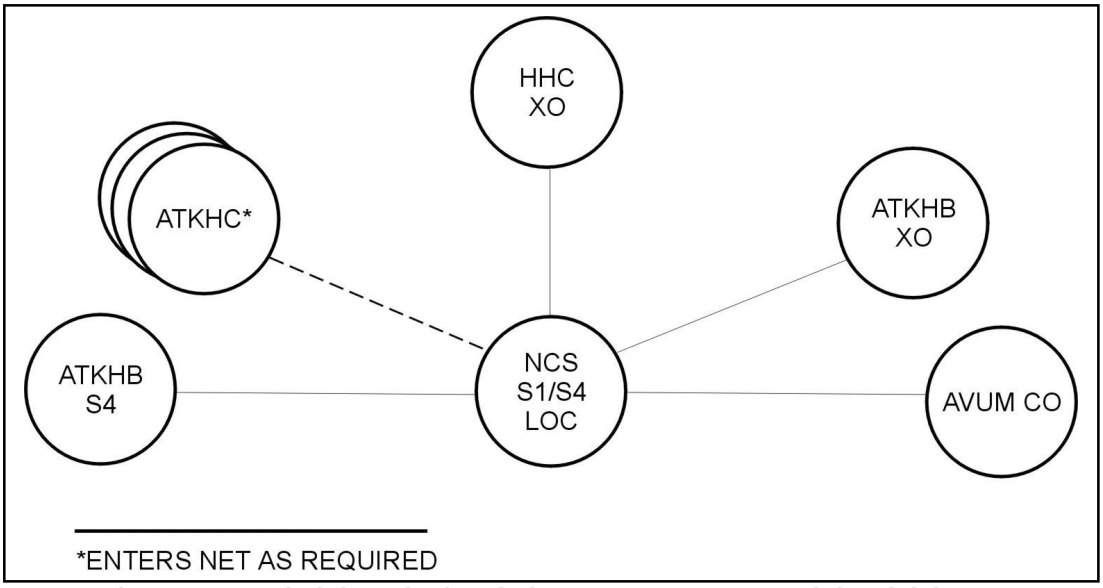


Figure J-12. Administrative/Logistics FM Net—ATKHB, Light Division

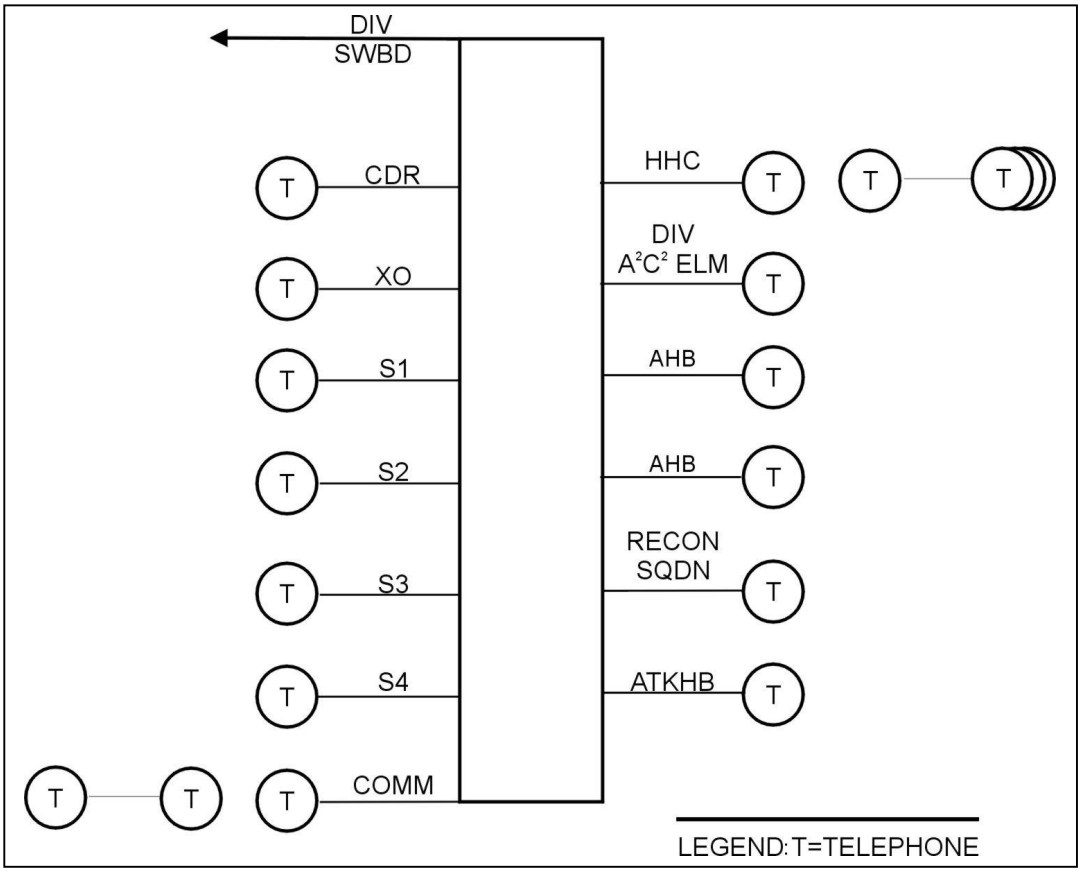


Figure J-13. Telephone System—Aviation Brigade, Light Division

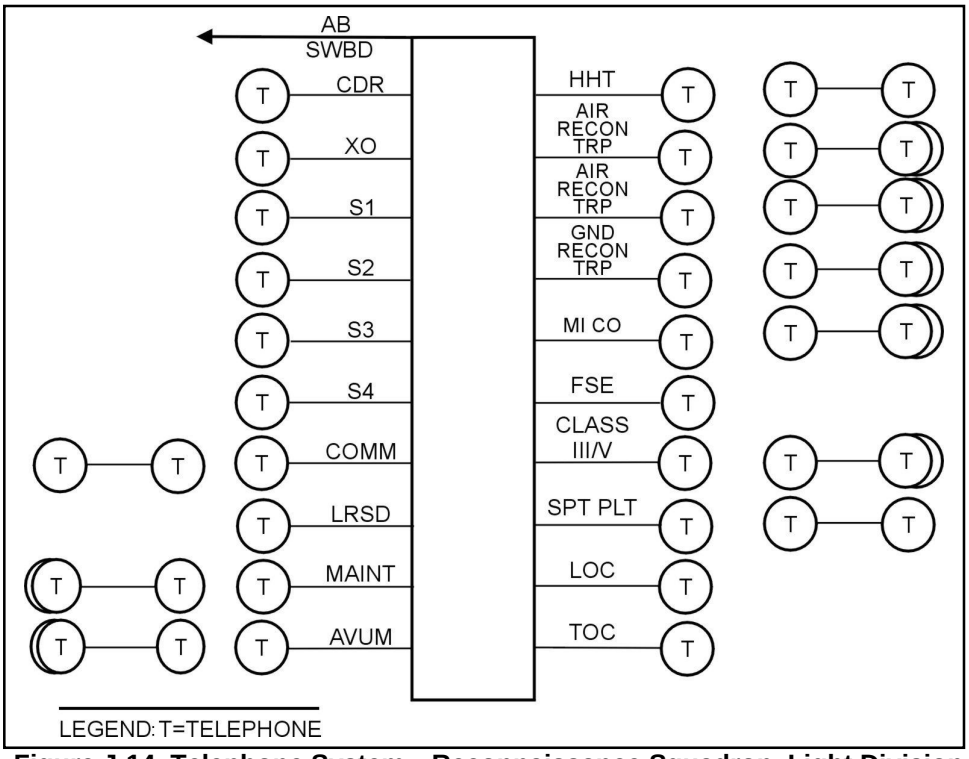


Figure J-14. Telephone System—Reconnaissance Squadron, Light Division

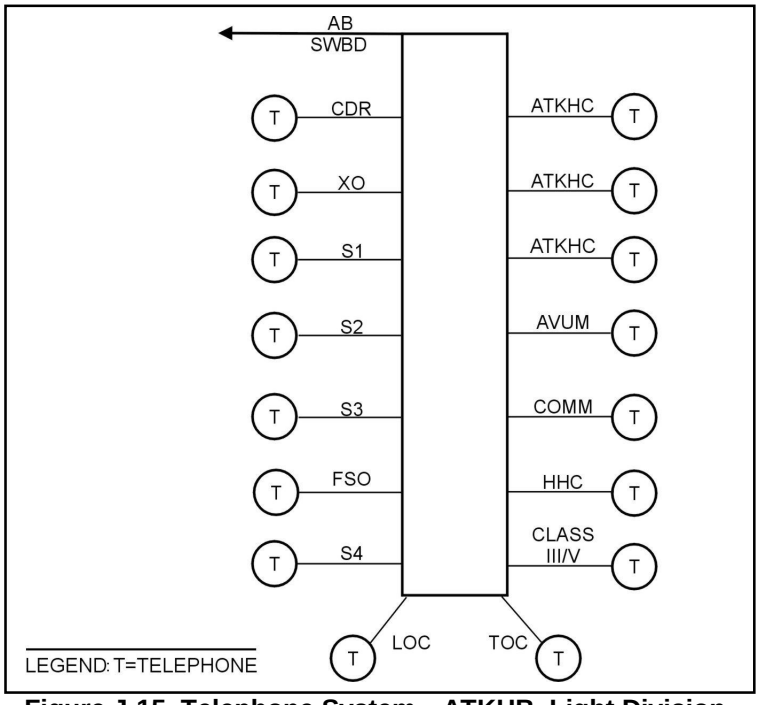


Figure J-15. Telephone System—ATKHB, Light Division

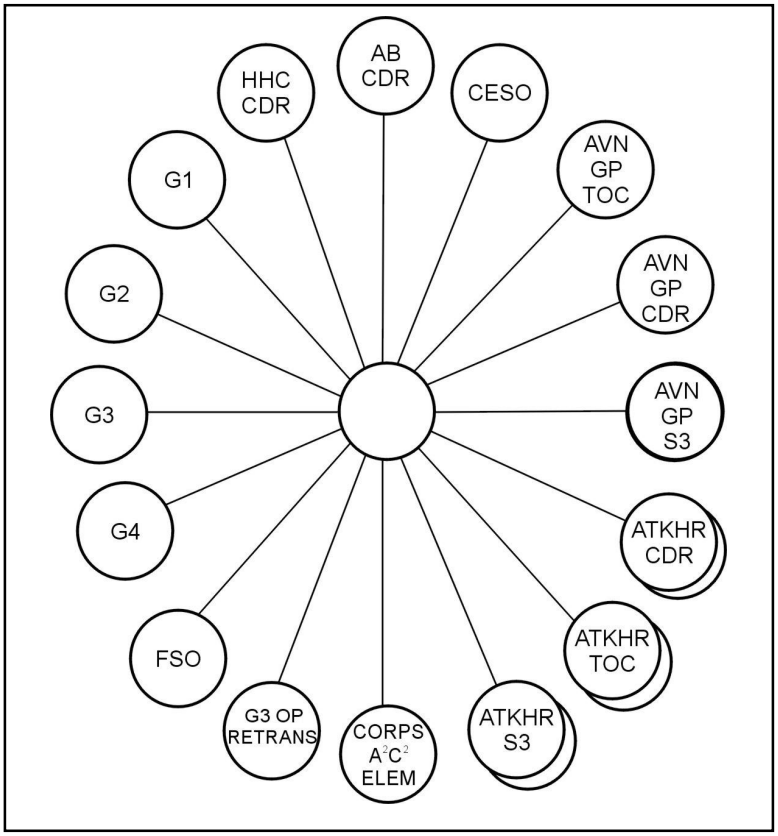


Figure J-16. Command/Operations FM Net—AB, Heavy Corps

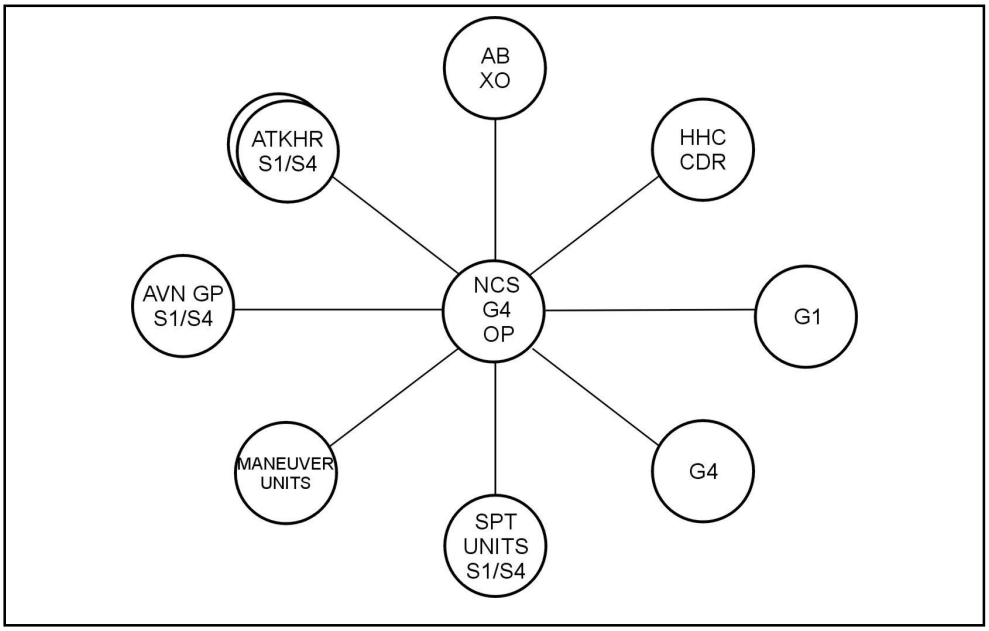


Figure J-17. Administrative/Logistics FM Net—Aviation Brigade, Heavy Division

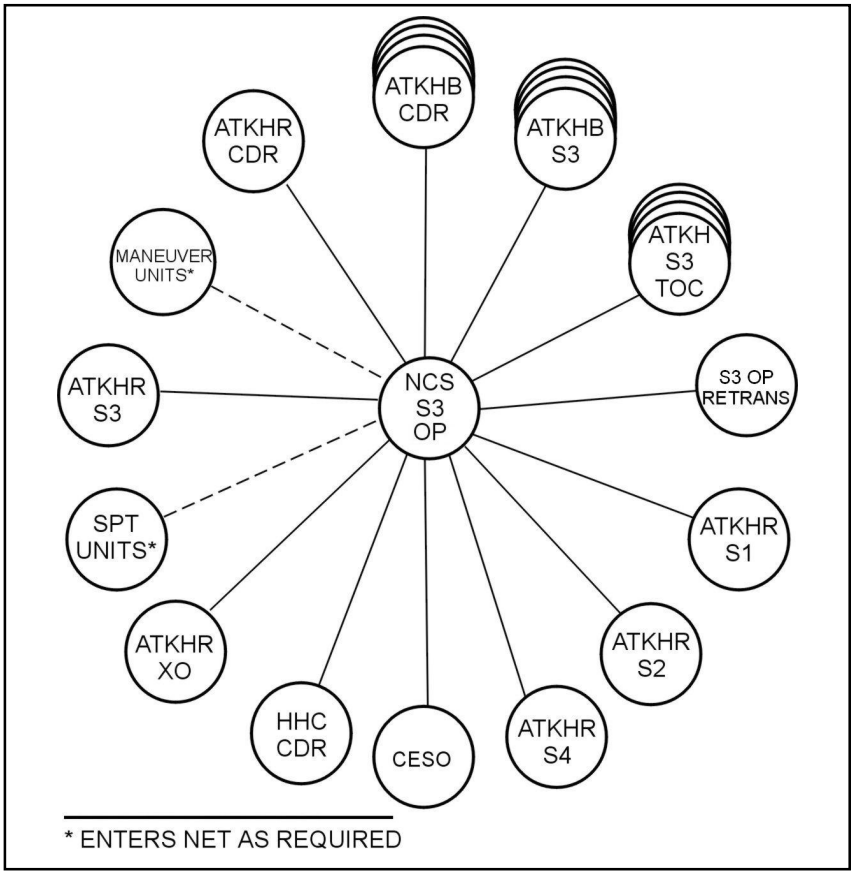


Figure J-18. Command/Operations FM Net—ATKHR, Heavy Corps

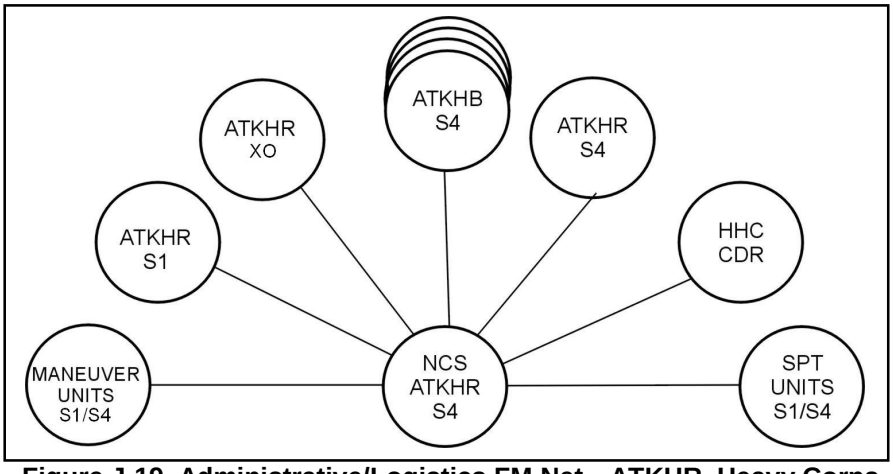


Figure J-19. Administrative/Logistics FM Net—ATKHR, Heavy Corps

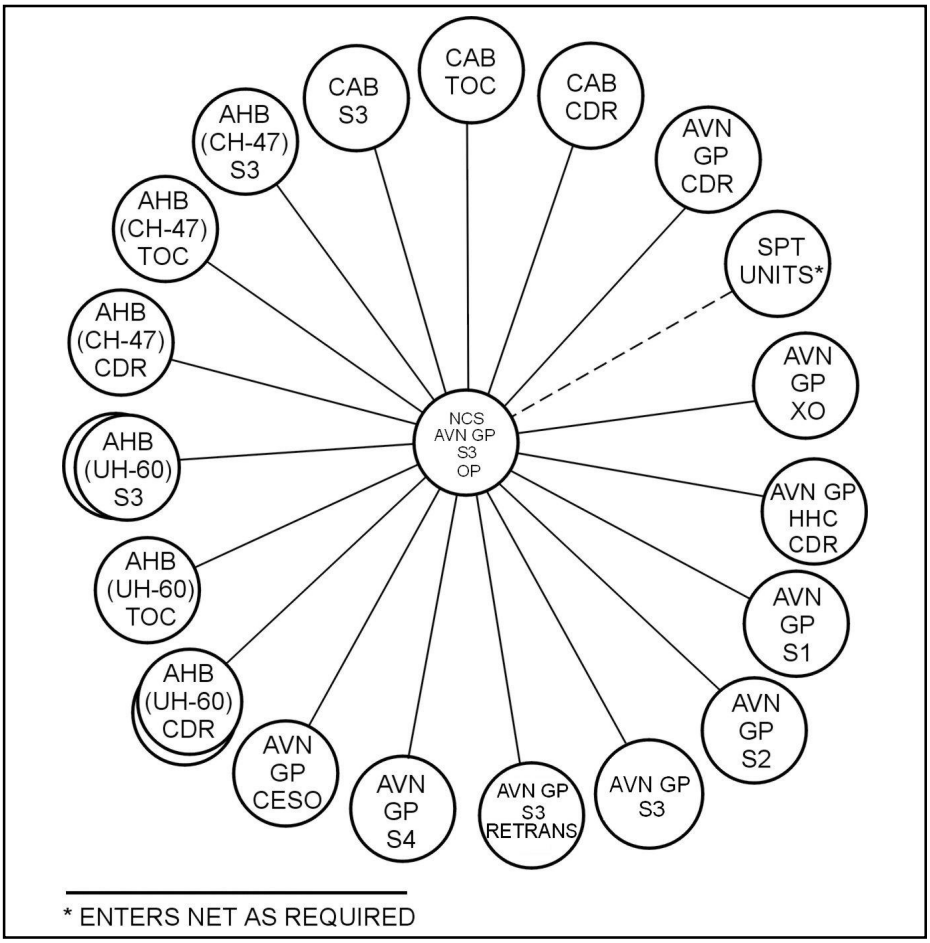


Figure J-20. Command/Operations FM Net—Aviation Group, Heavy Corps

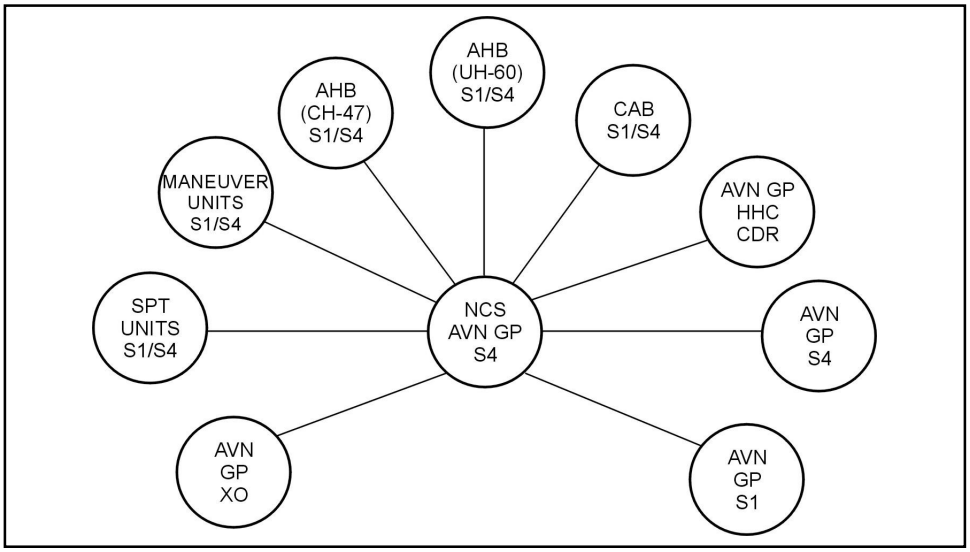


Figure J-21. Administrative/Logistics FM Net—Aviation Group, Heavy Corps

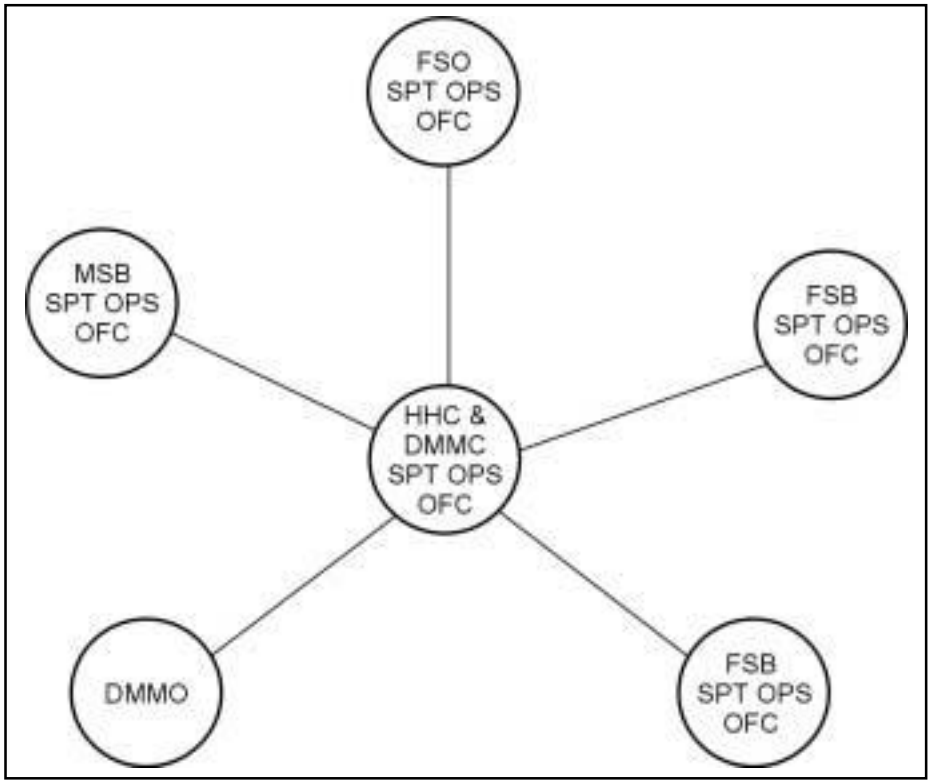


Figure J-22. Logistics Operations Net (AM-SSB)—DISCOM, Heavy Division

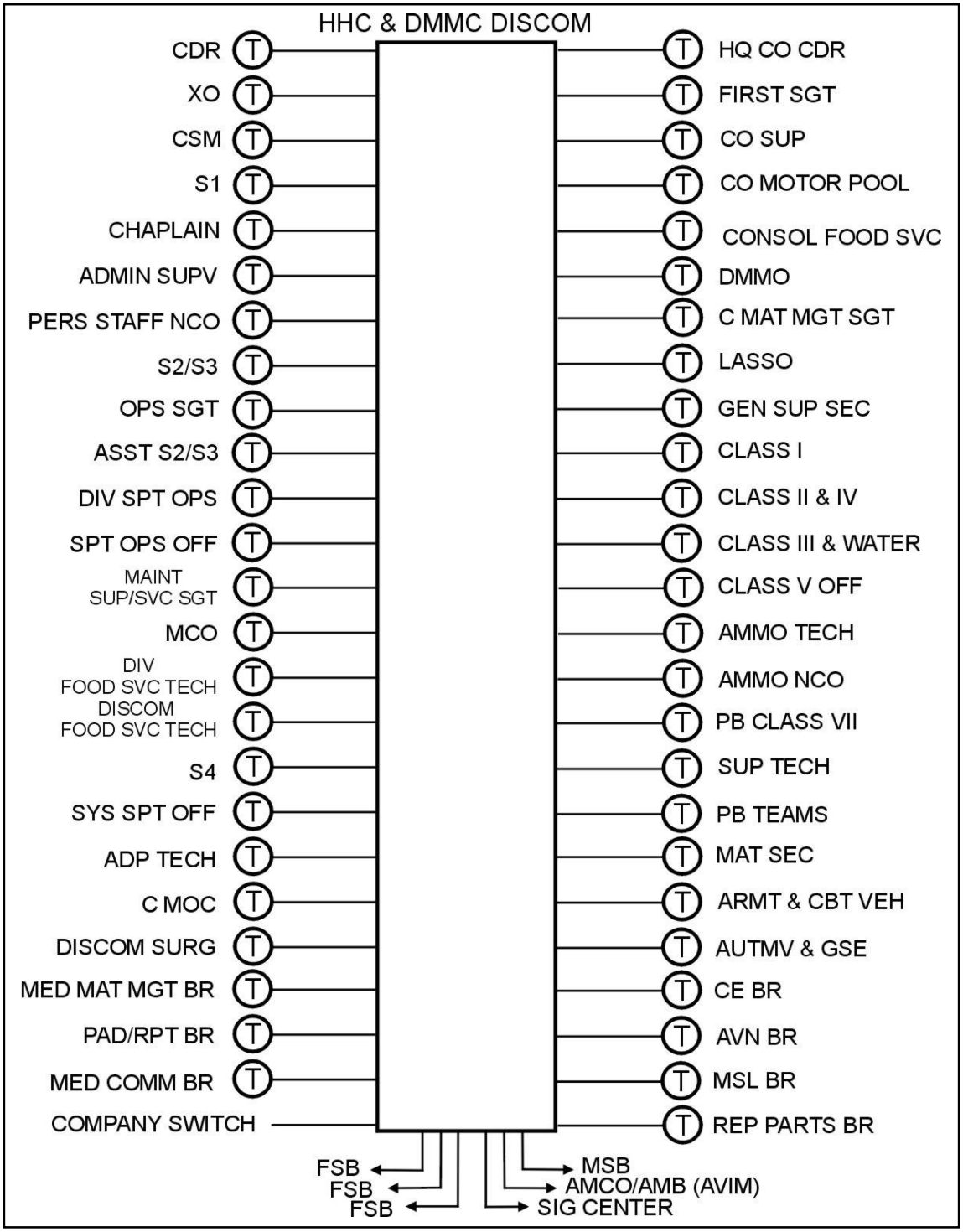


Figure J-23. Wire Net—DISCOM

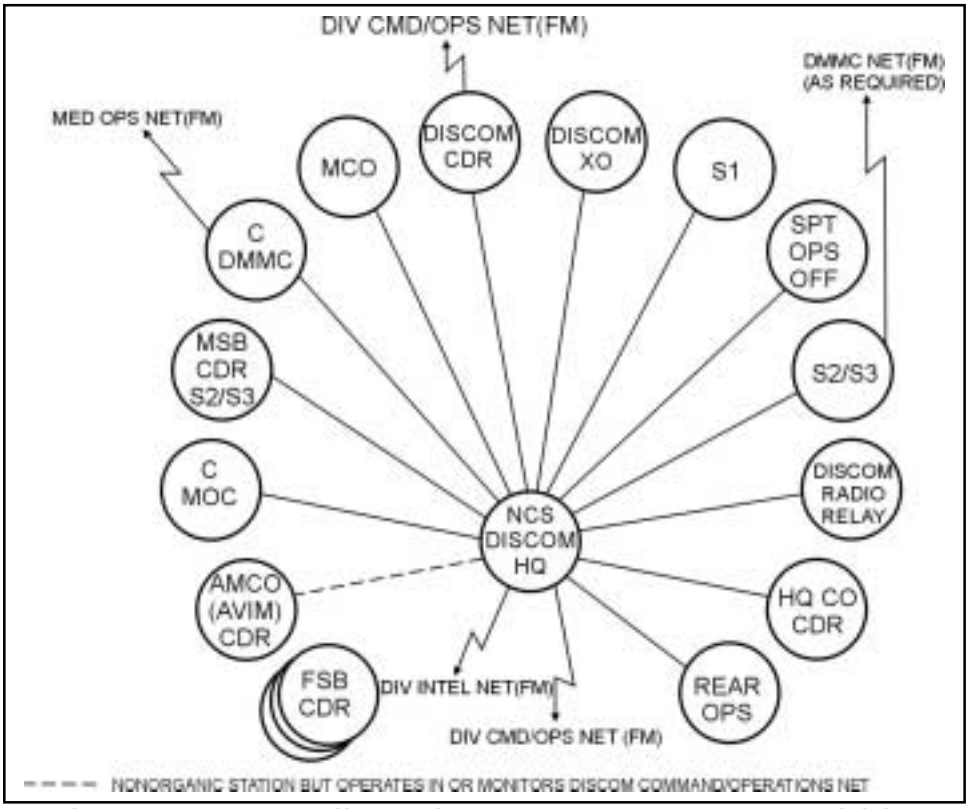


Figure J-24. Command/Operations FM Net—DISCOM, Heavy Division

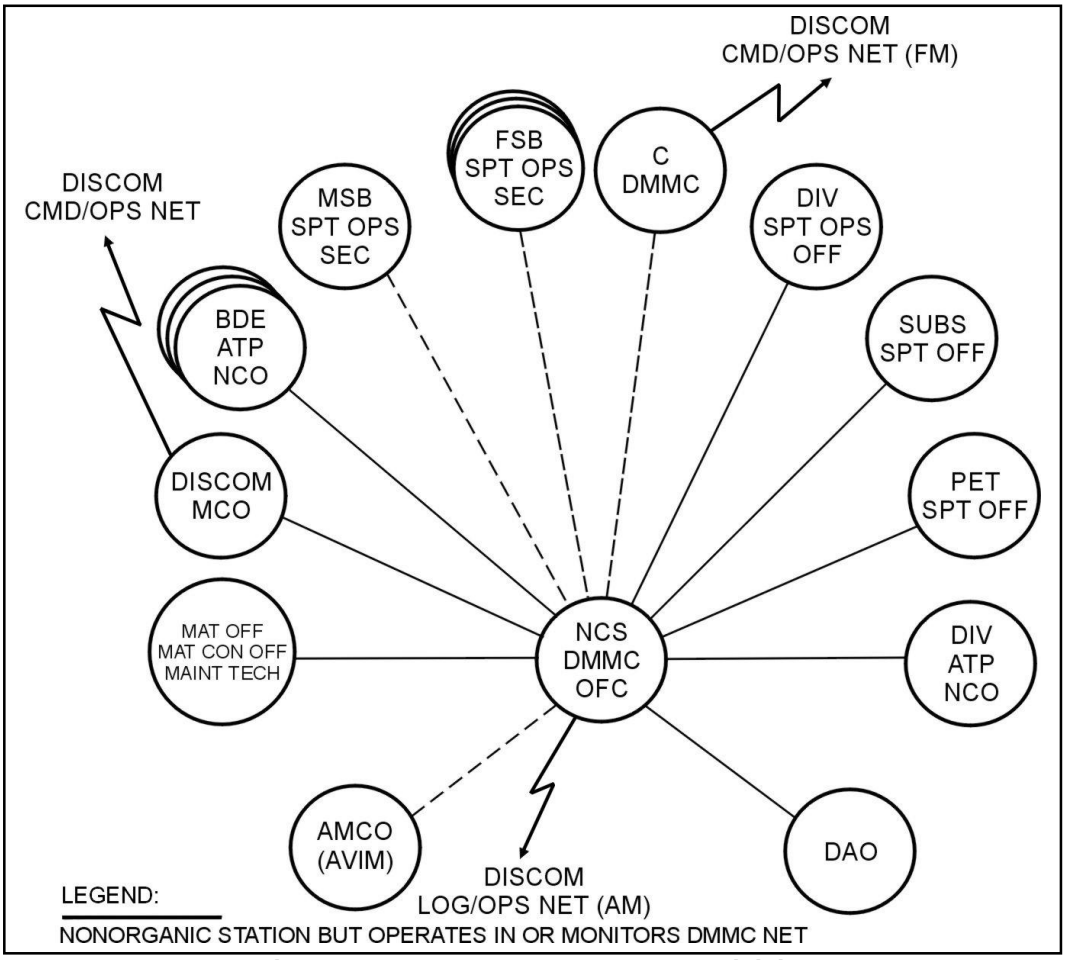


Figure J-25. FM Net—DMMC, Heavy Division

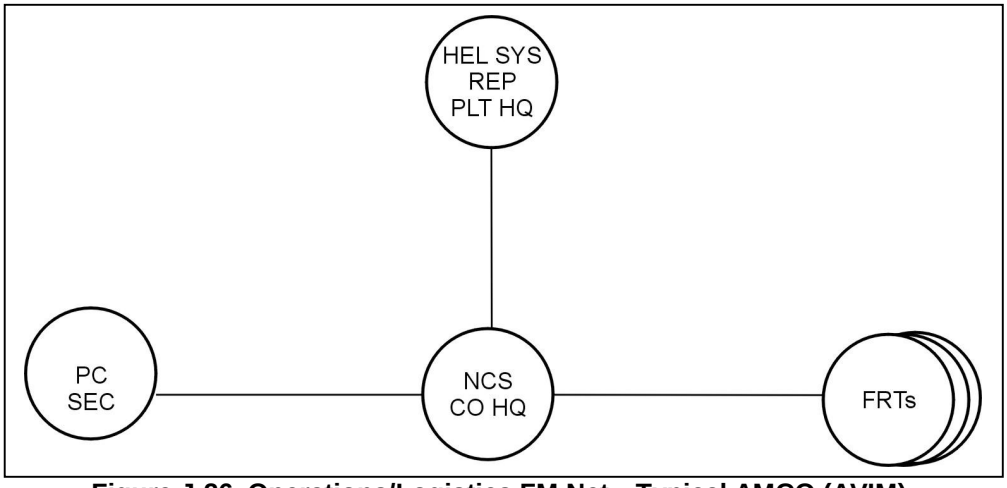


Figure J-26. Operations/Logistics FM Net—Typical AMCO (AVIM)

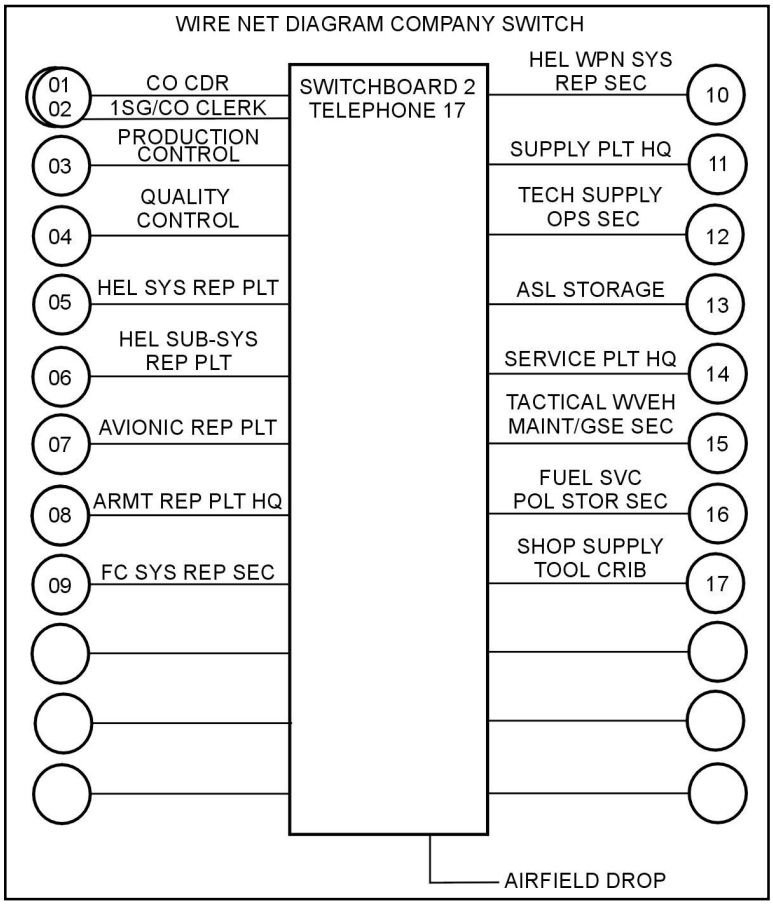


Figure J-27. Wire Net Diagram—AMCO (AVIM) (NON-DASB)

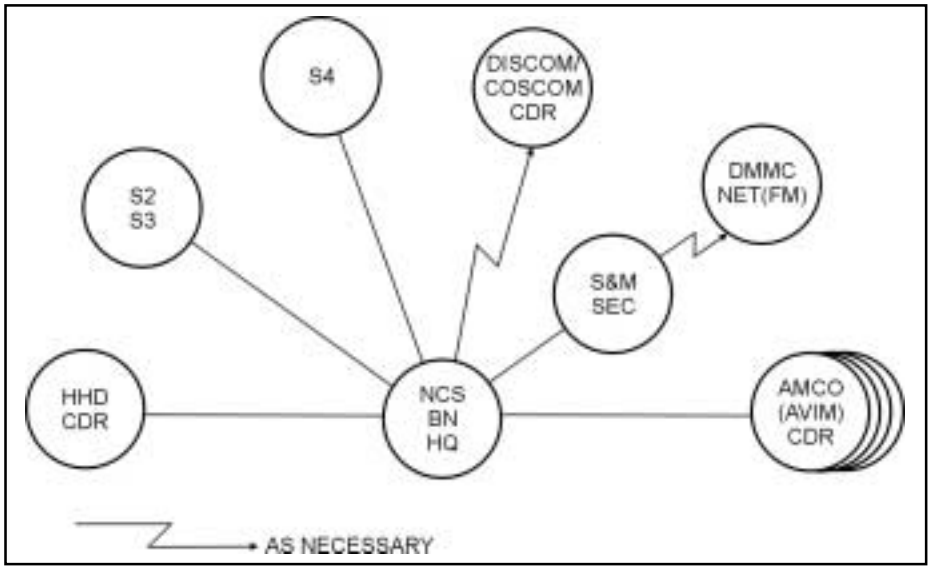


Figure J-28. FM/Voice Company Command Net—Typical HHD, AMB

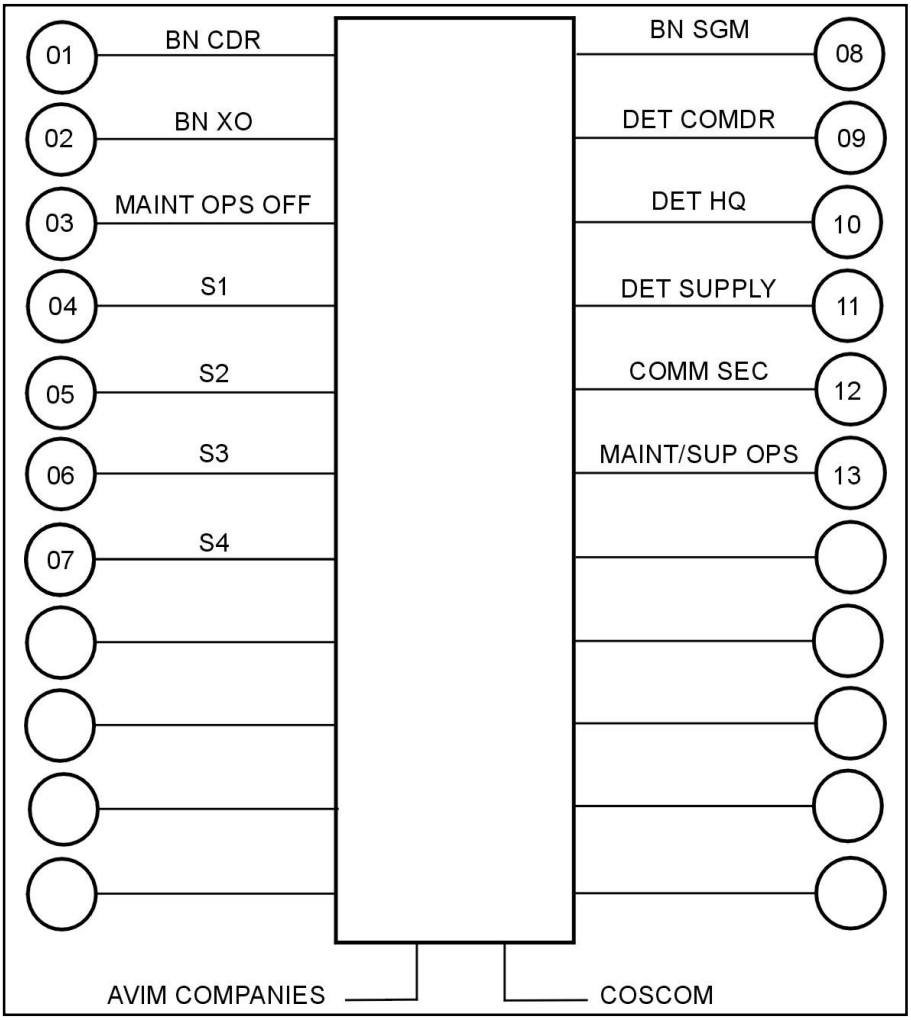


Figure J-29. Wire Net Diagram—HHD, AMB (AVIM), COSCOM

Appendix K

Calibration

MANAGEMENT AND CONTROL

K-1. AR 750-43 assigns Armywide management of the U.S. Army TMDE C&RS Program to HQ, AMC, except for the ARNG. In turn, the U.S. Army TMDE Activity (through AMC) is responsible for the DA TMDE program management and execution. 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

K-2. The DA TMDE C&RS program makes sure that measurement accuracy is traceable from owner or user instrumentation through the Army system to the NIST or fundamental physical constants. The USAPSL (an organizational element of USATA), TSCs, and ATSTs are established to provide calibration and repair support for U.S. Army instrumentation worldwide. They assure the accurate transfer of measurements within the Army. The following provides calibration service traceable to NIST.

PRIMARY LEVEL

K-3. The USAPSL or primary (P) level receives calibration service from NIST for selected U.S. Army primary reference standards. The USAPSL provides calibration and repair service for selected calibration standards in subordinate calibration laboratories and for TMDE that requires the USAPSL level of accuracy. All standards requiring NIST support must be coordinated with Director, USATA, ATTN: AMSAM-TMD-S, Redstone Arsenal, AL 35898-5400.

SECONDARY LEVEL

K-4. 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 ATST's transfer or (T) level and other customers that are identified in TB 43-180 as requiring S-level 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.

TRANSFER LEVEL

K-5. ATST's T- level receives support from the S- and P-levels of support for the standards used to calibrate user/owner equipment. The ATST provides C&RS to units located in the divisions and corps. These teams are located in CONUS and OCONUS, and are staffed by military in a theater of war. Civilian ATST’s are deployed at echelons above corps.

USER LEVEL

K-6. Owner/user or F-level receives calibration and repair services from its supporting ATST for TMDE identified in TB 43-180 as requiring ATST (T-level) calibration and repair support. DS/GS/AVIM units provide calibration and repair service for TMDE support program identified in TB 43-180 as requiring DS/GS/AVIM unit calibration and repair.

SUPPORT OF TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT

K-7. Calibration and repair support requirements of instruments used in support of U.S. Army materiel will be listed in TB 43-180. The calibration procedures listed in TB 43-180 are DOD or USATA approved procedures and shall be used. The approved maintenance manual is also listed in TB 43-180.

AREA TMDE SUPPORT TEAM SUPPORT

K-8. 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 workload 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 ATST is responsible for providing the necessary service and returning the repaired and calibrated TMDE to the owner/user. When service external to the ATST is necessary, except for warranty TMDE, the ATST will arrange for the service and assure the return of the TMDE to the owner/user.

AREA CALIBRATION LABORATORIES/U.S. ARMY PRIMARY STANDARDS LABORATORY SUPPORT

K-9. TMDE and/or standards requiring ACL support or USAPSL support may be transported to the ATSTs or shipped directly to the ACLs or USAPSL.

MANUFACTURER SUPPORT

K-10. 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

K-11. 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 U.S. Army TMDE support program for compliance with the regulations and directives.

K-12. 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 performs the following duties:

- 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 holders bump hand receipts 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 ATST's external SOP.
- Reviews the 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 ATST is notified of any changes.
- Ensures that the supporting ATST 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 ATST 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 item 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 item 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 required accessories and manuals accompany the TMDE.
- Highlights delinquent list with appropriate hand receipt 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.
  - Determine if system maintenance checks previously performed using this out-of-tolerance TMDE must be repeated.
  - 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." Notify the supporting ATST in writing that 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.

K-13. 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 an ATST, area calibration laboratory or support center, DOD support facility, or DS/GS/AVIM support unit for TMDE-SP.

K-14. 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.

K-15. 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.

RESPONSIBILITIES OF TMDE USERS

K-16. 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 use have a current DA Label 80 or DA Label 163 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 ATST 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 ATST 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 hand receipt 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?
- 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?

TMDE MANAGEMENT REPORTS

K-17. IMRF (master list) is distributed quarterly 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 ATST. The accuracy of these files rests, in part, with the TMDE owner/user who must initially provide accurate information and thereafter review master lists for accuracy and take corrective action when necessary. The TMDE owner/user must advise the supporting ATST/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

K-18. A DA 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 also specified in Appendix C, TB 750-25.

Appendix L

Site Selection

SITE CONSIDERATIONS

L-1. 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.

L-2. The site chosen must meet the following requirements:

- 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.

MAP, AERIAL, AND GROUND RECONNAISSANCE

L-3. The maintenance CO 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

L-4. An ideal maintenance site has the following features (not all of which are normally found at any one site):

- Close proximity to the aircraft AA 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 turn-around, or loop, is desirable to move traffic directly through the area.)

L-5. Additional factors to consider when selecting a site are the following:

- 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 operation 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

ADVANCE PARTY

L-6. 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.

OBJECTIVES

L-7. 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 workflow. However, some compromises, which will somewhat reduce efficiency, may be necessary to meet RAP or RACOs requirements. The company's elements must be positioned so that they can defend themselves and offer mutual defense support to each other.

AVIATION INTERMEDIATE MAINTENANCE UNIT LAYOUT

L-8. Figure L-1 shows a typical AVIM unit in a wooded area. Each element is located for easy access to the aircraft AA and landing area. This area should be approximately 300 to 500 square meters. METT-TC will be considered when dispersing the unit sections. The following items should be considered:

- PC and QC 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 PC 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 PC 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 PC.
- 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 fixed-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.

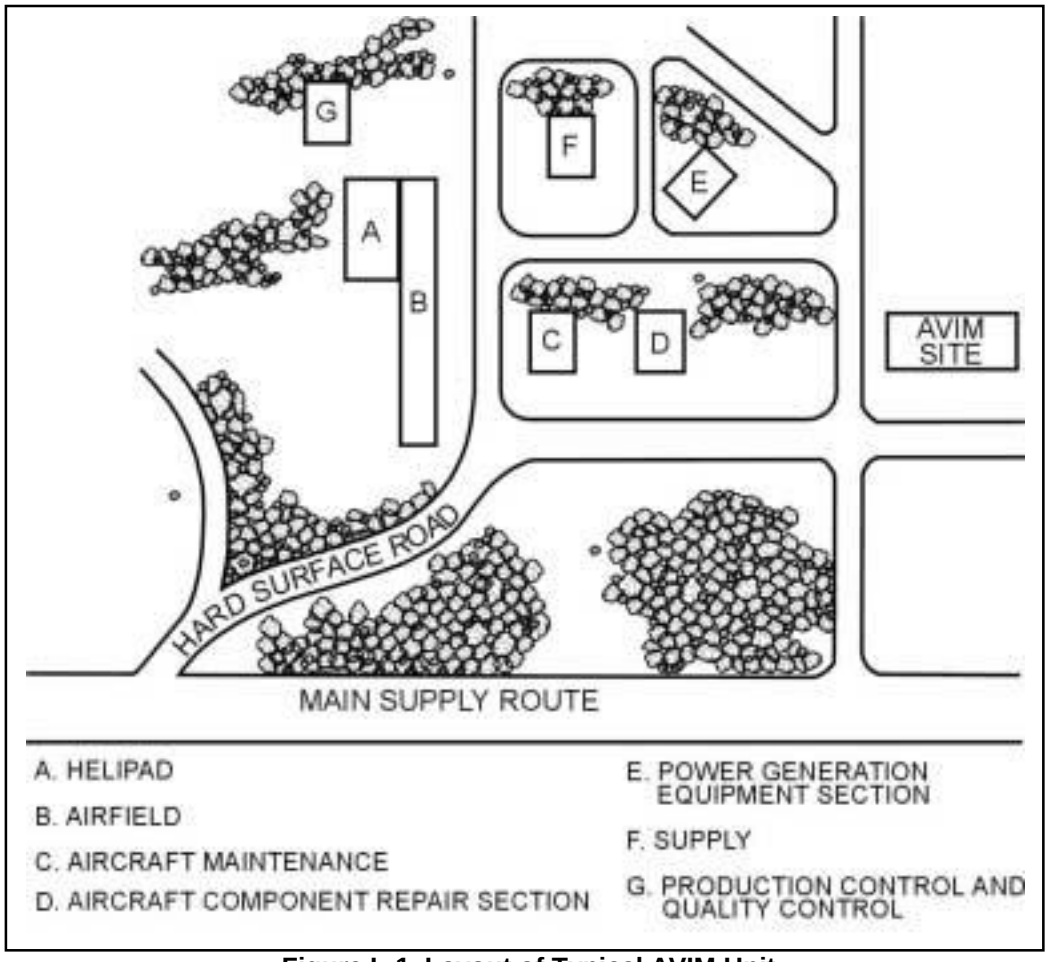


Figure L-1. Layout of Typical AVIM Unit

Appendix M

Reconstitution

DEFINITION

M-1. 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

M-2. 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 C^2; cross-leveling or replacing personnel, supplies, and equipment; and conducting essential training. Command priorities should be established to allocate resources and preserve unit cohesiveness.

M-3. If reconstitution is necessary, commanders have two options—reorganization and regeneration. Often these are executed in combination.

REORGANIZATION

M-4. 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

M-5. Regeneration rebuilds a unit through large-scale replacement of personnel, equipment, and supplies. C^2 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

M-6. Reconstitution operations place very high demands on the existing CSS system. High-priority requisitions for replacement materiel are processed by MMCs. 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.

M-7. 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 workload 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.

M-8. Reconstitution should take place as far forward as possible. However, the area chosen should be free from enemy harassment. In the COMMZ, the TSC commander normally designates a reconstitution location. 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.

M-9. 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 S&S company refuels the division. If HNS is available and appropriate, the ASG HNS directorate coordinates it. ASG support of reconstitution significantly increases its workload. 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.

M-10. 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 personnel command/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.

M-11. 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 TSC headquarters, the TSC 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.

M-12. The ASG SPO directorate is responsible for overall ASG reconstitution planning and coordination. Reconstitution is conducted to restore an ASG unit's effectiveness when ordered by TSC 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.

M-13. 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.

M-14. 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

M-15. 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, 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.

M-16. In addition to C^3 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 MEDEVAC assets.
- Supply elements for replenishment of Classes II, III, IV, VII, and water and rations.
- Service elements for clothing exchange and bath.
- AVIM/IDSM teams for maintenance and Class IX and RX support.
- Ammunition supply point assets to replenish Class V basic loads.
- Transportation assets to support replenishment and evacuation operations.

M-17. 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

M-18. The division transmits requirements that are beyond its capabilities to the COSCOM MMC. Initial priority will be to replenish Classes 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 prepositioned with materiel:
- Classes I and II supplies may be prepositioned based on head count and requirements.
- Classes V, VII, and IX may be prepositioned based on the type of units to be reconstituted and their condition.
- Class VII items may be made available from prepositioned war reserve stocks, recovered and repaired equipment, redistributed assets, and ready-for-issue replacements through the supply system.

M-19. The TSC MMC maintains backup reconstitution pull packages in unit sets that 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.

M-20. 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.

M-21. Forward-employed BDA 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 that 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.

M-22. Emergency medical treatment, which began as far forward as possible, will continue in the reconstitution area. MEDEVAC air or ground ambulance assets will be on hand to evacuate personnel following any necessary triage or treatment.

M-23. 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 process will not normally be used in reconstitution.

Appendix N

Environmental Issues

AWARENESS AND COMPLIANCE

N-1. ARs 200-1 and 200-2 explain the Army's environmental programs. Appendix A, in both regulations, references the additional documents that should be reviewed. TC 5-400 provides a comprehensive listing of all items of interest in the preparation for operating near and avoiding environmentally sensitive areas. Another good reference for environmental issues is GTA 5-8-2.

ARMY ENVIRONMENTAL COMPLIANCE ASSESSMENT SYSTEM

N-2. Compliance of environmental regulations is a command responsibility. All maintenance units must be aware of the regulations and publications governing environmental protection. All aviation maintenance units handle HW and HM. Each maintenance unit, company and above, must designate, in writing, a HW Coordinator. The units must comply with the ECAP protocol and will be periodically inspected. The units can attain the ECAP protocols from ED/DPW or by calling the Army Environmental Hotline at 1-800-USA-3845 or DSN 584-1699. Environmental awareness training should ensure that all personnel know to report any notice of tax, penalty, fee, fine, sanction, or other compliance order arising from local, state, or federal environmental requirements or enforcement activities. They will also report alleged violation of any local, state, or federal environmental law or regulation. These violations will be reported to the commander, environmental division or the environmental law attorney, Office of the Staff Judge Advocate.

ENVIRONMENTAL COMPLIANCE OFFICER/NCO

N-3. The HW coordinator may also serve as the environmental compliance officer/NCO. This person is the unit POC and is responsible for environmental education, SOP updates, preparation of environmental risk assessments, and incident reporting. Commanders, along with the HW coordinator and the environmental compliance officer/NCO, must—

- Ensure all unit personnel have had or are scheduled to receive environmental awareness training.
- Designate, in writing, an environmental compliance officer/HW coordinator and ensure they are properly trained and qualified.
- Ensure the unit environmental compliance officer interfaces with appropriate environmental personnel and that unit is in compliance with environmental laws and regulations.
- Meet with battalion S3, S4, and installation personnel who deal with environmental issues.
- Identify requirements concerning ECAP inspections that may affect the unit and how to avoid or protect environmentally sensitive areas.

- Ensure the unit SOP addresses environmental issues/procedures and coordinate environmental requirements with appropriate installation/chain of command personnel.

PLANNING

N-4. Advanced preparation is key to successful completion of missions and the same holds true for environmental awareness and protection. Environmental awareness can be incorporated into the unit training program with minimal additional planning. Most topics can be reviewed by contacting the ED, NRB, SJA, and/or Range Control. In most cases, ED and NRB are located under the DPW.

N-5. Figure N-1 is a general point of contact matrix to assist personnel with environmental concerns:

TOPIC	POINT OF CONTACT
Air pollution	Environmental Division
Archeological and historic sites	ED and NRB
Clean and safe water	ED
Legal Consideration	Environmental Law Attorney, OSJA
Hazardous material and waste	Directorate of Logistics, Defense Reutilization and Marketing Office, ED, and the fire department.
Noise pollution	ED, Range Control (Directorate of Plans, Training, and Mobilization)
Range clearances and restrictions	Range Control (DPTM)
Standing operating procedures	ED
Spill reporting	ED
Threatened/endangered species	NRB
Water pollution	ED
Wetland protection	NRB, Range Control
Wildlife management	NRB, Range Control

Figure N-1. Environmental POC Matrix

N-6. When overseas, refer to the U.S. agencies providing liaison with the equivalent of the above listed points of contact. If there is no host nation equivalent, all training and maintenance will be conducted under U.S. policies and requirements. Units should coordinate with these organizations to provide a briefing prior to deployments.

UNIT LEVEL ENVIRONMENTAL PROGRAMS

N-7. There may be several types of environmental programs at the unit level. TC 5-400 gives additional information about the following environmental programs:

- HM Programs.
- HW Programs.
- HAZCOM Programs.
- Pollution Prevention and HAZMIN Recycling Programs.
- Spill Prevention and Response Plan Programs.

Appendix O

Contractors

GENERAL

O-1. Contractors are being used to provide many types of CSS throughout the Army. As the Army transitions to Force XXI, the use of contractors is expected to increase. Contracting can increase existing capability, provide a new source of supplies and services, and bridge gaps in the deployed force structure. With this increased use of contractors comes the need to identify the doctrine, policies, and procedures affecting the use of civilian contractors.

TYPES OF CONTRACTORS

O-2. There are three types of contractors that may provide support to aviation maintenance units. These include system contractors, theater support contractors and external support contractors.

SYSTEMS CONTRACTORS

O-3. Systems contractors support deployed operational forces under pre-arranged contracts awarded by PM and the AMC. They support specific materiel systems throughout the system's life cycle during both peacetime and contingency operations. The systems include, but are not limited to, weapons systems, aircraft, C^2 infrastructure, and communications systems. Contracting officers working for the PMs and for the AMC subordinate commands administer their systems contractors' functions and operations via their contracts. AMC and the individual PMs maintain contracting authority for those contracts, planning required support for their systems, and coordinating that support with the supported CINC's planning staff. Systems contractors establish and maintain liaison with the PARC or senior Army contracting official in the theater as specified in the theater contracting support plan. These contractors procure goods and services they require within the theater according to the PARC's theater contracting plan, published in the OPLAN or OPORD.

THEATER SUPPORT CONTRACTORS

O-4. Theater support contractors support deployed operational forces under prearranged contracts or under contracts awarded within the mission area, by contracting officers serving under the direct contracting authority of the theater PARC. Theater support contractors provides goods, services, and minor construction, usually from the local vendor base, to meet the immediate needs of operational commanders. Immediate contracts involve deployed contracting officers procuring goods, services or minor construction, usually from local vendors or nearby offshore sources, immediately before or during the operation itself. Theater support contracting occurs according to the PARC's theater contracting plan, an appendix to the OPLAN or the OPORD, which governs all procurement of goods, services, and minor construction within the AO.

EXTERNAL SUPPORT CONTRACTORS

O-5. External support contractors provide support to deployed operational forces that is separate and distinct from either theater support or systems contractors. They may be prearranged contracts or contracts awarded during the contingency itself to support the mission. Contracting officers who award and administer external support contracts retain unique contracting authority deriving from organizations other than the theater PARC or systems offices under PMs or AMC. AMC, for example, provides commercial depot support through contracts by its commodity commands. Other organizations providing external support contractors include the LOGCAP program office, which, through LSEs, administers its prearranged umbrella contracts, commonly referred to as LOGCAP; USTRANSCOM commands, which provide CRAF and commercial sealift supporting a theater; and the Corps of Engineers, which procures leased real property and real estate. The LOGCAP program office's umbrella contract, activated only upon Army ODCSLOG approval, supports contingency operations and is administered through the in-theater LSE. These organizations retain contracting authority for those specific functions from their parent commands. Commanders and their staffs include these commands in their mission planning and should include support appendices in the applicable staff section annex to the OPLAN or OPORD. For example, the staff engineer coordinates Corps of Engineer procurement or real estate or real property. The Joint Force transportation planner coordinates with USTRANSCOM commands to monitor their assets. External support contractors establish and maintain liaison with the theater PARC as they conduct their unique support missions. They procure goods and services they require within theater according to the PARC's theater contracting plan, published in the OPLAN or OPORD.

ROLE OF CONTRACTORS

O-6. Contractors can provide augmentation support for CSS and CS functions in peacetime and on the battlefield. Some of those functions and the contracted support associated with them are maintenance support, transportation support, and supply and field services.

MAINTENANCE SUPPORT

O-7. System contractors perform sustainment maintenance on specified weapons systems, including subsystems. The contracts are usually awarded on a case-by-case basis and extend over long time periods encompassing both peacetime and wartime.

O-8. Contingency contractors may be used for limited support and usually in circumstances involving low levels of violence. These contracts, which are executed only during the contingency, normally focus on providing routine, general logistics support.

TRANSPORTATION SUPPORT

O-9. System contractors are generally not applicable except as part of a direct vendor delivery in peacetime. During operations, they will routinely deliver to the port of embarkation.

O-10. Contingency contractors may perform selected mode and terminal operation functions (for example, drivers and stevedores) to augment Army transportation units as METT-TC permits. Militarily significant water port operations routinely use contracted stevedore and long-shore capability.

SUPPLY AND FIELD SERVICES

O-11. System contractors can perform item management, stockage, and direct delivery for selected system specific components. They may also provide management, stockage, and delivery for specific ammunition items. They will normally manage high value munitions and munitions requiring close control or relatively high levels of continuous maintenance or security.

O-12. Contingency contractors can, as determined by METT-TC, provide field services such as laundry, bath, and clothing repair to augment quartermaster units. They routinely provide base operations-type support to deployed military forces in austere AO. They can also provide technical expertise and assistance for supply, maintenance, surveillance, utilities, demilitarization, transportation, safety and accountability of munitions and hazardous materials.

CONTRACT STATEMENT OF WORK

O-13. Contractor roles and functional requirements, as well as security issues and the relationship to the military chain of command, must be accurately and adequately defined in the SOW.

APACHE PRIME VENDOR SUPPORT

O-14. Apache PVS is a pilot program for contractor support of Apache helicopters during peacetime, contingencies, and war. The concept is to use one civilian contractor (prime vendor) to enhance maintenance and supply functions for Apache helicopters. The contractor support includes an Apache Field Support Team consisting of technical specialists for maintenance support of the Apache and support operations specialists to assist in streamlining the logistics support and acquisition processes to the unit.

MAINTENANCE

O-15. Apache PVS will be used to enhance the maintenance capabilities within the AVUM and AVIM companies—more of a two-level maintenance system approach. This will be accomplished by the AVUM/AVIM companies retaining their maintenance support responsibilities and using contractor technical specialists (airframe, mission equipment, engine) to provide maintenance support directly to the Apache battalions. These specialists will have the capability to perform some tasks that are currently depot level and to perform diagnostic and fault isolation procedures. The ability to perform limited on-site depot level repairs (such as engine and structural repairs) will reduce downtime. The additional ability to perform diagnostics and fault isolation will reduce the amount of serviceable parts being replaced, saving both time and money.

O-16. Other support to the AVUM/AVIM companies will include technical assistance and factory liaison. The use of new technologies and better maintenance practices will enhance the capabilities of Army maintainers. The contractor specialists will provide the units with direct access to the factory (prime vendor) for technical assistance. Having on-site factory representatives will also improve coordination of new aircraft and/or systems configurations and retrofit.

SUPPLY

O-17. Apache PVS will greatly enhance the supply support to the AVUM/AVIM companies. The AVUM companies will retain their PLL and the AVIM will continue to retain their responsibilities for the SSA.

O-18. The contractors will provide support operations specialists that interface with the AVIM SSA. This will be accomplished by having the contractors open a supply support RX window behind the SSA. The contractors will provide total asset visibility, intransit visibility, guaranteed order-to-ship time, process AOG parts requests, provide LRUs, and provide direct support to the AVIM SSA.

CONTRACT MAINTENANCE RESPONSIBILITY

O-19. Contractors for aviation maintenance will provide maintenance/supply support to AVUM/AVIM units as per the contract. Contracts for aviation maintenance should be written with the following principles and considerations:

- Contractors will be deployable under all operational scenarios. They will be subject to the same time-phased force deployment data requirements as deploying military units.
- The contractor information system will interface with the Standard Army Management Information System at both retail and wholesale levels. Army units should not have to contend with two separate information systems.
- The contractors will be located with the AVIM company during peacetime. During deployments, the commander (subject to contract terms and conditions) will determine where contractors operate in the AO. The contractors will provide support forward to the AVUM companies as needed.
- The contractors will not replace force structure. They will augment Army capabilities and provide an additional option for meeting support requirements.
- Force protection, including protecting contractors, is the responsibility of commanders.
- Contracted support must be integrated into the overall support plan. Movement of parts from the POE to the AO and transportation of contractors on the battlefield must be planned.
- C^2 of contract personnel is dependent upon terms and conditions of the contract. The contracting officer or his designated representative is the appointed liaison for monitoring contractor performance requirements and will ensure that contractors move material and personnel according to the combatant commander's plan. Because international and domestic law, to include status of forces agreements, affect the relationship between commanders and contract personnel, commanders and contracting officers should seek legal advice concerning issues arising during operations.
- There must be a contractor personnel reporting and accountability system in place. The theater commander may direct the accountability of personnel be accomplished by the logistics support element.
- During deployments, contractors will live and work in field conditions comparable to those for the supported Army forces. Living arrangements, transportation requirements, food, medical, and other support services will be provided according to the contract.

PUBLICATIONS

O-20. The Army is developing policies and procedures for the use of contractors during peacetime and on the battlefield. More information on the role, deployment, C^2, location

on the battlefield, security, and other issues pertaining to contractors can be found in the following publications:

- AR 700-137.
- AR 715-9.
- DA Pam 690-47.
- DA Pam 715-16.
- DODI 3020.37.
- FM 63-11.
- FM 100-21.
- FM 100-5.
- FM 100-10.
- FM 100-10-2.
- DA Policy Memorandum, Subject: Contractors on the Battlefield. 12 Dec 97.
- TRADOC Pam 525-53.

Glossary

A^2	Army airspace
A^2C^2	Army airspace command and control
AA	assembly area
AB	Aviation Brigade
ABF	availability balance file
ACC	Air Combat Command
ACFT	aircraft
ACL	Army Calibration Laboratories
ACofS	Assistant Chief Of Staff
ACR	armored cavalry regiment
ACRC	Army Calibration And Repair Center
ACT	air cavalry troop
ADLO	air defense liaison officer
ADMIN	administrative
ADMRU	aviation depot maintenance round-out unit
ADP	automatic data processing
ADPC	automatic data processing center
AFB	Air Force Base
AFMP	auxiliary fuel management pane
AFTO	Air Force technical order
AG	Adjutant General
AGPU	auxiliary ground power unit
AGSE	aviation ground support equipment
AH	attack helicopter
AHB	assault helicopter battalion
AHC	attack helicopter company
AIS	automated information system
AIT	automated identification technology
AIMI	aviation intensive management items
AL	annual leave

ALO	air liaison officer
ALOC	air lines of communication
ALSE	aviaiton life support equipment
AM	amplitude modulated
AM-SSB	amplitude modification-single sideband
AMB	aviation maintenance battalion
AMC	Army Materiel Command
AMCO	aviation maintenance company
AMCOM	United States Army Aviation and Missile Command
AMCP	aircraft maintenance collection point
AMDF	Army master data file
ammo	ammunition
AMSS	Army materiel status system
AM-SSB	amplitude modulated-single sideband
AMO	aviation maintenance officer
ANMCS	anticipated not mission-capable, supply
AO	area of operation
AOAP	Army oil analysis program
AOG	aircraft-on-ground
AP	antipersonnel
APP	appendix
API	armor-piercing incendiary
APOE	aerial port of embarkation
APU	auxiliary power unit
AR	Army Regulation
ARC	accounting requirements code
ARMT	armament
ARMS	Army Master File Retrieval Microform System
ARNG	Army National Guard
ASAM	aviation safety action messages
ASE	aircraft survivability equipment
ASF	Army stock fund
ASG	area support group
ASL	authorized stockage list

ASMP	Army strategic mobility program
ASP	ammunition supply point
ASR	alternate supply route
ASSESSOR	A trained maintenance technician whose function it is to assess aircraft battle damage.
asst	assistant
AT	antitank
ATAS	Air-To-Air Stinger
ATHS	airborne target hand-over system
ATKHB	attack helicopter battalion
ATKHC	attack helicopter company
ATKHR	attack helicopter regiment
ATP	Army training program
ATS	air traffic services
ATST	area TMDE support team
ATTN	attention
AUTMV	automotive
AVCRAD	aviation classification repair activity depot
AVIM	aviation intermediate maintenance
AVN	aviation
AVUM	aviation unit maintenance
AWOL	absent without leave
AX	ancilliary
AZ	azimuth
BAMO	brigade aviation maintenance officer
BATTLE-	The process used to determine if repair of a battle-damaged
DAMAGE	aircraft or system can be safely deferred either for a onetime
ASSESSMENT	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

BIIL	basic issue item list
BITE	built-in test equipment
BLAST	blocked asynchronous transmission (software protocol)
BLDG	building
BMO	battalion movement officer
BN	battalion
BR	branch
BSA	brigade support area
C	chief
C^2	command and control
C^3	command, control, and communications
C^3I	command, control, communications, and intelligence
C^4	command, control, communications and computers
CAB	combat aviation battalion
CAC	combat aviation company
CAGE	commercial and government entity (code)
CAISI	combat service support automated information system interface
C&RS	calibration and repair support
CSA	corps support area
CAV	cavalry
C/B	center of balance
CBR	chemical, biological, radiological
CBT	combat
CBU	calibrate before use
CCAD	Corpus Christi Army Depot
CD	compact disk
CDR	commander
CD-ROM	compact disk-read only memory
CE	communications-electronics
CEB	clothing exchange and bath
CEO	communications-electronics officer
CESO	communications-electronics security officer
CG	center of gravity
CH	cargo helicopter

CHAPS	climatic heat aircraft protective system
CINC	commander in chief
CIV	civilian
CL	checklist
CMD	command
CML	chemical
CMMC	corps materiel management center
CMMI	command maintenance management inspection
CMOC	civil-military operations center
CNR	calibration not required
CofS	chief of staff
CO	company or commanding officer
CO_2	carbon dioxide
COA	course of action
COMM	communication
COMMZ	communications zone
COMSEC	communications security
CON	control
CONSOL	consolidate
CONUS	Continental United States
COOP	continuity of operations plan
COSCOM	corps support command
CP	command post
CPC	corrosion-preventive control
CPE	combat periodic inspection
CPM	combat phase maintenance
CPR	cardiopulmonary resuscitation
CPT	Captain
CRAF	civil reserve air fleet
CRC	calibration and repair center
CRP	central receiving point
C&RS	calibration and repair support
CS	combat support
CSAR	combat search and rescue

CSB	corps support battalion
CSG	combat service group
CSM	command sergeant major
CSS	combat service support
CSSCS	combat service support control system
CY	calendar year
DA	Department of the Army
DAMMS-R	Department of the Army Movement Management System-Redesign
DAO	division ammunition officer
DA PAM	Department of the Army Pamphlet
DART	downed aircraft recovery teams
DASB	division aviation support battalion
DCSLOG	Deputy Chief of Staff for Logistics
DCSOPS	Deputy Chief of Staff for Operations and Plans
DDN TAC	defense data network terminal access controller
DET	detachment
DEW	directed-energy weapon
DIR	director(ate)
DISCOM	division support command
DIV	division
DLIS	defense logistics information services
DLR	depot-level repairable
DMC	distribution management center
DMMC	division materiel management center
DMMO	division materiel management officer
DMRD	defense management review decision
DOD	Department of Defense
DODAAC	Department of Defense activity address code
DOL	Directorate of Logistics
DOS	days of supply
DPTM	Directorate of Plans, Training, and Mobilization
DPW	Directorate of Public Works
DRF	division ready force

DRMO	Defense Reutilization and Marketing Office
DS	direct support
DSA	division support area
DSC	distribution of stockage code
DSU	direct support unit
EA	engagement area
EAC	echelons above corps
EAPS	engine air particle separation
EC	essentiality code
ECAP	environmental compliance achievement program
ECAS	enhanced cobra armament system
ECC	equipment category code
ECOD	estimated cost of damage
ED	environmental division
EIC	end item code
EIR	equipment improvement recommendation
ELM	element
EM	end users manual
EMP	electromagnetic pulse
ENCOM	engineer command
ENGR	engineer
EOM	end of mission
ERFS	extended range fuel system
ESSS	external stores support system
EW	electronic warfare
F-level	owner/user level
FAA	Federal Aviation Administration
FAD	force activity designator
FARP	forward arming and refueling point
FAW	forward axil weight
FC	fire control
FEDLOG	Federal Logistics
FHP	flying hour program
FIFO	first in, first out

fld	field
FLOT	forward line of own troops
FLT	flight
FM	field manual or frequency modulated
FMC	fully mission-capable
FOD	foreign object damage
FORSCOM	Forces Command
FRAGO	fragmentary order
FROG	free rocket over ground
FRT	freight
FSB	forward support battalion
FSC	federal supply classification
FSE	fire support element
FSO	fire support officer
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)
GCSS-ARMY	global combat support system-Army
GEN	general
GND	ground
GP	group
GPS	global positioning system
GS	general support
GSE	ground support equipment
GUI	graphic user interface
GWT	gross weight
HAZCOM	hazardous communications
HAZMIM	hazard minimization
HDRS	heavy drop rigging site
HEL	helicopter
HELLFIRE	heliborne fire and forget missile system

HF	high frequency
HHB	Headquarters and Headquarters Battalion
HHC	Headquarters and Headquarters Company
HHD	Headquarters and Headquarters Detachment
HHT	Headquarters and Headquarters Troop
HICHS	helicopter internal cargo-handling system
HIT	health indicator test
HM	hazardous material
HNS	host nation support
HOS	helicopter oxygen system
HOSP	hospital
HQ	Headquarters
HR	hour
HSC	headquarters and supply company
HSS	horizontal store support
HW	hazardous waste
IAIC	immediate action interim change
I&S	interchangeability and substitutability
ICRC	installation calibration and repair center
ICS	intercommunications system
ICS3	integrated combat service support system
ID	identification
IOC	Industrial Operations Command
IDSM	integrated direct support maintenance
IEW	intelligence and electronic warfare
IFR	instrument flight rules
IHFR	improved high-frequency radio
IL	identification list
ILAP	integrated logistics analysis program
IMMO	installation materiel maintenance officer
IMRF	instrument master record file
INTEL	intelligence
IPS	inlet particle separation
IR	infrared

IVIS	intervehicular information system
JP	joint publication
JRTC	Joint Readiness Training Center
JTA	joint table of authorization/allowances
KM	kilometers
KO	contracting officer
KVDT	keyboard video display terminal
LAMS	large area maintenance shelter
LAN	local area network
LAO	logistics assistance office
LAP	logistics assistance program
LASSO	logistics automation systems support office
LCF	legitimate code file
LIN	line item number
LM	logic module
LNO	liaison officer
LO	lubrication order
LOC	line(s) of communication
LOG	logistics
LOGCAP	logistics civil augmentation program
LOGSA	logistics support activity
LRSD	long-range surveillance detachment
LRU	line replacement unit
LSE	logistics support element
MAC	maintenance allocation chart
MACE	mobilization AVCRAD control element
MACOM	Major Army Command
MAINT	maintenance
MAIT	maintenance assistance and instruction team
MARKS	modern Army recordkeeping system
MAT	materiel
MATCAT	materiel category
MCN	management control number
MCO	movement control officer

MCP	maintenance collection point
MCS	maintenance control system
MCSR	materiel condition status report
MDS	mission, design, and series
MED	medical
MEDCOM	Medical Command
METT-TC	mission, enemy, terrain, troops, time available, and civilian considerations
MGT	management
MI	military intelligence
MIL	military
mm	millimeter
MMC	materiel management center
MMDF	maintenance master data file
MOOTW	military operations other than war
MOC	maintenance operational check
MOPP	mission-oriented protection posture
MOS	military occupational specialty
MP	military police
MPN	MSE packet network
MRE	meals ready to eat
MRM	maintenance reporting and management
MRO	materiel release order
MSE	mobile subscriber equipment
MSB	main support battalion
MSDS	materiel safety data sheets
MSL	missile
MSR	main supply route
MSS	missile sight subsystem
MST	maintenance support team
MTDA	modification table of distribution and allowances
MTF	maintenance test flight
MTOE	modification table of organization and equipment
MTW	major theater of war

MWO	modification work order
NAMP	night aircraft maintenance program
NATO	North Atlantic Treaty Organization
NAVAID	navigation aid
NBC	nuclear, biological, chemical
NCO	noncommissioned officer
NCOIC	noncommissioned officer in charge
NCS	net control station
NDI	nondevelopmental item
NDT	nondestructive testing
NEC®	national electrical code
NET	new equipment training
NFC	national fire code
NFPA	National Fire Protection Association
NG	National Guard
NICAD	nickel cadmium
NICP	national inventory control point
NIIN	national item identification number
NIST	National Institute of Standards and Technology
NMC	not mission-capable
NMCE	not mission-capable, equipment
NMCM	not mission-capable, maintenance
NMCS	not mission-capable, supply
NPT	nonproductive time
NRB	natural resources branch
NRI	net radio interface
NSN	national stock number
NTC	National Training Center
OCM	on-condition maintenance
OCONUS	Outside Continental United States
ODCSLOG	Office of the Deputy Chief of Staff for Logistics
OFC	office
OFF	officer
OH	observation helicopter

OIC	officer in charge
OP	operator
OPS	operations
OPLAN	operation plan
OPORD	operation order
OPSEC	operations security
OPTEMPO	operational tempo
OR	operational readiness
ORF	operational readiness float
OSC	objective supply capability
OSHA	Occupational Safety And Health Administration
OSJA	Office of the Staff Judge Advocate
OST	order to ship time
OT	overtime
OVE	organizational vehicle equipment
P-level	primary level
PAD	patient administration and distribution
PAM	pamphlet
PARC	principal assistant responsible for contracting
PB	property book
PBO	property book officer
PC	production control
PCE	protective clothing and equipment
PE	periodic
PERS	personnel (U.S. Army)
PERSCOM	Personnel Command
PET	petroleum
PLL	prescribed load list
PLT	platoon
PM	phase maintenance
PMC	partially mission capable
PMCS	preventive maintenance checks and services
PMD	preventive maintenance daily
PMS	preventive maintenance services

POD	port of debarkation
POE	port of embarkation
POL	petroleum, oils, and lubricants
pos	position
PPM	progressive phase maintenance
PQDR	product quality deficiency report
PRAM	preliminary report of aircraft mishap
PT	productive time
PVS	prime vendor support
QC	quality control
QSS	quick supply store
QTR	quarters
RAP	rear area protection
RACO	rear area combat operations
RAS	regimental aviation squadron
RAW	rear axel weight
RCC	rescue coordination center
RCF	repair cycle float
REC	radioelectronic combat
RECON	reconnaissance
recov	recovery
reg	regular
rep	repair
retrans	retransmit
RF	radio frequency
RML	revolution in military logistics
RO	requisitioning objective
ROP	reorder point
RPM	revolutions per minute
RPT	report
RX	repairable exchange
S-level	secondary level
S1	adjutant
S2	intelligence officer

S3	operations and training officer
S4	supply officer
S&S	supply and service
SAAS	Standard Army Ammunition System
SAILS	Standard Army Intermediate Level Supply System
SAMS	Standard Army Maintenance System
SAMS–1	Standard Army Maintenance System-Level 1
SAMS–2	Standard Army Maintenance System-Level 2
SARSS	Standard Army Retail Supply System
SARSS-1	Standard Army Retail Supply System-Level 1
SARSS-2AC/B	Standard Army Retail Supply System-Level 2AC/B
SARSS-2AD	Standard Army Retail Supply System-Level 2AD
SARSS-O	Standard Army Retail Supply System-Objective
SB	supply bulletin
SCA	supply control activity
SDI	SAGE database inquiry
SEC	section
SEN	small extension node
SFDLR	stock funding of depot-level repairable
SGT	sergeant
SIG	signal
SJA	Staff Judge Advocate
SL	sick leave
SLC	stockage list code
SOF	safety of flight
SOP	standing operating procedures
SOS	source of supply
SOW	statement of work
SPBS–R	standard property book system-revised
SPO	security, plans, and operations
SPOE	seaport of embarkation
SPT	support
SQDN	squadron
SRBM	short-range ballistic missile

SSA	supply support activity
SSL	shop stock list
SSSC	self-service supply center
STACOMP	standard computer
STAMIS	Standard Army Management Information System
STANAG	standardization agreement
STARPUBS	standard Army publications system
SUBS	subsistence
SUP	supply
SUPV	supervisor
SURG	surgeon
SVC	service
SWBD	switchboard
SYS	system
T-level	transfer level
TA	theater army
TAA	tactical assembly area
TACCS	tactical Army combat service support computer system
TACSAT	tactical satellite
TAMMS	The Army Maintenance Management System
TAMMS-A	The Army Maintenance Management System-Aviation
TAMP	theater aviation maintenance program
TASO	terminal area security officer
TB	technical bulletin
TBO	time between overhaul
TDA	table of distribution and allowances
TDY	temporary duty
TEAC	turbine engine analysis check
TECH	technical
TF	task force
TI	technical inspector
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 of organization and equipment
TOW	tube-launched, optically tracked, wire-guided
TPFDD	time-phased force deployment data requirements
TRADOC	Training and Doctrine Command
TRANS	transportation
TRP	troop
TS	technical supply
TSO	TMDE support office
TSC	theater support command
TSC MMC	Theater Support Command Materiel Management Center
TTA	tactical terminal adapter
TWX	teletypewriter exchange
UH	utility helicopter
UIC	unit identification code
ULLS	Unit-Level Logistics System
ULLS-A	Unit-Level Logistics System-Aviation
ULLS-G	Unit-Level Logistics System-Ground
ULLS-S4	Unit-Level Logistics System-S4
UMNIPS	Uniform Materiel Movement and Issue Priority System
UND	urgency of need
U.S.	United States
USAAMC	United States Army Aeromedical Center
USAAVNC	United States Army Aviation Center
USAMC	United States Army Materiel Command
USAPSL	United States Army Primary Standards Laboratory
USASC	United States Army Safety Center
USATA	United States Army TMDE Activity
USP&FO	United States Property and Fiscal Officer
USR	unit status report
USTRANSCOM	United States Transportation Command
UTM	universal transverse mercator
VSP	vertical stores pylon

WARCO	warranty control office
WO	Warrant Officer
WPN	weapon
WSRO	weapons system replacement operations
WVEH	wheeled vehicle
WX	weather
XMSN	transmission
XO	Executive Officer

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Index

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By Order of the Secretary of the Army:

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