
Maintenance Operations

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Preface

ATP 4-33, *Maintenance Operations*, describes operational Army maintenance operations and focuses on the conduct of maintenance operations at the operational and tactical-level. Its primary focus is on maintenance organizations and their missions, but also addresses the roles and functions of strategic level maintenance organizations that provide logistics and individual Soldier support services.

The principal audience for ATP 4-33 is all members of the profession of arms. Commanders and staffs of Army headquarters serving as joint task force or multinational headquarters should also refer to applicable joint or multinational doctrine concerning the range of military operations and joint or multinational forces. Trainers and educators throughout the Army will also use this publication.

Commanders, staffs, and subordinates ensure that their decisions and actions comply with applicable United States, international, and in some cases host-nation laws and regulations. Commanders at all levels ensure that their Soldiers operate in accordance with the law of war and the rules of engagement. (See FM 27-10, *The Law of Land Warfare* and Department of Defense *Law of War Manual*.)

ATP 4-33 uses joint terms where applicable. Selected joint and Army terms and definitions appear in both the glossary and the text. Terms for which ATP 4-33 is the proponent publication (the authority) are italicized in the text and are marked with an asterisk (*) in the glossary. Terms and definitions for which ATP 4-33 is the proponent publication are boldfaced in the text. For other definitions shown in the text, the term is italicized and the number of the proponent publication follows the definition.

ATP 4-33 applies to the Active Army, Army National Guard/Army National Guard of the United States and United States Army Reserve unless otherwise stated.

The proponent of ATP 4-33 is the United States Army Combined Arms Support Command. The preparing agency is the Combined Arms Support Command, Training Support and Doctrine. Send comments and recommendations on a Department of the Army Form 2028 (*Recommended Changes to Publications and Blank Forms*) to Commander, United States Army Combined Arms Support Command, ATTN: ATCL-TS (ATP 4-33), 2221 Adams Ave, Building 5020, Fort Lee, VA, 23801-1809; or submit an electronic DA Form 2028 (*Recommended Changes to Publications and Blank Forms*), by e-mail to: usarmy.lee.tradoc.mbx.leecc-cascom-doctrine@mail.mil

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Introduction

The United States Army is organized, trained, and equipped to be the most decisive land force in the world. Army forces are employed within a strategic context and conduct decisive sustainable land operations through the simultaneous combination of offensive, defensive, and stability or defense support of civil authorities tasks. The Army developed two-level maintenance doctrine to support this type of warfare.

In supporting the Army, the primary goal of two-level maintenance is to generate/regenerate combat power and to preserve the capital investment of weapon systems and equipment to enable mission readiness and accomplishment. The commander who combines the skillful use of assigned equipment with an effective maintenance management processes has a decided advantage.

The purpose of this ATP is to provide a clear description of the two-level maintenance structure and base operating requirements enabling commanders to provide flexible maintenance support to meet operational objectives.

Our Soldiers are trained to perform field-level maintenance. Leaders have to provide time on the training schedule for them to build their skills. Training is the cornerstone to a successful unit support mission by ensuring that ready equipment is available for operations.

With all this in mind, leaders must ensure that personnel utilize adequate safety precautions and personal protective equipment in every operation—our Soldiers are our greatest asset.

ATP 4-33 has numerous changes from the previous ATP 4-33. The most significant changes are an enhanced discussion on two-level maintenance, updates on other maintenance formations, and an enhanced discussion of Global Combat Support System-Army (GCSS-Army).

Chapter 1, *Maintenance Fundamentals*, discusses the role of the Army maintenance system as combat multiplier by generate/regenerate combat power, and by preserving the capital investment of weapon systems and equipment to enable mission accomplishment. Provides an overview of maintenance support to Large Scale Combat Operations.

Chapter 2, *Maintenance Organizations*, discusses the different types of maintenance organizations, the makeup, and responsibilities of each organization. The chapter explains the Army's current force organizations, and the logistics structure that provides unity of command from the strategic to the tactical level.

Chapter 3, *Maintenance Planning Considerations*, discusses the nature and conduct of maintenance-related activities that depend on the operational environment associated with either contiguous or non-contiguous battlefield. The chapter also discusses recovery operations, Battle Damage Assessment and Repair, and retrograde and reconstitution operations.

Chapter 4, *Maintenance Management*, describes the maintenance management process, levels of management, maintenance control, internal management procedures, and quality assurance and quality control for maintenance operations.

Chapter 5, *Repair Parts Supply Operations*, discusses supply support operations; maintenance relates stocks; and repair parts management.

Chapter 6, *Test, Measurement and Diagnostic Equipment Calibration and Repair Support*, discusses the objectives, structure and employment of calibration and repair of test, measurement and diagnostic equipment.

Chapter 7, *Other Maintenance Activities*, this chapter discusses the requirements for communications and electronics; missile system; Army watercraft; Army aviation; and medical maintenance. The chapter identifies how these organizations are structured and discusses the capabilities they provide to the commander.

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Chapter 1

Maintenance Fundamentals

Army maintenance primary purpose is to ensure unit readiness by maintaining weapon systems and equipment in a fully mission-capable status for immediate and continuous employment in complex and highly lethal environments. Army maintenance organizations are increasingly required to anticipate, analyze, adapt, and tailor available resources for effective and timely support of operations. Success in these types of operations and environments continues to be based on the bottom-line measurements of maintainability, reliability, and availability.

- Maintainability - The ability of an item to be retained in, or restored to a specified condition when personnel having specified skill levels, using prescribed procedures and resources, at each prescribed level of maintenance and repair, perform maintenance.
- Reliability - The probability of an item to perform a required function under stated conditions for a specified period.
- Availability - The degree to which an item is in an operable state and can be committed at the start of a mission.

Effective planning requires maintenance managers to embrace change and to exercise leadership, initiative, and flexibility. This chapter provides an overview of maintenance fundamentals and sets the foundation for the rest of this publication.

MAINTENANCE SYSTEM OVERVIEW

1-1. Maintenance is a commander's responsibility. The purpose of the Army maintenance system is to ensure unit readiness. *Readiness* is the ability of military forces to fight and meet the demands of assigned missions. (JP 1). Maintenance operations also generate or regenerate combat power to enable mission accomplishment and preserve the capital investment of weapon systems and equipment. Army maintenance is founded on the principle that the useful service life of Army equipment is achieved when the item is—

- Operated within its intended purposes and parameters.
- Maintained in accordance with the appropriate technical manuals (TM) and the Army regulations to the designed or engineered specifications.

1-2. The nature of the modern battlefield, with units engaged across the range of military operations, demands a maintenance system that is capable, flexible, responsive, and focused on returning systems to an operational status quickly and as near as possible to the point of failure or damage. This requirement implies a forward presence of maintenance capability on the battlefield. Maintenance assets must move as far forward as the tactical situation permits to return inoperable and damaged equipment to the battle as quickly as possible. Maintenance conducted as far forward as possible is a combat multiplier central to operational success. That success is determined by how quickly equipment can be returned to a fully mission-capable status or to a state that allows mission accomplishment. *Fully mission capable* is defined as: systems and equipment that are safe and have all mission-essential subsystems installed and operating as designated by applicable Army regulation. A fully mission capable vehicle or system has no faults that are listed in the “not fully mission-capable ready if” columns of the TM/ETM XX-10 and XX-20 series preventative maintenance checks and services tables and AR 385-10, *The Army Safety Program* provisions that apply to the vehicle and/or system or its sub-system required by AR 700-138, *Army Logistics Readiness and Sustainability*. (AR 750-1). The equipment must perform all tactical and combat missions safely and without endangering the life of the operator or the crew. Maintainers must accomplish this work while also ensuring maximum equipment reliability and availability.

1-3. Once units enter combat operations, maintenance is critical to maintain combat power and momentum. Replacement weapon systems and equipment may not be immediately available. This is especially true during the early stages of an operation before a supply distribution system is fully developed. This places a greater importance on effective maintenance operations. Units must keep existing systems fully mission-capable for the duration of the operation or until the system is clearly damaged beyond field-level maintenance repair capability.

1-4. Although the Army maintenance structure is smaller than in the past, it is highly capable, adaptable, and flexible if properly understood and utilized. The Army streamlined and designed the maintenance system to be fast, agile, and responsive to the needs of the commander.

1-5. The brigade combat team (BCT) is the Army's primary combined arms, close combat force. BCTs often operate as part of a division or joint task force. BCTs possess the required capability to conduct field maintenance on all organic combat systems and equipment without reliance on outside maintenance capability. Maintenance support provided by the field maintenance company (FMC) and the forward support companies is habitual which fosters effective maintenance support. BCT commanders and staffs must understand the brigade's maintenance capability and plan for the most effective use of it to ensure operational success. The BCT commander should empower their brigade support battalion (BSB) commander to cross level maintenance assets in order to array them across the battlefield to best support operations.

Note: Within the BCT, in most cases, there is no maintenance capability for repair of main battle tanks, infantry and cavalry fighting vehicles, self-propelled artillery or Stryker vehicles above the forward support company.

1-6. At echelons above brigade (EAB), maintenance support is not habitual, as in the BCT, and planning for it can be more complex. At EAB, support maintenance companies (SMC) provide maintenance capability. Army planners tailor the number of SMCs available to meet the needs of the supported forces. The SMC provides field-level maintenance for all units at EAB. The SMC also provides support on an area basis, which can result in unpredictable support requirements that stress the existing capability. These factors are indicative of why EAB maintenance requires detailed planning and assignment of clear support relationships.

1-7. Units with an effective garrison maintenance program that includes leader involvement enter decisive action operations with multiple advantages. Foremost is fully mission capable, operational equipment that is immediately available to execute missions. The unit will possess engaged leaders with an understanding of maintenance procedures and requirements. Other advantages include well-developed maintenance procedures and well-trained mechanics, operators, and crews.

1-8. Army maintenance processes and procedures rely on commanders to achieve the maintenance mission and a high state of materiel readiness by—

- Emphasize command responsibility for the readiness and safety of assigned equipment.
- Hold subordinate leaders accountable for maintenance execution and equipment readiness.
- Achieve and sustain the Army maintenance standard for assigned and attached equipment.
- Preserve the inherent reliability of equipment through preventive maintenance checks and services (PMCS), predictive-maintenance techniques, diagnostics, and condition based maintenance. These maintenance tools will allow the operator and the Ordnance school trained maintainer to identify faults, take action on the maintenance faults, and provide updated status to leadership.
- Ensure that all assigned equipment is maintained in accordance with appropriate TMs and AR 750-1, *Army Materiel Maintenance Policy*.
- Provide resources, assign responsibility, and train their Soldiers to achieve maintenance standards.
- Ensure expeditious return of non-mission-capable equipment back to operational status.
- Ensure proper manpower utilization of assigned maintainers.

MAINTENANCE FUNDAMENTALS

1-9. The seven functions of maintenance include—

- **Planning-** Maintenance planning is integrated into all operations through the military decisionmaking process (MDMP) to ensure synchronization and unity of effort. Planning includes identifying requirements, reviewing available assets, preparing a maintenance estimate, comparing requirements to capabilities, and making adjustments to maintenance priorities to meet the mission requirement.
- **Reporting-** Maintenance readiness reporting enables maintenance leaders at all levels to view their own status as well as their subordinates' maintenance status. This is critical to maintenance requirements determination.
- **Services-**Services include all actions necessary for retaining an item in or restoring it to a specified condition. Services encompass periodic services, safety directed services, and PMCS.
- **Repair-** Maintenance personnel restore equipment to the highest status within their scope. Repair encompasses fault identification, verification, parts management, replacement, fabrication, repairable management, and battle damage assessment and repair (BDAR).
- **Recovery-** The actions taken to retrieve, or free immobile, inoperative, materiel from the point where it was disabled or abandoned.
- **Evacuation-** The movement of equipment to a maintenance site or from one maintenance site to another based on mission variables or a change in maintenance level.
- **Disposition-** Systematically removing materiel that is uneconomical to repair damaged beyond repair or obsolete.

MAINTENANCE PROCESS

1-10. The Army relies on four core maintenance processes to manage equipment during the course of its service life to achieve a high state of readiness. AR 750-1 discusses each of these processes in detail. These core processes are—

- Performance observation encompasses preventive maintenance checks and services required by equipment specific TMs in the before, during, and after operation preventive maintenance checks and services.
- Equipment services are maintenance actions performed in accordance with the original equipment manufacturer and engineer specifications. These prescribed maintenance actions include routine checks, adjustments, changes, analysis, and lubrication to equipment, components, or systems when specified.
- Crew or operators and maintenance personnel use fault repair to restore equipment to the original designed or engineered functionality. Faults include deficiencies and shortcomings.
- Single-standard repair ensures the application of a single repair standard to all end items, secondary items, and components repaired. This establishes a predictable service life and assures the quality of items returned to the supply inventory.

1-11. Maintenance managers at all levels typically use sustainment information systems to collect, store, and analyze maintenance information. Global Combat Support System-Army (GCSS-Army) is one of the primary sustainment information systems. Units and planners must also be prepared to execute the maintenance mission in the absence of connectivity.

1-12. Maintenance managers anticipate maintenance requirements by utilizing effective communication; analyzing and tracking maintenance reporting; and monitoring and evaluating equipment performance. Using MDMP they develop and execute maintenance plans that are an integral part of the unit's mission. Commanders who understand, properly direct, and implement the maintenance management processes have a decided combat advantage when they pair it with the skillful use of assigned equipment.

STRATEGIC ROLES AND MAINTENANCE

1-13. The Army's primary mission is to organize, train, and equip its forces to conduct prompt and sustained land combat to defeat enemy ground forces and seize, occupy, and defend land areas. Winning is the achievement of the purpose of an operation and the fulfillment of its objectives.

1-14. The Army supports the joint force in four strategic roles: shape operational environments, prevent conflict, prevail in large-scale ground combat, and consolidate gains. The Army wins when it successfully performs these roles during operations and meets all of its objectives. It must effectively shape an operational environment (OE) for combatant commanders by responding rapidly with enough combat power to prevent war through deterrence during crisis. When required to fight, the Army's ability to prevail in large-scale ground combat becomes a decisive factor in breaking the enemy's will to continue fighting. The Army wins when an enemy is defeated to such a degree that it can no longer effectively resist, and it agrees to cease hostilities on U.S. terms. To ensure that the military results of combat are not temporary, the Army follows through with its unique scope and scale of capabilities to consolidate gains and win enduring outcomes favorable to United States (U.S.) interests. Figure 1-1 shows the Army's strategic roles in a general relationship to the joint phasing model.

1-15. Maintenance plays a key role across all four strategic roles. Regardless of whether Soldiers perform maintenance during home station training, combat training center rotations, or during large-scale combat, effective maintenance enhances readiness. Readiness directly correlates to combat power. Combat power is reflected in the assets commanders are able to employ to accomplish the mission.

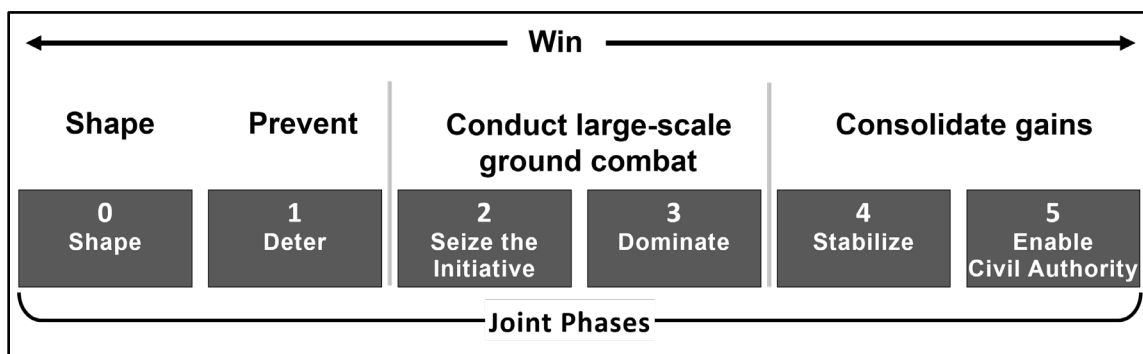


Figure 1-1. Strategic roles

MAINTENANCE SUPPORT TO OPERATIONS TO SHAPE

1-16. Operations to shape consist of various long-term military engagements, security cooperation, and deterrence missions, tasks, and actions intended to assure friends, build partner capacity and capability, and promote regional stability. Operations to shape typically occur in support of the geographic combatant commander's (GCC's) theater campaign plan or the theater security cooperation plan. These operations help counter actions by adversaries that challenge the stability of a nation or region contrary to U.S. interests.

1-17. Army operations to shape bring together all the activities intended to promote regional stability and to set conditions for a favorable outcome in the event of a military confrontation. Army operations to shape help dissuade adversary activities designed to achieve regional goals short of military conflict. As part of operations to shape, the Army provides trained and ready forces to GCCs in support of their theater campaign plan. The theater Army and subordinate Army forces assist the GCC in building partner capacity and capability and promoting stability across an area of responsibility. Army operations to shape are continuous throughout a GCC's area of responsibility and occur before, during, and after a joint operation within a specific operational area.

1-18. Shaping activities include security cooperation and forward presence to promote U.S. interests, developing allied and friendly military capabilities for self-defense and multinational operations, and providing U.S. forces with peacetime and contingency access to a host nation. Regionally aligned and engaged Army forces are essential to achieving objectives to strengthen the global network of multinational partners and preventing conflict. The Army garrisons forces and pre-positions equipment in areas to allow national leaders to respond quickly to contingencies.

1-19. Operations to shape occur across the joint phasing model. Operations to shape roughly correlate with theater shaping activities described in JP 3-0, *Joint Operations*. They also include unit home station activities: maintaining operational readiness, training, and contingency planning. Operational readiness, training, and

planning for potential operations by Army forces at home station are also a part of operations to shape. Army operations to shape correspond to continuous shaping activities within the joint phasing model.

1-20. Army forces must demonstrate a credible level of readiness against regional peer threats to effectively deter adversaries and assure partners. Generating credible readiness is the most important shaping task for units as they train at home station and during combat training center exercises. Readiness to successfully conduct decisive action tasks in the context of large-scale land warfare against regional peer threats is the primary focus before Army forces are called on to prevent conflict or win during wartime.

1-21. Maintenance operations supporting operations to shape center on activities promoting organizational readiness. Maintenance is a command priority and leaders at all levels play a key role. At the unit level, leaders ensure Soldiers perform PMCS and train to perform maintenance duties on the battlefield. All units and their supporting sustainment elements train on vehicle recovery and establishing and operating maintenance collection points. Engaged leaders provide supervision and ensure accountability. This results in effective unit maintenance programs, relevant Command Maintenance Discipline Programs, and timely test, measurement and diagnostic equipment (TMDE) calibration and maintenance programs all of which contribute to a positive organizational readiness rate. Standard battle rhythm events, such as brigade maintenance meetings, sustainment readiness reviews, and theater maintenance working groups, are effective for tracking readiness and prioritizing efforts. Senior leaders reinforce and verify maintenance practices by building relationships with the brigade logistics support element (BLSE) and conducting periodic maintenance terrain walks. More information regarding maintenance activities is found in DA PAM 750-1, *Commanders' Maintenance Handbook*.

MAINTENANCE SUPPORT TO OPERATIONS TO PREVENT

1-22. The purpose of operations to prevent is to deter adversary actions contrary to U.S. interests. They are typically conducted in response to activities that threaten unified action partners and require the deployment or repositioning of credible forces in a theater to demonstrate the willingness to fight if deterrence fails. As part of crisis response or limited contingency operations, operations to prevent are tailored in scope and scale to achieve a strategic or operational level objective. They may be conducted as a stand-alone response to a crisis, as in a non-combatant evacuation operation, or as part of a larger joint operation. The ability of an Army force to prevent stems from an adversary's realization that further escalation would result in military defeat.

1-23. Army operations to prevent include all activities to deter an adversary's undesirable actions. These operations are an extension of operations to shape designed to prevent or block an adversary's opportunities to further exploit positions of relative advantage by raising the potential costs to adversaries of continuing activities that threaten U.S. interests. Prevent activities are generally weighted toward actions to protect friendly forces, assets, and partners, and to indicate U.S. intent to execute subsequent phases of a planned operation. As part of a joint force, Army forces may have a significant role in the execution of directed flexible deterrent options. Additionally, Army prevent activities may include mobilization, force tailoring, and other pre-deployment activities; initial deployment into a theater to include echeloning command posts; employment of intelligence collection assets; and development of intelligence, communications, sustainment, and protection infrastructure to support the joint force commander's concept of operations. Army operations to prevent correspond to the deter phase in a joint operation.

1-24. Maintenance operations in support of operations to prevent continue to emphasize enhanced operational readiness and extend to projecting maintenance assets forward. Planners working on setting the theater must plan for adequate maintenance support to ensure the combatant commander is able to maintain the force as a credible threat. Planners should analyze current Army maintenance capability during the prevent phase of operations. Army maintenance units should always be the first considered to provide maintenance support. If analysis indicates that sufficient Army maintenance capability does not exist to meet mission requirements, planners examine the availability of other Service, multinational, and host-nation maintenance capabilities. At this point, planners also identify a need for and request contracted maintenance support when feasible and available. Units determine what items are included as part of the shop and bench stock of their combat repair and field maintenance teams and the types and numbers of on-board spares. These determinations are based on—

- The types and tempo of projected operations.
- The types and frequency of combat damage and maintenance failures.

- The quantities needed to support authorized table of organization and equipment and commercial off-the-shelf equipment.

1-25. Concurrent with actions intended to confront and deter an adversary, the theater Army commander sets the theater to enable landpower to exert its full capabilities. This includes extending the existing signal and network infrastructure to accept the land component and its supporting units. Enabling land power may include negotiation and contracting through the GCC with adjacent nations to establish tactical staging bases and realignment of security cooperation efforts based on emerging threats. The theater Army requests forces to conduct prevent activities and employs theater-level units required to support prevent activities.

MAINTENANCE SUPPORT TO LARGE SCALE COMBAT OPERATIONS

1-26. Large-scale combat operations executed through simultaneous offensive, defensive, and stability tasks require continuously generating and applying combat power, often for extended periods. Combat power is the total means of destructive, constructive, and information capabilities that a military unit or formation can apply at a given time (ADRP 3-0).

1-27. During large-scale combat operations, Army forces focus on the defeat and destruction of enemy ground forces as part of the joint team. Army forces close with and destroy enemy forces in any terrain, exploit success, and break their opponent's will to resist. Army forces attack, defend, conduct stability tasks, and consolidate gains to attain national objectives. Divisions and corps are the formations central to the conduct of large-scale combat operations, organized, trained and equipped to enable subordinate organizations. The ability to prevail in ground combat is a decisive factor in breaking an enemy's will to continue a conflict. Conflict resolution requires the Army to conduct sustained operations with unified action partners as long as necessary to achieve national objectives. Conducting large-scale ground combat operations corresponds to seize the initiative and dominate phases of joint operations.

1-28. Once the nation commits the Armed forces to accomplish a mission against an enemy, the distinction between seizing the initiative and dominate is difficult to discriminate from a tactical, land-force perspective. Therefore, in discussing operations to win, the Army recognizes that seizing the initiative must be quick and decisive to perform activities to dominate and win the conflict.

1-29. Armies go into battle with the forces they have available. Commanders rely on maintenance operations to provide the initial combat power and rapidly repair damaged weapon systems to help maintain combat power. During combat operations maintainers recover and repair damaged platforms enabling them to shoot, move, and communicate and stay in the fight.

1-30. During combat operations, maintainers prioritize work on weapon systems. Field maintenance assets move as far forward as possible to repair inoperable and damaged equipment to return it to service as quickly as possible. Crews perform preventive maintenance checks and services as modified for the climate and terrain in which they find themselves. Battle damage assessment and repair restores the minimum essential combat capabilities necessary to support a specific combat mission or to enable the equipment to self-recover. Crews and maintenance and recovery teams conduct battle damage assessment and repair and controlled substitution to rapidly return disabled equipment to battlefield service using field expedient components and means.

1-31. Commanders utilize Maintenance to weight the fight. Massing recovery and maintenance assets and arraying these assets on the battlefield enables the commander to support the main effort. Commanders who weight the fight return a greater number of weapon systems to operational status at the point of need. Commanders can authorize utilization of BDAR and controlled exchange to rapidly return a larger percentage of combat damaged equipment to an operational status.

1-32. Cross leveling maintenance assets during combat operations to weight the main effort requires planning and coordination. Planning for cross leveling of forward support company (FSC) maintainers includes identifying: maintainers with the required military occupational specialty (MOS), identifying specialty tools the maintainers need to accomplish the mission, and a time line for movement. Coordination efforts include communicating with both the current and future supported maneuver companies to inform them of the details of the cross-leveling plan. Coordination for movement includes consideration for providing security. Movement on the battlefield, even behind the front lines, requires security. In most instances, cross-leveled maintainers move around the battlefield along with BSB distribution platoon and FSC distribution platoons. Their

movement is integrated into the established logistical resupply convoys. This technique takes advantage of existing battle rhythm and existing security. In emergencies, the BSB support operations (SPO) section can work with the BSB distribution platoon to organize a convoy to pick up and move the cross-levelled maintainers and their equipment to their destination. This technique requires additional security assets and may disrupt the BSB's existing battle rhythm.

MAINTENANCE SUPPORT TO OPERATIONS TO CONSOLIDATE GAINS

1-33. Army operations to consolidate gains include activities to make enduring any temporary operational success and set the conditions for a sustainable environment, allowing for a transition of control to legitimate civil authorities. Commanders continuously consider activities necessary to consolidate gains and achieve the end state. Consolidation of gains is an integral and continuous part of armed conflict, and it is necessary for achieving success across the range of military operations. It is essential to retaining the initiative over determined enemies because it ultimately removes both the capability and will for further resistance.

1-34. Army forces deliberately plan to consolidate gains during all phases of an operation. Early and effective consolidation activities are a form of exploitation conducted while other operations are ongoing, and they enable the achievement of lasting favorable outcomes in the shortest time span. Army forces conduct these activities with unified action partners. In some instances, Army forces will be in charge of integrating forces and synchronizing activities to consolidate gains. In other situations, Army forces will be in support. While Army forces consolidate gains throughout an operation, consolidating gains becomes the focus of Army forces after large-scale combat operations have concluded. Army operations to consolidate gains correspond with stabilize and enable civil authority phases of a joint operation. It establishes security and stability in a manner decisive enough to achieve national strategic aims. It is the final exploitation of tactical success.

1-35. Maintenance support during operations to consolidate gains are similar to those in large-scale combat operations. Maintainers continue to maintain vehicles and equipment to provide and sustain combat power. Priorities may shift in some instances from repairing battle-damaged weapons systems to servicing equipment including rolling stock and generators required for stabilization efforts. Weapons systems returned to service utilizing BDAR techniques should receive assessment to determine if the temporary repairs require permanent corrections. Units may also utilize maintenance assets to prepare equipment and vehicles for redeployment.

1-36. For additional information on the Army's strategic roles see FM 3-0, *Operations*.

TWO-LEVEL MAINTENANCE

1-37. The Army utilizes a tiered, two-level maintenance system comprised of field and sustainment maintenance. Command teams, maintenance personnel, and planners must have a complete understanding of two-level maintenance fundamentals in order to properly plan and execute maintenance operations. Table 1-1 on page 1-8 provides examples of the alignment of Soldiers and formations to field and sustainment level maintenance. Two-level maintenance provides the operating unit with more capabilities forward and the ability to respond rapidly.

- Soldiers perform field-level maintenance as far forward as possible with the equipment being retained by or returned to the owning unit. Crewmembers, equipment operators, and Ordnance trained maintainers perform field maintenance.
- All Army modification table of organization and equipment (MTOE) maintenance units perform field maintenance.
- Sustainment maintenance is performed by U.S. Army Materiel Command (USAMC) elements normally comprised of civilians and contractors who return equipment to a national standard, after which the equipment is placed back into the Army's overall supply system. When a unit sends equipment to a sustainment maintenance organization the owning unit, in most cases, removes the equipment from its property book. Only in rare instances, such as unit reset, and watercraft maintenance, is the equipment returned to the owning unit.

Table 1-1. Alignment of Soldiers and formations to field and sustainment level maintenance.

<i>Field maintenance</i>	<i>Sustainment maintenance</i>
--------------------------	--------------------------------

<ul style="list-style-type: none"> • Operator/Crew 	<ul style="list-style-type: none"> • Army field support brigade (process manager)
<ul style="list-style-type: none"> • Forward support company 	<ul style="list-style-type: none"> • Army field support battalion
<ul style="list-style-type: none"> • Field maintenance company 	<ul style="list-style-type: none"> • U. S. Army Material Command support formations
<ul style="list-style-type: none"> • Support maintenance company 	<ul style="list-style-type: none"> • U. S. Army depots
<ul style="list-style-type: none"> • Other units with Ordnance school-trained maintainers 	<ul style="list-style-type: none"> • Logistics readiness centers (installation)

1-38. The goal of the maintenance system is to reduce repair cycle times by repairing or replacing components, modules, and assemblies as far forward as possible, maximizing reliance on rapid repair parts distribution, and visibility. TM maintenance allocation charts provide repair time guidelines for both field and sustainment-level tasks. For additional information on maintenance allocation charts see appendix C.

Field Maintenance

1-39. Three distinct groups of Soldiers perform field maintenance: equipment operators, equipment crews, and Ordnance Corps trained maintainers. The owning unit or a supporting maintenance unit performs field maintenance utilizing its own tools and test equipment. The unit should retain and repair the item until it is ready to return to service. Maintainers perform field maintenance on all types of unserviceable items of equipment and weapon systems. Repairs include the replacement of an unserviceable line replaceable unit, component, module, or part. However, field maintenance is not limited to simply remove and replace actions. If the operator/crew or Ordnance Corps trained maintainers are authorized and possess the requisite skills, special tools, proper repair parts, references, and adequate time the item should remain on-site and not be evacuated for sustainment maintenance. This is especially relevant to BCTs. The expertise to fix major weapon systems (Abrams, Bradley, Paladin, and Stryker vehicles) resides only in the FSC. There are no maintenance units equipped or staffed to perform field-level maintenance repairs to these weapon systems outside the BCT. The brigade support battalion in a Stryker brigade combat team (SBCT) is one exception as the FMC includes mechanics to maintain the medical company’s Stryker medical vehicles.

1-40. The BSB has low-density specialty maintainers whose mission is to provide maintenance for specialty equipment in the BCT. These personnel maintain equipment that the forward support companies are not structured to accomplish including missiles, fire control, and signal systems.

1-41. Field maintenance also includes adjustment, alignment, services, applying approved field-level modification work orders, fault/failure diagnoses, BDAR, recovery, and common software updates. Field-level maintenance is typically repair and return to the user and includes maintenance actions performed by crewmembers, operators, and Ordnance trained maintainers. Brigade level maintainers are found in the owning unit’s FSC and FMC.

Operator and Crew Field Maintenance

1-42. Operators and crews perform field maintenance on their equipment as outlined in the operator’s -10 TM. Some Soldiers receive formal training from their proponent on a specific system through advanced individual training or new equipment training. For example, the driver and gunner for an Abrams Main Battle Tank receive training that gives them an important skill set. Other Soldiers receive specialized training from their unit. Unit commanders are responsible for establishing, conducting, and maintaining a driver’s training program. Driver’s training programs emphasize the critical role that platform operators play in PMCS. The operator/crew are typically the first to observe a fault or identify the development of a fault. In many instances, they have the ability to repair the fault or minimize its impact using onboard spares enabling mission completion. Condition-based maintenance indicators or instrumentation can initiate operator/crew tasks. Typically, tasks consist of inspecting, servicing, lubricating, adjusting, and replacing minor components/assemblies as authorized by the maintenance allocation charts. TMs identify operator/crew tasks within a maintenance allocation chart. The maintenance allocation chart (MAC) identifies the proper basic issue item tools and onboard spares required to complete a given service. AR 600-55, *The Army Driver and Operator Standardization Program*, and TC 21-305-2, *Training Program for Night Vision Device Driving Operations* provide relevant information on drivers training programs.

1-43. Operators/crews are system specialists in those MOSs that receive formal training from their proponent through advanced individual training or specialized functional courses on diagnosing specific system faults. These operator/crews include Patriot missile, signal, military intelligence, or a maneuver unit's master gunner. In some instances, these personnel receive special tools to perform maintenance on their assigned system. Operator/crew maintenance falls into the crew subcategory of field maintenance, detailed in the equipment operator's manual. Operators troubleshoot the entire system using the operator's -10 TM and simplified or embedded diagnostic equipment to identify, isolate, and trace problems. Their primary focus is on a system's performance and proper operation. Troubleshooting typically identifies a faulty line replaceable unit. After operators/crews have exhausted their maintenance capabilities, they rely on Ordnance trained maintainers to conduct field-level maintenance on the item of equipment. The FSC provides this support for most maneuver units.

1-44. Figure 1-2 depicts a maintenance allocation chart showing field-level maintenance performed by the operator, crew, and operator-maintainers. The lowest level maintenance authority for the tasks identified in column 3 "Maintenance Function" is indicated in column 4 "Maintenance Level." Column 4 "Maintenance Level" is sub-divided by "Field" and "Sustainment," each of which are further subdivided. Field maintenance tasks performed by the crew or operator are aligned with the "Field"/"Crew"/"C" sub-columns. Appendix C provides additional information on maintenance allocation charts.

1-45. All maintenance functions (column 3) have an associated maintenance level with an estimated amount of time that should be allotted to complete the task. (column 4). If no time is present it indicates that maintenance at that level is not authorized.

FIELD MAINTENANCE
TSEC/ST-34
MAINTENANCE ALLOCATION CHART (MAC)
Table 1.MAC for TSEC/ST-34

(1) Group Number	(2) Component Assembly	(3) Maintenance Function	(4) Maintenance Level				(5) Tools and Equipment Reference Code	(6) Remarks Code	
			Field		Sustainment				
			Crew	Maintainer	Below Depot	Depot			
			C	F	H	D			
00	TSEC/ST-34	Inspect	0.1				1	A	
		Service	0.2					B	
		Replace	0.4					C, D	
		Test	0.3					E	
		Repair		1.0				F	
		Repair			2.0			1,2,3,4,5	G, H
		Repair				2.0		1,2,3,4,5,6,7,8	I
Overhaul				10.0	1,2,3,4,5,6,7,8	J			
01	Power Unit, STP-34	Inspect	0.1				A		
		Test	0.3				E		

Figure 1-2. MAC with system operator or crew member field-level maintenance tasks circled

Maintainer Field Maintenance

1-46. Maintainer maintenance is accomplished by Ordnance school trained maintainers utilizing the relevant TM on a component, accessory, assembly, subassembly, plug-in unit, shop replaceable unit within a line replaceable unit, or other portion either on the system or after it is removed by a trained maintainer. Depending on the system and MOS involved, the definition of a line replaceable unit or shop replaceable unit is flexible. The characterization of line or shop replaceable units for wheeled and tracked vehicles, radar, or the Warfighter Information Network-Tactical (WIN-T), shifts as the field maintenance troubleshooting increases in complexity. Figure 1-3 depicts a maintenance allocation chart showing field maintenance performed by

Ordnance Corps trained maintainers. The lowest level maintenance authority for the tasks identified in column 3 “Maintenance Function” is indicated in column 4 “Maintenance Level.” Column 4 “Maintenance Level” is sub-divided by “Field” and “Sustainment”, each of which are further subdivided. Field maintenance tasks performed by Ordnance trained maintainers are aligned with the “Field”/”Maintainer”/”F” sub-column.

1-47. Both operator-maintainers working with network based defense, Stryker nuclear-biological-chemical reconnaissance vehicles, joint biological point detection system, and WIN-T as well as Ordnance Corps trained maintainers working with communication and electronics (C&E), armament and missiles routinely do work that would fall under sustainment-level maintenance on other systems.

FIELD MAINTENANCE
TSEC/ST-34
MAINTENANCE ALLOCATION CHART (MAC)
Table 1.MAC for TSEC/ST-34

(1) Group Number	(2) Component Assembly	(3) Maintenance Function	(4) Maintenance Level				(5) Tools and Equipment Reference Code	(6) Remarks Code
			Field		Sustainment			
			Crew	Maintainer	Below Depot	Depot		
			C	F	H	D		
00	TSEC/ST-34	Inspect	0.1					A
		Service	0.2					B
		Replace	0.4				1	C, D
		Test	0.3					E
		Repair	1.0				1,2	F
		Repair	2.0				1,2,3,4,5	G, H
		Repair	2.0				1,2,3,4,5,6,7,8	I
Overhaul	10.0				1,2,3,4,5,6,7,8	J		
01	Power Unit, STP-34	Inspect	0.1					A
		Test	0.3					E

Figure 1-3. MAC with field-level maintenance performed by a maintainer circled

Note: Legacy maintenance allocation charts have an additional sub-column, “O”. Tasks listed in the third column “Maintenance Function” are aligned with the performer in the fourth column “Maintenance Level.” Field-level maintenance maintainers normally complete the tasks aligned under the “O” sub-column. Figure 1-4 depicts a Legacy maintenance allocation chart with the “O” sub-column.

MAINTENANCE ALLOCATION CHART								
Group Number	Component Assembly	Maintenance Function	* Maintenance Level				Tools and Equipment	Remarks
			C	O	F	H		
05	COOLING SYSTEM CONT.							
0505	Fan Tower Assembly	Inspect	0.2	0.3				
		Test	0.2					
		Replace	4.5					
		Repair Overhaul				**	35 37	A
06	ELECTRICAL							
0601	Alternator	Inspect	0.2					
		Test	0.2					B

Figure 1-4. Legacy MAC with circled tasks associated with organizational level maintenance

Sustainment Maintenance

1-48. Sustainment maintenance is comprised of two subcategories; below depot-level sustainment maintenance and depot-level sustainment maintenance. Units utilize sustainment maintenance when crew, operator, operator-maintainer or Ordnance Corps trained maintainers lack the requisite skills, special tools, proper repair parts, or references to complete repairs using field maintenance. Based on the extent of damage to the specific item, leaders must decide the best course of action based on operational and mission variables. There is no absolute checklist. Field maintenance is the preferred method of repair. The intent of sustainment-level maintenance is to perform commodity-oriented repairs to return items to a national standard, providing a consistent and measureable level of reliability. USAMC, through the Army Sustainment Command (ASC) and its subordinate Army field support brigades and Army field support battalions, execute sustainment maintenance missions. Sustainment maintenance supports both operational forces and the Army supply system. Unless prior planning occurs, USAMC subordinate elements typically enter after initial setting the theater tasks are completed.

Below Depot Sustainment Maintenance

1-49. Maintainers perform below depot-level sustainment maintenance on a component, accessory, assembly, subassembly, plug-in unit, or other portion generally after removal from the system. Sustainment maintenance performed in an operational environment, will normally be below-depot sustainment maintenance. Figure 1-5 on page 1-12, depicts a maintenance allocation chart showing sustainment maintenance performed below the depot level. The lowest level maintenance authority for the tasks identified in column 3 “Maintenance Function” are indicated in column 4 “Maintenance Level”. Column 4 “Maintenance Level” is sub-divided by “Field” and “Sustainment,” each of which are further subdivided. Sustainment maintenance tasks performed by Department of Defense (DOD) civilians or contractors are aligned with the “Sustainment”/“Below Depot”/“H” sub-column. After maintenance is performed at this level, items are returned to the supply system. Below depot sustainment-level maintenance can also apply to end item repair and return to the supply system.

FIELD MAINTENANCE
TSEC/ST-34
MAINTENANCE ALLOCATION CHART (MAC)
Table 1.MAC for TSEC/ST-34

(1) Group Number	(2) Component Assembly	(3) Maintenance Function	(4) Maintenance Level				(5) Tools and Equipment Reference Code	(6) Remarks Code
			Field		Sustainment			
			Crew	Maintainers	Below Depot	Depot		
			C	F	H	D		
00	TSEC/ST-34	Inspect	0.1					A
		Service	0.2					B
		Replace	0.4				1	C, D
		Test	0.3					E
		Repair		1.0			1,2	F
		Repair			2.0		1,2,3,4,5	G, H
		Repair				2.0	1,2,3,4,5,6,7,8	I
	Overhaul				10.0	1,2,3,4,5,6,7,8	J	
01	Power Unit, STP-34	Inspect	0.1					A
		Test	0.3					E

Figure 1-5. MAC with sustainment-level maintenance below depot level tasks circled

Depot Sustainment Maintenance

1-50. Maintainers perform depot-level maintenance on end items or on a component, accessory, assembly, subassembly, or plug-in unit either on the system or after it is removed. Figure 1-6 shows a maintenance allocation chart depicting sustainment maintenance performed at the depot level. The lowest level maintenance authority for the tasks identified in column 3 “Maintenance Function” is indicated in column 4 “Maintenance Level.” Column 4 “Maintenance Level” is sub-divided into “Field” and “Sustainment,” each of which are further subdivided. Sustainment maintenance tasks performed by DOD civilians or contractors are aligned with the “Sustainment”/“Depot”/“D” sub-column. Items are returned to the supply system or by exception directly to a using unit after maintenance is performed at this level.

FIELD MAINTENANCE
TSEC/ST-34
MAINTENANCE ALLOCATION CHART (MAC)
 Table 1. MAC for TSEC/ST-34

(1) Group Number	(2) Component Assembly	(3) Maintenance Function	(4) Maintenance Level				(5) Tools and Equipment Reference Code	(6) Remarks Code	
			Field		Sustainment				
			Crew	Maintainer	Below Depot	Depot			
			C	F	H	D			
00	TSEC/ST-34	Inspect	0.1					A	
		Service	0.2					B	
		Replace	0.4					C, D	
		Test	0.3					E	
		Repair		1.0				F	
		Repair			2.0			,2 ,2,3,4,5	G, H
		Repair				2.0		,2,3,4,5,6,7,8	I
Overhaul				10.0		,2,3,4,5,6,7,8	J		
01	Power Unit, STP-3A	Inspect	0.1					A	
		Test	0.3					E	

Figure 1-6. MAC with sustainment-level maintenance tasks at the depot level circled

Thunder Run to Baghdad

The evening of April 4, 2003, two weeks after the invasion of Iraq began, found the men of First Battalion, Sixty-fourth (1-64th) Armored Regiment, Second Brigade, Third Infantry Division (Mechanized) in bivouac just outside Baghdad more than 600 kilometers from their initial start point. The unit was resting having just completed a long day of combat mopping up remnants of the Iraqi Republican Guard's Medina Division. That night the commanders and crews received the order to conduct a reconnaissance in force into Baghdad at first light, a Thunder Run.

Throughout the night, the crews worked alongside the battalion's mechanics to prepare their vehicles. The long advance severely impacted maintenance operations and many vehicles were in need of extensive repairs. A lack of class IX repair parts dead-lined two of the four M-1 Abrams tanks in Charlie Company's first platoon. At daylight, the 1-64th lined up all of its mission capable armored vehicles. Non-armored wheeled vehicles including fuel tankers remained behind in expectation of impending heavy combat. Despite the best efforts of the maintainers and crew, many of the armored vehicles, though mission capable, were operating in a circle X status or command override, with multiple major maintenance deficiencies.

The less than optimal maintenance status was the result of a high training operations tempo in Kuwait during the build-up coupled with the rapid pace of operations after crossing into Iraq. The advance into Iraq constituted the fastest overland march in U.S. military history and provided minimal time for maintenance. Additionally few, if any, class IX parts reached forward units, resulting in abandoned vehicles, vehicles forced to fight with degraded capabilities, and cannibalization of vehicles that might otherwise have been returned to a fully mission-capable status. Despite the shortage of spare parts, combat units sustained the drive north as a result of the skill, experience, hard work, and energy of their forward deployed maintenance Soldiers. The first Thunder Run on April 5, 2003 punched up Highway 8 through the southwestern sector of Baghdad and then swung to the west to cross into the International Airport. The 1-64th met determined resistance and lost one tank to enemy action. In return, they inflicted approximately 1,000 casualties on the Iraqi defenders. Moreover, they proved that the American military could push into the heart of Baghdad at will.

Two days later Colonel David Perkins, the 2nd brigade commander, who accompanied the 1-64th on the first Thunder Run, took his entire brigade back into Baghdad. As a result of the ceaseless effort by crew and maintainers to repair the battle damage incurred during the first Thunder Run, the 1-64th was in the lead. After a series of hard fought combats, Perkins elected to remain in the city. The second Thunder Run proved to be the tipping point that caused Saddam Hussein's regime to collapse.

The lessons learned during the advance into Iraq helped shape current maintenance doctrine to include fixing forward, enhanced maintenance planning, and a renewed emphasis on command and control.

Chapter 2

Maintenance Organizations

The Army maintenance support structure is an expansive, robust, and highly flexible group of organizations that range from the strategic to the tactical levels of war. The structure provides comprehensive maintenance support for Army equipment from the time of inception until disposal. It is critical that commanders, staff planners, maintenance personnel, and platform operators understand the maintenance support structure to ensure proper integration at all levels. This chapter discusses the different types of maintenance organizations, their makeup, and responsibilities.

SECTION I – STRATEGIC MAINTENANCE PARTNERS

2-1. Strategic maintenance partners for the Ordnance Corps include elements of the Assistant Secretary of the Army for Acquisition, Logistics, and Technology (ASA[ALT]), and USAMC.

UNITED STATES ARMY MATERIEL COMMAND

2-2. USAMC is the Department of Army's sustainment maintenance process owner. USAMC equips, resets, and sustains the Army by leveraging its capabilities to include the Logistics Readiness Centers on all major Army installations. In addition to sustainment maintenance, USAMC provides logistics support to Army forces as well as the USAMC-related common support to other Services, multinational and interagency partners. The capabilities of USAMC are diverse and accomplished through national-level maintenance and supply programs managed and executed by its subordinate life cycle management command (LCMC).

2-3. Three USAMC major subordinate commands play a significant role in maintenance operations and are discussed in detail:

- Aviation and Missile LCMC (AMCOM).
- Communications-Electronics LCMC (CECOM).
- Tank-Automotive and Armaments LCMC (TACOM).

USAMC LIFE CYCLE MANAGEMENT COMMANDS

2-4. The assistant secretary of the Army for acquisition, logistics, and technology program executive officers and product or project managers ensure support for fielded weapon systems and equipment throughout their entire life cycle. The LCMCs' support to deploying and deployed forces is coordinated through the ASC and executed under the control of the supporting Army field support brigade (AFSB). The exact organizational make up of each LCMC varies. LCMCs provide support to both field and sustainment operations through the logistics assistance program and forward repair activities.

Aviation and Missile Life Cycle Management Command

2-5. AMCOM together with the ASA(ALT) program executive officers, program managers, and product managers deliver responsive aviation, missile and calibration materiel readiness. It sustains aviation, missile and unmanned vehicle systems, ensuring weapon systems readiness. It supports materiel developers with the development, acquisition, and fielding of aviation and missile systems and other related equipment. The AMCOM performs applied research, integrated logistics support, materiel readiness management, maintenance support for Army aviation and missile systems, subsystems, and associated equipment.

Communications-Electronics Life Cycle Management Command

2-6. The CECOM together with the ASA(ALT) ensure the global readiness of the networked Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance systems and capabilities. CECOM provides systems engineering support, training expertise, network and cyber defense capability development, field service support, and depot manufacturing.

Tank-Automotive and Armaments Life Cycle Management Command

2-7. TACOM together with the ASA(ALT) program executive officers, program managers, and product managers manages the Army's ground and support systems materiel enterprise. It provides acquisition support of tank-automotive, armaments and Soldier end items, repair parts, and supplies for U.S. and multinational weapon systems. TACOM also repairs, overhauls, and modernizes equipment.

UNITED STATES ARMY CONTRACTING COMMAND

2-8. The United States Army Contracting Command provides contracting support to deployed sustainment units through its contracting support brigades. For additional information on contracting support, refer to ATP 4-92, *Contracting Support to Unified Land Operations*.

Contract Maintenance Support

2-9. Contract maintenance support can come in the form of system support, external support, and theater support contracts. The military uses contract support when there is a valid operational need to augment deployed military maintenance support capabilities and to reduce the operational burden on military maintenance forces. All contract maintenance support requirements and issues should be coordinated with the supporting AFSB or subordinate element.

System Support Contract Capabilities

2-10. Life cycle management commands and separate Army program management offices pre-arrange system support contracts. Supported systems include, but are not limited to, newly fielded weapons, command and control, and communication systems. System contractors provide support in garrison and may deploy with the force for both training and contingency operations. System support contract maintenance can include both technical assistance and support via a contractor field service representative (CFSR) as well as complete field and sustainment-level support capabilities.

External Contract Support Capabilities (including the Logistics Civil Augmentation Program)

2-11. Contract authorities outside of the operational area provide external support contract maintenance. The largest and most commonly used external support contract is the Logistics Civil Augmentation Program. The Logistics Civil Augmentation Program, also called LOGCAP, is an Army program executed by USAMC that provides the operational commander an alternative source for rapidly filling sustainment and field maintenance shortfalls from commercial sources. The supported Army Service component command (ASCC), in coordination with the supporting contracting support brigade and AFSBs, will utilize Logistics Augmentation Program-related maintenance support when this commercial support augmentation option is determined to be the most effective, expeditious, and cost effective means to augment deployed Army force maintenance capabilities. The operational commander should consider other external support and/or theater support maintenance contract support options, other than the Logistics Augmentation Program, especially for long-term, sustained operations and/or for operations with sufficient lead-time to plan and coordinate other types of contracted support. For additional information regarding maintenance capabilities of the Logistics Civil Augmentation Program, see AR 700-137, *Logistics Civil Augmentation Program* and ATP 4-10.1, *Logistics Civil Augmentation Program Support to Unified Land Operations*.

Theater Support Contract Capability

2-12. Theater support contracts support deployed Army forces under contracts awarded from the mission area, by contracting officers under the command and control and contracting authority of the supporting

contracting support brigade or designated Joint Theater Support Contracting Command. Theater support contracts can provide limited maintenance related services based on the regionally available commercial support capabilities. Requiring activities should consult with their supporting AFSB to ensure that other contract venues are not already in place before submitting their maintenance support contract requirement to their supporting contracting support brigade or designated Joint Theater Support Contracting Command.

U. S. Army Depots

2-13. The mission of the USAMC's Army Depot Maintenance Enterprise is to provide the resources, skills, and capabilities to sustain the life cycle readiness of the Warfighter's weapon systems and equipment worldwide in a reliable and efficient manner. Depots provide sustainment maintenance support for contingency operations from continental United States (CONUS) locations. The Depot Maintenance Enterprise consists of resource providers, acquisition and sustainment planners, and maintenance performers. Depots may deploy personnel to provide fielding services and repairs in the field.

ARMY SUSTAINMENT COMMAND

2-14. The ASC provides logistics support by synchronizing support from the strategic through the operational to the tactical level. The ASC provides sustainment maintenance and facilitates reach back across the USAMC to enhance mission support. The ASC supports Army, joint and multinational forces, manages Army prepositioned stocks, and provides materiel management capabilities not provided by supporting sustainment brigades. The ASC has AFSBs forward deployed at overseas locations regionally aligned to an ASC and focused to serve as the bridge between the generating force and the operational force.

2-15. Major ASC responsibilities include—

- **Field Support:** The ASC field support network of AFSBs, battalions, and teams identify and resolve equipment and maintenance problems, as well as materiel readiness issues for their supported commands. A component of this is sustainment maintenance support to operational organizations.
- **Materiel Management:** The ASC matches materiel to mission and assures logistics readiness in the Army force generation process. This includes issuing, maintaining and managing theater-provided equipment in combat theaters, storing and maintaining unit maintained equipment, and maintaining and issuing pre-deployment training equipment that made available to non-deployed units for training.
- **Army Pre-positioned Stocks:** The ASC maintains, accounts for, and manages combat equipment, supplies, and humanitarian mission stocks at land- and sea-based positions strategically located around the globe.

LOGISTICS READINESS CENTER

2-16. The ASC manages logistics readiness centers through its AFSBs. The fundamental mission of the logistics readiness center is to support the Soldier at home station by providing installation and Army logistics readiness. Depending on the location and authorities assigned, logistics readiness centers may conduct both field and sustainment maintenance for organizations on the installation. Logistics readiness centers manage installation supply, maintenance, and transportation, to include food service, ammunition supply, clothing issue facility/clothing initial issue point, hazardous material, bulk fuel, personal property/household goods, passenger travel, non-tactical vehicles, rail, and garrison equipment. Soldiers and commanders are able to access not only supply, and maintenance support, but also technical reach-back to the entire USAMC enterprise. Logistics readiness centers are located in CONUS and outside continental United States (OCONUS).

ARMY FIELD SUPPORT BRIGADE

2-17. The AFSB supports the mission by providing national level sustainment support to the theatre Army. AFSBs are assigned to the ASC and when deployed, the AFSB is under operational control of the supported theater Army. This operational control relationship is normally delegated to the supporting theater sustainment command (TSC) or expeditionary sustainment command (ESC) as appropriate.

2-18. As it pertains to maintenance activities, the AFSB administers the logistics assistance program to include command and control of their subordinate Army field support battalions, logistics support elements, and BLSE supporting the tactical commander. The AFSB plans for and provides command and control over USAMC sustainment maintenance, and synchronizes and coordinates Army acquisition and materiel fielding support. The AFSB also plans for and coordinates special support missions such as the Army oil analysis program and ammunition support. The AFSB is the organization through which sustainment maintenance is coordinated. The TSC, in coordination with the ASCC G-4 will determine if sustainment maintenance support is required. If so, coordination for either in-theater or CONUS-based sustainment maintenance is made through the AFSB. For additional information on AFSBs, refer to ATP 4-91, *Army Field Support Brigade*.

ARMY FIELD SUPPORT BATTALION

2-19. Army field support battalions are organizations with tailored capabilities to provide sustainment support to maintain Army operational readiness for all units in an area of responsibility. They support active, reserve, and Army National Guard (ARNG) units through prioritization, integration, and synchronization of the Army's acquisition logistics and technology capabilities.

2-20. Army field support battalions provide area support tailored to their missions. Subordinate commanders might also serve as the senior USAMC logistics support advisor to a division or corps commander. Army field support battalion commanders are multi-tasked as deployable commanders and are responsible for home station, field, and sustainment maintenance support to include, reset management. An Army field support battalion can provide integrated support by reaching back to the AFSB and/or national sustainment base when required. Additionally, an Army field support battalion can provide additional maintenance support to deployed units by performing modification work orders on selected items of equipment and assist with in theater reset, and left behind equipment sustainment. Army field support battalions may also employ distribution management teams to perform materiel management functions as required.

2-21. When an Army field support battalion deploys forward, a portion of the battalion remains at home station to manage Army sustainment readiness related functions, such as below depot sustainment-level maintenance management and accountability of unit maintained equipment. This configuration ensures continuous and uninterrupted support. When deployed forward in support of Army contingency missions, Army field support battalions are attached to the AFSB upon arrival and might be further attached or placed under tactical control to a designated unit for logistics support and incorporation into the local security plan.

2-22. The Army field support battalion's mission areas and capabilities in garrison include re-equipping redeployed units or reset management, unit maintained equipment management and accountability, authorized stockage list management, supply, and ammunition activities. Army field support battalions also represent USAMC as logistics advisors to division and/or corps commanders and their staffs, and providing logistics assistance representative support to active, United States Army Reserve and ARNG units within an area. For additional information regarding the organization and capabilities of the Army field support battalion, refer to ATP 4-91.

LOGISTICS ASSISTANCE REPRESENTATIVES

2-23. LCMCs' logistics assistance representatives, commonly known as LARs, provide weapon systems oriented supply and maintenance technical assistance to Army units. These representatives are normally assigned to an Army field support battalion or a BLSE, but can be assigned individually to a unit as needed. Logistics assistance representatives are experienced technicians and are able to provide information regarding maintenance, training, supply parts, and operational readiness. The logistics assistance representative takes an active role in educating and training Soldiers and in some instance may assist in resolving a maintenance issue. Logistics assistance representatives share information gained in the field with the appropriate ASC structure, their respective LCMC, and the project manager for the relevant system. In all cases, the LCMC maintains technical authority over their assigned logistics assistance representative. For additional information on logistics assistance representatives refer to ATP 4-91.

BRIGADE LOGISTICS SUPPORT ELEMENT

2-24. The mission of the BLSE is to synchronize and integrate USAMC capabilities at the brigade level to increase combat power. The BLSE's roles and responsibilities include:

- Providing logistics assistance representative technical expertise at the brigade level to assist in diagnosis and repair, determining battle damage and disposition instructions.
- Assisting and coordinating ASA(ALT) assistance called forward to support the BCT or combat aviation battalion (CAB).
- Assisting in the coordination, synchronization, and resolution of system support contract and related logistics support program actions.
- Providing technical support capability for the BCT or CAB from the appropriate USAMC command.

2-25. The BLSEs are ad hoc organizations formed from the Army field support battalion structure to meet mission requirements. The element is led by a logistics management specialist and augmented by logistics assistance representatives to assist the brigade in identifying and resolving systemic logistic problems. It also provides equipment technical expertise to aid in building and maintaining readiness. The number of logistics assistance representatives within a BLSE is dependent upon the equipment and technology densities within the supported unit. BLSEs are typically found working with BCTs and combat aviation brigades. Units operating at EAB receive general support from a designated Army field support battalion.

2-26. In addition to the Army field support battalion, USAMC has numerous national-level provider organizations that may be deployed to augment a deployed AFSB. These organizations, with the exception of the theater aviation sustainment maintenance group and component repair teams, are ad hoc organizations formed from existing USAMC capabilities based on mission variables. The actual size and composition (mixture Department of the Army (DA) Civilians and contractors) of these USAMC organizations varies from mission to mission. For additional information about USAMC support formations, see ATP 4-91.

EQUIPMENT SUPPORT ACTIVITY

2-27. Equipment support activities provide sustainment maintenance and are ad hoc organizations normally formed from depot and arsenal capabilities and called forward to a designated operational area. An equipment support activity provides limited sustainment maintenance and augmented field maintenance support as needed. The team's sustainment mission focuses on the repair, overhaul, and modification of Army weapon systems. The equipment support activity performs this work through subordinate forward repair activities, combat vehicle evacuation teams and component repair teams. The equipment support activity's primary mission is to perform production and control scheduling of maintenance shop operations.

2-28. The equipment support activity is attached to an AFSB or designated Army field support battalion. It relies on the supported unit for logistics and force protection support. Command remains the responsibility of the AFSB.

COMPONENT REPAIR TEAM

2-29. Component Repair Teams drawn from ARNG component repair companies perform sustainment maintenance. Component repair companies are only in the ARNG. The component repair teams are normally mobilized as platoons but can be mobilized as full companies. Because they are modular formations their capabilities may vary. They are called forward to the operational area in order to address specific component repair capabilities requested by the AFSB. Component repair teams are the only Soldiers with the mission to perform sustainment maintenance.

2-30. The component repair team's primary mission is to repair weapon systems components to provide both surge and deployed component repair during reset operations. In some cases, the component repair team may be directed to repair and return an item directly to a designated unit or provide assistance with a unit's field maintenance.

2-31. The component repair team is attached to the AFSB or designated Army field support battalion and work loaded by the designate equipment support activity. Unlike most AFSB support organizations the

component repair team may deploy with limited life support assets organic to the component repair company. For other logistic support and force protection the component repair team relies on the supported unit. Command remains the responsibility of the AFSB. All component repair teams will convert into classification and inspection companies or other formations by the end of 2020.

COMBAT VEHICLE EVACUATION TEAM

2-32. Combat vehicle evacuation teams are task organized and called forward to the operational area to evaluate combat vehicles after major combat action or extended use in a sustained military operation. The teams evaluate combat equipment faults and damage; and make recommendations as to vehicle disposition based on the available logistics support, commander priorities, and the overall tactical situation. They prioritize repairs to return the maximum number of vehicles to an operational condition in a minimum amount of time.

2-33. Combat vehicle evacuation teams are normally attached to an Army field support battalion and work loaded by a designated equipment support activity or directly by the Army field support battalion. The team relies on the supported unit for logistics and force protection support. Command in all cases is the responsibility of the designated AFSB.

FORWARD REPAIR ACTIVITY

2-34. Forward repair activities can be called forward from select LCMCs. Forward repair activities are task organized and designed to meet the specific requirements required to accomplish repairs on specific types of equipment and/or components.

2-35. Forward repair activities perform sustainment maintenance and may augment the Army field support battalion, BLSE or sustainment brigade's capabilities based on the operational commander's priorities and the need to surge maintenance capabilities to generate combat power. A forward repair activity may also be used to help prepare tactical units for future missions or assist in their reconstitution after a major combat engagement.

2-36. Forward repair activities are attached to an AFSB or Army field support battalion and work loaded by a designated equipment support activity or directly by the Army field support battalion. The unit relies on the supported unit for logistics and force protection. Command remains the responsibility of the AFSB.

SECTION II – ECHELONS ABOVE BRIGADE OPERATIONAL ORGANIZATIONS

2-37. Within an area of responsibility, there are normally three operational headquarters organizations at EAB: the ASCC, the corps, and the division. The commander and staff of each of these headquarters organizations have very similar maintenance and repair parts management responsibilities. All are ultimately responsible for ensuring that subordinate organizations have adequate maintenance support and meet equipment readiness standards.

OPERATIONAL HEADQUARTERS' MAINTENANCE RESPONSIBILITIES

2-38. The ASCC is the senior Army command aligned with a geographical combatant command. The Army Service component commander's support responsibilities include the requirements to organize, equip, train, and maintain Army forces in theater. It has both operational and support responsibilities that are assigned by the geographical combatant commander. The Army Service component commander is responsible to the geographic combatant commander for recommending how assigned Army forces should be allocated and employed. The ASCC G-4 is responsible for maintaining visibility of the maintenance and readiness posture of all Army units operating in the area of responsibility. The TSC and the ASCC G-4 makes recommendations to the G-3 based upon readiness requirements and maintenance trends. These trends are identified in collaboration with subordinate maintenance organizations to provide the necessary capability to support operations in the area of responsibility. This includes requirements for sustainment maintenance, additional EAB support maintenance companies, or contracted maintenance support.

2-39. The ASCC, corps, and division commanders and their staffs play an important part in ensuring they meet subordinate commander's maintenance needs. The G-4 on each of the staffs is the primary logistics coordinating staff. At all echelons it receives, consolidates, and analyzes summarized equipment readiness status reports submitted by subordinate commands. Based upon the analysis, the G-3 reports the maintenance status to the commander who ultimately passes the information to the next higher level of command to include recommendations to increase or reallocate maintenance structure to meet readiness needs. Also based upon the assessment of maintenance status, the G-3 staff formulate policy, procedures, and directives related to the maintenance readiness of the force.

2-40. The ASCC, corps, and division G-4 staff do not directly manage maintenance or class IX support operations but rather establish priorities that are executed by, and synchronized with, the appropriate supporting organizations. The G-4 staff must continually coordinate with the appropriate sustainment headquarters to ensure that systemic maintenance problems are understood and addressed during materiel readiness reviews

MODULAR ORGANIZATION MAINTENANCE RESPONSIBILITIES

2-41. There are multiple modular organizations at EAB that range from detachment to battalion size. Types of modular units include military police, engineer, chemical, air defense, quartermaster, ordnance, transportation, signal, and others. The maintenance and class IX support capability within these organizations varies widely based upon the size, type of organization, and the density of its equipment. In many instances maintenance capability is limited to wheeled vehicles and other common commodities such as small arms or signal equipment. Units that have limited or no maintenance capability or limited capacity rely on designated support maintenance companies operating on an area basis to augment the assigned maintenance capability and capacity of the organization.

2-42. The field maintenance capability within these organizations, especially for units with limited maintenance capability, is normally located within the headquarters and headquarters company (HHC), company, or detachment headquarters. Larger units with greater maintenance requirements may have a separate maintenance section or team assigned to the unit. Units with high densities of equipment or units with very specialized equipment may have separate maintenance companies. Examples of these types of units are engineer battalions and air defense artillery units.

2-43. Commanders and staffs of modular organizations operating above brigade level must understand the sustainment organizations in place to provide support to the area within which they operate. Commanders and staffs must take the initiative to establish contact and coordinate with the supporting organization to ensure adequate maintenance and class IX support are available.

2-44. Sustainment organizations providing area support must be aware of the types and quantity of modular units operating in the supported area. The sustainment organizations must ensure that they task organize support maintenance companies to provide maintenance and class IX support to these units.

SECTION III – ECHELONS ABOVE BRIGADE SUSTAINMENT ORGANIZATIONS

2-45. The sustainment command, either the theater sustainment command or the ESC, serves as the senior Army sustainment headquarters (less medical) in an area of responsibility in support of the ASCC, corps, division, or joint task force. The sustainment command plans and coordinates the sustainment functions supporting unified land operations. In instances where there is no TSC or ESC, a sustainment brigade can serve as the senior Army sustainment headquarters (less medical) in an area of responsibility in support of a joint task force in a limited contingency operation.

THEATER SUSTAINMENT COMMAND

2-46. The Army conducts operations in a complex, interconnected, and increasingly global environment encompassing air, land, maritime, space, and cyberspace domains and the information environment. It is within this setting that the TSC provides command and control to Army operational-level logistics (less medical) in support of an Army, joint, or multinational force. The TSC is assigned to an ASCC. TSCs provide command and control, and decentralized execution of logistics operations throughout the theater.

2-47. The mission of the TSC is to plan, prepare, rapidly deploy, as necessary, and execute operational-level sustainment (less medical) within an assigned theater. The TSC is capable of planning, controlling, and synchronizing all operational-level sustainment operations for the ASCC or joint force commander. The TSC provides command and control for units executing sustainment support for theater opening (port opening and reception, staging, onward movement, and integration), theater distribution, sustainment support of joint and Army forces, and theater closing in order to provide integrated and responsive support.

2-48. The TSC is the fleet maintenance manager for deployed Army forces in an area of responsibility. In this capacity and in collaboration with the ASCC G-4, the TSC collects, analyzes, and monitors readiness data of subordinate and supported units. This enables the TSC to effectively manage maintenance support to units and systems in accordance with ASCC priorities. The TSC passes systemic issues, beyond TSC capabilities, to the appropriate national level maintenance manager via the AFSB for resolution.

2-49. The TSC is responsible for assessing and identifying maintenance capability requirements for the theater. The TSC communicates with subordinate headquarters and analyzes fleet maintenance status to identify maintenance trends. The TSC must then pass this information to the ASCC in terms specific of maintenance organizations required to meet the need.

2-50. The TSC is also responsible for managing critical class IX supplies to support theater readiness requirements. The TSC must identify critical class IX shortages and pass this information to national level providers to fulfill the need. The TSC monitors the status of critical class IX requisition and the status of all inbound critical class IX. Once received in theater, the TSC is responsible for ensuring proper and timely distribution of the class IX supplies to the appropriate maintenance facility.

2-51. The TSC develops plans, policies, programs, and procedures involving the maintenance of ground, missile, and aviation equipment. The goal is to maximize combat readiness through the effective application of field and sustainment maintenance capabilities.

2-52. TSC field-level maintenance activities involve the collection and analysis of maintenance data and reports; enabling the TSC to enforce ASCC priorities relating to the repair of specific types of equipment or support of specific units. These same activities provide the means to identify significant trends and deviations from established standards. This enables TSC maintenance managers to take action to ensure the maximum number of combat systems remain fully mission-capable. TSC actions may include disseminating technical information and the allocation or reallocation of resources and capabilities to support maintenance requirements.

2-53. The SPO staff's distribution management, materiel readiness branch, maintenance section works closely with the AFSB to ensure effective sustainment-level maintenance support to Army forces. The TSC maintenance managers analyzes readiness data for both systemic problems and those associated with the unique aspects of the specific operational environment, such as, environmental conditions and usage levels. This coordination and collaboration also provides the basis for the effective employment of USAMC sustainment maintenance capabilities. For additional information on the capabilities and organization of the TSC see ATP 4-94, *Theater Sustainment Command*.

EXPEDITIONARY SUSTAINMENT COMMAND

2-54. The ESC is a headquarters that deploys to an area of operations or joint operations area and provides command and control of multiple sustainment brigades. The ESC synchronizes current and future operations in support of a Corps or a Joint headquarters, a Joint Task Force or Joint Force Land Component Commander, executing major operations. The ESC coordinates and provides recommendations for EAB maintenance priorities with the Corps G-4. The ESC is responsible for communicating EAB maintenance support priorities within the joint operations area to subordinate sustainment brigades through the standard operation order process.

2-55. The SPO staff's distribution management, materiel readiness branch, maintenance section provides staff supervision over maintenance issues affecting force readiness. It determines requirements and manages the maintenance capabilities for supported units of the command. Within the staff there are personnel tasked to provide oversight of ground maintenance, electronic maintenance, and aviation maintenance. They conduct

maintenance trend analysis, identify equipment maintenance issues, and coordinate resolution with appropriate elements of the TSC, ASCC, and USAMC.

2-56. The ESC is responsible for assessing and identifying maintenance capability requirements for the area of operations or joint operations area. The command accomplishes this through communication with subordinate headquarters and through analysis of fleet maintenance status to identify maintenance trends. The ESC must then pass this information to the TSC, or if necessary directly to the ASCC, in terms specific of maintenance organizations required to meet the need.

2-57. The ESC is also responsible for managing critical class IX supplies to support area of operations or joint operations area readiness requirements. The ESC identifies critical class IX shortages and passes this information to national level providers to fulfill the need. The ESC monitors the status of critical class IX requisition and the status of all inbound critical class IX. Once received in theater, the ESC is responsible for ensuring proper and timely distribution of the class IX supplies to the appropriate maintenance facility. For additional information on the capabilities and organization of the ESC, see ATP 4-94.

SUSTAINMENT BRIGADE

2-58. Army planners attach sustainment brigades to a TSC or an ESC to provide maintenance and class IX management support to Army forces on an area basis. The sustainment brigade provides support to both corps and division subordinate formations. The sustainment brigade's coordination requirements differ from the ESC and TSC. The sustainment brigade is the link from EAB sustainment to the brigade. Therefore, the sustainment brigade must continually coordinate with the supported operational headquarters, normally division headquarters, and the supported brigades. This coordination is necessary to ensure the sustainment brigade commander and staff understand maintenance support priorities and maintenance requirements in order to allocate maintenance assets properly.

2-59. The sustainment brigade executes maintenance support through combat sustainment support battalions (CSSB). The sustainment brigade SPO staff coordinates maintenance management and support within the supported area. The SPO staff advises the commander on balancing maintenance support requirements with maintenance capabilities. The SPO section contains a maintenance branch that manages electronic, armament, mechanical, special purpose, and engineer equipment maintenance.

2-60. The SPO staff's materiel readiness branch is responsible for assessing the current EAB maintenance capabilities and for making recommendations for additional maintenance capability if required. The sustainment brigade must communicate EAB maintenance support priorities to subordinate CSSBs through the operations order process. For more information, refer to ATP 4-93, *Sustainment Brigade*.

DIVISION SUSTAINMENT BRIGADE

2-61. The division sustainment brigade, also known as the DSB, is assigned to a division. The division sustainment brigade is a renamed sustainment brigade. The division sustainment brigade commander is the primary senior advisor to the division commander and the deputy commanding general (support) for the sustainment warfighting function. The commander is responsible for the integration, synchronization, and execution of sustainment operations at echelon. The division sustainment brigade employs sustainment capabilities to create desired effects in support of the division commander's objectives. The division sustainment brigade has a division sustainment support battalion attached. The command and its subordinate units must be able to move and displace at the pace of large-scale combat operations.

COMBAT SUSTAINMENT SUPPORT BATTALION

2-62. The CSSB is a multifunctional logistics headquarters attached to the sustainment brigade. The role of a CSSB is to exercise command and control for task organized companies, teams, and detachments executing logistics operations. The CSSB is task organized with functional companies, teams, and detachments that execute transportation (mode, terminal, and movement control) operations, maintenance, munition operations, and quartermaster operations. The Army designed the CSSB to employ and control up to seven company-sized units conducting logistics operations. The requirements for the number and type of units attached to a CSSB is

mission dependent. Attaching additional units to a CSSB task organization may increase responsiveness but reduces agility of the CSSB specifically in the ability to provide effective command and control.

2-63. The CSSB supports echelon above brigade units, multifunctional brigades (maneuver enhancement brigade, field artillery brigade, and CABs), and functional support brigades (military police, signal, and engineer brigades). The CSSB may also support Army special operations forces as part of their area support task.

2-64. The SPO staff's maintenance management personnel provide oversight of the maintenance organizations attached to the CSSB. The SPO staff coordinate maintenance, class IX management and support within its supported area. The maintenance branch has a maintenance manager and a maintenance control sergeant to oversee maintenance workload, requirements, and to identify systemic maintenance problems.

2-65. The CSSB headquarters company includes field maintenance capability that supports the headquarters' organic equipment.

DIVISION SUSTAINMENT SUPPORT BATTALION

2-66. The division sustainment support battalion, also called DSSB, is a renamed combat sustainment support battalion. The division sustainment support battalion is organic to division sustainment brigades assigned to divisions. The division sustainment support battalion and its subordinate units must be able to move and displace at the pace of large-scale combat operations. The division sustainment support battalion commands and controls all organic, assigned, and attached units. As directed by the DSB commander, the division sustainment support battalion conducts maintenance, transportation, supply, and distribution. A division sustainment support battalion is organic to division sustainment brigade. Each division sustainment support battalion has an organic composite supply company, composite truck company, support maintenance company, and field feeding company. Other capabilities are task organized by the division commander in accordance with requirements. The division sustainment support battalion synchronizes and executes logistics support to BCTs and multifunctional support brigades attached to the division.

Division Sustainment Support Battalion

- **Role:** The role of the division sustainment support battalion is to command and control tactical units executing logistics operations.
- **Capability:** The division sustainment support battalion controls and synchronizes the logistics operations of four organic companies and up to two additional companies as task organized by the division.
- **Parent:** Division sustainment brigade.
- **Command relationship:** Organic to the division sustainment brigade.
- **Support relationship:** General support to all units in the division area of operations.
- **Span of operations:** Division rear boundary to brigade support area.
- **Mobility Index:** Capable of 83% mobility in one lift using organic assets.

SUPPORT MAINTENANCE COMPANY

2-67. Planners attach a SMC to either a CSSB or a sustainment brigade based on the projected maintenance workload of the supported unit. The SMC is a modular maintenance company that provides field-level

maintenance support to units designated through an operations order from its higher headquarters. It also provides maintenance support on an area basis to units at EAB when tasked to do so.

2-68. The higher headquarters, most commonly a CSSB, may task organize the unit, establish authorities, and establish priorities. The CSSB also maintains administration and support authority over the unit. The higher headquarters staff integrates the SMC through the communications network and may require the SMC to provide a liaison to the headquarters.

2-69. The SMC receives tasking through operations orders or fragmentary orders. Typical information in the order includes identification of supported units, the support relationship with each unit, priority of support, attachments and detachments to the SMC as required. The SMC commander and key leaders use troop-leading procedures to conduct mission analysis, develop courses of action, plan maintenance support, and direct subordinate elements.

2-70. The CSSB commander provides command and control and directs the SMC to establish routine communications with the headquarters for reporting purposes. Typical reporting requirements include a logistics status report (LOGSTAT) providing the status of the SMC's maintenance support capability and on hand class IX. The LOGSTAT also includes the status of the SMC's organic equipment and supplies to include pacing items, critical maintenance sets, kits, outfits, and TMDE. The SMC commander also provides recommendation to the CSSB SPO and Commander regarding sustainment maintenance requirements.

2-71. The CSSB commander provides taskings through operations orders or fragmentary orders. Typical information in the order includes identification of supported units, the support relationship with each unit, priority of support, attachments and detachments to the classification and inspection company' as required. The SMC commander and key leaders use troop-leading procedures (FM 6-0) to conduct mission analysis, develop courses of action, plan maintenance support, and direct subordinate elements.

2-72. SMCs provide: allied trades support; wheeled vehicle recovery; as well as armament; wheeled vehicle; communication; electronics; special electronic devices; ground support equipment; power generation equipment; utility equipment; TMDE maintenance, and quality control (QC). The SMC has three platoons: an automotive/armament platoon, an electronic maintenance platoon, and a ground support equipment maintenance platoon. It is able to task organic maintenance teams to provide support in multiple locations. Figures 2-1 and 2-2 on page 2-12 depict the SMC organization and the SMC battlefield array.

Note: Army planners neither intended nor designed the SMC to provide a source of back up maintenance support for the BSB. The SMC does not have maintenance capability to work on major combat systems including the M-1 Abrams, M-2/3 Bradley, Paladin, or Stryker vehicles.

Support Maintenance Company

- **Role:** Provides field-level maintenance support to EAB units designated in the operations order.
- **Capability:** Provides automotive armament, electronic, and ground support equipment maintenance support.
- **Parent:** CSSB or Sustainment Brigade.
- **Command Relationship:** Attached.
- **Support Relationship:** General Support.
- **Span of Operations:** Operates at any echelon above the BCT level. May be located at any point in the theater from port to division support area.
- **Mobility:** Requires 80% mobility in a single life using organic vehicles.

2-73. The SMC establishes communication with all supported units to enable effective maintenance support and coordination. This ensures the SMC has all supported unit locations and equipment density. The SMC uses this coordination to assist in planning and work loading their on-site maintenance teams. It also enables the SMC to identify if the supported unit has mechanics assigned. If so, the SMC may coordinate with the unit to incorporate the mechanics into the maintenance effort. In some instances, this may result in the temporary attachment of the supported unit's mechanics into the SMC maintenance section. The SMC may also be required to coordinate with supporting transportation units designated to deliver materiel. Part of the coordination is providing accurate locations for delivery. The SMC is responsible for management of all supply stocks required to support its maintenance function, predominately class III(p) and class IX. Execution of materiel management functions by the SMC include supply planning, requirements determination, requirements verification, stock control, asset visibility, and asset reporting.

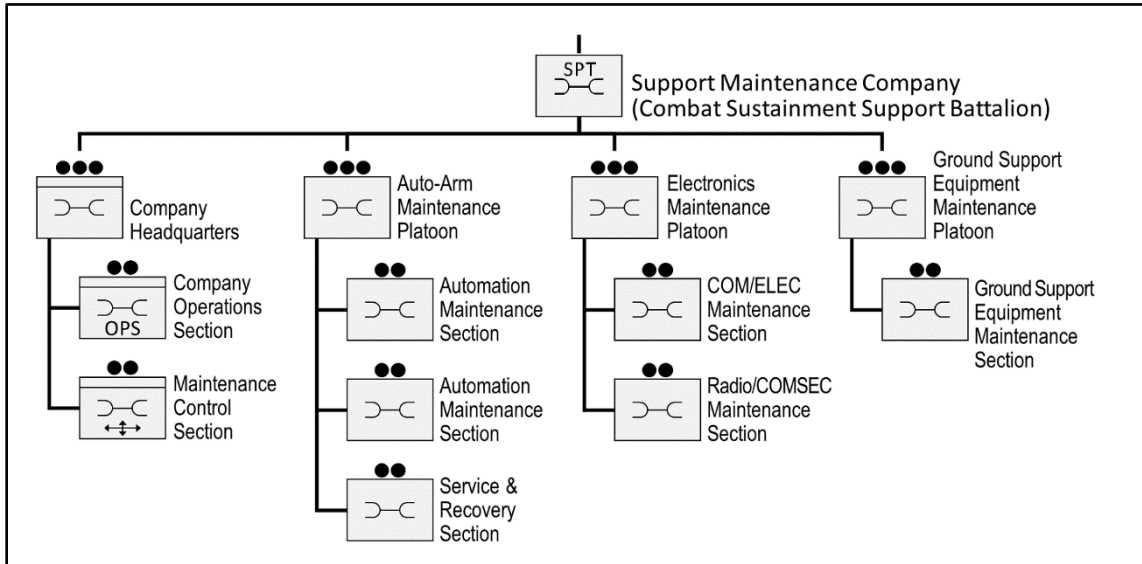


Figure 2-1. Support maintenance company

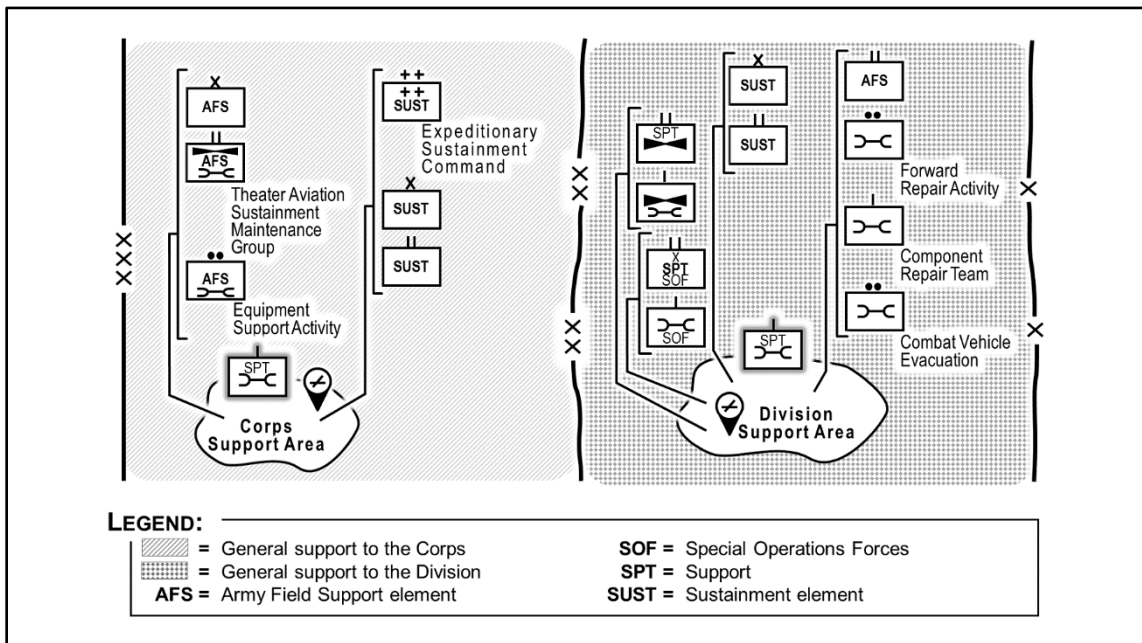


Figure 2-2. Support maintenance company, battlefield array

CLASSIFICATION AND INSPECTION COMPANY

2-74. The classification and inspection company is attached to a CSSB and operates at the corps or theater level. The Company supports USAMC by rapidly returning reparable components to the repair facility and serviceable materiel back into the supply system for redistribution. The classification and inspection company receives, temporarily stores, classifies, inspects, and gains accountability of retrograde materiel, including supply classes II, III(P), IV, VII, and IX. Figures 2-3 and 2-4 on page 2-14 depict the classification and inspection company organization and battlefield array.

2-75. The company's maintenance capabilities include a ground support equipment and automotive and armaments platoons. The ground support equipment platoon includes a radio and communications security (COMSEC) section and a ground support equipment section. Soldiers in the sections perform field-level maintenance on radios, radar, electronic missile systems, radar, power generation equipment, chemical equipment, and construction equipment. The automotive and armaments platoon includes an armaments section, a recovery section and a maintenance section. Soldiers in the sections perform recoveries, and field-level maintenance to include limited welding on small arms, fire control equipment, and wheeled and track maintenance.

2-76. The Army assigned all of the classification and inspection companies to the Army Reserve and ARNG. The Army designed the companies as a permanent replacement to ad hoc redistribution property assistance teams, known as RPATs. When deployed the companies

are dependent upon the CSSB personnel staff section for personnel services and on appropriate elements with the theater for religious, legal, Army Health System support, force health protection, and finance. They also require the support of a medium truck company for distribution of supplies to the appropriate destination.

2-77. The CSSB commander provides taskings through operations orders or fragmentary orders. Typical information in the order includes identification of supported units, the support relationship with each unit, priority of support, attachments and detachments to the classification and inspection company' as required. The classification and inspection company commander and key leaders use troop-leading procedures (FM 6-0) to conduct mission analysis, develop courses of action, plan maintenance support, and direct subordinate elements.

2-78. The classification and inspection company establishes routine communications with the headquarters for reporting purposes. Typical reporting requirements include a LOGSTAT providing the status of the classification and inspection company's rate of receipt, inspection, classification, and distribution of equipment. The LOGSTAT also includes the status of the classification and inspection company's organic equipment and supplies to include pacing items, critical maintenance sets, kits, outfits, and TMDE. The classification and inspection company commander also provides recommendation to the CSSB SPO and Commander regarding transportation requirements. The classification and inspection company also establishes communication with designated supported units to enable effective support and coordination.

Classification and Inspection Company

- **Role:** Corps or Theater level asset that rapidly returns repairable components to repair facilities and serviceable material into the supply system.
- **Capability:** Receives, temporarily stores, classifies, field-level maintenance, inspects, and gains accountability of retrograde materiel.
- **Parent:** CSSB.
- **Command Relationship:** Attached.
- **Support Relationship:** General Support.
- **Span of Operations:** Corps or Theater rear boundary to the BSA.
- **Mobility:** Requires 50% mobility, with the exception of the Service and Recovery section which requires 80% mobility in a single lift with organic vehicles.

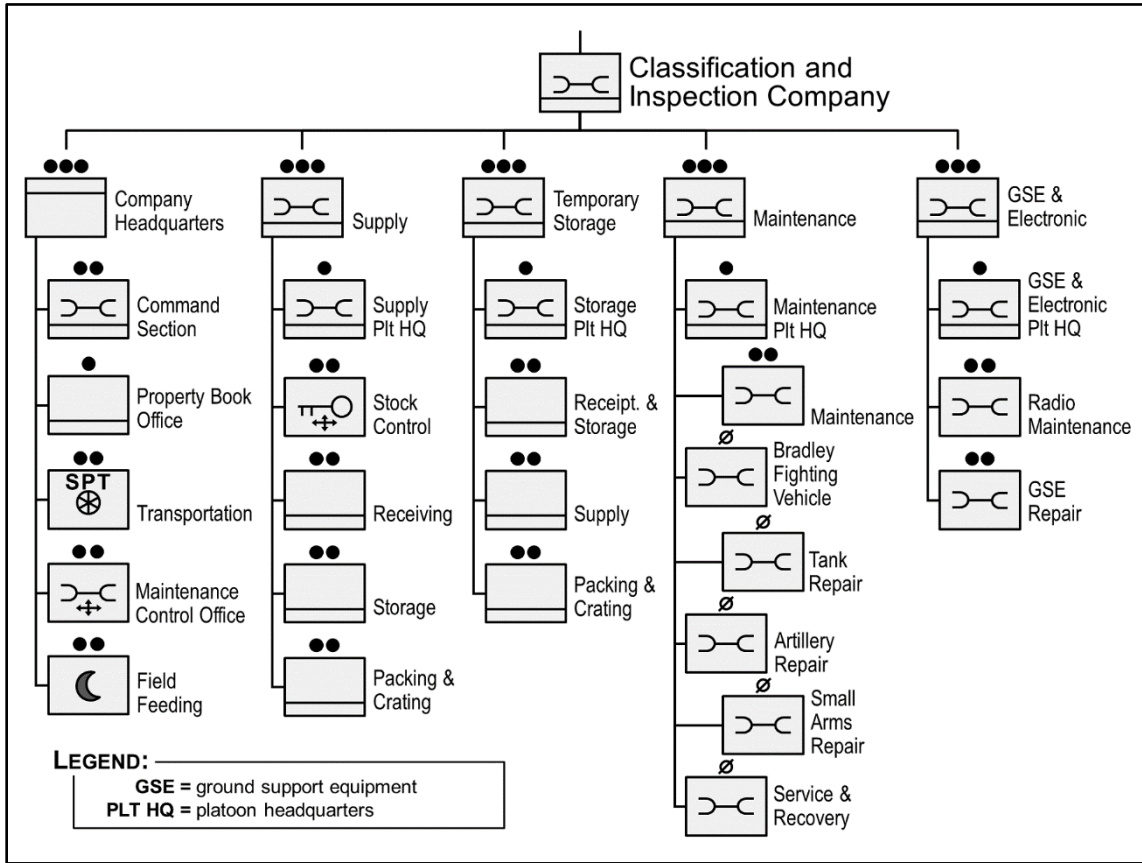


Figure 2-3. Classification and inspection company

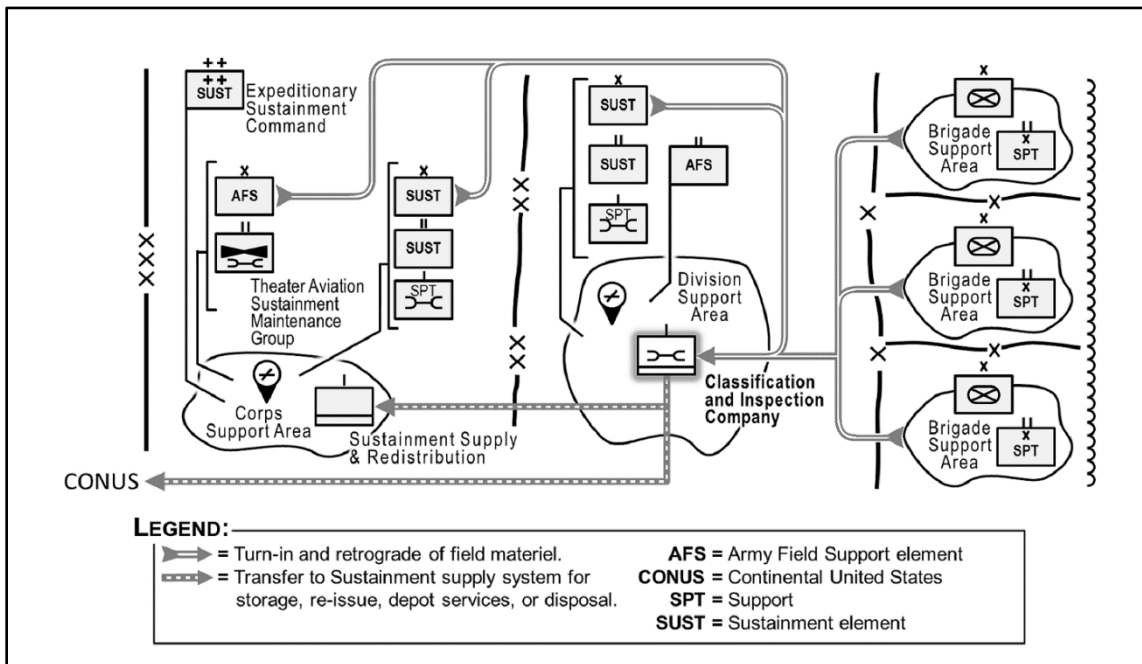


Figure 2-4. Classification and inspection company, battlefield array

SECTION IV – BRIGADE COMBAT TEAM MAINTENANCE SUPPORT

2-79. Army maintenance organizations are structured to provide a wide range of maintenance management and logistics support in order to meet operational requirements of the brigade to which they are assigned, and within the limits of their capability, to elements transiting the brigade support battalion’s area of support that are without assigned or organic support capability.

BRIGADE SUPPORT BATTALION

2-80. The BSB is an organic unit of the BCT. Each BCT and support brigade has a BSB designed to sustain the brigade. The BSB plans, coordinates, synchronizes, and executes logistics operations in support of brigade operations.

2-81. The BSB typically plans and executes replenishment operations in support of maneuver forces. It distributes supply classes I, II, III, IV, V, VII, VIII, and IX; provides food service, Army Health System support, as well as field maintenance, and recovery. It relies on the theater distribution system to synchronize the flow of throughput into the brigade’s operational area. These deliberate, time-sensitive operations are conducted to replenish the brigade’s FSCs. Figure 2-5 depicts units typically assigned to a BSB. For additional information regarding the organization and capabilities of the BSB, see ATP 4-90, *Brigade Support Battalion*.

2-82. The brigade commander provides taskings to the BSB through operations orders or fragmentary orders. Typical information in the order includes identification of supported units, the support relationship with each unit, priority of support, attachments and detachments to the BSB as required. The BSB commander and key leaders use troop-leading procedures (FM 6-0) to conduct mission analysis, develop courses of action, plan maintenance support, and direct subordinate elements.

2-83. The BSB establishes routine communications with the headquarters for reporting purposes. Typical reporting requirements include a LOGSTAT providing the status of the BSB’s maintenance support capability and on hand class VII and IX. The LOGSTAT also includes the status of the BSB’s organic equipment and supplies to include pacing items, critical maintenance sets, kits, outfits, and TMDE. The BSB commander also provides recommendation to the brigade SPO and Commander regarding sustainment maintenance requirements.

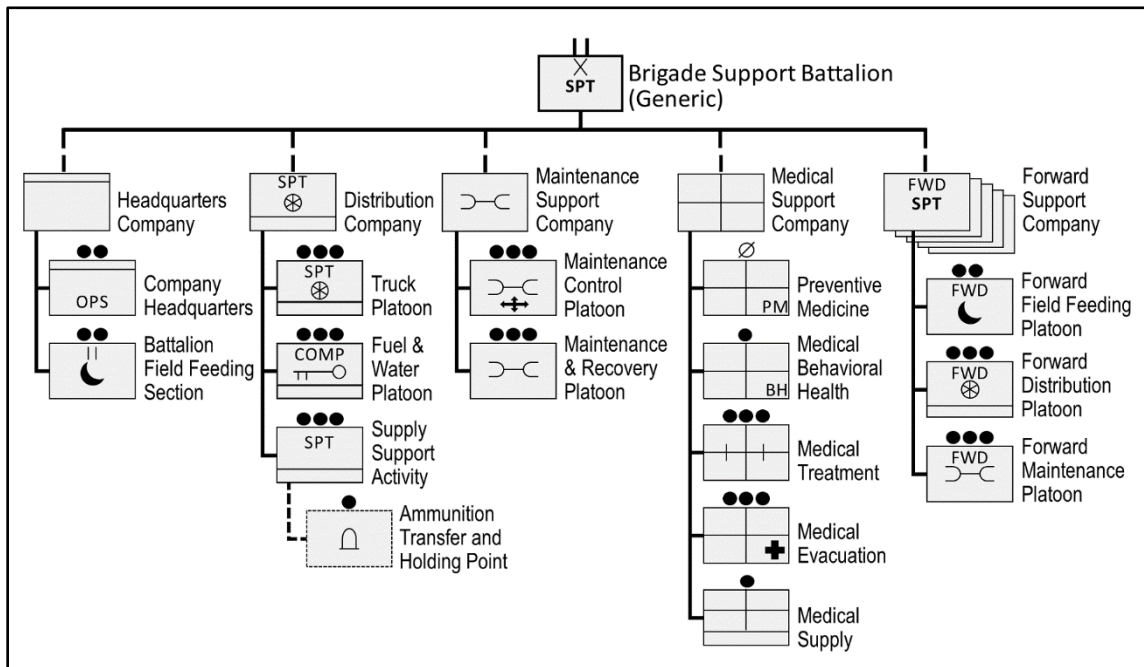


Figure 2-5. Brigade support battalion

2-84. The BSB medical company provides Role 1, also known as unit level medical care, and Role 2, basic primary medical care, Army Health System support to all BCT units operating within the brigade area of operations. The Army assigns one biomedical equipment specialist that is normally capable of providing field-level maintenance for organic equipment to Medical companies in theater. Limitations may exist with highly specialized systems such as laboratory and diagnostic imaging services that may require sustainment maintenance support. The brigade support medical company's brigade medical supply office provides field-level medical equipment maintenance for the company and may provide emergency medical equipment maintenance for the medical platoons in the BCT. For additional information on the BSB medical company, see ATP 4-02.3, *Army Health System Support to Maneuver Forces*. For additional information on medical maintenance capabilities and class VIII, see ATP 4-02.1, *Army Medical Logistics*. For additional information on medical maintenance capabilities, see chapter 7.

BRIGADE SUPPORT BATTALION IN THE BRIGADE COMBAT TEAM

2-85. Brigade combat teams include the Infantry, Armor, and Stryker BCT. Each has an organic BSB that functions as the primary source of sustainment for the BCT. The BSBs are similar in structure and provide field maintenance support through the FMC. They also possess FSCs that provide field maintenance support to the maneuver battalions assigned to the BCT. The BSB SPO staff and the brigade logistics officer (S-4) coordinate field maintenance support of assigned equipment through their subordinate FSCs and the FMC.

2-86. The BCT in its principal role as a combined arms maneuver unit closes with and destroys the enemy by combining reconnaissance, surveillance, target acquisition, long-range fires, maneuver, and the support of joint forces and other Army units. Although capabilities differ somewhat depending upon the type of brigade the core capabilities of the BCT's assigned BSB include maintenance, medical, supply, and distribution.

2-87. The BSBs in all types of brigade combat teams have similar structure. A BSB contains an HHC, a distribution company, a FMC, a medical company, and up to six FSCs. Identical FSCs support the maneuver battalions (combined arms battalion, infantry battalion or Stryker battalion). The cavalry squadron, fires battalion, and brigade engineer battalion all have a supporting FSC with a unique structure designed to support each specific battalion. Figure 2-6 depicts a battlefield array of a BSB supporting an armored brigade combat team, also called an ABCT.

2-88. The BSB FMC provides lift capabilities for the repair shop, recovery of organic equipment, recovery to supported units, and support for maintenance evacuation of equipment requiring sustainment-level maintenance. The company also provides limited maintenance support to the FSCs for low-density commodities such as C&E and armament equipment. The FMC normally operates within the designated brigade support area (BSA).

2-89. The FSC's maintenance platoon establishes the maintenance collection point (MCP) and provides vehicle and equipment evacuation, and maintenance support. The ***maintenance collection point is a temporary location established within the battalion echelon for the collection of equipment needing or undergoing field maintenance.*** Each of the BSB's FSCs include trained and qualified maintainers who perform all field-level maintenance tasks on the maneuver battalion's main weapon systems. For additional information on the organization and operation of the BCT For additional information on the BSB see FM 3-96, *Brigade Combat Teams*.

BSB, Brigade Combat Team

- **Role:** The BSB provides logistics, Army Health System, and maintenance support to a brigade combat team.
- **Capability:** The BSB is an expeditionary, multi-functional logistics battalion with integrated Army Health System support capable of operating at the tactical level.
- **Parent:** Brigade Combat Team.
- **Command Relationship:** Organic to a Brigade Combat Team.
- **Support Relationship:** Not applicable. A support relationship is not required because the BSB is organic to the BCT.
- **Span of Operations:** Brigade combat team area of operations.
- **Mobility:** Requires 100% mobility in a single lift using organic vehicles.

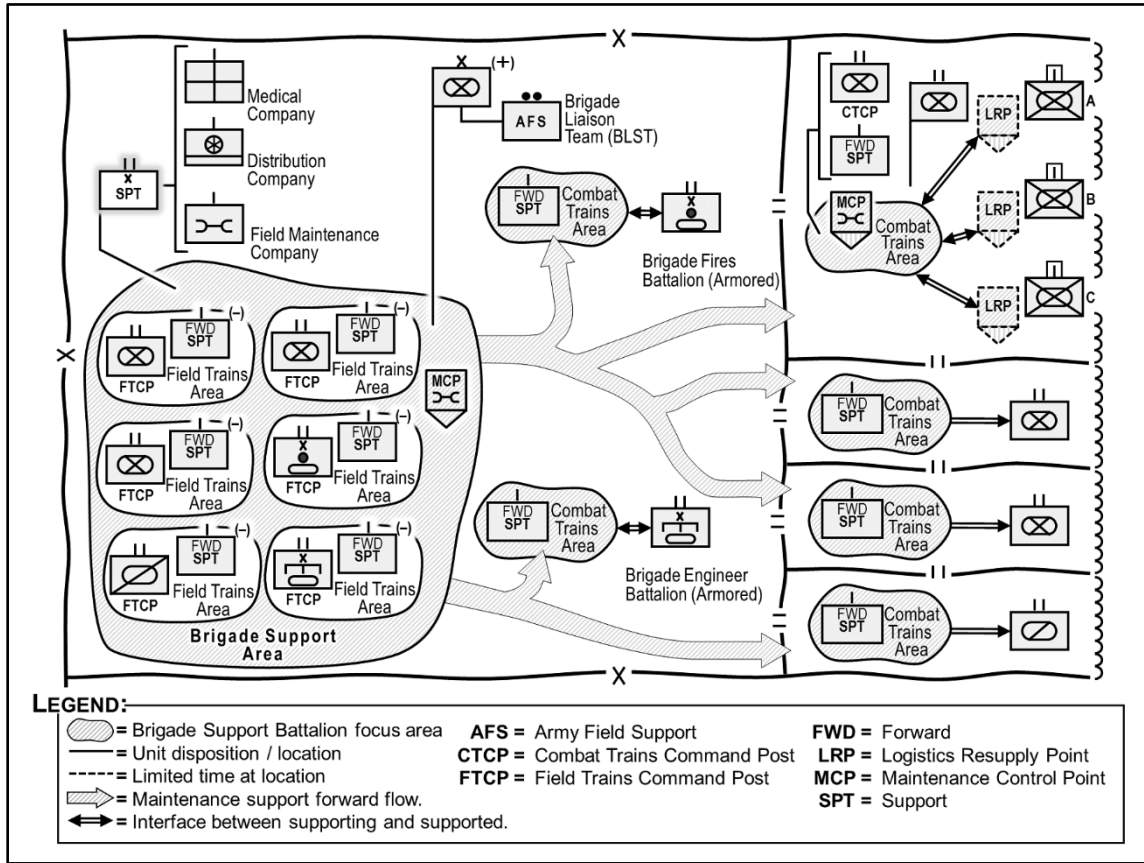


Figure 2-6. BSB supporting an ABCT, battlefield array

BRIGADE SUPPORT BATTALION IN SUPPORT BRIGADES

2-90. A mix of multifunctional support brigades support theater Army, corps, and division commanders. These supporting brigades include the maneuver enhancement brigade, CAB, field artillery brigade. Most support brigades are not fixed organizations. All support brigades except the CABs are designed around a base of organic elements, to which a mix of additional capabilities is added based on mission variables. In most instances, support brigades contain maintenance capabilities similar to those found in the BCTs. The maintenance support is tailored to the appropriate brigade structure.

2-91. For example the maneuver enhancement brigade is designed as a multifunctional headquarters that is able to perform maneuver support, consequence management, stability operations, and support area operations for the supported force—normally a division. The brigade is normally assigned an area of operations with control of terrain. The higher headquarters can tailor the unit to perform numerous types of missions including movement control, recovery, and information collection.

2-92. The maneuver enhancement brigade's BSB contains a headquarters and service company, a distribution company, and a FMC. It does not contain FSCs or a medical company. In the maneuver enhancement brigade there are no organic battalions, all organizations are attached. All attached organizations rely on the brigade staff to coordinate area sustainment support. The maneuver enhancement brigade BSB does

not contain a medical company and depends on its BDE medical section and from the supporting medical battalion multifunctional. The maneuver enhancement brigade's FMC provides field-level maintenance for equipment within the BSB and brigade headquarters. It also provides supplemental field-level maintenance support to other units attached to the maneuver enhancement brigade requiring maintenance that exceeds their capabilities. Figure 2-7 and 2-8 depict a BSB supporting a maneuver enhancement brigade.

2-93. For additional information regarding the structure of the maneuver enhancement brigade BSB refer to ATP 4-90, and FM 3-81, *Maneuver Enhancement Brigade*.

BSB, Maneuver Enhancement Brigade

- **Role:** The BSB provides logistics, limited transportation and field maintenance to a Maneuver Enhancement Brigade and attached units.
- **Capability:** The BSB is an expeditionary, multi-functional logistics battalion capable of operating at the tactical level.
- **Parent:** Organic to a Maneuver Enhancement Brigade
- **Command Relationship:** Organic to a Maneuver Enhancement Brigade.
- **Support Relationship:** Direct support to Maneuver Enhancement Brigade and general support to attached units.
- **Span of Operations:** Maneuver Enhancement Brigade area of operations, are at division or echelon above division.
- **Mobility:** Requires 100% mobility in a single lift using organic vehicles.

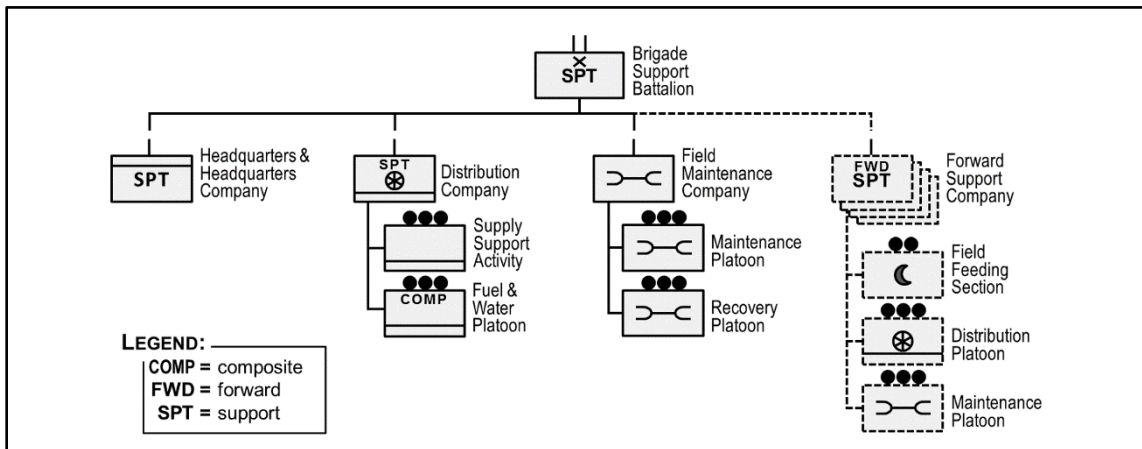


Figure 2-7. Maneuver enhancement brigade

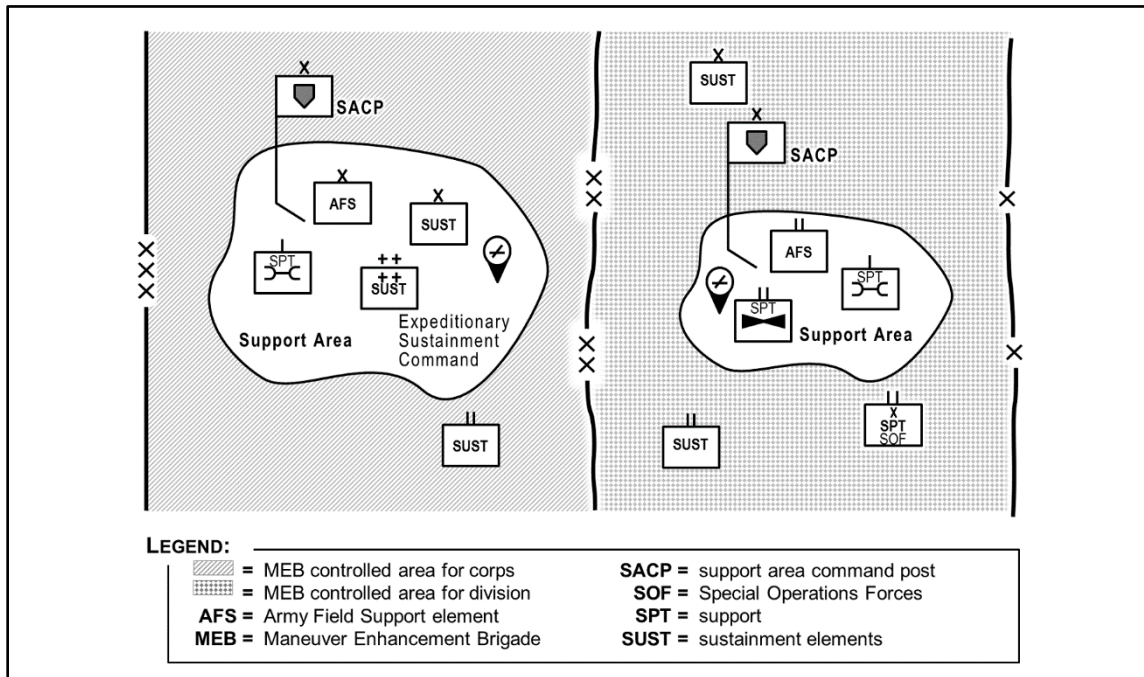


Figure 2-8. Maneuver enhancement brigade, battlefield array

HEADQUARTERS AND SERVICE COMPANY IN THE FIELD ARTILLERY BRIGADE

2-94. The field artillery brigade's mission is to destroy, neutralize, or suppress the enemy by cannon, rocket and missile fire and to help integrate all lethal and nonlethal fire support assets into combined arms operations. The field artillery brigade has a headquarters and service company instead of a traditional BSB. The headquarters and service company is a modular unit and serves as the BSB for the artillery brigade. The headquarters and service company consists of three platoons: the headquarters platoon, distribution platoon, and the automotive/armaments maintenance platoon.

2-95. The headquarters and service company does not have organic FSCs. Each assigned artillery regiment in the brigade has an attached FSC. The FSCs are numbered companies tailored to support the type of regiment they support. The brigade commander may attach the FSC to the headquarters and services company or to the artillery regiment as required. The field artillery headquarters and service company also lacks an organic medical company and depends upon area support medical units. Figure 2-9 on page 2-20, and Figure 2-10 on page 2-21 depict the headquarters and service company organization and battlefield array.

2-96. The maintenance platoon is responsible for maintenance on headquarters and service company and brigade headquarters equipment. The maintenance platoon has contact trucks to provide capability to repair equipment at the point of need, but, due to its limited size, the maintenance platoon will often require a daily resupply from the supporting CSSB of mission critical repair parts.

Field Artillery Brigade, Headquarters and Service Company

- **Role:** The HSC provides logistics, ammunition, and limited maintenance support to a Field Artillery Brigade.
- **Capability:** The HSC is an expeditionary, multi-functional logistics company capable of operating at the tactical level.
- **Parent:** Field Artillery Brigade.
- **Command Relationship:** Organic.
- **Support Relationship:** Direct Support.
- **Span of Operations:** Field Artillery Brigade area of operations.
- **Mobility:** Requires 100% mobility in a single lift using organic vehicles.

2-97. For additional information regarding the structure of the field artillery, brigade headquarters and service company refer to ATP 4-90.

2-98. The headquarters and service company receives orders from the field artillery brigade headquarters. Depending on the mission and attachments, the company staff may have to coordinate for supplies and resupply from a supporting CSSB. This is especially applicable to class IX support and distribution.

2-99. The brigade commander provides taskings to the headquarters and service company through operations orders or fragmentary orders. Typical information in the order includes identification of supported units, the support relationship with each unit, priority of support, attachments and detachments to the headquarters and service company as required. The headquarters and service company commander and key leaders use troop-leading procedures (FM 6-0) to conduct mission analysis, develop courses of action, plan maintenance support, and direct subordinate elements.

2-100. The headquarters and service company establishes routine communications with the headquarters for reporting purposes. Typical reporting requirements include a LOGSTAT providing the status of the headquarters and service company's maintenance support capability and on hand class VII and IX. The LOGSTAT also includes the status of the headquarters and service company's organic equipment and supplies to include pacing items, critical maintenance sets, kits, outfits, and TMDE. The headquarters and service company commander also provides recommendation to the brigade SPO and Commander regarding sustainment maintenance requirements

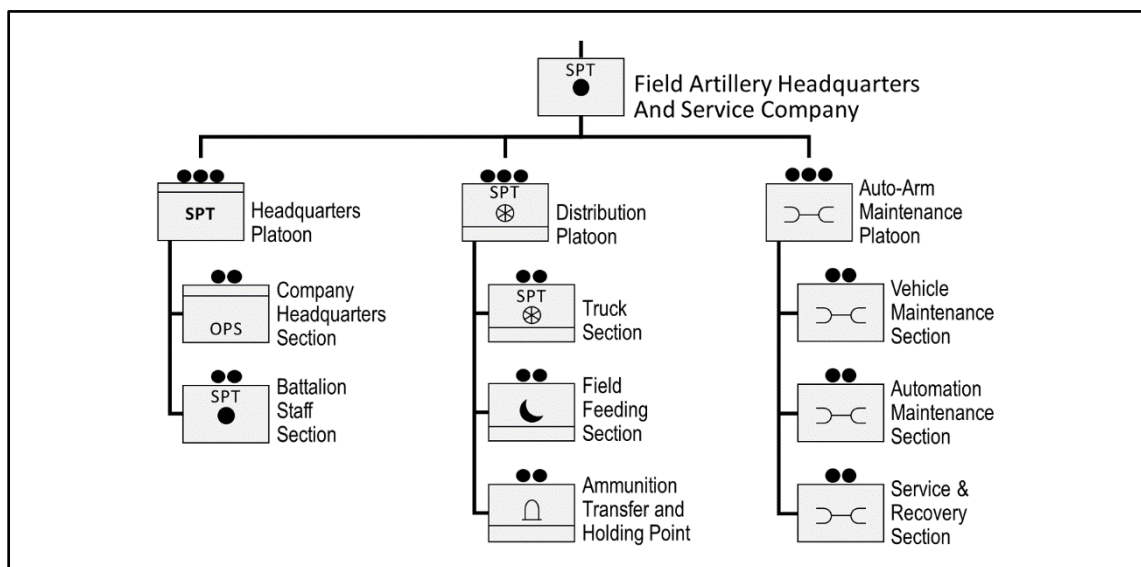


Figure 2-9. Field artillery brigade headquarters and service company

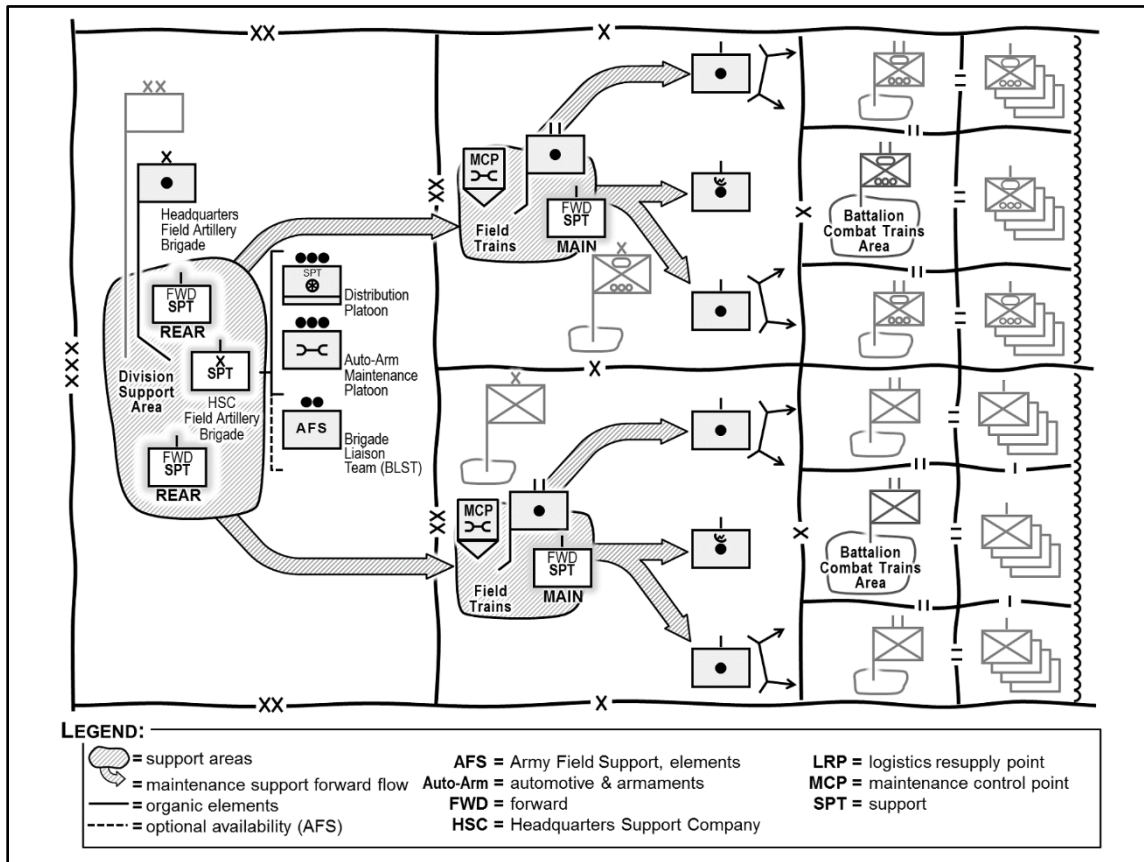


Figure 2-10. Field artillery brigade headquarters and service company, battlefield array

INFANTRY OR AIRBORNE TASK FORCE SUPPORT COMPANY

2-101. Infantry or airborne task forces are units designed to fight independently. Approximately one-third the size of a BCT, a task force contains the combat and support elements necessary to fight autonomously of BCTs. The infantry and airborne task force support company, also called ITFSC or ATFSC, serves a detached or independent battalion-sized element.

2-102. Support companies are permanent organizations assigned to support and sustain standing, separate infantry task forces. The infantry task force support company is identical in size and capability to the airborne task force support company. The support company is organic to the task force and depends on the task force headquarters and staff for administrative support, planning and operations management, and sustainment automation support. The support company's capabilities are similar to those found in a FSC. The support company contains a distribution, headquarters and maintenance platoon. The maintenance platoon consists of a maintenance control section; a wheeled maintenance section; a service and recovery section; and field maintenance teams (FMT) that support armament, radar, communication, and electronic repair requirements.

Infantry or Airborne Task Force Support Company

- **Role:** The Task Force Support Company provides logistics, field feeding, and limited maintenance support to an Infantry or Airborne Task Force.
- **Capability:** The Task Force Support Company is an expeditionary, multi-functional logistics company capable of operating at the tactical level.
- **Parent:** Infantry or Airborne Task Force.
- **Command Relationship:** Organic.
- **Support Relationship:** Direct Support.
- **Span of Operations:** Infantry or Airborne Task Force area of operations.
- **Mobility:** Requires 100% mobility in a single lift with organic assets.

2-103. The infantry and airborne task force support company commander receives orders from the task force commander. The infantry and task force support company will have to coordinate supply and resupply with a CSSB or sustainment brigade operating in the area of operations.

2-104. The task force commander provides tasking to the support company commander through operations orders or fragmentary orders. Typical information in the order includes identification of supported units, the support relationship with each unit, priority of support, attachments and detachments to the support company commander as required. The support company commander and key leaders use troop-leading procedures to conduct mission analysis, develop courses of action, plan maintenance support, and direct subordinate elements.

2-105. The support company commander establishes routine communications with the headquarters for reporting purposes. Typical reporting requirements include a LOGSTAT providing the status of the support company's maintenance support capability and on hand classes of supply. The LOGSTAT also includes the status of the support company commander's organic equipment and supplies to include pacing items, critical maintenance sets, kits, outfits and TMDE. The support company commander also provides recommendations to the task force commander regarding sustainment maintenance requirements. Figures 2-11 and 2-12 depict an infantry task force support company and a notional battlefield array. For additional information regarding the organization and capabilities of the infantry task force support company see ATP 4-90.

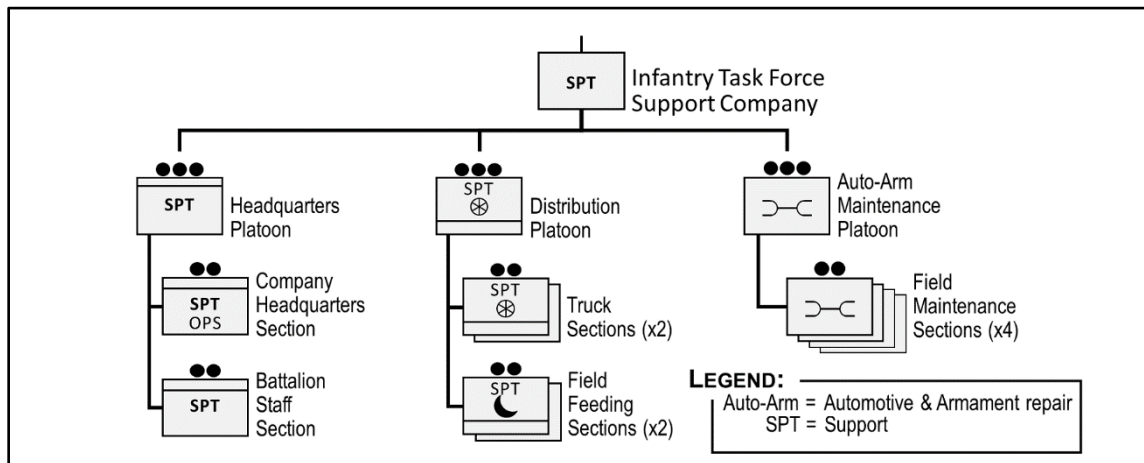


Figure 2-11. Infantry task force support company

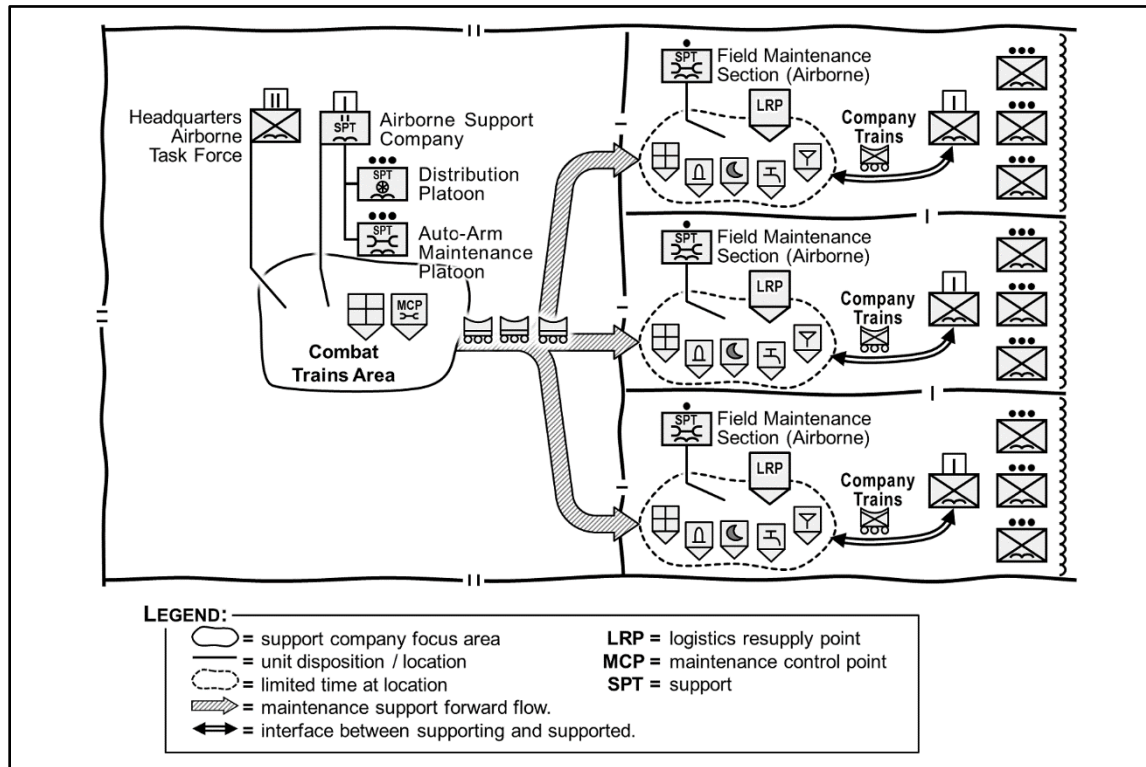


Figure 2-12. Infantry task force support company, battlefield array

FIELD MAINTENANCE COMPANY

2-106. FMCs are organic to the BSB within a BCT and most support brigades. The Army tailored the FMC's structure to the brigade's mission. The mission of the FMC is to provide field maintenance support to units in the brigade that are not supported by an FSC and provide specialized low-density field maintenance support to the entire brigade.

2-107. The BSB may task organize the FMC, and establish authorities, and priorities. The BSB maintains administration and support authority over the unit. The staff integrates the FMC through the communications network and may require the FMC to provide a liaison to the headquarters.

2-108. The FMC receives tasking through operations orders or fragmentary orders. Typical information in the order includes identification of supported units, the support relationship with each unit, priority of support, attachments and detachments to the FMC as required. The FMC commander and key leaders use troop-leading procedures to conduct mission analysis, develop courses of action, plan maintenance support, and direct subordinate elements.

Field Maintenance Company

- **Role:** The BSB field maintenance company provides field-level maintenance support to the BSB and brigade combat team.
- **Capability:** The field maintenance company performs field-level maintenance on or near the unserviceable piece of equipment or weapon system utilizing line replaceable units or modules and component replacement or repair.
- **Parent:** Brigade Support Battalion.
- **Command relationship:** Organic to a Brigade Support Battalion.
- **Support relationship:** General support to the BSB and BCT.
- **Span of operations:** Brigade Combat Team area of operations, typically located in the Brigade Support Area.
- **Mobility:** Requires 100% mobility in a single lift using organic vehicles.

2-109. The BSB commander provides command and control and directs the FMC to establish routine communications with the headquarters for reporting purposes. Typical reporting requirements include a LOGSTAT providing the status of the FMC's maintenance support capability and on hand classes of supply. The LOGSTAT also includes the status of the FMC's organic equipment and supplies to include pacing items, critical maintenance sets, kits, outfits, and TMDE. The FMC commander also provides recommendations to the BSB SPO and Commander regarding sustainment maintenance requirements.

2-110. The FMC provides automotive, armament, ground support equipment, C&E maintenance support including signal assemblages, electronic missile systems repair, radar repair, allied trades support, recovery support, and maintenance management support to the BSB and provides reinforcing support in all areas to FSCs. It also provides support to the brigade and serves as the central entry and exit point for all equipment requiring evacuation for sustainment maintenance evacuation. For additional information on the organization and capabilities of the FMC, see ATP 4-90.

2-111. The FMC possesses limited reinforcing capabilities in the area of automotive maintenance and recovery support. It has expanded capability in armaments, electronics, and allied trades. The FMC does not have the ability to provide maintenance on the BCT's main weapon systems (M-1 Abrams, M-2/3 Bradley, Paladin, or Stryker). The Ordnance Corps trained maintainers for those systems are only in the FSC. Figure 2-13, and Figure 2-14 on page 2-26 depict the units assigned to an FMC supporting an Armored BCT and a notional battlefield array.

2-112. The FMC establishes communication with all supported units to enable effective maintenance support and coordination. This ensure the FMC has all supported unit locations and equipment density. The FMC uses this coordination to assist in planning and work loading their on-site maintenance teams. It also enable the FMC to identify if the supported unit has mechanics assigned. If so, the FMC may coordinate with the unit to incorporate the mechanics into the maintenance effort. In some instances, this may result in the temporary attachment of the supported unit's mechanics into the FMC maintenance section.

2-113. The FMC is responsible for management of all supply stocks required to support its maintenance function, predominately class III(p) and class IX. Execution of materiel management functions including supply planning, requirements determination, requirements verification, stock control, asset visibility, and asset reporting. During peacetime, some units consolidate the FSC field maintenance team's low density MOSs in the FMC for efficiency, ease of training, and mentoring by the senior non-commissioned officers (NCOs) and warrant officers.

2-114. FMCs within armored brigade combat teams utilize the Direct Support Electrical Systems Test Set, also known as DSESTS, or the Next Generation Automatic Test System, also known as NGATS, to test line replaceable units and shop replaceable units for the Abrams and Bradley including those that provide vehicle power distribution, forward looking infrared cameras, data management, optics and sighting, ballistic solutions, and GPS. The direct support electrical systems test sets enables maintainers to perform diagnostics that will assist them in repairing and replacing line replaceable unit components. The Next Generation Automatic Test System expands diagnostic testing to the Paladin and Avenger systems. The diagnostic systems also prevents line replaceable units from being turned in to the supply system with no evidence of failure, also referred to as NOEF.

2-115. Repairing and replacing line replaceable units and shop replaceable units within the BCT saves time, space, and money. When a shop replaceable unit or line replaceable unit is identified as unserviceable a work order is opened with the supporting BSB's C&E shop. The C&E shop utilizes diagnostic spares to isolates the defective component in the line replaceable units or shop replaceable unit and replaces the faulty element. Diagnostic stocks are elements of the shop stock maintained for classification, testing or repair of defective elements and are managed in a similar manner to special tools. The shop then returns the line replaceable unit or shop replaceable unit to the FSC as shop stock. If the C&E shop tests the defective part and classifies it as non-reparable then the part is sent back to the FSC. The FSC then orders a replacement from the supporting a BCT's supply support activity (SSA) stocks or from wholesale stocks. Faulty line replaceable units and shop replaceable units are typically replaced from BCT stocks.

2-116. BSBs and SSA work in concert to ensure that line item number requests for line replaceable units and shop replaceable units are not filled until they verify that the ordered line replaceable or shop replaceable unit

is classified as non-reparable. This manual process will continue at the unit level until an automated process is put in place. This check and balance alleviates excess stock accumulation in the FSC.

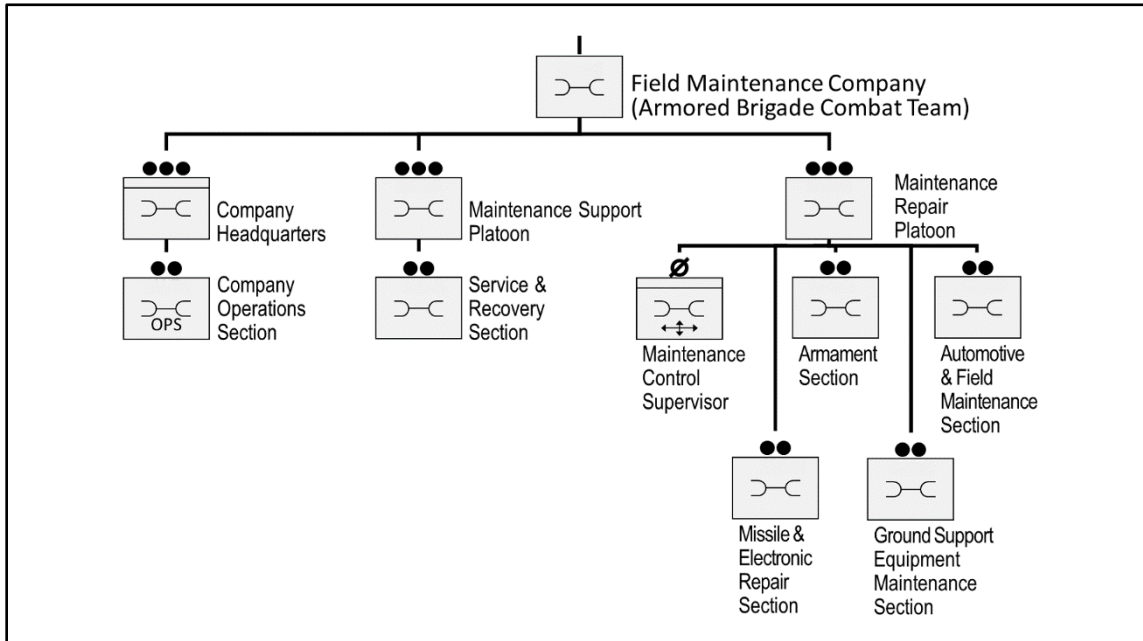


Figure 2-13. BSB field maintenance company in an ABCT

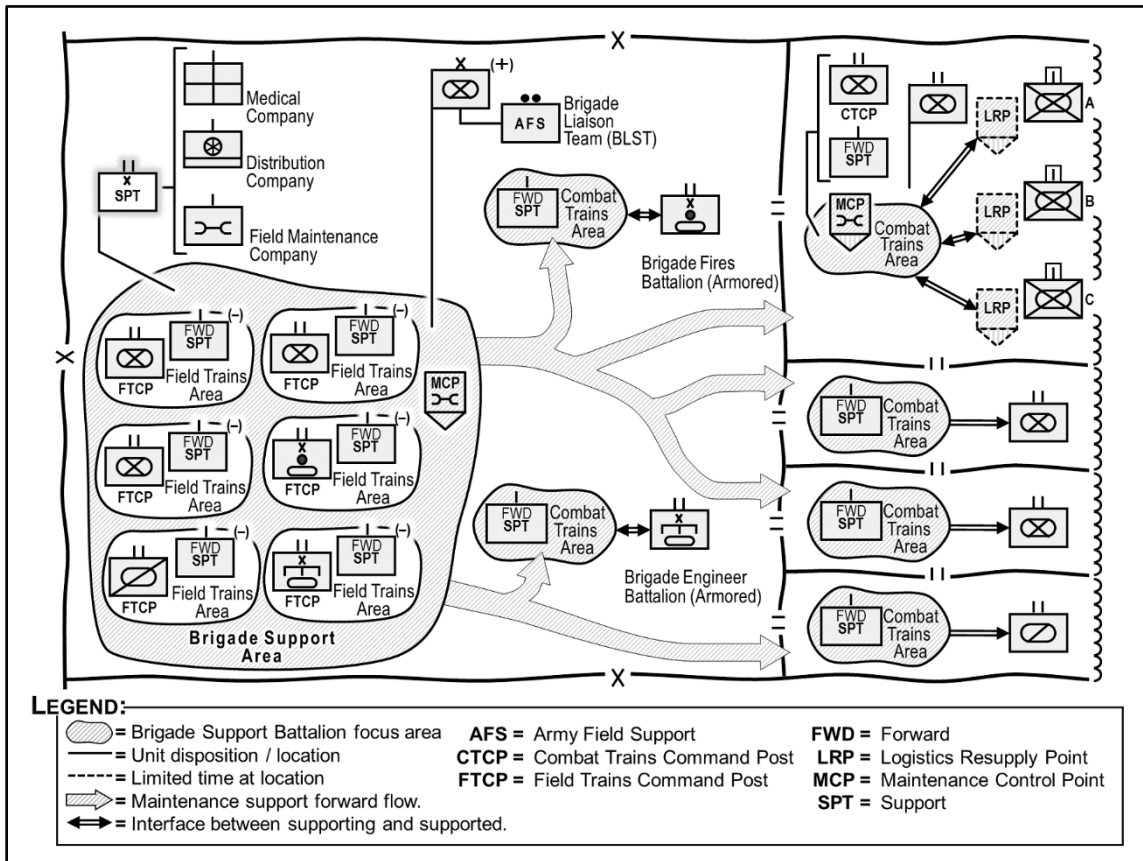


Figure 2-14. BSB field maintenance company in an ABCT, battlefield array

FORWARD SUPPORT COMPANY

2-117. FSCs are organic to the BSB in a BCT and attached in most support brigades. The role of the FSC is to provide direct logistics support to include field maintenance to a maneuver battalion. The FSCs are the link from the BSB to the supported battalions. The FSCs are the organizations that provide the battalions and BSB commander the greatest flexibility for providing logistics support across the brigade.

2-118. The BSB can task organize the unit, assign it to an area of operations, and establish authorities. The BSB provides administration and support authority over the FSC. The BSB integrates the FSC into staff operations and communicates with it through the BSB communications net. In addition, the FSC may be required to provide a liaison to work within the BSB staff.

2-119. This provides the BSB commander and the BSB SPO staff the flexibility to task organize the FSCs and cross-level maintenance assets amongst the FSCs when it is necessary to weight the maintenance support to specific battalions within the brigade. FSCs depend on the BSB for administrative support, some logistic support, and technical oversight.

2-120. Depending on the current operation and situation, the brigade commander may place a FSC under operational control, known as OPCON, of its supported battalion. In this command relationship the maneuver battalion may task organize the unit, establish authorities, and establish priorities. The maneuver battalion staff integrates the FSC through the communications network and may require the FSC to provide a liaison to the headquarters. While operating under an operational control command relationship the FSC will typically have reporting functions to both the maneuver unit and the parent BSB. The BSB will continue to provide administrative support. FSC attachment or operational control to its supported battalion is generally limited in duration and should only be for a specific mission or phase of an operation.

Note: Establishing a command relationship between the FSC and its supported maneuver battalion limits the BSB commander's, and ultimately the brigade commander's, flexibility to support the brigade.

Forward Support Company

- **Role:** The Forward Support Company provides logistics in direct support to a specific supported battalion.
- **Capability:** The Forward Support Company provides field feeding, bulk fuel, general supply, ammunition, and field-level maintenance in direct support of a supported battalion.
- **Parent:** Brigade Support Battalion.
- **Command Relationship:** Organic to a Brigade Support Battalion; may be attached or OPCON to its supported battalion for a limited duration.
- **Support Relationship:** Direct support to its specific maneuver battalion; general support to other units in the BCT, General support to others on a limited basis by exception.
- **Span of Control:** Brigade Combat Team area of operations from the BSA to the forward line of troops.
- **Mobility:** Requires 100% mobility in a single lift using organic vehicles.

2-121. The FSC provides field maintenance teams as far forward as possible and does the bulk of its work no further back than the MCP though on occasions elements may move into the front lines. Tasking orders should contain all of the information required for the FSC to coordinate support to the assigned maneuver company. Each FSC is designed to support a specific type of maneuver battalion or squadron. FSCs provide field feeding, fuel, ammunition, field maintenance, and distribution support to a battalion. The structure of FSCs is similar with the most significant differences in the maintenance capabilities.

2-122. The FSC's maintenance platoon performs both field maintenance on company vehicles and equipment; and maintenance management functions for the unit and supported battalion. The maintenance platoon leader coordinates all maintenance requirements with the FSC commander. The platoon consists of the platoon headquarters section, maintenance control section, maintenance section, recovery section and the FMTs.

2-123. The maintenance control section is the management center for all maintenance actions in the FSC and supported battalion. The maintenance control section performs maintenance management functions, dispatching operations, and tracks scheduled services for the maneuver battalion and FSC. The maintenance control section also has a small supply section that provides class IX support including shop stock and bench

stock for shop operations. It also provides exchange of reparable items. The maintenance control officer is the senior maintenance representative in the maintenance control section and manages the maintenance control section, maintenance section, service and recovery section, and the FMTs. The maintenance control section also oversees execution of materiel management functions including supply planning, requirements determination, requirements verification, stock control, asset visibility, and asset reporting.

2-124. The FSCs normally operate in close proximity to its supported battalion. The supported battalion determines the location of the FSC. The distance between the FSC and the battalion is based on mission variables. Figures 2-15 and Figure 2-16 depict a typical structure of the FSC and a notional battlefield array.

2-125. The BSB commander or the maneuver battalion commander, if the FSC is directly attached, provides taskings to the FSC through operations orders or fragmentary orders. Typical information in the order includes identification of supported units, the support relationship with each unit, priority of support, attachments and detachments to the FSC as required. The FSC commander and key leaders use troop-leading procedures (FM 6-0) to conduct mission analysis, develop courses of action, plan maintenance support, and direct subordinate elements.

2-126. The FSC establishes routine communications with the headquarters for reporting purposes. Typical reporting requirements include a LOGSTAT providing the status of the FSC's maintenance support capability and on hand class VII and IX. The LOGSTAT also includes the status of the FSC's organic equipment and supplies to include pacing items, critical maintenance sets, kits, outfits, and TMDE. The FSC commander also provides recommendation to the BSB or maneuver battalion SPO and commander regarding sustainment maintenance requirements.

2-127. The FSC establishes communication with all supported units to enable effective maintenance support and coordination. This ensure the FSC has all supported unit locations and equipment density. The FSC uses this coordination to assist in planning and work loading their field maintenance teams.

2-128. The FSC supporting the brigade engineer battalion in the armored brigade combat team and SBCT provide maintenance support to the armored vehicles assigned to the Brigade's headquarters company. Wheeled vehicles are typically maintained by the FMC.

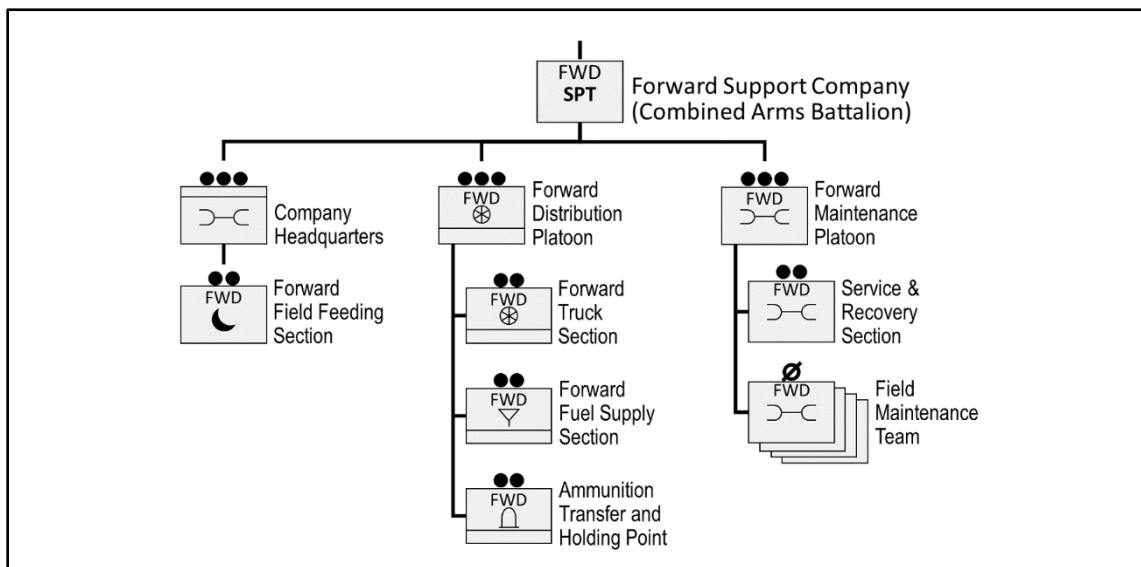


Figure 2-15. FSC supporting a combined arms battalion

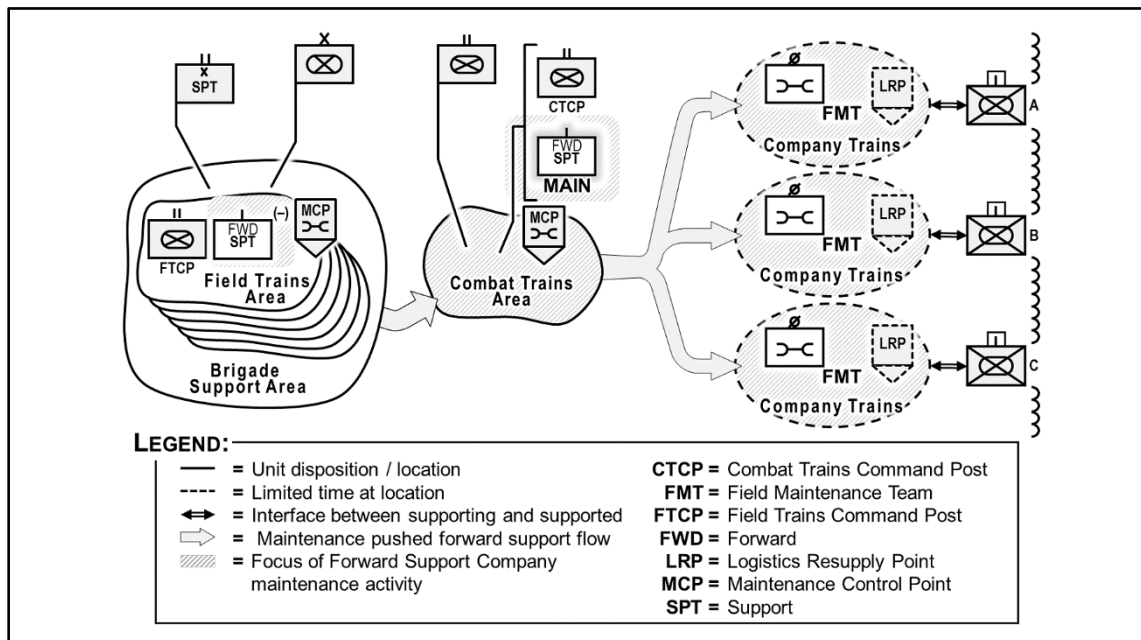


Figure 2-16. FSC supporting a combined arms battalion, battlefield array

FIELD MAINTENANCE TEAM

2-129. The FMTs provide field maintenance for all combat platforms in the supported unit. The FMTs provide field maintenance and BDAR to maneuver companies. All or part of a FMT typically travels with the company teams.

Note: Field maintenance teams are tailored to the requirements of the BCT they support. IBCT and SBCT FSCs do not have FMTs.

2-130. The supported company commander and the maintenance control section establish the field maintenance team's priorities in accordance with the battalion commander's guidance. The field maintenance team's maintenance non-commissioned officer in charge supervises the field maintenance team, which operates under the operational control of the maneuver company. The maneuver unit fully integrates FMTs into their operational plans.

2-131. FMTs perform field maintenance repairs as far forward as possible to return equipment to the battle quickly. The teams perform BDAR, diagnostics, and on-system replacement of line replaceable units. If the tactical situation permits, FMTs focus on completing jobs on-site. FMTs carry limited on-board combat spares to facilitate forward repairs. The FSC's maintenance platoon provides reinforcing maintenance to the FMTs when required.

SECTION V - MANEUVER ROLES IN MAINTENANCE

2-132. A wide range of maintenance roles and responsibilities reside within maneuver formations. These roles encompass personnel from Corps level staff officers to the average crewman and operator. This section briefly touches on key maintenance management, planners and performers within maneuver formations.

CORPS AND DIVISION

2-133. The corps G-4 is dual-hatted as the chief of sustainment and is responsible for coordinating the efforts of the G-1, G-8, and surgeon sections. The G-4 serves as both the chief of sustainment cell and the logistic

section chief. The corps main command post sustainment cell provides oversight for corps logistic operations. The G-4 and staff's major responsibilities include—

- Developing the corps operation plan service support annex.
- Coordinating external logistic support.
- Formulating policy, procedures, and directives related to materiel readiness.
- Formulating and implementing policy and procedures for classes of supply and related services.
- Monitoring and reporting the status of corps logistic automated information systems.
- Coordinating with internal and external activities and agencies regarding mobility operations.
- Monitoring corps logistic operations.

See ATP 3-92, *Corps Operations*, for additional information on the duties and responsibilities of the Corps G-4.

2-134. The division G-4 establishes close coordination with the organizations providing sustainment. The division does not have a command relationship with supporting TSC, ESC, or sustainment brigade(s). The division's supporting sustainment brigade(s) is task-organized by the theater sustainment command or expeditionary sustainment command to support the division's operations.

2-135. The G-4 maintains an accurate status of the quantity and location of critical logistics supplies as they arrive in the division's support area and recommends their allocation to the G-3, the chief of staff, and the commander. The G-4 also maintains the status of committed unit class I, III, and V and may be tasked to supplement the limited recovery assets of assigned BCT brigade support battalion with additional heavy equipment transporters from supporting combat sustainment support battalions. For additional information on the Division G-4's duties and responsibilities, see ATP 3-91, *Division Operations*.

BRIGADE COMBAT TEAM

2-136. The BCT is the Army's primary combined arms, close combat force. BCTs often operate as part of a division or joint task force. The BCT commander has the overall responsibility for the BCT's equipment readiness and combat power.

2-137. The BCT executive officer is the commander's principal assistant and directs staff tasks, manages and oversees staff coordination, and special staff officers. The commander normally delegates executive management authority to the executive officer. The executive office provides oversight of sustainment planning and operations for the BCT commander. The Executive Officer provides oversight of sustainment planning and operations to include the BCT's maintenance status.

The BCT S-4 is the principal staff officer for sustainment planning and operations, supply, maintenance, transportation, field services, distribution, and operational contract support. The S-4 provides staff oversight to assigned units in the areas of supply, maintenance, transportation, and field services. The duties of the S-4 include monitoring and analyzing the equipment readiness status of all BCT formations; developing logistics plans and support annexes to support operations; recommending sustainment priorities and controlled supply rates to the commander; and monitoring and analyzing the equipment readiness status of all assigned units. For additional information, see FM 3-96.

BATTALION

2-138. The battalion commander has total responsibility for the battalion and its actions. The battalion commander commands all battalion units, whether organic, assigned, under an operational control, or attached command relationship. The commander plans the unit's operations with the assistance of staff and subordinate leaders. The commander leads the battalion by providing purpose and direction to accomplish the mission and by his presence and direction during operations. The battalion commander has the overall responsibility for the battalion's equipment readiness.

2-139. The executive officer is the principal assistant to the battalion commander. As the second in command, the executive officer must be ready to assume command immediately if the commander becomes a casualty. The battalion executive officer's two main responsibilities are to direct the operational efforts of the staff and to sustain battalion readiness. The executive officer provides oversight of sustainment planning and operations

to include the battalion's maintenance status. The Battalion's principal sustainment planners include the S-4, S1, FSC Commander all of whom work with the Battalion executive officer.

2-140. The command sergeant major is the senior NCO in the battalion. The command sergeant major is responsible for providing the commander with personal, professional, and technical advice on enlisted Soldier matters and the NCO Corps as a whole. The command sergeant major also plays a key role in the sustaining effort as the sustainment troubleshooter for the battalion.

2-141. The battalion S-4 is the coordinating staff officer for sustainment operations. The S-4 provides staff oversight to the battalion in the areas of supply, maintenance, transportation, and field services. The duties of the S-4 include developing logistics plans and support annexes to support battalion operations; coordinating with the supporting FSC and BSB on current and future support requirements and capabilities; and monitoring and analyzing the equipment readiness status of all battalion units. The battalion S-4 is usually the officer in charge of the combat trains command post, also known as the CTCP. The S-4 is the staff integrator for the FSC commander, who executes sustainment operations for the battalion. The S-4 provides guidance to these assets as well as those of the FSC. The S4, S1, FSC CDR and battalion executive officer are the principal sustainment planners.

2-142. The battalion leadership will ensure FSC command presence at the supported battalion's combat trains command post and the field trains command post. The FSC personnel in the trains require dedicated communication and computer equipment to facilitate sustainment support. For additional information, see ATP 3-90.5, *Combined Arms Battalion*.

COMPANY

2-143. The company commander is responsible to the battalion commander for leadership, discipline, training, and sustainment activities in the company. The company commander has the overall responsibility for the company's equipment maintenance and readiness and is responsible for the company's success in combat.

2-144. The executive officer is second in command of the company whose primary role is to assist the commander in mission and sustainment planning and accomplishment. The executive officer assumes command of the company as required. The executive officer plans and supervises the company's maintenance effort before battle with the first sergeant and works with the first sergeant, platoon leaders, platoon sergeants and maintenance team chief to maintain a current operating picture on maintenance. The executive officer regularly updates the company commander on the maintenance status. The executive officer coordinates with the battalion S-4 and battalion operations staff officers in planning and resourcing the company's missions.

2-145. The company first sergeant is the senior NCO and normally the most experienced Soldier in the company. The first sergeant is the commander's primary tactical advisor and the expert on individual and NCO skills. The company's first sergeant is the primary sustainment operator. The first sergeant assists the commander to plan, coordinate, and supervise all logistical activities that support the tactical mission. The first sergeant works closely with the executive officer in sustainment planning for the company. The first sergeant operates where the commander directs, usually positioned with the Company trains and places the FMT or contact team within the perimeter.

2-146. The master gunner, where assigned, is the company's expert in vehicle gunnery. The master gunner also assists turret mechanics from the FMT in troubleshooting and repairing turret main armament and fire control systems. In the planning and preparation phases, the master gunner assists in sustainment coordination and execution.

2-147. The company supply sergeant requests, receives, issues, stores, maintains, and turns in supplies and equipment for the company. The supply sergeant also plays a key role beginning with anticipating and reporting logistical requirements. Company supply sergeants generally position themselves with the FSC. The supply sergeant coordinates and monitors the status of the company's logistics requests and coordinates with the FSC and supervises the organization of the company logistics package, also called the LOGPAC, in the field trains.

2-148. The company signal support specialist, also known as the senior radio operator, supervises the operation, maintenance, and installation of organic digital, wire, and frequency modulation communications. During tactical operations, the signal support specialist is typically attached to the company FMT or maintenance contact team. The signal support specialist performs limited troubleshooting of the company's

organic communications equipment and provides the link between the company and the BSB FMC for maintenance of communications equipment.

PLATOON

2-149. The platoon leader leads his Soldiers by personal example and is responsible for platoon equipment maintenance and for the platoon's success in combat. The platoon leader is responsible to the company commander for providing leadership, discipline, training, as well as sustainment activities in the platoon.

2-150. The platoon sergeant is the platoon's most experienced NCO and second in command. The platoon sergeant is accountable to the platoon leader for the leadership, discipline, training, and welfare of the platoon's Soldiers. The platoon sergeant coordinates the platoon's maintenance and logistical requirements and compiles maintenance reports and provides them to the platoon leader and company first sergeant.

2-151. The operator and/or crew perform preventive maintenance checks and services. Based on mission variables, the Soldier can diagnose and replace subcomponent items as outlined in the MAC charts.

2-152. For additional information on key maintenance personnel with the company and platoon see ATP 3-21.10, *Infantry Rifle Company*, and ATP 3-90.1, *Armor and Mechanized Infantry Company Team*.

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Chapter 3

Maintenance Planning Considerations

Army strategic operations require continuous, simultaneous combinations of offense, defense, and stability or defense support of civil authority tasks. Planning for maintenance support for these operations requires thorough mission analysis, careful identification of the force supported, and an understanding of the commander's intent. This chapter discusses the nature and conduct of maintenance-related activities that occur within an OE associated with either contiguous or non-contiguous battlefields.

Maintenance is one of the logistics functions that support Soldiers and their systems in the field. It sustains materiel in an operational status, restores it to serviceable condition, or upgrades its functional utility through modification or product improvement.

SUSTAINMENT OPERATIONAL ART AND PLANNING FOR MAINTENANCE OPERATIONS

3-1. Commanders, both maneuver and sustainment, must use operational art to develop a vision of how to establish conditions that accomplish their assigned missions and objectives. Commanders and staffs use operational art to develop strategies and operations to organize and employ tactical forces. While accepting and accounting for risk, commanders and staff use their collective skill, knowledge, experience, creativity and judgement to integrate ends, ways and means. Commanders use operational art to pursue strategic objectives through the arrangement of tactical action in time, space and purpose. Operational art allows commanders to translate their operational approach into a clear and concise concept of operation that is disseminated in an operations order.

3-2. Commanders use the elements of operational art to understand the OE and to develop a concept of operations. The following elements can be used selectively in an operation as required—

- End state and conditions.
- Center of gravity.
- Decisive points.
- Lines of operation and lines of effort.
- Tempo.
- Phasing and transitions.
- Culmination.
- Operational reach.
- Basing.
- Risk.

3-3. Maintenance planners in an operational headquarters generally do not drive the planning process but must be fully integrated throughout the process. Maintenance planners use the commander's intent, planning guidance, and MDMP to develop the maintenance concept of support. They derive the concept of support from running estimates developed using a variety of planning tools. These running estimates project casualty figures, maintenance requirements, software patches, and other sustainment requirements (see ADRP 5-0 for additional information). Maintenance planners participate in all aspects of MDMP to ensure synchronization and unity of effort.

3-4. Effective maintenance plans balance three elements: identify requirements (the minimum number of available weapon systems required for mission success); identify available maintenance resources (what maintenance and repair parts capability is on hand to meet the mission); and manage the maintenance resources for maximum effect (establishing priorities, task organizing to weight the main effort, posturing class IX, anticipating shortfalls). This last requirement is aligned to the unit with maintenance priority, and the priority of work assigned to the key systems. Prioritization is used to identify how maintenance support is weighted for the mission. Figure 3-1 illustrates the maintenance planning process.

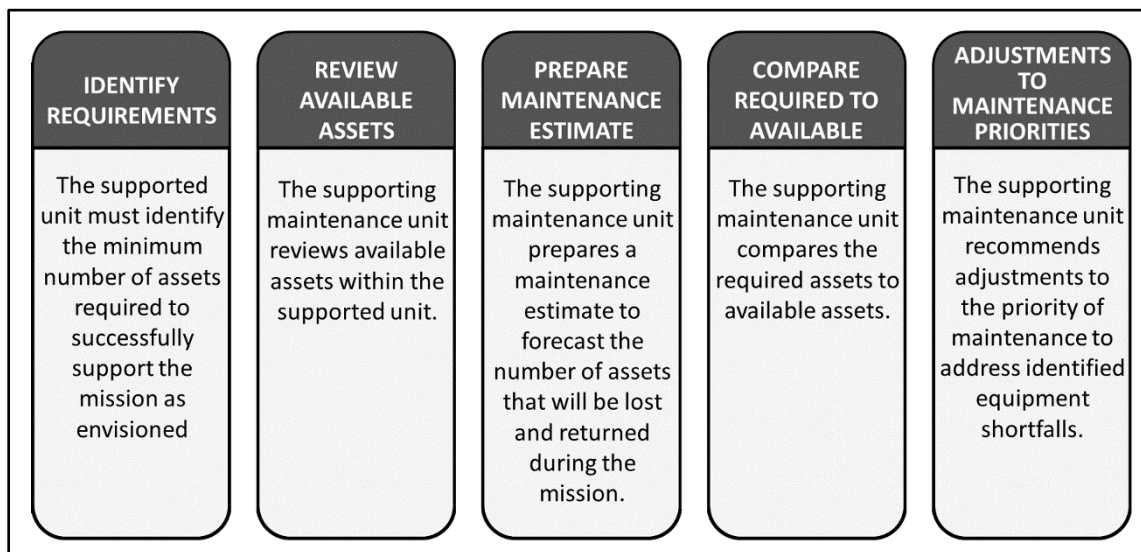


Figure 3-1. The maintenance planning process

3-5. As soon as the higher headquarters identifies a mission, the staff should initiate maintenance mission specific planning. The S/G-3 initiates planning, identifies tasks, and priority of support. The S3 section within the BCT has the added benefit of a dedicated logistician who is present to provide sustainment subject matter expertise. The maneuver commander establishes maintenance priorities based on the systems and units that are critical to the success of the operation.

3-6. Through task organization, commanders establish command or support relationships and allocate resources to weight the decisive operation or main effort. The concept of operations may also identify a main effort (if required); otherwise, the priorities of support go to the unit conducting the decisive operation. The *main effort* is a designated subordinate unit whose mission at a given point in time is most critical to overall mission success (ADRP 3-0). The commander normally weights the main effort with the preponderance of combat power. Designating a main effort temporarily gives that unit priority of maintenance support. *Priority of support* is set by the commander to ensure a subordinate unit has support in accordance with its relative importance to accomplishing the mission (ADRP 5-0). Commanders may shift the main effort and priority of support during an operation and subsequently the priority of maintenance support will shift accordingly. Commanders shift resources and priorities to the main effort, as circumstances and the commander's intent require.

3-7. The staff planners calculate the minimum number of weapon systems required to complete the mission. The S/G-4, S/G-3 and maintenance planners work together to determine how many of the key systems identified are mission ready and then coordinate with the supporting maintenance organizations to repair systems to meet the minimum number required for the mission. The supporting maintenance organization prioritizes work around shortfalls in the key systems working from highest to lowest priority.

3-8. The staff wargames the operation and prepares an estimate from projected system losses and gains during each stage of the operation. They then develop a maintenance estimate to determine if or when the unit can be expected to drop below the minimum requirement of systems for success.

3-9. The support operations officers at all echelons along with the supported S/G-4 are responsible for synchronizing resupply operations to ensure adequate class IX supplies are available to support the mission. The supply locations and routes are integrated into the scheme of maneuver to ensure proper timing to avoid interfering with likely or planned maneuver actions.

3-10. Commanders determines whether to utilize BDAR on battle damaged equipment when standard maintenance repairs are not practical. The commander may also approve the use of controlled exchange or cannibalization to meet repair parts requirements. Cannibalization is only utilized during combat operations. Commanders must clearly communicate the authority to use BDAR, controlled exchange, and cannibalization in the operation order. The commander may limit these actions to a specific operation or phase of an operation. The support operations staff can also task or attach maintenance assets to supported units and help expedite parts delivery by ground or air to speed repairs and equipment return to a supported unit.

3-11. Commanders at echelon can utilize fabrication to enable rapid replacement of critical repair parts or to enhance BDAR. Fabrication on the battlefield is a critical capability that utilizes many different technologies including additive and subtractive processes. Emerging additive manufacturing technologies can drastically reduce the amount of time it takes to obtain or make parts. This technology also enables the production of shapes that are impossible with traditional manufacturing processes. Subtractive manufacturing using computer numerical controlled mills and lathes enhance a Soldier's ability to fabricate and replicate items in an expeditionary environment.

3-12. Commanders position maintenance personnel and teams as far forward as possible to support maneuver units. The maintenance personnel and teams must have the necessary transportation, communication assets, tools, security, and repair parts to ensure rapid repair and return of non-mission-capable equipment to support the operation. Reliable sustainment information system connectivity is required for these teams to rapidly replenish supplies and share maintenance information. Staffs should consider Aerial delivery for delivery of critical repair parts to speed repairs when feasible.

3-13. The Army currently utilized the Very Small Aperture Terminal, also known as VSAT, and the Combat Service Support Automated Information Systems Interface, also known as CAISI, to facilitate maintenance reporting and supply operations utilizing GCSS-Army. During operations in denied environments or limited connectivity, the Army may be required to operate without the benefit of electronic reporting. Commanders and staff at all levels need to develop and practice disconnected operations for use when automated systems are not available.

3-14. During periods of degraded communications maintenance work continues. Planners must have contingency plans in place to push the most frequently used bench and shop stock. Commanders must establish a timeline for transitioning from normal operations to a push operation. The timeline should be identified within the operations order. Commanders should also consider giving maintainers permission to utilize cannibalization or controlled exchange in order to maintain the combat strength. Additional information about cannibalization and controlled exchange is provided later in this chapter. Requests for class IX must expedited.

WARFIGHTING FUNCTION PLANNING CONSIDERATIONS FOR MAINTENANCE

3-15. Throughout operations, Army leaders face various problems, often requiring unique and creative solutions. Planning provides an informed forecast of how future events may unfold. It entails identifying and evaluating potential decisions and actions in advance to include thinking through consequences of certain actions. Planning involves thinking about ways to influence the future as well as how to respond to potential events. Put simply, planning is thinking critically and creatively about what to do, how to do it, and what can go wrong along the way.

3-16. Planning considerations tied to their respective warfighting function, with the exception of fires, are listed below as examples of what sustainment planners may take into account while planning for maintenance operations:

- Command and Control.
 - Expect enemy attacks on space and cyberspace domains to include the electromagnetic spectrum that will degrade communications and digital information transmission. Attacks on

these domains affect sustainment operations in terms of satellite communications, positioning, navigation, timing, information collection, internet operations, computer systems, and FM communications. Commanders must develop and execute a primary, alternate, contingency, and emergency communications plan ensuring redundancy.

- Identify sustainment forces that will support the defense reserve force in all types of defense tasks. Commanders will determine what risk is acceptable in attaching sustainment units to the reserve.
- Understand how terrain may limit/degrade communications and force retransmission stations. This is important for Combat Service Support Automated Information Systems Interface / Very Small Aperture Terminal operations.
- Movement and Maneuver.
 - Expect sustainment resupply and support elements, including recovery and maintenance assets, to operate outside the unit boundaries and beyond the forward line of troops while supporting covering, guard, screening forces, and attacking forces. Maintenance personnel must understand operational control measures to include passage of lines with maneuver forces in perimeter defense.
 - Understand and anticipate how terrain, defense obstacles, fire support coordination measures, and movement restrictions will affect the placement of maintenance assets.
 - Expect increase in unmanned aircraft system resupply items (CL III B, repair pairs, CL V) to increase during defense operations.
 - Plan for support to special operations forces at the BCT level. This includes special ammunition and special, non-standard equipment maintenance.
- Intelligence.
 - Understand enemy threat capability and enemy probable courses of action. This aids in planning unit protection operations and informs how the enemy threat may impact maintenance operations.
 - Understand the OE through analysis of all operational variables. Understand how each variable may impact maintenance and sustainment operations.
- Protection.
 - Commanders should plan to disperse forces and operations to facilitate concealment. Units must use adequate cover and concealment measures to prevent detection by enemy forces. Dispersion mitigates effects of long-range fires and attack aircraft.
 - Plan for chemical, biological, radiological and nuclear conditions to include an increase in requirements for non-potable water and chemical defense equipment. biological, radiological and nuclear defense planning must consider processing of contaminated human remains and equipment decontamination.
 - Expect direct enemy attack by small unit/special operations ground forces, attack aircraft, and long-range artillery. Commanders at all levels must ensure that defense measures are adequate to detect and defeat small unit operations (level I or level II threats).
- Sustainment.
 - BCT commanders, staff, and support operations offices may weight the main defensive effort by cross leveling sustainment and logistics assets within the brigade. This may include shifting maintenance and recovery capability in the forward support companies.

MANAGING BATTLEFIELD MAINTENANCE

3-17. When a shift or change in priorities could provide a greater overall effect, the maintenance manager takes appropriate action or makes recommendations through the chain of command. Figure 3-2 shows the basic concept for managing maintenance support. In a similar manner to the maintenance planning process above, the maintenance manager must identify the resources on-hand and those already committed to meet identified requirements. Staffs manage available resources within the established support framework to return the maximum number of items to a fully mission-capable status.

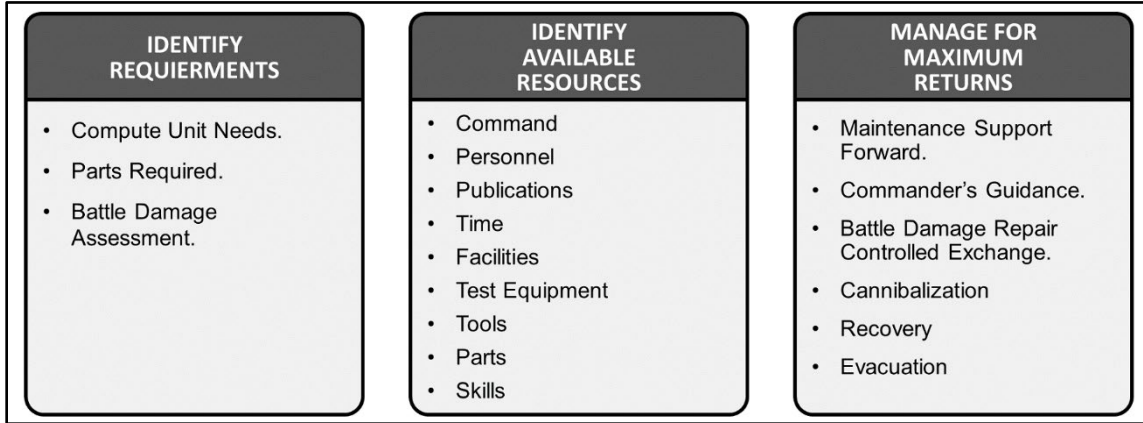


Figure 3-2. Managing battlefield maintenance support

Critical Information for Maintenance Support

3-18. Timely maintenance support is reliant on supported units providing critical information. This information includes unit locations, type of equipment requiring maintenance, type of fault, mobility status (can the equipment move on its own), parts required, number and status of supporting mechanics, and threat. Accurate reporting ensures commanders at all levels have a true picture of the capabilities of formations from the forward line of troops back. Units may utilize communications to rapidly pass information up the chain of command but must utilize a DA Form 5988-E (*Equipment Maintenance and Inspection Worksheet (EGA)*) to maintain a permanent record.

3-19. The information flowing from maneuver units on vehicle and equipment status is complemented by the statuses entered into GCSS-Army. There is often a delay before a DA Form 5988-E is entered into GCSS-Army and vehicle and equipment statuses need to be synchronized on a regular basis to ensure the commander has an accurate maintenance picture.

3-20. This critical information can be incorporated into a unit's common operating picture, also known as a COP. Reports pulled from GCSS-Army can be utilized to help populate the common operating picture. For additional information on common operating pictures see chapter 4.

Time Limits

3-21. The BCT commander, with input from the BSB commander, may establish time factors for evacuation of battle-damaged or non-mission capable equipment. Time limits identify the amount of time a piece of non-mission capable equipment can be worked on before moving it to the rear. The decision on whether or not to implement time limits must include an analysis of time-distance factors. Moving a piece of equipment to another location for service may significantly increase the amount of time it takes to return the item to the unit in a combat ready status. Time limits, when adopted, are typically included within a unit's standard operating procedures (SOP), but should provide flexibility to adjust to local conditions and operational tempo.

3-22. The maneuver unit commander and BSB commander can array their maintenance personnel across the battlefield in a manner that they believe will most efficiently allow maintainers to repair disabled or battle damaged equipment. Commanders must keep in mind if they elect to use time-factored evacuation that there is no maintenance support for key weapons systems above the FSC level. In order to have key weapons fixed in the BSA the commander must pre-position maintainers who possess the requisite skills, special tools, proper repair parts, references, and adequate time, otherwise key weapons evacuated to the BSA will not be fixed.

3-23. The FSC in the MCP must be aware of time limits established by unit SOP and manage workflow accordingly. This ensures that maintainers do not initiate repairs on equipment that cannot be completed before a planned move. The time between moves during offensive operations is typically shorter than in other operations. An accurate maintenance assessment of incoming equipment, similar to the triage process used by

medical personnel, determines priorities of work. It may also be the basis for the MCP not accepting equipment for repair. Options for equipment that is not accepted include—

- The unit can self-tow the broken equipment during the move.
- The FSC can tow the equipment.
- Maintainers may utilize BDAR to enable the equipment to move under its own power.
- Units can cannibalize or sanitize and abandon the equipment.
- Evacuate it to a rear echeloned element of the FSC if echeloned. Typically, this will be the BSA, if the maintainers there have additional time, training, and tools to fix it.
- During tactical pauses, FMTs should work to bring as many systems back into operation as possible.

3-24. During large-scale combat operations units may reach a point at which the number of non-mission capable vehicles impacts the unit's freedom of maneuver and freedom of action. The unit must decide at that point whether or not to remove a non-mission capable item; when to remove the item; and to where and how far back it should be moved. The commander must also move maintainers and their tools along with the equipment in order to repair the vehicle or piece of equipment. The commander must also keep in mind that the further back a non-mission capable piece of equipment is evacuated the longer it will take to return it to the unit. This is especially significant during offensive operations where the unit can advance significant distances within a 24-hour period.

Logistics Status Report

3-25. Logistics status reports give sustainment planners, materiel managers, and leaders a daily snapshot of on hand quantities, and future requirements. A synchronized logistics status reporting procedure is critical for leaders to monitor the readiness and logistics posture of subordinate units. Accurate and timely reporting based on task organization, equipment density, and assigned mission, enables command and control and drives decision making for each unit's specific requirements. Logistic status reports include the unit's on hand stockage levels, and what they expect to have over the next 24, 48, and 72 hours. The logistics status report enables the higher command and support units to make timely decisions, prioritize, cross level, and synchronize the distribution of supplies to sustain units at their authorized levels.

3-26. Logistics status reports normally contains personnel headcount, on hand quantities of class I, class III, and class V, and maintenance status of weapon systems, vehicles, and communication equipment. The amount of information required in a logistics status report will vary according to the commander's information requirements, the type or phase of an operation, and higher echelon requirements. Typically, submitted once daily, commander's requirements and unit battle rhythm dictate the timing of logistics status report submissions. During periods of increased intensity, the commander may require more frequent status updates

3-27. Accurately forecasting logistics requirements is a crucial process. Forecasting and mission analysis conducted at each phase of the operation provides planners with the ability to provide commanders logistic estimates that will ensure supply support throughout the operation. Supply support involves personnel from every level identifying requirements to ensure a continuous flow of materiel to supported units. Disciplined logistics status reporting result in more precise forecasting because accurate and timely reporting enables and drives materiel decision making.

Maintenance and Logistics Synchronization Meetings

3-28. Maintenance meetings are forums where leaders and maintenance managers provide the commander with a clear picture of the unit's maintenance posture, and set the conditions needed to produce maximum combat power for future operations. The meetings are key events that enable synchronization of a unit's maintenance efforts. Units at all levels can utilize both the maintenance and logistics meetings however, they are universally held within maneuver units at the brigade and battalion level.

Maintenance Meeting

3-29. The brigade maintenance meeting ensures efforts of the maintenance managers are synchronized. It ensures that all leaders and maintenance managers have a clear picture of the current and projected combat

power, who is responsible for conducting specific actions to generate combat power for future operations, and when these actions must occur. The meeting also serves as a forum to close the loop on any open actions and ensures that all maintenance resources are utilized effectively to increase combat power for future operations.

3-30. The brigade/battalion maintenance meeting is a daily meeting normally overseen by the BCT/BN executive officer. The meeting is typically held in the BCT/BN's headquarters. Other key participants include—

- BCT/BN S-4.
- BSB SPO.
- BSB SPO maintenance officer.
- Supported BN or Task Force executive officer or shop officer.
- Separate company executive officer or motor sergeants.
- BLSE representative.
- SSA officer.

3-31. Participants are expected to be prepared for the meeting and arrive with up-to-date information on their area of responsibility. For example, a maneuver battalion's executive officers should have an accurate list on non-mission capable vehicle along with the national stock number for parts required to repair the vehicle. Participants in the meeting attend in person if possible. Face-to-face interaction reduces friction and encourages synchronization. Participants who cannot physically attend the meeting should connect in through a secure communication device. Units should identify primary and secondary means of communication as part of their planning.

3-32. The agenda must meet the commander's intent and focus on issues the commander deems critical. A sample agenda includes—

- BDE/BN mission next 24/48/72 hours.
- BDE/BN priority of maintenance.
- Executive officer issues.
- SPO officer issues.
- Review of issues from previous meeting.
 - Current combat power.
 - Status of class IX parts.
 - Cross-level options.
 - Projected combat power based on maintenance management.
- Miscellaneous.
- Review of issue assignment.
- Closing comments.

Logistics Synchronization Meeting

3-33. The BDE/BN logistics synchronization, also called LOGSYNCH, meeting encompasses all classes of supply and maintenance activity. Combat and sustainment operations must be synchronized in order to predict and provide effectively executed logistical resupply operations. A lack of synchronization can affect company and platoon operations with second and third order effects that can adversely influence the BCT/BN's mission. The BDE/BN executive officer hosts the daily logistics synchronization meetings because such meetings are essential to successful sustainment execution. Effective logistics synchronization meetings are scripted events that have appropriate participation, and are used to validate logistic status reports, synchronize resupply operations, and create shared understanding amongst all of the sustainment planners.

3-34. For maintainers this meeting has the most impact on distribution of class IX repair parts. Class IX requirements are difficult to forecast during an operation because of the unknowns involved with combat and equipment wear and tear. Planners work with the SSA and maintenance support elements to predict what types and quantities of class IX will be needed during an operation.

3-35. Participation is critical in validating the logistic status reports. Having an established timeframe to conduct the meeting enables the sustainment planners to develop a battle rhythm. A key output of the logistics

synchronization meeting is an updated logistics synchronization matrix. The logistics synchronization matrix spells out who is getting what (commodities and amount), when (time window), where (grid), and how (supply point, logistics release point, forward logistics element).

3-36. Logistics synchronization meetings are typically conducted in the BSA. Attendees include the battalion executive officer, S-4, S-1, FSC key leaders, representative from the supported units, and a representative from the S-1 and S-2 staff.

3-37. A typical agenda for the logistics synchronization meeting includes—

- BDE/BN executive officer update.
- BSB executive officer update.
- Forecast items and quantities on the logistic status report.
- Specific delivery times.
- Convoy reception plan.
- Subordinate BN/Company updates:
 - Class I status.
 - Class III and IIIb status.
 - Class IV status.
 - Class V status.
 - Class IX status.
 - Maintenance status.
 - Current combat power.
 - Issues/Challenges.
 - Requests for Assistance.
- BCT/BN executive officer guidance/priorities.

Maintenance Planning in the Offense

3-38. The maneuver brigade conducts, or participates in, movements to contact, attacks, exploitations, and pursuits. Armies maintain offensive momentum to prevent the enemy from recovering from the shock of the first assault, gain the initiative, and mount a successful counterattack. Operators, crews and maintenance personnel maximize momentum by fixing inoperable equipment at the point of malfunction or damage. They enhance momentum by keeping the maximum number of weapon systems operational. Therefore, maintenance and recovery personnel perform their mission as far forward as possible.

3-39. The change from one type of operation to another, such as from a hasty attack to a pursuit, does not require a major shift in logistics plans and procedures. However, the priorities and requirements for support may change. See ATP 3-90.5 for additional information on offensive operations.

3-40. Planners ensure maintenance operations support momentum and massing at critical points. Planning considerations for maintenance support in offensive operations include rapid repair and return of non-mission-capable equipment to support the operation and establishment of command maintenance priorities. Offensive operations place a heavy requirement on BCT transportation assets. Offensive operations also increase equipment maintenance requirements and impact sustainment information system connectivity. Because of the fast pace of offensive operations and communication limitations, maintenance planning requires extensive effort to make it work effectively. Planning tasks include—

- Anticipate increased vehicular maintenance especially in operations taking place in rough terrain.
- Establish criteria for requesting additional recovery assets.
- Consider the feasibility of splitting recovery assets to provide broader coverage for attacking companies.
- Identify critical combat spares and preposition them with the frontline FMTs or have them ready to move forward on short notice.
- Ensure rapid repair and return of non-mission-capable equipment to support the operation.

- Anticipate the use of captured enemy supplies, support vehicles and petroleum, oil and lubricants. Test for contamination before use.
- Ensure that maintenance preparations do not compromise the tactical plan such as excess stockpiles of vehicles and supplies.
- Anticipate increased consumption of class III (B) and class IX due to substantial maneuver.

3-41. During the maneuver battalion's MDMP, the location of the MCP needs to be established. The BN S-3, BN S-4, FSC commander, and maintenance control officer provide input and select the location. The S-3 communicates the MCP location to the BCT S4 and SPO staff. During offensive operations, the MCP should be located as far forward as possible. The MCP is often located with the maneuver battalion combat trains command post, also known as CTCP, in order to share defensive tasks. Dispersal within the combat trains for greater protection from hostile artillery and aviation is important. The MCP can gain greater disbursement by not co-locating with the combat trains command post however; this requires more personnel for defensive tasks. The BSB commander must take into account the impact on repair rates when using maintenance personnel for perimeter defense. Crews accompanying non-mission capable platforms to the MCP should be integrated into BSA security operations.

Movement to Contact

3-42. During the preparation phase of movement to contact, there is a major logistics effort. Maintenance personnel place maximum effort on preparing equipment for combat. The maintenance assets move closely behind the combat unit's main body to insure rapid recovery, repair, and return of damaged and/or disabled equipment. Commanders select the maintenance assets position in the march column to support the combat units while being protected from enemy fire.

Attack

3-43. The attack is quick and violent. The FSC commander monitors the tactical situation to support the attack. The FSC commander, in concert with the maneuver battalion's S-3, S-4 and executive officer identify and provide the current and future locations for MCPs. The maneuver company's first sergeant and executive officers array the FMTs.

3-44. During the attack, the maintenance teams are forward with the maneuver companies. On-site maintenance support and recovery operations are inherently risky due to the rapid advances of the combat forces. Maintenance activities during this phase concentrate on recovery and BDAR. After the attack, the FSC commander coordinates maintenance requirements with the maneuver battalion executive officer and S-4. They discuss the current situation, priority of effort, and transition plan for the next operation.

Exploitation and Pursuit

3-45. The maneuver brigade covers a large area during the exploitation and pursuit phase. Combat units strike at objectives deep in the enemy's noncontiguous operating environment, rear, while keeping pressure on retreating enemy forces. Command and control; and communication are extremely difficult.

3-46. The BSB commander must have the flexibility to weight the maintenance effort. FMTs or contact teams perform on-site repairs to bring weapon systems online to maximize combat power during this key phase of offensive operations. Equipment that cannot be repaired on site will be recovered to the MCP. Evacuating equipment to the BSB should be the maintenance control officer and maintenance warrant officer's last resort. The maintenance tactical SOP should address time limits for non-mission capable equipment that will be evacuated to the BSB from the MCP

Maintenance Planning in the Defense

3-47. Brigade defensive operations break the momentum of the enemy's attack while posturing to transition to the offense. The brigade conducts a static defense or varying degrees of a more mobile dynamic defense against a variety of threats and in differing terrain. The tactical mobility of the BCT makes it well suited for the dynamic defense. For additional information on defensive operations, see ATP 3-90.5.

3-48. During the preparation of the defense, priority of protection goes to those units preparing positions and obstacles. Once the defensive positions are prepared, priority shifts to protection of the reserve, BSA, MCP, forward FSC elements, and command post locations. Maintenance considerations for defensive operations include: planning to reorganize to replace lost maintenance capability, use maintenance teams well forward at MCPs, plan to displace often, and emphasize recovery and retrograde of equipment that require extended repair time. Maintenance priority goes to those units that are preparing positions and obstacles.

3-49. MCPs in defensive operations are normally located further back from the front than during offensive operations. Dispersal within the MCP during defensive operations is even more important than in offensive operations as the location is typically in operation a longer time and easier to locate. The same considerations apply for co-locating or not co-locating with the combat trains command post. Co-location typically decreases the size of the perimeter allowing more maintainers to concentrate on repair operations.

3-50. The FSC's field maintenance platoon takes all required steps to place as many weapon systems as possible in serviceable condition. Operators, crews, and FMTs perform any necessary repairs authorized at their level of repair. Once combat operations begin, the principles are the same as for the offense.

Maintenance Planning in Stability Operations

3-51. Sustainment tasks executed by Army forces to stabilize an area of operations include—

- Establish civil security.
- Establish civil control.
- Restore essential services.
- Support governance.
- Support economic and infrastructure development.
- Conduct security cooperation.

3-52. Because the logistic requirements for stability tasks vary widely, mission analysis determines the proper maintenance capabilities required. Planners allocate maintenance assets based on the identified requirements.

Stability Planning Considerations

3-53. The key to success with stability tasks is interagency coordination. Only in the most extreme situations will the U.S. military be providing relief directly to those in need. In most stability operations, the U.S. military will be assisting non-governmental organizations in providing the required level of support to the affected population. Multi-national support, host-nation support, and support from non-governmental organizations may increase the demands on transportation, medical, food, water, and housing.

3-54. Host-nation support, contracting, and local purchase are force multipliers in many of these operations. Situations that lack optimal sustaining capabilities may require using other methods that augment or replace existing logistic capability. Contracting personnel should support or travel with the lead elements of Army forces if feasible. The Army may employ nonstandard logistics for supply classes (such as I, II, III, IV, IX, and X), maintenance, repair, forklift support, fixed facilities, and mobile communications.

3-55. Maintenance operations may include providing assistance to intergovernmental agencies. While stability operations are not considered combat operations, a defensive posture should be maintained. For additional information on maintenance considerations in stability operations, see FM 3-07, *Stability*.

Peacekeeping

3-56. When planning maintenance support during peace operations, logisticians must take into consideration factors such as hostile environment, joint or multi-national chain of command, support to multi-national forces, risk assessment, security of maintenance operations, and environmental impact.

3-57. The Army most often conducts peace operations as part of a multi-national coalition. This presents new challenges for all commanders who could potentially support host nation's military, coalition force and commercial equipment. Beyond some of the special considerations noted here, much of the maintenance support for peacekeeping will not differ substantially from normal maintenance operations.

Hostile Environment

3-58. National policy may require the Army, either singularly or as part of a joint or multi-national task force, to conduct peace operations in politically sensitive areas of the world. At such times, regional combatants may disregard the peace initiative and continue sporadic or repeated armed struggle. Commanders must anticipate this and be prepared to provide maintenance support in hostile, potentially life-threatening situations.

Lack of Host-Nation Support

3-59. Since friendly forces must operate in hazardous and politically sensitive areas, commanders should never assume availability of dedicated host-nation support during peace operations. Instead, they must plan for maintenance support using organic resources.

Multi-National Support

3-60. Since the Army frequently conducts peace operations with other nations, maintenance managers may encounter a multi-national chain of command. In such cases, they must quickly establish communication channels to confirm or clarify mission requirements. Commanders must also determine how and from where they can expect timely resupply to perform their critical maintenance mission. Prompt coordination of mission and support requirements with higher headquarters ensures logistics planners deliver timely maintenance support to customer units.

3-61. Maintenance managers must anticipate support to all friendly forces. To accomplish that task, they must contact higher headquarters as well as known supported units to coordinate support requirements. Managers also need to verify if an Acquisition Cross Servicing Agreement, also called ACSA, exists. An Acquisition and Cross Servicing Agreement is a formal agreement between nations enabling the sharing of supplies and assistance. At times, support to multi-national forces may present unique logistical challenges. In such cases, logistics planners must take the initiative to determine customer equipment type and density.

Maintenance Planning in Foreign Humanitarian Assistance

3-62. As in peace operations, maintenance doctrine does not change during humanitarian operations. However, humanitarian operations do introduce unique challenges to logisticians. Depending on the regional political situation, the Army may conduct humanitarian missions in either friendly or hostile environments.

3-63. Because the Army conducts humanitarian missions in both friendly and potentially hostile environments, logistics planners must consider the situation and locate maintenance operations away from dense population centers. Planners must also identify maintenance sites that units can easily secure and defend, establish and secure lines of communication, coordinate with engineer support, enclose maintenance operations areas, establish entrance and exit control points, maintain responsive 24-hour perimeter security, and consider the impact on the environment. For additional information, see ATP 3-57.20, *Multi-Service Techniques for Civil Affairs Support to Foreign Humanitarian Assistance*.

Maintenance Planning in Defense Support of Civil Authorities

3-64. Defense support of civil authorities includes tasks that address the consequences of natural or man-made disasters, accidents, terrorist attacks, and incidents in the United States and its territories. The Army conducts defense support of civil authorities' tasks in support of homeland defense only after civil authorities have requested assistance and the Secretary of Defense has authorized it. This is typically only when the size and scope of events exceed the capabilities or capacities of domestic civilian agencies. Defense support of civil authorities' actions is always subordinate to civilian authority control. For additional information, see ATP 3-28.1, *Multi-Service Tactics, Techniques, and Procedures for Defense Support of Civil Authorities (DSCA)*.

3-65. In disaster relief operations, maintenance and logistics planners need to identify commercial vendors who can quickly supply the technical and repair parts support required and organize assets from other agencies, contractors, and local maintenance resources for economy of effort.

3-66. Planners must evaluate and prioritize repair of equipment for infrastructure, firefighting, law enforcement, medical, construction, power generation, organic, and equipment belonging to other military elements involved in the operation.

PLANNING FOR SUSTAINMENT LEVEL MAINTENANCE

3-67. Effective units incorporate sustainment level maintenance planning into their operations plans. Equipment that is beyond the capability of the field level sustainers to repair will require evacuation to sustainment level maintainers. Units utilize historical maintenance data combined with estimates of combat losses to project sustainment requirements. Maintenance units access sustainment level maintenance chiefly through USAMC's forward theater assets. Maintainers typically work closely with a BLSE to evacuate equipment and obtain replacements. The BLSE is the lowest echelon of support in the materiel enterprise and designed to augment the capabilities of the units it habitually supports.

3-68. BLSEs serve as the primary link to sustainment-level maintenance capabilities for the BCT and CAB. BLSEs provide both maintenance support forward and reach back capability. The team interface with supported units and helps maintain the BCT's equipment using a mix of Soldiers and contracted technicians. The BLSE works with field service representatives to support the brigade's ability to shoot, move, and communicate. For example, the Communications-Electronics Command has digital systems engineers and a training support division that are responsible for supporting the brigades, sometimes on a regional basis

3-69. The BLSE also plays a role in class IX replenishment. BLSEs can access logistics personnel and managers of materiel in multiple organizations at varying echelons, such as the program or product managers, item managers, the Defense Logistics Agency, manufacturers, and the LCMCs, either to expedite a critical class IX repair parts item or to be updated on its status.

3-70. EAB units typically access sustainment level maintenance through Army field support battalions. The Army field support battalion personnel coordinate sustainment-level maintenance through ASC and life cycle management centers technicians or supply support personnel who deploy as field service representatives.

3-71. Maneuver unit S-4s also play a role in sustainment maintenance planning. When they receive the unit maintenance status indicating equipment requires sustainment maintenance they will initiate requests for replacement equipment. They may also work with through their chain of command to request forward deployed sustainment level maintenance capabilities.

3-72. The ASC's AFSB may utilize reach-back capabilities to call forward selected sustainment maintenance capabilities to include equipment support activities, forward repair activities, component repair teams, and theater aviation sustainment maintenance groups. These capabilities will normally be co-located with the AFSB.

3-73. In some instances, only contractors provide sustainment-level maintenance. Either the equipment is evacuated or a contracted maintainer moves forward to do the repair onsite. For additional information on the sustainment-level maintenance planning see ATP 4-91.

CONCEPT OF SUPPORT FOR ECHELONS ABOVE BRIGADE MAINTENANCE OPERATIONS

3-74. EAB maintenance support is planned and executed through a combination of modular support units (sustainment brigades, CSSBs, and SMCs), as well as forward repair activities of the Army Materiel Command. The exact number of units allocated to the maintenance effort is dependent upon the size and scope of overall TSC or ESC logistics operations.

EAB SUSTAINMENT COMMANDS

3-75. The distribution management centers within the TSC and ESC provide centralized planning, control, and management of maintenance operations of the theater or area of operations or joint operations area respectively. The TSC and ESC are cognizant of the ASCC mission, objectives, and priorities. The distribution management center maintenance sections maintain detailed status of the maintenance and readiness posture of all units operating within their supported area. Based upon this status, each command ensures that adequate maintenance support capability and repair parts supply is available to support the mission. If they identify shortfalls in maintenance and class IX, the sustainment commands communicate these as requirements to the ASCC G4. Planning considerations include but are not limited to:

- Field maintenance support to EAB units.

- Sustainment maintenance support to the theater includes repair of end items, modules, assemblies, and components retrograded for repair and return to the supply system. The USAMC National Maintenance Manager directs and supervises the execution of Theater level maintenance support.

3-76. The TSC and ESC distribution management center's maintenance section plans and manages maintenance support. They establish policy, plans, and procedures for all theater maintenance support programs. TSC or ESC manage maintenance information through reports retrieved from GCSS-Army, sustainment information systems, Sustainment System Command and Control and the logistics information warehouse. This provides a theater maintenance database for the commander.

EAB SUSTAINMENT BRIGADES

3-77. Sustainment brigades are the operational arm for the TSC and ESC composed of functional and multifunctional units. Sustainment brigades provide maintenance support to units in its area through the SMCs of the CSSBs.

3-78. The sustainment brigade support operations maintenance section provides management of maintenance operations within its supported area. The sustainment brigade maintenance sections maintain detailed status of the maintenance and readiness posture of all units operating within its supported area. Based upon this status, the sustainment brigade ensures that adequate maintenance support capability and repair parts supply is available to support the mission. Shortfalls in maintenance and class IX are communicated to the ESC or TSC distribution management center. The support operations office staff retrieves data from their sustainment information systems. Maintenance operations provide field maintenance to units and troops in its assigned area and backup support to the BCTs and other brigades.

EAB COMBAT SUSTAINMENT SUPPORT BATTALION

3-79. The CSSB is a multifunctional logistics headquarters. It is task organized with the capabilities required to support specified mission requirements. The CSSB supports echelon above brigade units, multifunctional brigades (maneuver enhancement, field artillery, and CABs), functional support brigades (military police, signal, and engineer brigades), and brigade combat teams. ATP 4-93.1, *Combat Sustainment Support Battalion*, provides more information about CSSBs. The CSSB provides the following capabilities in support of the BCTs and support brigades:

- Ammunition lift platoons or modular ammunition companies assigned to the battalion operate an ammunition supply area or point that provides for the receipt, storage, issue, and reconfiguration of ammunition items.
- Transportation elements provide mobility of personnel and distribution of all classes of supplies. At the tactical level, the CSSB's transportation assets provide distribution capacity from the CSSB area to the brigade support battalion.
- A composite supply company provides water purification and bulk fuel storage, capabilities no longer available within the BSB.
- A support maintenance company.
- Supply and services provide all classes of supplies and field service operations for personnel assigned to or transiting through the area of operations. Field services include clothing exchange, laundry and shower support, textile repair, rigger units, and mortuary affairs support.

3-80. SMCs are normally attached to a CSSB. The CSSB executes command and control over attached SMCs. Upon receipt of an operations order from the parent sustainment brigade, the CSSB executes the military decision making process internally to publish its own operation order. This operation order establishes and restates the CSSB mission and includes an annex F to delineate support tasks to subordinate units. From a maintenance perspective, the annex F should emphasize paragraph 4.a.1. Within the annex F the CSSB will designate support relationships for each attached SMC that clearly identifies each unit the SMC supports by nomenclature and/or type and quantity. This information is necessary to allow the SMC commanders to plan maintenance support properly.

3-81. The CSSB commander and SPO staff must constantly assess maintenance support requirements and balance them against the available SMCs and maintenance support capability. If the CSSB commander

determines that the maintenance requirements exceed capability, the commander must request additional SMCs through the parent sustainment brigade.

3-82. The CSSB oversees the SMC and directs their maintenance support efforts. The CSSB ensures that the SMC are properly allocated based upon supported unit density. The CSSB does not manage maintenance support to BCT but does manage supply distribution to the BSBs within the BCT.

Location

3-83. The CSSB normally operates from multiple locations ranging from the division support area to the theater Army support area. The HHC is located where it can best command and control subordinate units. Factors affecting the position of units include the tactical situation, road network, availability of suitable terrain for force sustainment, security requirements, and location of other support activities.

Battalion Headquarters

3-84. The support operations section of the battalion headquarters keeps track of logistics issues of supported units through reports, visits, liaison, and briefings. The battalion headquarters must stay alert to potential mission changes and inform subordinate units of changes to instructions governing operations. It also performs maintenance management and staff supervision to ensure adherence to established policies.

SUPPORT MAINTENANCE COMPANY

3-85. The SMC, if attached, provides field maintenance and technical assistance support to units at EAB. The SMC has three platoons; the automotive armaments platoon, the electronics maintenance platoon and the ground support equipment maintenance platoon. Capabilities of the SMC include maintenance control, field level maintenance on wheeled vehicles, armament, radios, COMSEC equipment, special electronics, and power generation. The SMC has limited welding and machine shop capacity and wheeled vehicle recovery assets. An area test, measurement and diagnostic equipment support team may augment the SMC.

3-86. The SMC does not provide maintenance support to BCTs and does not reinforce BSB maintenance capability. The SMC does not have M1, M2/3, M109A6, or Stryker repair capability.

3-87. The SMC provides maintenance support in accordance with support relationships designated in the operations order received from the parent CSSB. The support relationships will normally be general support for multiple supported units and in this instance, the parent CSSB establishes the maintenance support priorities. Depending on operational and mission variables, the SMC may have a direct support relationship with a single designated unit. In this instance, the unit with which it has the direct support relationship establishes the maintenance support priorities.

3-88. As stated earlier, the SMC also provides maintenance support on an area basis. This task requires the SMC to support units not previously designated by a support relationship in the operation order. Units that are in close proximity to the SMC or transient through an area within which the SMC operates may have maintenance requirements and must rely on the SMC for support. In this instance, the SMC commander and maintenance control officer must assess the area support requirement and balance it against priorities designated in the operations order. The SMC provides the area maintenance support unless it is clear that in doing so, it will be unable to fulfill priorities and requirements designated in the operation order. When conflicts are apparent, the SMC commander should contact the CSSB commander or SPO to deconflict the support requirement. For additional information on the organization and capabilities of the SMC, see ATP 4-93.1.

3-89. The area test, measurement and diagnostic equipment support team is normally attached to the SMC. The team provides both mobile and fixed site calibration and repair of test, measurement, and diagnostic equipment.

On-Site Maintenance

3-90. The SMC can provide on-site maintenance based on capabilities upon request. The SMC dispatches properly staffed and equipped maintenance support teams to a supported MCP or to the site of equipment failure. All company elements provide personnel for on-site maintenance as directed by the maintenance control

section and coordinated through the CSSB. The SMC returns the items they repair to the supported units or the supported maintenance unit.

3-91. Maintenance support team NCOs serve as technical inspectors to inspect and diagnose faults. They schedule equipment for repair, depending on workload, parts availability, the priority of the requesting unit, and the priority of the specific equipment to support current operations.

Records and Reports

3-92. The company utilizes GCSS-Army to manage maintenance processes. GCSS-Army enables maintenance leaders at all levels to view their own status as well as their subordinate's status.

Liaison Visits

3-93. SMCs provides maintenance management and support to EAB units, some of which do not have organic maintainers. SMCs utilize liaison visits to supported units within their operational footprint to proactively establish relationships. The liaison visits facilitate discussions of maintenance requirements that enable the SMC to ensure that common spare parts and any required special tools are on hand to provide service to the unit in a timely manner.

3-94. The SMCs should also assist EAB units with their command maintenance discipline program especially in the areas of weapon maintenance, C&E, and allied trades. Liaison teams should include representatives from the ground support equipment, auto armament maintenance and electronic maintenance platoons. The teams can provide an overall assessment of the status of the EAB unit's maintenance. This is especially important for units without assigned maintainers.

Technical Assistance

3-95. Technical assistance is providing technical instruction and guidance to enable supported units to perform their mission more efficiently. The USAMC's Logistics Assistance Program maintenance assistance and instruction teams may formally provide technical assistance. The SMC commander may also provide assistance informally. Technical assistance includes visits by technical assistance teams made up of subject matter experts.

3-96. The assistance team's functions include determining the nature and scope of maintenance support required. This enables the USAMC to send a properly manned and equipped maintenance support team to provide on-site maintenance. It discusses and resolves mutual maintenance support issues regarding personnel, equipment, or operational procedures and policies. They also provide assistance to the unit commander with the evaluation of equipment condition, the effectiveness of the maintenance program, and the development of remedial action to correct deficiencies.

Maintenance Check Points

3-97. Field-level maintenance support can be set up at refuel points, rest stops, or attached to a convoy support center along heavily traveled routes. This is a practical method of providing efficient, roadside maintenance service. This element may consist of four to six mechanics equipped with a vehicle and cargo trailer carrying small, easily replaceable repair parts and BDAR kits.

3-98. The maintenance element can assist the operator/crew in verifying PMCS of their vehicles while the vehicles are refueled. The maintainers and crews can correct minor deficiencies and shortcomings on the spot with available tools, repair parts, and BDAR techniques. Shortcomings that do not render the vehicle non-mission-capable will be annotated on automated DA Form 5988-E or manual DA Form 2404 (*Equipment Inspection and Maintenance Worksheet*). The maintainers provide a copy of the form to the vehicle driver for further action upon return to the unit. Status symbols on the DA Form 2404 are often used as a shorthand for a vehicle's status. These include:

- X - indicates a deficiency in the equipment that places it in an inoperable status.
- Circled X - indicates a deficiency, however, the equipment may be operated under specific limitations as directed by higher authority or as prescribed locally until, until corrective action can be accomplished.

- Horizontal dash (-) - indicates that a required inspection, component replacement, maintenance operation check, or test flight is due but has not been accomplished, or an overdue MWO has not been accomplished.
- Diagonal (/) - indicates a material defect other than a deficiency which must be corrected to increase efficiency or to make the item completely serviceable.

CONCEPT OF SUPPORT FOR BRIGADE AND BELOW MAINTENANCE OPERATIONS

3-99. Maintenance organizations provide a wide range of support to generate and maintain combat power to support combatant commander's mission accomplishment. This is accomplished through the functions of maintenance management and support operations, which provide critical aspects of logistics. Commanders, maintenance managers, and Soldiers must understand the sustainment warfighting function and how it enables operations. For additional information regarding the sustainment warfighting function see ADRP 4-0, *Sustainment*.

3-100. Maintenance in support of maneuver brigade operations requires continuous cross-talk between the BCT Commander, BCT staff elements, the BSB commander and FSC commanders. Planning for maintenance must be fully integrated into the operations order process to ensure maximum responsiveness. Cross-talk continues throughout an operation as it changes and evolves.

BRIGADE SUPPORT BATTALION PLANNING CONSIDERATIONS

3-101. The BSB commander is the senior logistician, logistics operator, and advisor for support to the BCT. The BSB may function in a highly dispersed manner with some BSB elements close to the maneuver units they support and others near or within the BSA. The BSB staff monitors and manages logistic operations through on-site supervision, recurring reports, and an array of digital information systems and other technological innovations.

3-102. The logistics structure of the BCT links to the supporting sustainment brigade. The direct linkage between the BSB and the sustainment brigade remains in effect, even when the BCT is attached to a different division. The BSB sends status reports to the brigade S-3 and S-4 to keep the brigade staff and commander informed of the logistics situation.

3-103. The BSB SPO section provides planning, preparation, and oversight of maintenance support tasks during the execution of the brigade's mission. The BSB SPO staff tracks the common operational picture for logistics within each formation and throughout the BCT to ensure timely delivery of required support at the decisive place and time. The SPO staff coordinates support for all units assigned or attached to the brigade. The SPO section works closely with the BSB S-3, BCT S-4 and supported battalion S-4s to coordinate future support requirements and locations with supported units. The SPO staff's functions generally include; transportation, maintenance, ammunition, mortuary affairs, health services support (except field artillery and maneuver enhancement brigade), and distribution operations. SBCT SPO staffs have an S-3 who provides direct oversight of the materiel management section in order to manage all classes of supply, less class VIII. Figure 3-3 depicts the elements of the BSB SPO staff.

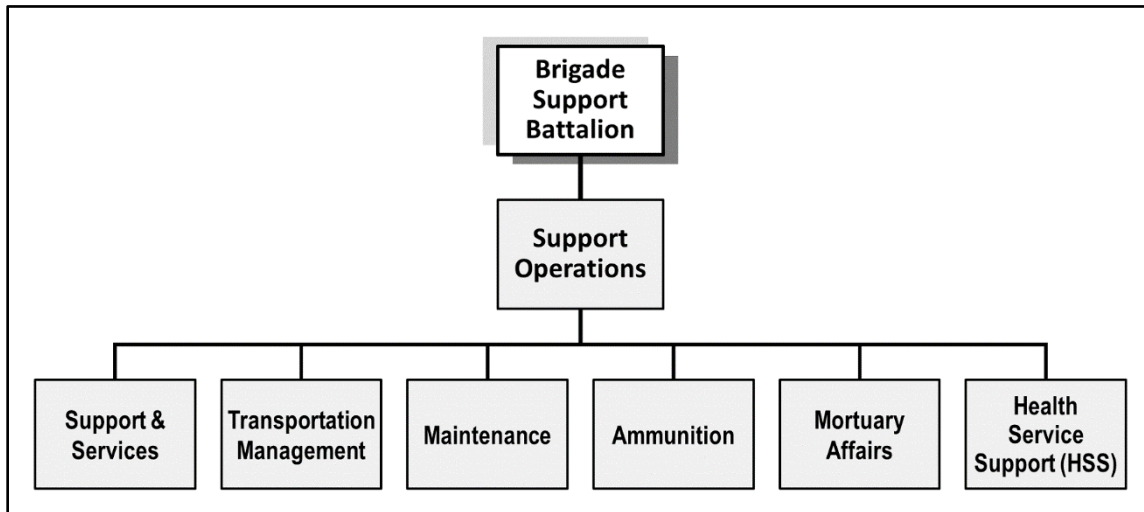


Figure 3-3. Brigade support battalion support operations section

3-104. The SPO staff maintains visibility maneuver unit readiness through a logistics reporting process established within the brigade. This allows the section to identify problems quicker, anticipate requirements, and allocate resources more efficiently. This staff section serves as the point of contact for supported units. The duties and responsibilities of the BSB SPO staff include the following—

- Conduct continuous logistics preparation of the battlefield.
- Submit logistics forecasts to external SPO staffs/distribution elements.
- Coordinate and provide technical supervision for the BSB logistics mission including: supply activities, maintenance support and coordination of transportation assets.
- Coordinate logistics for units passing through the brigade area of operations.
- Develop maintenance support standing operating procedures.
- Monitor daily battle loss reports to anticipate future requirements.
- Recommend maintenance priorities to the BCT S-4.

3-105. The maintenance management personnel provide maintenance oversight of the FMC and FSC maintenance sections. They ensure integrated, automated maintenance management for combat vehicles, automotive, ground support equipment, C&E equipment and missile equipment. The maintenance management personnel also plan and forecast maintenance and related class IX requirements based on future operational plans and coordinate the disposal of enemy equipment. The duties and responsibilities of the maintenance management personnel include—

- Work directly with the BLSE for logistics assistance representative support.
- Coordinate external maintenance and recovery support when required.
- Recommend changes to maintenance support to facilitate the combatant commander's objectives.
- Coordinate CFSR support as required or forecasted.
- Monitor brigade logistics status reporting and equipment readiness levels.
- Provide a common operational picture for use by the BSB commander and combatant commander to make informed decisions.
- Manage and track class IX replenishment support from the supporting CSSB.

3-106. The support operations office must collaborate with the brigade staff to develop a viable logistics status reporting process using available communication systems. A basic logistics status report should, as a minimum, provide personnel headcount, on hand quantities of class I (rations and water), class III, class IX to include critical class IX requirements, class V, and maintenance status of class VII weapon systems and vehicles. Logistics status report submissions timing is based on commander's requirements and unit battle rhythm, but should be submitted at least once daily and whenever a significant change occurs. The commander may require

status updates more frequently during periods of increased intensity. Commanders should not overwhelm subordinate units with data submission requirements. The logistics status report must be focused, complete, timely, and accurate.

FORWARD SUPPORT COMPANY PLANNING CONSIDERATIONS

3-107. The FSCs contain a large percentage of the BSB's overall maintenance capability. FSCs are designed to support specific maneuver battalions and are resourced with all mechanics and tools necessary to support the equipment in the supported battalion. This makes the FSC a critical and valuable maintenance capability within the BCT and planning for its use must be deliberate and thoughtful. In most instances, an FSC will provide dedicated support to a single maneuver battalion and operate independently in this manner. Mission requirements may require consolidation of the FSC maintenance capability to provide the most effective support to the BCTs operation.

3-108. FSCs that support the armored brigade combat team, combined arms, cavalry, and fires battalion contain the sole source of maintenance support for the armored brigade combat team primary weapon systems; M1, M2/3, and M109A6. Similarly, within the SBCT, the FSCs contain the sole source of maintenance capability for the Stryker family of vehicles. Within the armored brigade combat team and the SBCT, the BCT commander, subordinate battalion commanders, and staff planners must understand there is no maintenance support capability for the M1, M2/3, M109A6, or Stryker systems in the BSB FMC or in the EAB support maintenance company. These factors make it imperative to task organize and consolidate armored brigade combat team and SBCT FSC maintenance capabilities. This enables the command to leverage maintenance as a brigade asset instead of as an individual battalion asset. Consolidated maintenance power enables a brigade to achieve the required maintenance support for the main effort.

3-109. The FSC is organic to the BSB and maintaining this command relationship is desirable to enable the BSB commander to task organize and consolidate FSC maintenance capability. This relationship provides the most effective and flexible support for the BCT mission. BSB planners must develop a viable course of action for maintenance support that includes FSC task organization. This includes placement of the FSCs within the brigade area of operations and shifting FSC mechanics, particularly mechanics for primary weapon system, from one FSC to another to weight the main effort. This course of action must configure the FSC maintenance assets in a way that is most advantageous to the overall brigade mission even though it might appear to be less advantageous to one or more maneuver battalions. The operation order support concept and Annex F detail this course of action. The staff must brief the commander on the desired course of action during the orders process.

3-110. Although the collective use of FSC maintenance capability is the most effective way to support brigade maintenance requirements, other courses of action might be necessary. Depending on the current operation and situation, the commander may attach or place an FSC under operational control of its supported battalion. The brigade commander upon the advice of the BSB commander and after careful and thorough mission analysis decides on the type of command relationships. FSC attachment or operational control to its supported battalion is generally limited in duration and should only be for a specific mission or phase of an operation. Placing an FSC under a command relationship with the supported battalion for prolonged periods severely limits the flexibility and responsiveness of the overall brigade maintenance capability.

ECHELONED MAINTENANCE OPERATIONS

3-111. The FSC provides field-level maintenance and supply to its supported battalion or task force. The maintenance platoon can function consolidated or split based depending on mission variables. The FMT from the FSC provides dedicated field-level maintenance and recovery capability to the supported companies. The BSB commander arrays these forces on the battlefield to best support the BCT.

3-112. The BSB is responsible for establishing a base or base cluster from which to operate within the BCT support area. This base or base cluster is typically referred to as the BSA. The BSB commander simultaneously supports BCT operations while ensuring BSA security. The BSB commander must balance constant support operations and security requirements as it establishes and operates the BSA. The BSB commander normally tasks the HHC to manage the defensive perimeter defense.

3-113. Organization and identification of units that will occupy the BSA is determined through mission analysis. The BSB's FMC is normally located within the BSA and provides field-level maintenance for the BSB's organic equipment and for brigade equipment not supported by an FSC.

3-114. Placement of FSC maintenance capability in the BSA must be carefully considered and weighed against operational requirements. A primary consideration is the distance between the BSA and the supported units. While it might appear to be advantageous to place FSC maintenance capability in the BSA to move the maintenance burden out of the supported battalion operations area, doing so creates evacuation problems and also increases the time it takes to return repaired equipment to the owning unit.

Trains

3-115. Maneuver battalions and squadrons employ echeloned trains at their level and typically organize them into field trains, combat trains, and company trains. Trains are a grouping of personnel, vehicles, and equipment that provide sustainment to the battalion and subordinate companies of the BCT arrayed across the area of operations. They array subordinate sustainment elements including unit personnel, vehicles, supplies, and elements of their supporting FSC.

3-116. The battalion or squadron commander and staff, the BSB commander and staff, and the FSC commander collaborate to determine the best method of employment to meet both the BCT's concept of support and brigade commander's guidance. The commanders and staffs also determine the best allocation of personnel between each train and command posts within the trains. A command presence is required at each level as determined by the supported unit and the supporting FSC.

Field Trains

3-117. Field trains are positioned based on mission variable considerations and are often located in the BSA. The maneuver battalion's HHC (battery or troop) commander or designated representative controls the field trains. Field trains typically include battalion or squadron sustainment assets not located with the combat trains. When established, the field trains command post, serves as the battalion or squadron commander's primary direct coordination element with the supporting BSB in the brigade support area.

Combat Trains

3-118. Combat trains typically consist of elements of the maneuver battalion or squadron's HHC including the commander, first sergeant, S-1 section, S-4 section, aid station, MCP, and elements of the FSC. Combat trains are normally where the preponderance of FSC maintenance and recovery capability is located. The combat trains location is a good compromise in terms of proximity to the supported unit and security.

3-119. The FSC may position its commander, first sergeant, field-feeding section, portions of the distribution platoon, maintenance control officer, recovery assets, and portions of the maintenance platoon in the combat trains. These FSC elements are often co-located with the MCP. The MCP is the furthest back that maintenance activities should take place. The further to the rear that you evacuate the equipment the more time it adds to its repair and return to service.

Company, Battery, and Troop Trains

3-120. The maneuver company (battery or troop) first sergeant normally commands the company trains. The maneuver units lack organic logistic organizations. They task organize personnel and equipment to facilitate echelon support. Echeloned support expedites the replenishment of subordinate elements using either the supply point or the unit distribution methods or a combination of both. When using supply point distribution the receiving unit moves to a supply point and picks up supplies using organic transportation. Supply point distribution requires unit representatives or the unit itself to move to a supply point and pick up their supplies.

3-121. FSCs with FMT capability may locate an FMT in the company trains. This will often consist of a contact truck with two maintainers. Their role is to make repairs within the time limits established by the unit SOP. They will also assist the company with verification of faults identified on an automated DA Form 5988-E. The maintainers will determine if the fault requires parts or services requiring the equipment's evacuation to the MCP. Depending on mission variables, a recovery vehicle with a two or three man crew may be present to

assist with moving vehicles to the MCP. During offensive operations, recovery vehicles may be echeloned forward to speed recovery operations.

Lateral Support Request

3-122. The Army designed the BCT to be lethal, mobile, and agile. Force developers gave the BCT the necessary capabilities for self-sustainment during operations. The BCT has all the necessary field maintenance capabilities to support every equipment item it employs. These field maintenance capabilities reside within the field maintenance platoon of the FSC and the FMC. By force design structure, the FMC has expanded capabilities for all common specialty sections (automotive, armament, C&E, ground support equipment, radar repair, target acquisition system (missile) repair, and service and recovery). A Missile support team is present within an FMC when the supported units have missile equipment. These additional capabilities support low density and specialized equipment maintenance within the BCT. The consolidation and management of common specialty capabilities in a central location enables the leveraging of low-density resources. Lateral support request at the BCT level enable field maintenance organizations to access each other's capabilities. In peacetime, a best practice is to consolidate FSC field maintenance team low density MOSs Soldiers within the FMC for efficiency, ease of training, and mentoring by the senior NCOs and warrant officers.

REPLENISHMENT OPERATIONS AND TECHNIQUES

3-123. Replenishment operations are preplanned sustaining operations that allow combat forces to replenish routinely. A replenishment operation is a deliberate, time sensitive logistics operation. The BSB conducts replenishment operations to replenish its FSCs and by the FSC to replenish the combat loads of individual Soldiers and weapon platforms. These operations, which may be augmented with assets from the sustainment brigade, are quick and in-stride with the supported commander's battle rhythm. The purpose of replenishment operation is to replace stocks within a BCT or support brigade. This replacement may be either deliberate or hasty depending on circumstances. Typical logistic activities that take place include rearming, refueling, and fixing to meet immediate needs.

3-124. Logistics packages provide the most efficient re-supply for tactical units. The company supply sergeant under the supervision of the FSC commander and the distribution platoon leader organize logistics packages. The Company commander may direct the executive officer to assist with this supervision based on mission variables or decisions by the battalion executive or commander. The FSC organizes logistics packages for each company or separate element in the battalion on a replenishment cycle as determined by the needs of the units. Logistics packages are organized and dispatched as required by the tactical situation and logistical demands. The S-4 plans and coordinate logistics operations to ensure they fully support the commander's tactical plans. The BSB's SOP identifies the standard logistics package that in turn details how to execute the logistics mission.

3-125. Demand for class IX supplies will increase due to combat, environmental effects and maintenance tempo. Units should maintain a supply of small high-usage rate items as far forward as practical. Resupply of these high demand class IX supplies are typically distributed as part of a logistics package. These items typically include, but are not limited to—

- Filter elements.
- Tires.
- Water pumps, gaskets, fan belts, water hoses, and clamps.
- Ignition system components.
- Wheel and sprocket nuts and bolts.
- Spare caps for liquid containers.
- Speedometers and cables.
- Cleaning fluids for electronic equipment and windshields.

3-126. A unit's bench stock depends on its equipment, but parts should be limited to only those items preventing equipment from performing if the item fails. Unexpected requirements may need to be moved to the MCP.

RECOVERY OPERATIONS

3-127. Recovery includes the actions taken to repair, free, and retrieve immobile, inoperative, materiel from the point where it was disabled or abandoned. Recovery prevents enemy capture of equipment and collects enemy equipment to support technical intelligence requirements and collection. Damaged and inoperable equipment on the battlefield can strain dedicated recovery resources. Commanders should strategically place dedicated recovery assets for optimum support throughout the operational area to effectively support battlefield recovery operations. Commanders must emphasize the use of self and like vehicle recovery methods to the greatest extent possible. These practices will minimize the use of dedicated recovery assets for routine recovery missions. Recovery managers and supervisors must ensure recovery vehicles are used only when absolutely necessary. Only properly trained and certified recovery personnel will operate wheeled and tracked recovery vehicles. One or more additional skill identifier H8 certified maintainer must be present for wheeled vehicles recovery missions. During tracked recovery missions, at least two additional skill identifier H8 certified maintainers must be present.

Note: Because recovery assets are limited, the BSB in BCTs should plan to pool assets. This will enable the BSB commander to efficiently position recovery assets on the battlefield to support the main effort.

3-128. Dedicated recovery vehicles must be returned as quickly as possible to a central location to support the unit. Maintenance operations often utilize recovery equipment to provide heavy lift in addition to its recovery mission. Recovery managers and supervisors must use all available resources carefully to provide sustained support. Wheel additional skill identifier H8 recovery specialists cannot be substituted for track additional skill identifier H8 recovery specialists.

RESPONSIBILITY

3-129. The FSC has recovery assets located in the recovery section and FMTs within the field maintenance platoon. The maintenance warrant officer or maintenance non-commissioned officer in charge (NCOIC) are responsible to the FSC commander and the maneuver battalion or squadron S-4 to track and manage recovery operations.

3-130. Field maintenance companies are responsible for recovering their own organic equipment and provide limited backup support with wreckers or tracked recovery vehicles when requirements exceed a supported unit's capability. The BSB may also task the unit to provide recovery support on an area basis to support units lacking a recovery capability. If the FSC requires additional recovery assets, the FSC must request recovery assets through the BSB SPO staff.

MANAGEMENT

3-131. The maintenance warrant officer or maintenance NCOIC are responsible to the FSC commander and the maneuver battalion or squadron supply officer to coordinate recovery. They support the commander's priorities by balancing the overall repair effort, available resources, and the tactical situation. The goal is timely return of equipment to operation with the least expenditure of resources.

3-132. The maneuver battalion centralizes management and synchronization of recovery operations whenever possible. This does not preclude delegation of recovery authority to the BSB for specific operations.

3-133. Recovery operations should be coordinated with the maintenance effort and commander's priorities. Maintenance personnel repair equipment as far forward as possible within the limits of the tactical situation based on the amount of damage and available resources. Use maintenance time guidelines established by the commander to make repair-or-recovery decisions.

3-134. Use the right recovery equipment for the recovery mission. In general, wheel recovery systems should recover wheel; and track recovery systems should recover tracked vehicles. However, wheel recovery vehicles may flat tow track vehicles that are under their weight, but any track flat-tow recovery of wheel vehicles should be avoided due to potential damage to wheel vehicle's front steering components largely due to track vehicles

pivot turn. When a unit has only limited assets, it is very critical to select the right recovery vehicle for the mission.

3-135. The maneuver commander must provide the BSB commander with the flexibility to concentrate recovery assets in order to support the main effort. Because recovery vehicles are a limited commodity, the FMC and FSCs may be required to shift part or all of their recovery assets to support the maneuver battalion assigned the priority task.

3-136. Units should maintain recovery vehicles as far forward as the tactical situation permits. This keeps them available for immediate response as needed. The maintenance warrant officer or the maintenance NCOIC are responsible to the FSC commander and the maneuver battalion or squadron supply officer to coordinate recovery. The FSC Commander and the S-4 may request additional support from the BSB SPO staff.

3-137. Establish recovery priorities when recovery assets are limited. These depend on the commander's need for an item and the tactical situation. The type of maintenance or repair required affects the priority when two or more like items must be recovered. As a rule, always recover weapon systems before tactical vehicles.

3-138. The equipment recovery procedure involves four steps.

3-139. Step 1. When the equipment operator and crew detect an inoperable condition, they should—

- Assess the damage and cause of the inoperable status.
- Initiate action based on their analysis and the tactical situation.
- Operator/crew/field maintenance personnel use organic repair and recovery capability, including—
 - BDAR techniques.
 - Self-like-vehicle recovery.
 - Assistance from other units on-site when unit-level recovery resources are insufficient or unavailable.

3-140. Step 2. Unit requests assistance from the FSC located in the BSA. Requests must provide the following information:

- Unit identification.
- Equipment identification.
- Location (map coordinates, when possible).
- Equipment fault.
- Evaluation of on-site repair capability.
- Repair parts required.
- Organic recovery capability.
- Tactical situation and security requirements.
- Recommended route of approach.

3-141. Step 3. The operator/crew must remain with the equipment and follow unit SOP until it is recovered.

3-142. Step 4. Once the operator and crew initiate recovery procedures, they should—

- Take cover.
- Provide local security.
- Wait for assistance.
- Assist maintenance/recovery personnel on their arrival with the recovery action.

REPAIR AND RECOVERY CONSIDERATIONS

3-143. The key unit personnel responsible for developing the units repair and recovery plan are the BN S-4, the unit's maintenance warrant officer or maintenance NCOIC, and FSC Commander. They develop a plan of action for repair and recovery of the disabled equipment based on the request for assistance. The action plan includes battle damage assessment; establish priority for support, tactical situation, workload, and availability of maintenance and recovery personnel.

3-144. The maintenance warrant officer of maintenance NCOIC assigns the repair/recovery mission to the field maintenance platoon. At a minimum the field maintenance platoon's checklist will contain the following information: breakdown location/grid coordinates, cause of the breakdown, specific designation of required support (such as personnel by rank, MOS, equipment and quantity), and supply requirements (class I, III, V and IX).

3-145. The tactical situation should address the following considerations:

- Movement restrictions.
- Primary and alternate routes of march.
- Individual clothing.
- Individual equipment.
- Chemical, biological, radiological, nuclear, and explosive defense items.
- Equipment and supplies to decontaminate the disabled vehicle.
- Communication equipment availability (including applicable call signs, primary and alternate frequencies, and required reports).
- Security/safety requirements.
- Special instructions regarding the disposition of contaminated equipment, contingency plans.
- Special tactical considerations.

3-146. Recovery personnel require special training on the following when recovering abandoned or unmanned equipment:

- To identify the visual and physical indicators of chemical, biological, and radiological and nuclear contaminations.
- To identify visual indicators, scan for and react to possible explosive hazards for possible landmines, improvised explosive devices booby traps and unexploded ordnance.
- To wear mission oriented protective posture gear when chemical, biological, or radiological contamination is suspected.
- To clear or disarm weapon systems to prevent accidental discharge.

3-147. Once the maintenance recovery team discovers the equipment is contaminated, they immediately must initiate the appropriate report to their unit. The recovery team transmits the report according to the unit's SOP and to the chemical, biological, radiological, and nuclear warning and reporting system. Before initiating the action to recover potentially contaminated equipment for repair, the commanders should coordinate with the higher headquarters to determine if an emergency condition exists and warrants the risks associated with such action. If the equipment cannot be safely decontaminated, destruction may be required.

Abandoned Equipment

3-148. Once the recovery team makes the equipment safe, it proceeds with the recovery operation. The team inspects the equipment to assess the damage and determine repair or recovery requirements. The recovery team submits a situation report to the maintenance warrant officer or maintenance NCOIC who either directs repair and recovery of equipment or sends additional parts or personnel. The recovery team proceeds with repair/recovery as directed.

3-149. If the recovery team cannot contact the maintenance warrant officer or maintenance NCOIC, they proceed with the original plan or modify it based on judgment, the commander's priorities, and the unit SOP.

3-150. During defensive operations, recovery teams recover equipment to a coordinated location. From there they coordinate its removal to the field maintenance point as the situation permits.

3-151. During offensive operations, recovery teams recover to the minimum service requirements. From that point, the recovery teams notify the BSB SPO staff with the location of the equipment. In turn, the BSB SPO staff informs the sustainment brigade. The sustainment brigade devises a recovery plan based on the guidance from the TSC and ESC. During catastrophic recovery and downed aircraft recovery operations, the BSB support operations officer may request a higher level of support from different units outside the BCT to accomplish the mission.

Recovery Destination

3-152. Many factors may influence the recovery team's ability to recover equipment including— the tactical situation, recovery vehicle requirements, workload, available resources at the field maintenance point, and the extent of repairs required.

Night and Limited Visibility

3-153. Sometimes the tactical situation prevents access to disabled equipment. When that occurs, the maintenance warrant officer or the maintenance NCOIC receive guidance from the FSC commander, who must carefully weigh the potential benefits of recovery against the possible loss of personnel. This is particularly true during night operations when the need for noise and light discipline further complicates the recovery process.

3-154. Recovery operations at night or during limited visibility are generally the same as during daylight. Recovery elements may require night vision devices and additional personnel assistance for ground guides. In some cases, the mission may require the tactical commander to compromise light and noise discipline. When tactical elements are conducting night or limited-visibility operations, maintenance units must anticipate a potential increase in workload.

Foreign Materiel

3-155. Responsibilities for recovery and retrograde of foreign equipment and materiel are similar to those for U.S. materiel. Capturing units must report the discovery of foreign materiel through intelligence channels. Items for which there is no disposition instructions should not be retrograded until it is coordinated with technical intelligence elements.

3-156. Higher commands may direct the capturing unit to retrograde the item to a maintenance activity or the supporting technical intelligence unit. They may also instruct the unit to guard the item and leave it in place for on-site preliminary examination by technical intelligence personnel. When materiel does not need to remain in place for intelligence evaluation and the discovering unit is incapable of retrograding it, the unit may request recovery and retrograde assistance from the sustainment brigade, CSSB, or BSB.

Explosive Items

3-157. The presence of ammunition and explosives often complicates recovery. Personnel must remain constantly alert and should presume abandoned items are rigged with explosive booby traps. Exercise caution to prevent explosion, fire, or accidental weapon discharge. When unexploded ammunition is found or suspected, request assistance from an explosive ordnance disposal team.

3-158. If quantities of abandoned ammunition are found during recovery operations, leave the ammunition in place and notify the nearest explosive ordnance disposal unit immediately.

Note: Do not, under any circumstances, attempt to touch or move abandoned ammunition.

BATTLE DAMAGE ASSESSMENT AND REPAIR

3-159. Maintainers use BDAR to rapidly return disabled equipment to the operational commander by field expedient repair of components. BDAR restores the minimum essential combat capabilities necessary to support a specific combat mission or to enable the equipment to self-recover. BDAR includes bypassing components or safety devices, relocating parts from like or lower priority systems on the equipment, fabricating repair parts, or implementing a temporary or permanent repair, using substitute fluids, materials or components. Based on the commander's discretion, anyone with the requisite knowledge can perform BDAR depending on the extent of repairs required and mission variables. The commander or senior Soldier present decides whether to use BDAR instead of standard maintenance procedures. Expedient repairs may or may not return the vehicle to a fully mission-capable status. At the completion of immediate combat operations, qualified maintenance personnel will evaluate repairs to ensure the equipment is fully mission-capable according to -10 -20 maintenance standards. Army Regulation 750-1 is the regulatory guidance for BDAR.

3-160. Battle damage assessment appraise systems status. This effort identifies the number of items destroyed or damaged beyond repair and the number that can be repaired in the forward area. It also shows the location of forward maintenance salvage collecting points and the transportation required to support recovery or retrograde. Mechanics concentrate on mission-essential maintenance only and the priorities established by the commander. For more information on BDAR procedures, refer to ATP 4-31, *Recovery and Battle Damage Assessment and Repair* and GTA 01-14-001, *Battle Damage Assessment and Repair Smart Book*.

3-161. BDAR procedures apply to most operational levels (from the crew through field-level maintenance) and depend on mission variables, the extent of damage, time allowances, and available personnel with required skills, availability of parts, tools, and materials. Personnel performing BDAR must act quickly when possible to restore the vehicle to the combat-ready condition required and continue the mission or allow the vehicle to self-recover. BDAR procedures are non-standard maintenance practices.

Note: Whenever possible, commanders should always be consider standard maintenance over BDAR.

3-162. To be effective, personnel applying BDAR techniques should—

- Ensure standard maintenance practice is always the first consideration.
- Base decisions of using BDAR versus standard maintenance on the mission variables.
- Provide an accurate assessment.
- Ensure economy of maintenance effort (use maintenance personnel only when necessary).
- Train multifunctional skills.
- Repair only what is necessary to regain combat capability.
- Remain flexible about repair priorities.
- Be trained in BDAR and knowledgeable on the system.

3-163. Commanders should address the use of BDAR in the logistics section of their operation order. This will provide the crews and maintainers with a clear understanding of when and at what risk level they are authorized to perform BDAR.

3-164. Maintenance assets are heavily taxed on the battlefield. Because resources are limited (personnel, tools, and parts), it is imperative that maintenance resources are not wasted. Crewmembers must do repairs within their capabilities immediately rather than requesting maintenance personnel to do simple mechanical tasks.

Note: Personnel shortages and battlefield casualties mandate that maintenance team members have some knowledge of other skills needed to achieve critical repairs. A lack of key maintainers must not deter a team from doing BDAR. Whenever possible, on-the-job training or cross training of personnel should be utilized.

3-165. On the battlefield, the objective is to return the system into battle with enough combat capability to get the mission accomplished. Cosmetic repairs are not necessary and are a waste of time and resources. Maintainers should not repair a broken item unless it affects the ability to shoot, move or communicate, or poses a serious safety concern. Return equipment with issues that fall outside of these criteria to maintenance for standard repair procedures.

3-166. Priorities of repair; a shortage of personnel, parts, and time; a chaotic battlefield environment; a change of mission; the lack of a weapon systems crew; and a host of unforeseen circumstances demand a flexible approach to BDAR. If specific repair techniques are not in the manuals, ingenuity can be the key to successful BDAR. Additive manufacturing technology that can enable innovation.

BDAR DEFINITIONS

3-167. BDAR is a set of simple expedient repairs that can be rapidly implemented on disabled equipment to return it to operational condition in wartime by expediently repairing, bypassing, and restoring minimum function to essential systems with minimal resources used.

Short Cuts

3-168. Shortcuts are inherent to BDAR. When the removal, installation and repair of components are not performed in sequence or to a standard as outlined in the TMs, they are considered shortcuts.

Bypassing

3-169. Bypassing consists of eliminating a device or component from the system in which it plays a role. For example, maintainers can bypass a damaged fuel filter to allow the fuel system to function in a degraded mode. In this situation the fuel will not be filtered which could lead to clogged fuel system components. Another example, is when an electrical switch is damaged it can be eliminated from the circuit by connecting the wires together to bypass the switch. In this case, the circuit will remain active and may deplete battery power when the vehicle is not in use. Before attempting to bypass any component an assessment of the repair must be conducted to determine the risks associated with the procedure.

Expedient Repairs

3-170. Expedient repairs are temporary in nature. Maintainers should perform repairs that are more reliable as soon as possible. Examples of expedient repairs include using safety wire to temporarily secure a broken exhaust hanger and using duct tape or bungee cords to secure a partially detached fender or section of slab armor.

Fabrication

3-171. Fabrication involves using readily available materials and fashioning them by bending, cutting or welding them in the place of a damaged component. Fabrication involves both additive and subtractive methods. Examples include fabricating a radiator overflow reservoir using a suitable plastic container, or printing a part, to replace the damaged overflow tank. Maintainers can likewise repair a broken suspension tie rod by welding a suitable piece of stock metal, a length of pipe, or a machined replacement part to repair the damaged unit.

3-172. The metalworking and machine shop set, also known as MWMSS, is an authorized end item in field maintenance organizations. This shop set provides an all-purpose computer numerical control metal fabrication, reconstruction, additive manufacturing, and repair capability to support maintenance operations. The metalworking and machine shop set is critical to BDAR because it provides a means to rapidly restore equipment to a mission capable status. The use of polymers for fabrication, emerging metal printing technology, point-of-use requirements, and innovative ideas may reduce requirements on the supply and distribution system.

Substitution

3-173. In some instances, a maintainer can use another non-critical component of the equipment as a repair part to replace a critical component on the same equipment. As an example, the maintainer can replace a bad circuit breaker for the engine starter with a good breaker that normally controls internal lighting. Maintainers can use this type of substitution to quickly restore function to the starting circuit. These substitutions may require some modifications for the application to work and additional time to prepare.

Controlled Exchange and Cannibalization

3-174. Controlled exchange is the removal of serviceable components with the commander's authorization in accordance with AR 750-1 from unserviceable but economically repairable equipment for immediate reuse in restoring another like item of equipment to combat serviceable condition. The maintainer must install the unserviceable component in place of the serviceable component or retained with the end item that provided the serviceable component. Units must report any part or component acquired through controlled exchange through the supply system to generate a parts demand. Regardless of the source used to acquire the repair parts, recorded demands establish proper stockage demand levels in the supply system. Refer to AR 750-1 for more information on, and regulatory guidelines for, controlled exchange.

3-175. During combat, commanders may authorize the cannibalization of disabled equipment only to facilitate repair of other equipment for return to combat. Cannibalization is the authorized removal of components from

materiel designated for disposal. Extensively damaged equipment that is not economically repairable is usually designated as salvage. In spite of the damage, many serviceable parts and components are recoverable. It supplements supply operations by providing assets not readily available through normal supply channels. Unlike controlled exchange, a serviceable part acquired through cannibalization from a salvage piece of equipment does not require an unserviceable part to replace the one removed. However, maintainers should record all repair parts needed to repair any piece of equipment to establish a parts demand through the supply system regardless of the parts acquisition method. Documenting all repair part demands ensures the supply system will establish needed demand. Commanders should not authorize cannibalization for stockage. Considerations for cannibalization include costs to cannibalize and urgency of need. Regulations prohibit field organizations from cannibalizing depot maintenance candidate items, for controlled exchange, or component parts. Refer to AR 750-1 and AR 710-2 (Supply Policy below the National Level) for more information on cannibalization.

Fully Mission-Capable

3-176. The term fully mission-capable means systems and equipment are safe and have all mission-essential subsystems installed and operating as designated by applicable Army regulation. A fully mission-capable vehicle or system has no faults that are listed in the “not fully mission-capable ready if” columns of the TM/ETM XX-10 and XX-20 series PMCS tables and AR 385-10 provisions that apply to the vehicle and/or system or its sub-system required by AR 700-138. The equipment must perform all tactical and combat missions safely and without endangering the life of the operator or the crew (AR 750-1).

Not Mission Capable

3-177. Not mission capable means the damage to the equipment or failure of components rendered it inoperable (Not Ready/Available) and expedient repair procedures will not restore the equipment to combat capable or combat emergency capable status (wartime only) requiring the application of standard maintenance and/or repair parts.

BATTLE DAMAGE ASSESSMENT

3-178. The first and most important phase of BDAR is battle damage assessment. Maintainer’s quick and accurate assessments are critical in determining the extent of the damage, required expedient repairs, or recovery requirements for the equipment. A poor damage assessment can result in overlooked secondary damage or unnecessarily result in equipment recovery. Battle damage assessment must take place at the site of the breakdown. An accurate battle damage assessment determines the extent of primary damage and secondary damage to the subsystems and components including the type of repair and the risks involved. The assessment should also include an estimate of required personnel, time and materials required to perform expedient repairs.

3-179. Maintainers utilize the “equipment triage” concept when performing battle damage assessment on multiple pieces of damaged equipment. This concept establishes the order in which battle damaged equipment is repaired or reconfigured. It also informs the decision on whether spare parts acquisition through controlled substitution or cannibalization will be required. Major weapon systems should have top priority for repairs unless the immediate mission dictates otherwise. The goal is return as many of the major weapons systems to service with the ability to shoot, move, and communicate.

Basic Rules of Assessment

3-180. Always consider the safety of the crew and personnel performing BDAR on a piece of equipment. Perform the following safety checks to identify any obvious hazards.

- Is there a round of ammunition in the gun tube?
- Is any ammunition in a critical state due to shock, fire, or physical damage?
- Have any combustibles such as fuel, hydraulic fluid, or oil accumulated?
- Does wiring appear to be safe? Could an arc occur to stored ammunition or leaking combustibles?
- Is the fire-extinguishing system operational? If not, station a crewmember in the vehicle—prepared either to use a handheld fire extinguisher or to operate the onboard fire extinguishing

system manually. Station a second crewmember outside the vehicle with an additional fire extinguisher.

- For systems with built-in self-test procedures that appear undamaged, determine if a functional/operator test was performed.

3-181. Abandoned equipment, or equipment left unsupervised by friendly forces may have been booby-trapped. Booby traps, unexploded ordnance, improvised explosive devices, and other explosive hazards present unique challenges when conducting damage assessments or recovery of abandoned vehicles. To ensure the safety of individuals during BDAR and recovery operations, carefully inspect equipment for evidence of tampering before attempting to perform repairs or move the equipment. Request combat engineers or an explosive ordnance disposal team to neutralize any identifiable explosive hazard devices.

3-182. Do not disturb unexploded ordnance in the immediate area, on top, or inside the equipment. Contact explosive ordnance disposal personnel to dispose of the ordnance prior to BDAR or recovery operations.

3-183. Adopt the proper mission oriented protective posture level and check the area for contamination if chemical, biological, radiological or nuclear weapons were deployed in the area or transported on the damaged equipment. Decontaminate the equipment at designated decontamination sites prior to evacuation to the MCP.

3-184. Depleted uranium is a component of several types of munitions and vehicle armor panels. Although depleted uranium poses a greater risk as a heavy metal poison than radiation poison, recognizing the hazard and adopting depleted uranium contamination reduction practices is extremely important. Avoiding inhalation, covering any open wounds, and good personal hygiene are measures that help reduce particle ingestion and absorption. Utilize a radiac meter to determine if depleted uranium is present in damaged ammunition or vehicle armor panels. For more information on radiation hazards, see ATP 4-02.83, *Multiservice Tactics, Techniques, and Procedures for Treatment of Nuclear and Radiological Casualties*.

3-185. In the forward battle area, attempt to move the damaged equipment to a covered or concealed position away from enemy fire. Mission variable will determine the distance to move the equipment. Be aware of loaded weapons, damaged ammunition, and damaged wiring which pose a safety hazard during battle damage assessment.

3-186. Familiarization with the operation of damaged equipment is extremely important to prevent further damage to the equipment or injury to personnel. During a battle damage assessment and functional checks, only experienced individuals should operate the systems.

Battle Damage Indicators

3-187. Battle damage indicators play an important role in battle damage assessment. Damage can occur as the result of enemy contact, accidents or mechanical failures. During an incident, it may not be possible to focus on what just happened. However, immediate recognition and attention by operators/crewmembers is important because some battle damage indicators may not be apparent once the equipment stops functioning. For example, if the crew or operator notices engine oil pressure dropping rapidly due to a perforated oil pan, the operator can pull over and turn the engine off before it seizes due to lack of lubrication. A maintainer can conduct expediently repairs on the oil pan and refill the crankcase. This action will return the asset to operational status instead of requiring recovery and replacement of the engine.

3-188. Battle damage indicators include smoke, fire, unusual odors, unusual mechanical noise, leaking fluids, warning lights and alarms, and loss of mobility or system function. Most fluids have distinct colors and odors. Familiarization with the characteristic of each type of fluid is extremely important for quick identification of which system is damaged. Other battle damage indicators include loss of power, system function, control, or degraded system performance.

Perform an Assessment

3-189. The senior Soldier present decides when to perform BDAR during combat. The senior Soldier present bases this decision on mission variables and the appropriate risk repair level.

3-190. Do not attempt to operate systems or subsystems until the crew has performed an assessment to prevent further damage to equipment or personnel. For example, if all circuit breakers are tripped, including the main

circuit breaker, the assessment process should lead to determining the best method or sequence required to restore power to the vehicle. The maintainer can accomplish this assessment by initially resetting the main circuit breaker followed by resetting the remaining circuit breakers one at a time. In the forward battle area, the crew must attempt to move the vehicle to a covered or concealed position to prevent additional damage. The best “rule of thumb” is to move the vehicle at least one terrain feature or one kilometer away from enemy contact.

3-191. If the vehicle is not self-recoverable, use any like or heavier class vehicle to recover the vehicle or to conceal it. If this is not possible, turn the turret (if the vehicle is equipped), in the direction of engaging fire to limit damage and provide return fire capability.

3-192. To enable a systematic assessment, crews and maintenance personnel should use the 12 basic steps to battle damage assessment. The 12 basic steps in this manual include—

- Visually inspect interior and exterior for damaged parts and systems.
- Visually determine if vehicle main systems appear to be operable.
- Perform equipment self-test functions using a built-in test, built-in test equipment, and a function test.
- Assess system performance (exercise each system if engine can be safely started).
- Determine which subsystems are affected.
- Determine if crewmembers can repair the damage. (Are enough crewmembers with the required skills available, and will mission variables allow repairs at the current location?)
- Estimate the repair time (by crew and by a maintenance team).
- Estimate the number and type of repair personnel needed and the associated risk. Ensure command approval to perform repairs.
- Determine what materials are required.
- Determine what the vehicle limitations will be after repairing using BDAR or standard repair.
- Determine the recovery status—self/like/dedicated.
- Determine if damage can be repaired with fabrication using additive or subtractive manufacturing.

3-193. Based on mission variables, the maintenance team uses the assessment check information to—

- Determine if the current risk repair level assigned is appropriate for the required repairs.
- Conduct tests with maintenance test equipment, if required.
- Perform additional vehicle operational tests, if necessary.
- Determine what must be repaired or replaced.
- Estimate repair times for each repair task.
- Determine the sequence and priority of the repair action.
- Determine the repair location and, if other than on-site, arrange for recovery of the vehicle to the repair site.

Battle Damage Assessment Guidelines

3-194. This section gives guidelines for battle damage assessment. Use these guidelines to rapidly assess battle-damaged equipment and systematically determine which subsystems are affected, to include the time, personnel, and materials required for repair.

3-195. These guidelines will also assist in performing equipment triage. Equipment triage is the process used to decide the order that battle-damaged equipment will receive repairs. Maintainers make this determination based on combat or combat support equipment, time, urgency, materials, and personnel required to do the required repairs.

3-196. Units can develop locally produced forms or checklists that best support authorized equipment and unit maintenance structure, and list personnel trained to conduct BDAR actions based on the battle damage assessment. Consider the guidelines when assessing battle damage. Units can tailor these guidelines to fit specific vehicles and equipment.

3-197. BDAR may enable the equipment to either self-recover or continue the mission. The battle damage assessment will provide the commander with necessary information to make efficient decisions concerning whether to continue the fight or recover the equipment to the appropriate maintenance location.

3-198. Always report battle damage as soon as possible. Report damage according to the local operating procedure.

Expedient Repairs

3-199. On the battlefield, equipment damage can occur through various means. Enemy contact contributes to the majority of the damage inflicted on equipment. Accidents are another source that often causes serious damage to equipment. Extensive use of equipment and poor maintenance practices can lead to premature failures from fatigued and worn out components leaving personnel stranded. During the battle damage assessment phase, the extent of damage will determine if the equipment is a BDAR candidate or if it requires recovery assets. Always consider mission variables before attempting expedient repairs.

3-200. Maintenance assets are heavily taxed on the battlefield. Because resources are limited (personnel, tools, and parts), it is imperative that maintenance resources are not wasted. Operators/crew must perform expedient repairs within their capabilities immediately rather than requesting maintenance personnel to perform simple mechanical tasks. Most expedient repair functions are not found in TMs. Flexibility and ingenuity are the keys to successful BDAR.

BDAR TOOLS AND EQUIPMENT

3-201. Special BDAR kits are available to enable support crew and maintainers to perform BDAR. These kits are available to crew, maintenance teams, and maintainers. BDAR kits allow repair in numerous areas—such as fuel, hydraulics, cooling, tires, electrical systems, and hull repair.

3-202. When possible, the crew should first performed BDAR using the operator/crew BDAR kit, basic issue items, components of the end item, and additional authorized list or on-vehicle equipment. Maintenance personnel will have access to the same items available to the operator/crew, as well as additional components.

CLASSIFICATION OF BATTLE DAMAGE REPAIRS

3-203. All expedient repairs are classified based on the risk level associated with each repair. The risk levels are “High, Medium, and Low”. Repairs are also classified as temporary or permanent. Only a qualified maintenance inspector can classify the expedient repair as temporary or permanent regardless if the operator/crew or maintenance personnel performed the repairs.

- **High** risk repairs are expedient repairs that may cause further damage to equipment or cause injury to personnel. For example, a damaged or faulty neutral safety switch will prevent the vehicle’s engine from starting. Bypassing the switch will result in the engine starting in any gear. This can lead to vehicle damage or injury to personnel. Maintainers should only perform high-risk repairs in extreme emergencies and the damage corrected at the earliest opportunity with standard maintenance.
- **Medium** risk repairs are expedient repairs that may cause further damage to equipment but poses no risk to personnel. For example, a hole in the radiator resulted in a coolant leak. After repairing, the radiator there was not enough coolant or water to fill the cooling system. Potential exists for damaging the engine due to overheating but the condition should not pose a hazard to individuals in the crew compartment. Operating the equipment at lower speeds and loosening the radiator cap may minimize the damage until the cooling system is re-filled.
- **Low** risk repairs are expedient repairs that will not contribute to further damage to equipment or increase the risk to personnel. For example, a wiring harness on a vehicle chassis sustained cut wires. The maintainer splices the wires together and insulates them to restore the circuits. If the maintainer properly spliced and insulated the wire, no further damage to equipment or risk to personnel should occur.

RETROGRADE AND RECONSTITUTION OPERATIONS

3-204. All Army commanders and maintenance managers within theater or CONOUS must ensure that unserviceable, economically repairable items, weapon system, critical items, intensively managed items, and automatic return items are returned to retrograde channels within the timeframes required by AR 750-1, AR 710-2, and AR 725-50, *Requisition, Receipt, and Issue System*.

RETROGRADE OPERATIONS

3-205. Overseas commands retrograde materiel to support/staging bases within theater or CONUS. Retrograde cargo normally consists of unserviceable, economically repairable items and weapon systems destined for sustainment level repair. However, reclamation operations involve the removal of serviceable or economically repairable components, assemblies, and repair parts from end-items or large components classified as uneconomically repairable. Reclamation operations significantly reduce demands on the supply system. Materiel managers identify retrograde items as far forward as practical to prevent unnecessary handling and shipment.

RESPONSIBILITY

- 3-206. The TSC exercises three areas of responsibility for retrograde operations including—
- Establishes the type, quantity, and condition of equipment for retrograde in coordination with commodity commands.
 - Develops and publishes criteria for maintenance units; and coordinates transportation requirements and directs all retrograde shipments.
 - Publishes updated lists of items to be retrograded with the quantity and destination of each when required.

RECLAMATION

3-207. Table 3-1 provides an example of materiel reclaimed, based on the assignment of a serviceable, repairable, or uneconomically repairable condition code.

Table 3-1. Materiel reclamation

<i>Serviceable Item</i>	<i>Repairable Item</i>	<i>Uneconomically Repairable Item</i>
The serviceable engine of an otherwise destroyed tank is placed back into the supply system	Maintainers direct the unserviceable yet repairable transmission of a destroyed tank to the proper maintenance activity for repair and eventual return to the supply system.	The property reutilization office designates the hull of a totally destroyed tank as scrap.

EQUIPMENT RECOVERY

3-208. Recovery equipment is critical to the support of retrograde operations. Its use must be controlled and coordinated. Commanders should marshal recovery equipment at critical locations to keep routes open and to recover all materiel possible. Leaders must provide specific instructions regarding the destruction of supplies and equipment.

3-209. Recovery is of the utmost importance to prevent the enemy from capturing destroyed equipment. The method of choice is self-recovery utilizing like-vehicle-recovery. Recovery personnel should perform these operations in accordance with published safety standards. Commanders utilize wheeled and tracked recovery vehicles at critical points to keep the route of march open.

PLANNING

3-210. Maintenance managers at all levels continuously plan maintenance support throughout the retrograde operation to keep the maximum number of weapon systems operational. Maintenance efforts should concentrate on items that can be fixed rapidly using assemblies brought forward to facilitate rapid turnaround of weapon systems. Maintainers should seek commander's authorization to use, controlled exchange and cannibalization.

RECONSTITUTION OPERATIONS

3-211. Maintenance is an essential element of reconstitution. Reconstitution is an extraordinary action used to restore units to a desired level of combat effectiveness commensurate with mission requirements and available resources. No resources exist solely to perform reconstitution. It is a total process whose major elements are reorganization, assessment, and regeneration.

3-212. Maintainers perform assessment and regeneration as far forward as possible so units may return to combat with minimum delay. Assessments and regeneration normally occur in the support area two levels higher than the unit being reconstituted. Assessment measures a unit's capability to perform its mission and evaluates regeneration needs. Maintenance support of these operations initially consists of assessing the damage. It then shifts to repairing as many weapon systems as possible to meet the commander's priorities.

Chapter 4

Maintenance Management

The nature of the modern battlefield demands a maintenance system that is responsive and able to return systems to operational status quickly, with repairs completed as near as possible to the point of failure or damage. This requires maintenance managers to closely coordinate and collaborate at all levels. This chapter describes the maintenance management processes, levels of management, maintenance control and internal management procedures for maintenance operations.

MAINTENANCE MANAGEMENT PROCESS

4-1. Effective maintenance management includes anticipating maintenance requirements, tracking, and analyzing maintenance reports, proper identification and diagnosis of maintenance faults, application of the appropriate maintenance capability, and class IX management. Maintenance managers must allocate the proper number and type of maintenance units to provide adequate maintenance support to the force.

4-2. The maintenance management functions include forecasting, scheduling, production control, quality assurance (QA), technical assistance, resourcing repair parts, work loading/cross-leveling regional workload, and developing repairable programs to meet local, regional, and national needs. Operationalizing and resourcing unit maintenance requirements increases readiness.

4-3. Inherent in the maintenance management responsibility is the obligation to provide a safe environment while conducting maintenance operations. Maintenance management is as important during field or combat operations as it is during garrison maintenance missions. The SOP and operation orders must both address safety concerns.

4-4. Maintenance management takes on a different personality at each level. The common denominator remains the ability to forecast, plan, and employ maintenance assets. By utilizing the proper maintenance management techniques, the unit will be able to fulfill its maintenance requirements.

4-5. Maintenance management functions are classified as readiness and sustainment. The ASCC and TSC, in coordination with the Army Materiel Command generate the requirement for sustainment maintenance structures and operations. Sustainment maintenance leadership will perform the following—

- Provide sustainment functional training to TSC maintenance/supply directorates.
- Assist the ASCC and TSC managers concerning sustainment maintenance issues in order to optimize capabilities.
- Assist in planning and updating theater-focused maintenance support plans to capitalize on fixed base and mobile maintenance capabilities. Leadership also reviews selected maintenance career management field (CMF) and MOS proficiencies required to support the assigned missions.

4-6. The sustainment maintenance information management systems include connectivity with current maintenance and supply sustainment information systems. They also recommend pre-assigned maintenance support routing identifier code instruction to TSC and ESC for in theater and the strategic base in CONUS and OCONUS integrated sustainment maintenance operations.

4-7. The USAMC sustainment maintenance office integrates sustainment maintenance for the total Army. The office recommends support structure to the combatant commander and implements policies and procedures that provide optimal sustainment maintenance support to unified land operations creating a seamless process that is transparent to the user.

4-8. The National Sustainment Maintenance Management Office develops and implements business policies and procedures to provide optimal sustainment maintenance support to Army organizations. This activity integrates Total Army sustainment maintenance management by linking national, regional, and local sustainment maintenance programs through regional AFSB elements. The National Sustainment Maintenance Manager also supports reserve component training and contingency operations and participates in the deliberate planning process with USAMC operational elements.

4-9. Regional and theater sustainment maintenance management offices manage the execution of sustainment maintenance requirements in a designated region or theater. They oversee local sustainment maintenance operations and evaluate their performance. Within the United States there are two operational regional sustainment maintenance manager offices, one in the East Region and the other in the West Region. There are also sustainment maintenance manager offices in Europe, the Pacific, and Korea.

4-10. Sustainment maintenance managers at corps and above focus on materiel management. They focus on fixing by repair; sustaining units; supporting joint and multi-national equipment; and standard Army systems. The Army assigns sustainment maintenance managers to Theater and support commands. Managers use their maintenance knowledge, experience, and management interfaces to determine potential problems and to facilitate resolution of those problems.

4-11. Local sustainment maintenance management offices manage the work loading of multiple Army sustainment maintenance units and activities. Typically, the local sustainment maintenance manager office will be co-located with and support the materiel maintenance officer within an installation, staff, or for the ARNG, at a state surface maintenance management office.

4-12. Associate maintenance activities participate in integrated sustainment maintenance as work centers for designated local sustainment maintenance manager offices. In addition to executing their local workloads, associated maintenance activities perform regional integrated sustainment maintenance and national work as assigned. Associate maintenance activities report work they laterally transfer and receive to other integrated sustainment maintenance sites and other installations to their designated offices for control and tracking. Army commands designate which installations function as associate maintenance activities. These work centers are maintenance activities within the Army command's existing installation infrastructure.

4-13. Commanders are responsible for equipment readiness. Readiness maintenance managers at corps and lower echelons support commanders by managing operations to enhance equipment readiness. Readiness maintenance managers maximize combat readiness by coordinating repairs as far forward as possible for quick return to battle. Readiness maintenance managers may also support battalions supporting brigade-sized units.

COMMON OPERATIONS PICTURE

4-14. Logisticians develop a common operations picture, sometimes referred to as a logistics common operational picture. These are single displays of relevant information within a commander's area of interest tailored to the user's requirements. The contents are based on common data and information shared by more than one command. The common operational picture is typically automated, requiring minimal manipulation by command posts.

4-15. Maintenance logistics status reports are typically used to inform the common operating picture, running estimates and logistics synchronization. Commanders and staff utilize maintenance logistics status reports, including data pulled from GCSS-Army, to identify requirements to support decisive action. The logistics status report is a compilation of data that requires analysis before action. It is a snapshot of current stock status, on-hand quantities, and future requirements.

4-16. The staff's focus is the integrity and usability of information systems' data. Commanders and staffs collect only data which can be turned into information for a decision. The data requested and subsequently analyzed should be linked to the commander's critical information requirement.

4-17. Items in the maintenance portion of the common operating picture include—

- Unit's reportable systems.
- Total number of reportable systems on-hand.
- Number of reportable systems non-mission capable.

- Number non-mission reportable systems capable due to maintenance issues.
- Number of non-mission reportable systems capable due to supply issues.
- Number of reportable systems coded as catastrophic loss.
- Status of crews/operators.
- Status of mechanics.

4-18. The organization's battle rhythm is critical when considering cut off times, as of times, and reporting times. Adequate time must be factored in to give the staff enough time to analyze the data in order to provide the commander with a considered recommendation on future courses of action. The staff balances timeliness of reporting and amount of time needed to analyze the report.

LEVELS OF MANAGEMENT

4-19. Maintenance operations must have careful direction, supervision, and management. Company and higher headquarters levels accomplish these functions. Higher headquarters element concerned with maintenance operations are the TSC distribution management center's materiel readiness branch, the sustainment brigade maintenance branch, and the BSB support operations readiness section. The chain of command and other supporting units provide technical assistance on request. Close coordination with the readiness branch, maintenance branch, and the battalion's support operations office is essential.

4-20. Un-programmed requirements have a significant impact on the maintenance mission. The materiel readiness branch, maintenance branch, and the support operations office must identify known requirements in advance. Commanders and supervisors seek out information, predict future requirements, and assess requirements for their impact. Figure 4-1 shows the organizational chart for a TSC.

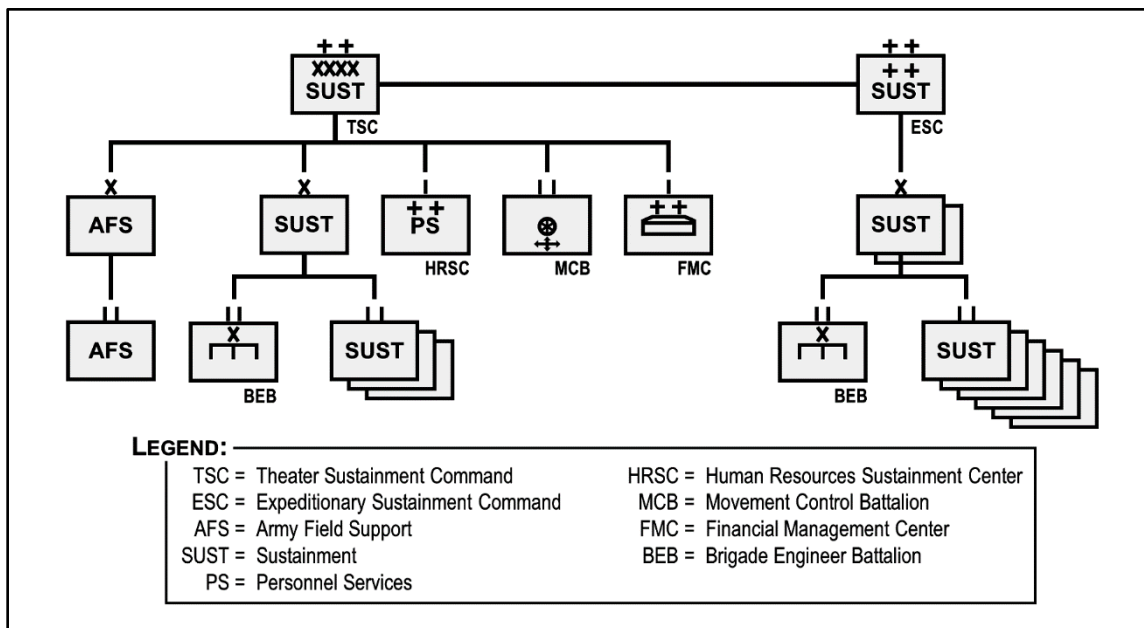


Figure 4-1. Theater sustainment command organizational chart

TSC AND ESC DISTRIBUTION MANAGEMENT CENTERS

4-21. The TSC and ESC conduct support operations through the distribution management center. The support operations officer heads the distribution management center. It is a coordinating staff section unique to TSC and ESC. The center's focus is coordinating sustainment support for all phases of the operations across the area of responsibility. For additional information on the distribution management centers in the TSC and ESC refer to ATP 4-94.

TSC Distribution Management Center

4-22. The distribution management center within the TSC includes a headquarters section and four subordinate branches as well as, a deputy SPO, and operational contract support and sustainment automation support management office sections, also called SASMO. The four branches are; the distribution integration branch, the material management branch, the fuel and water branch, and the transportation operations branch.

4-23. The materiel management branch develops plans, policies, programs, and procedures involving supply activities; maintains liaison with supported and supporting units; and recommends allocation of resources to support mission requirements. It determines requirements and manages capabilities for supported units. There are four subordinate sections: supply, munitions, field services and maintenance.

4-24. The distribution management center is the fleet maintenance manager for Army forces deployed to the area of responsibility. The maintenance section collects and analyzes maintenance data and reports; enabling the TSC to enforce theater Army priorities relating to the repair of specific types of equipment or support of specific units. These same activities provide the means to identify significant trends and deviations from established standards; enabling maintenance managers to take action to ensure the maximum number of combat systems remain fully mission-capable. Their actions may include disseminating technical information, the allocation or reallocation of resources and capabilities to support maintenance requirements, and coordination for sustainment maintenance.

4-25. The TSC distribution management center also develops plans, policies, programs, and procedures for ground missile and aviation equipment maintenance in accordance with requirements established by the theater Army with the intent to maximize combat readiness through the effective application of field and sustainment maintenance capabilities. The TSC passes systemic issues, beyond their capabilities, to the appropriate national level maintenance manager via the AFSB for resolution.

4-26. The materiel management branch's maintenance section plans, recommends resourcing, monitors, and analyzes maintenance readiness and support in the area of responsibility. It determines requirements and manages the maintenance capabilities for the TSC's supported units. The maintenance section includes aviation, electronic, and ground maintenance. They conduct trend analysis, identify equipment maintenance issues, and coordinate with strategic and national providers for theater maintenance issues. Maintenance managers work closely with the AFSB to ensure effective sustainment maintenance support to Army forces; analyzing readiness data for both systemic problems and those associated with the unique aspects of the specific operational environment, such as, environmental conditions and usage levels.

ESC Distribution Management Center

4-27. The ESC's DMC contains six subordinate branches. The branches are distribution integration, transportation operations, material management, operational contracting support, human resources operations, and financial operations. Execution of maintenance management is the responsibility of the materiel management branch.

4-28. The materiel management branch develops plans, policies, programs, and procedures involving supply activities; maintains liaison with supported and supporting units; and recommends allocation of resources to support mission requirements. It determines requirements and manages capabilities for supported units. There are five subordinate sections in the materiel management branch: supply, munitions, field services, maintenance, and fuel and water.

4-29. The maintenance section plans, recommends resourcing, monitors, and analyzes maintenance readiness and support in the joint operations area. It determines requirements and manages the maintenance capabilities for the ESC's supported units. The maintenance section includes aviation, electronic, and ground maintenance. They conduct trend analysis, identify equipment maintenance issues, and coordinate with strategic and national providers for theater maintenance issues. The ESC passes systemic issues, beyond its capabilities, to the appropriate national level maintenance manager via the AFSB for resolution.

4-30. The maintenance section staff collects and analyzes maintenance data and reports; enabling the ESC to enforce priorities relating to the repair of specific types of equipment or support of specific units. These same activities provide the means to identify significant trends and deviations from established standards; enabling

ESC maintenance managers to take action to ensure the maximum number of combat systems remain fully mission-capable.

4-31. Normally, the TSC works with an Army field support brigade or ASC on sustainment maintenance trends. An ESC deployed without a TSC works closely with the Army field support brigade or battalion to ensure effective sustainment maintenance support to Army forces; analyzing readiness data for both systemic problems and those associated with the unique aspects of the specific operational environment, such as, environmental conditions and usage levels. This coordination and collaboration also provides the basis for the effective employment of USAMC sustainment maintenance capabilities throughout the joint operations area.

BRIGADE/BATTALION LEVEL MAINTENANCE MANAGEMENT

4-32. Commanders and maintenance managers will manage field maintenance per the procedures contained in this Army techniques publication, (ATP), DA Pam 750-8, *The Army Maintenance Management System (TAMMS) User's Manual*, and DA Pam 750-3, *Soldiers Guide for Field Maintenance Operations*.

4-33. The FSC commander assists the SPO staff with planning and coordination for 20 level field services with the supported customer unit. The SPO staff coordinates all maintenance operations. It provides guidance on maintenance priorities, and sets objectives for production. The SPO staff coordinates and integrates the brigade's field maintenance mission and are a key element in maintenance data collection. They ensure its units provide automated data and generate appropriate maintenance reports.

4-34. At the battalion level, the SPO office manages supported customer units. The staff supervises, controls, and directs the operation of battalion units for field maintenance, recovery, repair parts supply, and technical assistance. The relationship between the support operations office and shop office is vital to mission success.

4-35. The CSSB and the BSB support operations officer provide updates to the sustainment brigade on maintenance and repair parts supply matters. These include recommendations concerning personnel, facilities and equipment requirements, maintenance performance, repair parts supply status in addition to reporting the state of materiel readiness, deployment, and employment of battalion units. Figure 4-2 depicts the elements of the support operations staff within a TSC.

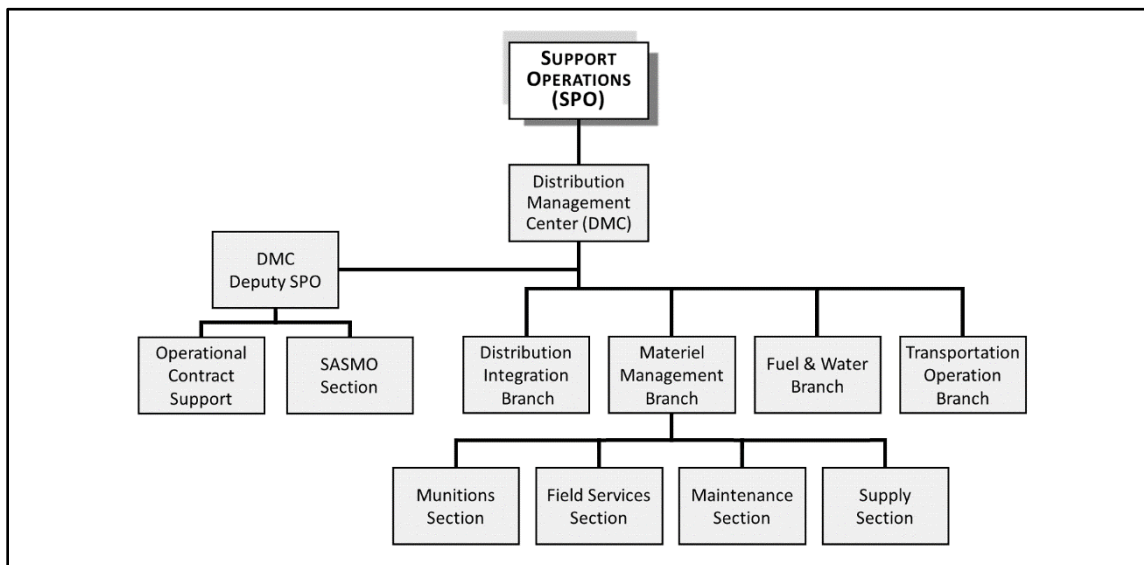


Figure 4-2. Theater sustainment command support operations section

COMPANY LEVEL MANAGEMENT

4-36. Company level maintenance management focuses on each job. The maintenance mission is resourced and accomplished at company level. The company must effectively manage its assets including personnel, time, and repair parts to provide the best support possible with the resources available.

4-37. Many techniques used at battalion level also apply at company level, but they require a more personal, direct approach along with an immediate response to actual or anticipated problems. Effective management at company level requires leadership, production control, workload analysis, determining maintenance requirements, work simplification, work measurement, total quality management, QA, and motivation.

Production Control

4-38. Production control involves production planning, scheduling, proper routing and rerouting of work, attaining maximum production by keeping all shop elements working at or near capacity, and proper shop layout.

Workload Analysis

4-39. Workload analysis is part of the overall production control process. It requires a continuous review of work in process as well as new work and it is a prime responsibility of the maintenance control sergeant. It helps prevent over commitment of resources with unrealistic priorities and deadlines.

Estimating Maintenance Requirements

4-40. In order to forecast maintenance workload, the maintenance control sergeant of each maintenance unit maintains a current operations map and equipment density list. The operations maps show personnel, the location of adjacent units, supply distribution points, aircraft landing areas, and denote field maintenance point locations. Equipment density lists keep personnel up-to-date on how much equipment is supported and where it is.

Work Simplification and Measurement

4-41. Every unit applies work simplification and measurement techniques. Work measurement standards are developed and applied to measure and compare Soldier's work. Maintenance units engaged in similar types of operations and keep records that show production results on a week-by-week basis.

4-42. Units can compare the most efficient repairs against the least efficient in terms of quality and quantity of production to obtain a mean or median for measurement of overall performance. Both the CSSB and BSB have information obtained from production reports of other units to permit comparison of production among units or individuals performing the same type of work. Implementing work simplification techniques may also uncover ways to improve unit layout to eliminate wasted effort and movement.

4-43. Maintenance managers should focus on the following—

- The unit commander's maintenance requirements for accomplishing the unit's tactical mission.
- Recommending equipment maintenance goals and objectives to the commander responsible for the maintenance of assigned equipment.
- Assisting the unit commander in the planning of operator/crew and field maintainer equipment sustainment training.
- Managing resources (for example, money, people, time, and materiel).
- Reporting accurate readiness.
- Recommending improvements to the total Army maintenance management system.
- Evaluating the constant performance of functional areas of field maintenance.
- Performing high quality field-level PMCS using the applicable equipment TMs.
- Integrating safety into all tasks associated with field maintenance.
- Reporting usage accurately.
- Coordinating with property book to ensure serial numbers and registration numbers are the same.

REPORTING SYSTEMS

4-44. Accurate reporting is the link between decentralized operations and centralized management. The ability to manage maintenance operations and maintain operational readiness standards is the measure of

success for a maintenance manager. GCSS-Army as described in appendix B of this publication provides the required reporting functionality. Maintenance managers should be prepared with a back-up management plan in the event that GCSS-Army is unavailable.

MAINTENANCE CONTROL

4-45. Maintenance control is a critical element of effective maintenance management for shop operations and procedures. It directs and controls work in a maintenance shop in a manner that provides for maximum output of quality work.

4-46. A primary function of maintenance control is to reduce, and when necessary, correct overload conditions. While a maintenance section should always work at or near capacity, backlogs should be minimized. Poor management, lack of personnel, or continuous operations can cause overloads.

Procedures

4-47. In a maintenance shop, maximum production, effective use of personnel, facilities, and orderly progression of work depends on an efficient, effective maintenance control element. Maintenance units have a maintenance control section, commonly referred to as the shop office, to accomplish production control functions.

4-48. While specific numbers vary depending on the type of unit, the maintenance control section normally contains a maintenance control officer, maintenance warrant officer, maintenance control sergeant and an automated logistics specialist. For operational purposes, the maintenance control section is usually organized according to the functions performed. The result is a maintenance control and shop supply element. Maintenance control elements carefully screen maintenance requests, assign work to various sections, maintain workload status in the shop section, improve operational procedures, and assist in determining parts requirements.

Operations

4-49. Maintenance control operations involve directing and controlling workflow. Maintenance control requires common sense, effective planning, close supervision, and prompt remedial action. It also requires the managerial tools to direct and control workflow through a maintenance shop in a manner that results in the maximum production of quality work.

Coordination

4-50. The maintenance control section must effectively coordinate with the supporting SSA to ensure prompt availability of required repair parts and other maintenance supplies. The coordination steps include schedule shop input, assign work to various shop sections to keep all shops working at capacity, carefully screening maintenance requests and inspection reports to ensure maximum repair. This may also involve shifting assets based on the availability of resources, capability of personnel, and shop capacity. The maintenance control section must keep abreast of the status and quantity of work in each section and minimize overloads, take corrective action when necessary, and aggressively pursue repair parts that are not available within the unit.

Overloads

4-51. A prime function of the maintenance control section is to take action to reduce backlog conditions in any of the sections. Supported units expect prompt repair and return of items taken into maintenance. Backlog conditions in any of the shop sections can seriously delay repair operations to the detriment of the supported unit's mission. Backlog conditions can result from required workloads temporarily exceeding the available capacity of one or more maintenance sections; temporary loss of maintenance capability in the maintenance section; competing priorities due to tactical operations; and reactive instead of proactive maintenance management.

4-52. To avoid backlogs, adhere to the following—

- Distribute work among the various shop sections to keep all sections working at or near capacity. Routing is the sequence of repair operations that ensures complete repair of each item in the shortest time possible. Any interruption in the normal flow of work needs immediate attention.
- Quick identification of hard to procure items or items with long lead times. The maintenance control section should work with the available resources for assistance.
- Resolve the problem by rerouting work or supplementing the capacity of the backlogged section with personnel from other sections working below capacity. The battalion may also take action to realign missions, reduce workloads, or provide additional personnel.
- Analyze workloads during field operations. Available man-hours may be severely reduced by guard duty, defense operations, enemy attacks, weather, unit movement, set up, details, and so forth.
- Work with the chain of command to ensure necessary details are properly apportioned. Therefore, an overloaded section provides a few personnel for special requirements while another section that is not overburdened picks up the majority of the special duty.

Maintenance Control Officer

4-53. For an effective maintenance control operation, the maintenance control officer must have a thorough knowledge of the mission of the entire company and the supported battalion. The Maintenance control officer must also be thoroughly familiar with the capabilities and capacities of the individual sections; stay informed of priorities assigned to supported units; expected workloads; shop progress; and maintenance supply status.

4-54. Maintenance control requires a continuous flow of data from all maintenance elements in the company and the shop supply element. The control section serves as the center for the production control process.

Production Methods

4-55. Production methods used include bay shop, job/bench shop, on-site maintenance, and production line operations. The method used depends on the type of materiel to be repaired and the personnel, facilities, and time available.

Bay Shop

4-56. The bay shop production method is used when a variety of jobs are performed in the shop or when the item being repaired is difficult to move. Under a bay shop method of operation, the equipment to be repaired remains in one shop location until work is complete. The Soldiers, tools, and equipment needed to do the work move to the equipment bay shop. Maintenance managers group personnel or equipment performing the same or similar jobs in sections under a modified bay shop operation. The equipment to be repaired moves from one section to another at irregular intervals until the work is complete.

Job/Bench Shop

4-57. Maintainers use job/bench shops are to repair small items, items requiring a high degree of technical skill, or items requiring repair with equipment mounted in a shop vehicle. Job shop repair includes work performed at stands or benches under maintenance shelters or in shop vehicles. Items repaired by this method include components, assemblies, small arms, fire-control instruments, fuel/electrical system components, electric motors, leather/textile items, C&E equipment, and missile electronic items.

On Site Maintenance

4-58. FMTs, recovery teams or contact teams perform on-site maintenance to the maximum extent possible. There are several advantages to conducting maintenance at the equipment breakdown site. Some of the advantages include reducing equipment downtime, eliminating time and resources required for recovery, reducing the battlefield signature caused by recovery, and reducing the potential for increased damage during recovery. Maintainers should apply expedient BDAR procedures to restore minimum system function whenever standard maintenance is not possible.

4-59. Maintenance managers organize the teams providing on-site maintenance based on known requirements. Therefore, leadership should fully inform the teams on the problem before they are dispatched. This includes the type of equipment, malfunction symptoms, and anticipated repair; the location including the route, and link-up point; and requesting unit, point of contact, frequency, call sign, enemy situation and current threat.

Production Line

4-60. The production line is a production method primarily used by sustainment-level maintenance activities. Maintainers utilize the method to repair or overhaul several similar items when the repair sequence is divisible into a series of independent operations. Production lines provide the most efficient method for repairing a large volume of similar items when individual operations are not too complicated or time-consuming, and the item are portable. The production line passes similar equipment through a series of workstations. Maintainers perform work in a sequential order until to repair the item.

QUALITY ASSURANCE AND QUALITY CONTROL

4-61. The objective of QA is to produce high-quality work the first time. A valuable QA program is essential for proper, effective, and efficient performance of any level maintenance mission. It covers all actions necessary to provide adequate confidence that materiel, data, supplies, and services conform to established technical and performance requirements. Maintenance managers must separate QA as a function from production control. This separation of QA and production control insulates QA from the pressures of meeting production at the expense of meeting standards. Persons assigned to perform the job of QA should be technically qualified and have additional training on QA techniques and procedures. Higher HQ assistance visits and inspections provide additional technical and process-oriented assistance to the QA team. Regardless of the source, QA focuses an independent set of eyes on products and processes to ensure maintainers meet expressed standards.

4-62. QC is a separate and distinct function. It is a leadership function and must be applied to all aspects of unit operations, including initial, in process, and final inspections. Commanders must ensure that QC team members are trained and motivated to balance quality concerns with production concerns.

4-63. As equipment, requiring repair, works its way through a maintenance organization, it is subjected to a series of inspections, which demonstrate the interplay between QA and QC. Initial, in process, and final inspections all represent opportunities for QA to overlay QC. This happens most frequently as the repair work nears completion. Repairmen/repair teams accomplish the tasks necessary to complete the job, subject to in-process QC inspections at both random and critical points in the work. Upon completion, a supervisor conducts a final QC inspection before sending the equipment for a final QA inspection. At each inspection point, QC directs corrections of the repairer's errors and positively reinforces the repairer's adherence to proper procedures. Similarly, QA personnel direct correction of QC shortfalls and positively reinforce adherence to standards by QC and production personnel. TMs appropriate to various items of equipment are the basic tools of QA and QC. Thorough familiarity with DA Pam 750-8, AR 710-2, and AR 750-1 is required.

4-64. Supervisors exercise the QC concept by routinely inspecting work, directing the correction of errors, and consistently reinforcing adherence to proper procedures in garrison and field training. QA and QC results in Soldiers, supervisors, and leaders knowing proper procedures, correct standards, and most importantly, applying them in all processes. It is reinforced by an independent set of eyes assuring quality by validating achievement of the applicable standards. QA and QC pay off in the form of a high quality, more effective and efficient maintenance operation.

4-65. Supervisors must continually motivate personnel to perform to Army maintenance standards. Commanders and shop officers must develop incentive programs that reward superior performance. Commanders can award Drivers, mechanics, and special equipment operators with the Driver and Mechanic Badge to denote the attainment of a high degree of skill in the operation and maintenance of motor vehicles. For additional information regarding the Driver and Mechanic Badge, refer to AR 600-8-22, *Military Awards*.

TOTAL ARMY QUALITY MANAGEMENT

4-66. Total Army quality management is a management technique used to supplement QC procedures by motivating all personnel to produce high-quality work the first time. A functional total Army quality management program becomes evident when Soldiers display the motivation and initiative to inspect their own work and take immediate corrective action to resolve QC problems. Units should apply total quality management at all times, in all functions. For more information on total Army quality management, refer to AR 5-1, *Management of Army Business Operations*.

TECHNICAL INSPECTION

4-67. A technical inspection of materiel is one of the most important aspects of maintenance operations. Inspections are essential for an effective maintenance program. Units should perform periodic technical inspections of their equipment to capture faults missed by operators/crew and identify training deficiencies of both operator and mechanic. Accurate initial, in process, and final inspections are vital in maintaining efficient maintenance operations and ensuring quality repairs. Units also perform material classification inspections to determine the overall serviceability and reparability of equipment.

MATERIEL CLASSIFICATION INSPECTIONS

4-68. Classifying materiel through close inspection allows the condition code of an item to be established. Classification, which indicates the physical condition of the returned materiel, is necessary to determine the proper disposition of an item. It identifies the extent of repairs required, whether the repairs can be accomplished, and whether the item is worth repairing in accordance with maintenance expenditure level guidelines. The objective is the efficient, rapid return of the greatest amount of materiel.

4-69. Qualified maintainers inspect materiel in accordance with instructions and specifications in TMs, technical bulletins, and sustainment brigade directives. The inspection results establish the materiel's condition code (classification). AR 725-50 provides a complete listing of condition codes.

INITIAL INSPECTIONS

4-70. All equipment that comes in for maintenance action requires an initial inspection. This initial inspection or preliminary diagnosis is useful in determining if the operator/crew has been fulfilling their maintenance responsibilities. The inspection provides a basis to validate equipment faults, extent of work required, determine economical reparability, parts requirements, recommending further disposition, recommending financial-liability-investigation-of-property-loss action (when it appears that equipment damage or unserviceable condition is the result of misconduct or negligence, rather than fair wear and tear or battle damage), determining necessary maintenance tasks, and estimating required maintenance man-hours.

IN-PROCESS INSPECTIONS

4-71. In-process inspections are necessary to ensure work is being performed properly. Maintenance supervisory personnel perform these inspections continually throughout the repair process.

FINAL INSPECTIONS

4-72. Maintainers perform a final inspection after the work is completed. This inspection determines the adequacy of repairs and requires an operability test to determine serviceability and safety.

WORK FLOW

4-73. Figure 4-3 illustrates a typical maintenance workflow for an item requiring field-level maintenance repair. This workflow applies to all commodities. However, with slight modification it can be tailored for specific shop needs. It is important to note that the modified work flow retains the following key elements:

- Three QA and QC inspections, initial, in process, and final.
- Maintainers should route DA Form 5988-E back to the operator/crew.

- Readiness reporting at the point of fault identification until fault correction.

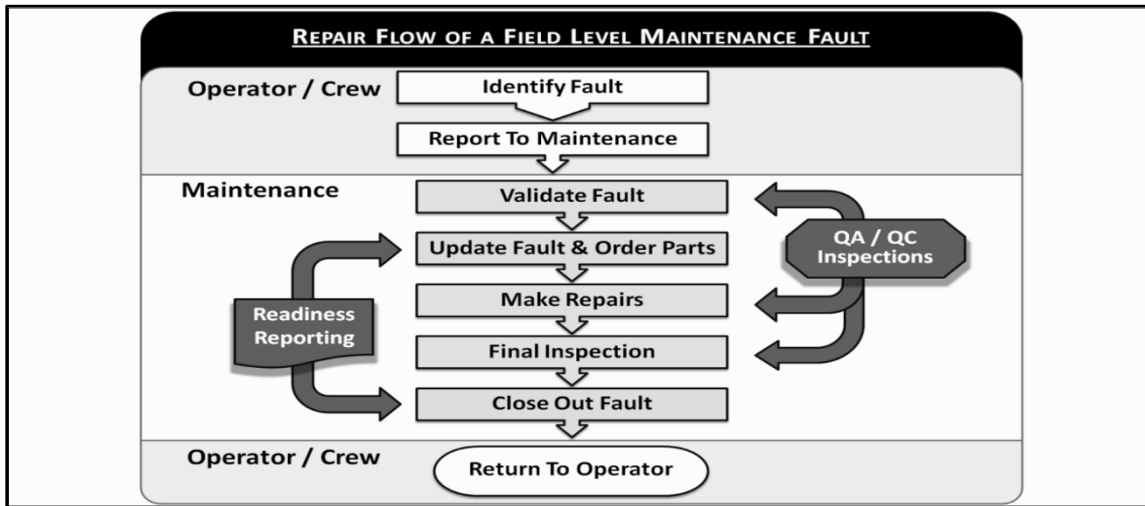


Figure 4-3. Field-level maintenance repair flow chart

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Chapter 5

Repair Parts Supply Operations

This chapter discusses supply support operations and repair parts supply. Repair parts supply support is a crucial part of all maintenance operations. Maintenance organizations require repair parts as well as tools and test equipment to execute their field and sustainment maintenance missions. Replenishment of shop stock and bench stock is critical to preserve readiness. Army supply policy governing supply support operations is found in AR 710-2, *Supply Policy below the National Level*. Units obtain repair parts from the following two areas:

- SSA.
- Maintenance shop supply.

The SSA performs all functions related to receipt, storage, and issue of supplies for the BDE, or within an assigned support area. Maintenance shop supply is the primary focus of this chapter. Shop supply obtains, accounts for, stores and replenishes supplies required for maintenance operations.

MAINTENANCE RELATED STOCKS

5-1. Shop supply receives, stores, and issues class IX supplies required to support the maintenance mission. AR 710-2 and DA Pam 710-2-1, *Using Unit Supply System (Manual Procedures)* govern these stocks. A complete understanding of which stocks are authorized will enable a unit to significantly reduce repair time and increase their readiness rates.

5-2. Deployable maintenance organizations maintain shop supplies separately from the supporting SSA or stock record account. Typically, units store and issue these stocks from vans, trailers, or other conveyances and will be managed for short notice deployments.

5-3. Shop stocks and bench stocks in non-deployable organizations should be stored separately from the supporting SSA and positioned for immediate access by maintenance personnel to achieve maintenance process efficiency in support of the organization, system readiness, and critical Army programs. Field and sustainment level maintenance related stocks include the following categories: shop stock, bench stock, and on-board spares.

5-4. Shop stock and bench stock may consist of repair parts (class IX), package petroleum (class III [P]), and other classes of supply needed to perform maintenance operations. Typically, a unit basic load should contain enough parts to address requirements equivalent to a fourteen day projected consumption rate. Approval authority for shop stock is the unit commander; the approval authority for bench stock is the maintenance control officer, in accordance with AR 710-2.

SHOP STOCK

5-5. The activity maintenance control section office manages shop stock. Shop stocks are demand-supported repair parts and consumable items stocked by the modified table of organization and equipment, table of distribution and allowances, or joint table of allowances maintenance organization. These maintenance organizations provide services in response to requests from supported organizations in field commands to meet their commander's mission requirements, or in response to USAMC inventory managers to support Army sustainment programs.

5-6. Maintenance personnel request shop stock, repair parts and supplies from their supporting supply activity. Maintenance units only utilize shop stock for the purpose of maintaining the readiness of the supported

units. Shop stock allows maintenance organizations to keep frequently used repair parts and expendable supplies to avoid repair delays and reduce the number of supply transactions. FMTs carry a portion of the FSC's shop stock. The FSC is responsible for the management of the shop stock.

BENCH STOCK

5-7. The using maintenance activities/sections manages bench stocks. Bench stock consists of low-cost consumables, repair parts, and supplies used by maintenance shop personnel at an unpredictable rate. The maintenance control officer determines stockage requirements based on the essentiality of the items that the unit is to repair.

5-8. Bench stocks typically consist of 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 repair parts authorized for inclusion in bench stock are small arms repair parts controlled inventory items code "U".

5-9. The FMT positions select shop and bench stock items in accordance with priorities and requirements to effect readiness of a specific supported unit. The FMT replenished stock based on maintenance actions executed.

Note: Maintenance personnel must actively monitor the replenishment of shop and bench stocks. These on hand parts are key drivers for unit readiness.

ON-BOARD SPARES

5-10. On-board spares are repair parts carried on a platform or unit organic equipment authorized by the TM or the commander. The operator/crew manage on-board spares. The logistics system considers on-board spares as consumed for accountability purposes. Units are not required to account for these spares within a logistics information system. The intended use for these items is to support the equipment on which they are mounted. If necessary on-board spares should be retrograded through the assigned SSA for sustainment repair and return to the supply system.

5-11. The electronic systems maintenance warrant officer (948B) and Ordnance electronic maintainers in the organic C&E maintenance shop perform brigade/division/battalion spares management for unique systems, including the WIN-T, Stryker Anti-Tank Guided Missile vehicle and other platforms,. The C&E maintenance shop ensures proper firmware, modification work orders, operating system baselines, security patches and other specified maintenance. This maintenance is an essential readiness function sustaining a multitude of platforms. See chapter 7 for additional details regarding on-board spares.

COMMERCIAL OFF-THE-SHELF ITEMS

5-12. The Army purchases non-standard items, often referred to as commercial off-the-shelf (COTS) items, because they are more economical for the Government to purchase and field rather than develop service-unique equipment. Many of these items represent rapidly changing technology. The Army benefits by leveraging the work of companies with a greater economy of scale than an Army-unique system would have, and additionally may bring the potential for interoperability with systems external to the Army. Another advantage is that COTS systems may come with warranties and service contracts. These warranties and contracts are a concern to the field maintenance shop office.

5-13. Commercial off-the-shelf equipment may increase the maintenance section's workload because COT items are usually not part of the MTOE and non-standardize sustainment support packages. Maintenance personnel may lack the tools and training to maintain COTS items. Field maintenance and repair on an item might void any original equipment manufacturer's warranties.

TOOLS AND SPECIAL TOOLS

5-14. Commanders and leaders must ensure that all sets, kits, outfits, and special tools are being used and maintained properly; properly accounted for; and promptly replaced when unserviceable or lost. Field-level maintainers cannot be expected to properly troubleshoot, remove, or replace components, unless the right tool is readily available and serviceable as called for in the equipment TM.

5-15. Special tool sets are required to perform maintenance on some systems. Maintainers must proactively identify whether units they are supporting possess systems that require special tools. Units can normally order special tools for existing systems by their stock number and add them to the maintenance unit's property book. For newly fielded systems and/or systems whose special tool sets are not yet available for order, maintainers may need to use a different approach. One technique is to contact the supported unit to find out whether they have multiple sets of the special tools. If they do, the supporting maintenance unit can request the unit transfer a set so the maintainer can work on the equipment. Another option is to draw up a memorandum of agreement specifying that the unit will provide the required special tools whenever the units sends a system for maintenance that requires the use of specific special tools.

REPAIR PARTS MANAGEMENT

5-16. AR 710-2 authorizes units to stock repair parts to support their maintenance mission. The inability to immediately obtain required repair parts is one of the most serious maintenance management issues. Maintenance managers must check to ensure requests are filled out correctly to help reduce delays and prevent zero balances. Supervisors must perform regular follow-ups on all requests and ensure maintainers order the correct part the first time by validating that the stock numbers/part numbers are in the current catalog prior to submitting requisitions.

5-17. 5-18. Below are the key steps for general requisition flow that maintenance managers should be aware of in the requisition process for class IX and other classes of supply.

- GCSS-Army verifies if the repair part is on the requesting units shop stock or the supporting SSA. If the repair parts are on the unit's shop stock GCSS-Army will notify the user that the material is on hand.
- If the repair parts are on the supporting SSA authorized supply listing, the supporting SSA will create and process a pick ticket creating a materiel release order.

5-18. Maintenance stocks for aviation, communication, medical, and missile can vary for source:

- The aviation brigade normally stocks required aviation repair parts.
- The signal battalion's C&E maintenance shop normally stocks required C&E repair parts.
- The C&E maintenance section normally updates software on signal and communication systems.
- The sustainment automation support management office normally update logistics automated systems software if the operator/crew is unable to perform the task.
- Medical maintenance elements maintain a limited stock of medical repair parts. Medical channels provide resupply.
- The missile maintenance element stocks missile related parts.

5-19. Alternate sources of supply can be also be used to fill high priority requisitions. These include controlled exchange, cannibalization points, and/or local purchase. If the item is obtained through one of these methods, the unit must capture demand and cancel or redirect open requisitions.

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Chapter 6

TMDE Calibration and Repair Support

The accuracy, sustainability and safety of Army weapon systems and personnel throughout the world depend on accurate and reliable measurements. The calibration and repair of test, measurement and diagnostic equipment ensures that the measurements made are traceable to national, international, or intrinsic standards of measurement. This chapter discusses the objectives, structure and employment of these resources.

GENERAL OVERVIEW

6-1. TMDE includes any system or device used to evaluate the operational condition of an end item or subsystem thereof to identify and/or isolate any actual or potential malfunction.

6-2. In general, TMDE refers to both general purpose and special purpose TMDE. TMDE-special purpose is developmental in nature for a specific weapon or support system. The Army normally procures TMDE-general purpose, utilized in a variety of applications as COTS items. Types of TMDE range from torque wrenches in a toolbox to complex equipment supporting sophisticated weapon systems. The Army's TMDE program supports a number of technical parameters such as infrared, electro-optics, direct current, low frequency, microwave, radiation, detection, indication and computation, mechanical, hydraulics, and pneumatics.

6-3. The TMDE calibration and repair support serves a vital role within the Army. Properly calibrated test and measuring equipment can accurately diagnose problems, reduce line replaceable unit failure and conduct maintenance to specified tolerances. From instruments used to control a helicopter's flight navigation to the targeting system on a tracked vehicle to the mechanic using a multi-meter to troubleshoot a faulty system, the Army ensures its weapon systems operate safely and properly through routine calibration of its test, measurement, and diagnostic equipment

COMMANDER'S RESPONSIBILITY

6-4. Commanders at all levels are responsible for their unit's TMDE readiness, and in accordance with AR 750-43, *Army Test, Measurement, and Diagnostic Equipment*, will appoint a TMDE coordinator to interact on their behalf with their assigned support activity.

COMPANY TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT CALIBRATION COORDINATOR

6-5. As designated by the unit Company Commander, the TMDE calibration coordinator is required to review the organization hand receipt to identify TMDE requiring support in accordance with TB 43-180, *Technical Bulletin Calibrating and Repair Requirements for the Maintenance, and Standardization*. The supporting area TMDE support team must train all TMDE calibration coordinators prior to executing the calibration coordinator responsibilities. They must ensure each item is placed on the support TMDE activity instrument master record file, turn in supported items, and ensure all items returned from the support activity have a DA Label 80, *U. S. Army Calibrated Instrument* or equivalent. The organization TMDE calibration coordinator manages all TMDE changes that include additions and/or deletions.

TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT CALIBRATION PROGRAM

OBJECTIVES

6-6. The objective of the Army's TMDE program is to ensure accurate and serviceable TMDE is available for Army use with measurement accuracies traceable to National, International, or intrinsic standards. Highly technical organizations consisting of military, civilian, and contractor personnel are responsible for calibration and repair of Army TMDE.

6-7. The integrity of the Army's TMDE calibration and repair support program is based on a hierarchy of traceable calibration accuracies. The accuracy of all calibrations can be traced up through the Army TMDE support structure to the appropriate standard of measurement. Figure 6-1 reflects the hierarchy of calibration traceability.

ORGANIZATIONAL STRUCTURE

6-8. The size of the TMDE support activity and the expanse of its mission capabilities are dependent on the type and geographical dispersion of supported units. All TMDE support activities operate on an area or regional support basis. Typically, planners assign military TMDE support teams to maintenance companies within Forces Command, ARNG, and selected ASCC. Civilian TMDE Support Centers, also called TSC, Secondary Reference Labs, and Primary Reference Labs are assigned under the U. S. Army Material Command.

LEVELS OF TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT CALIBRATION AND REPAIR SUPPORT

6-9. The following TMDE calibration and repair support levels are key to sustaining accurate and traceable measurements. They should not be confused with Army standard maintenance levels. (See figure 6-1.) This support provided by the Army may vary from one location to another because of the density, type of TMDE supported, and the criticality of the support mission. Some designated laboratories may have S-level and very limited P-level capabilities. Other locations may have T-level and S-level capabilities and comprise both military and civilian support elements. For additional information on the levels of TMDE, calibration and support refer to TB 43-180.

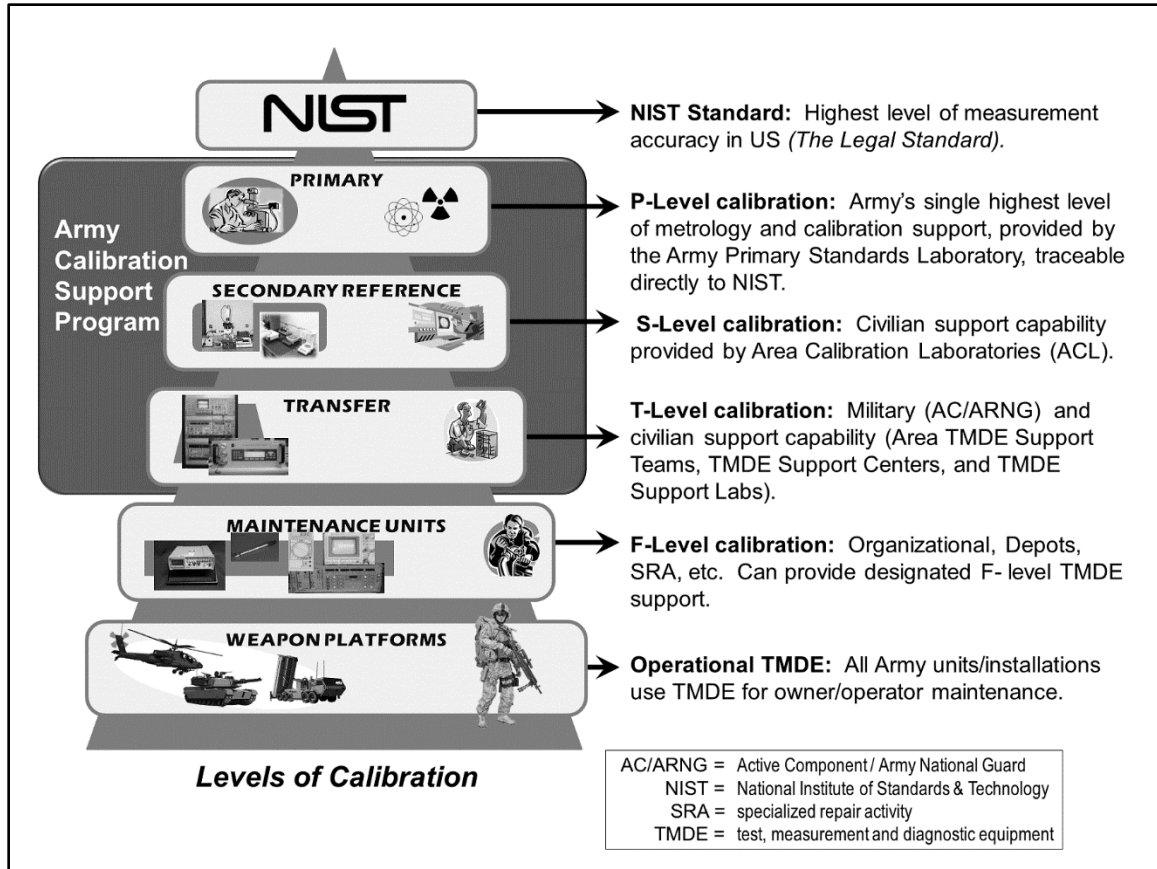


Figure 6-1. Hierarchy of calibration

F-level support

6-10. The letter “F” identifies those TMDE items that are supported by field maintenance, facilities, owner or user. All field/sustainment maintenance, facilities, owners, and users of TMDE provide F-level support as indicated in TB 43-180 and appropriate maintenance manuals.

T-level support

6-11. The letter “T” identifies those items of TMDE supported by a Secondary Transfer level facility. Area TMDE support teams provide calibration and repair support for TMDE requiring secondary transfer level support within the assigned mission area. Where F-level support capability for general purpose TMDE does not exist, T-level will provide that support. T-level support is typically provided by military, DA Civilians, or contractor personnel operating from a mobile or fixed facility. All military Area TMDE support teams providing T-level support are organized under a mobile equipment configuration for deployment purposes.

S-level support

6-12. The letter “S” identifies those items of TMDE that are supported by area calibration laboratories or by the closest support activity, which has the appropriate Secondary Reference support capability. Area calibration laboratories provide calibration and repair support for TMDE measurement standards and designated items of TMDE within their assigned mission area that require S-secondary reference-level support in accordance with TB 43-180. The area calibration laboratories are the principal support providers for T-transfer-level transfer standards.

P-level support

6-13. The letter “P” indicates support responsibility assigned to the Army primary standards lab. The Army primary standards lab, located at Redstone Arsenal, is the Army’s only complete principle support laboratory. P-level support is the Army’s highest support level for calibration and measurement accuracies. The Army primary standards lab provides support for measurement standards and selected items of TMDE requiring P-level support in accordance with TB 43-180.

MILITARY AREA TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT SUPPORT

6-14. A modular networked approach to TMDE support will ensure all TMDE customers have a coordinating cell within their immediate command.

TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT CALIBRATION AND REPAIR SUPPORT EXPEDITIONARY OPERATIONS COMMAND AND CONTROL

6-15. During expeditionary operations, the geographic combatant commander will exercise theater command and control over all TMDE logistic assets in the current joint operation area. This concept of operations will integrate the TMDE support capability within the geographic combatant commander’s footprint into a modular construct that provides TMDE calibration and repair support to TMDE owners assigned to, moving into or through the area of responsibility of the geographic combatant command and or subordinate commands. The maintenance cells located within the G-3 or S-3 of each command should maintain coordination. External coordination with the U. S. Army Test Measurement and Diagnostic Equipment Activity for calibration data and sustainment support should occur before and during deployment of calibration repair support mission assets. A modular networked approach to TMDE support will ensure all TMDE customers have a coordinating cell within their immediate command. The higher headquarters needs to be completely aware of how to locate their TMDE support in theater for their units. Each higher headquarters can coordinate services based on the commander’s priority and operational conditions. The higher headquarters must maintain continuous coordination within the maintenance network from early force entry through combat operations including stability and sustainment operations.

THEATER SUSTAINMENT COMMAND

6-16. TSCs establish a TMDE logistics area officer within the command staff. This TMDE logistics area officer provides expertise and technical assistance to subordinate sustainment brigades that have calibration and repair support capability as well as TMDE owners. The logistics area officer also coordinate with USAMC for backup or augmented support of TMDE services if needed. The liaison officer maintains oversight of calibration and repair support issues, metrics, and reports from subordinate commands to ensure TMDE services are appropriately work-loaded and adequate calibration and repair support assets are on hand to sustain the force in a dynamic environment. The logistics assistance officer is the primary coordinator with sustainment brigades that have calibration and repair support assets through the maintenance branch located within the sustainment brigade headquarters SPO staff.

6-17. When military and civilian calibration teams are collocated on the same installation an equitable workload agreement must be established to ensure a balance level of support.

COMBAT SUSTAINMENT SUPPORT BATTALION

6-18. The CSSB consolidates functions previously performed by corps and division support commands and area support groups into a single echelon and provide command and control of the full range of logistics operations. Area TMDE support teams fall under the command and control of the CSSB. Based on the support mission provided by the CSSB commander the CSSB operationally or administratively controls each Area TMDE support team. The area TMDE support team provides calibration and repair to TMDE owners assigned to the CSSB. The team will also provide support to units that require calibration and repair support within the sustainment brigade itself. Planners may assign one or more CSSBs to support the geographical combatant command area of responsibility. CSSBs that have a calibration and repair support mission will establish

communication with each other at the S-4 staff level within the SPO staff or maintenance cell to provide a theater level calibration and repair support infrastructure. This communication linkage provides the supported commands with the necessary information and support to ensure that all supported units who require calibration and repair support within the geographical combatant command area of responsibility are aware of where their support is located and how to interface with the area TMDE support team for their required calibration and repair support.

6-19. The loss of space-based communications through enemy disruption or denial attacks during deployed operations remains a major concern for organizations responsible for sustaining the U.S. forces. Leaders must be prepared to operate with alternative communication methods and networks. Alternative communication methods may mitigate short-term losses of communication. The CSSB will maintain contact with the theater sustainment command to ensure the geographic combatant commander is able to continuously monitor calibration and repair support within the operating environment. This enables the geographic combatant commander to direct the calibration and repair mission according to the theater commander's intent and mission objectives. A 948B assigned to the CSSB's FMC is responsible for providing management and technical support to the area TMDE support team.

AREA TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT SUPPORT TEAM

6-20. Planners usually assign area TMDE support teams to the SMC within the CSSB. Seven Soldier area TMDE support teams in both the active duty and ARNG utilize sets configured to provide calibration and repair support for the operational Army. Each area TMDE support team is capable of providing field-level calibration and repair support to any Army unit that owns and/or uses general purpose or selected special purpose TMDE within the two-level maintenance support concept. The area TMDE support team also has the capability to provide split-based type support to forward deployed units that require calibration and repair support. The supported unit that requires a split-based type calibration and repair support will need to coordinate that requirement with the supporting CSSB. The maintenance cell of the CSSB will coordinate with the area TMDE support team and provide the requested/required services. Reallocating calibration and repair support assets requires prior coordination to ensure other priorities for calibration and repair support are not left uncovered. The area TMDE support team must advise the CSSB maintenance support operations of calibration and repair support issues, trends, metrics and workload analysis. This information is to ensure the sustainment brigade has an accurate picture of the state of calibration and repair support within the support footprint of the support teams within its command. Due to the unique design and mission essential requirement of the calibration and repair support team it is absolutely essential that each area TMDE support team remain unencumbered by the host or parent unit and allowed to perform its mission. The command hierarchy from tactical to strategic levels of command is responsible for the successful calibration and repair support mission and must maintain visibility of those area TMDE support teams under their command and control.

OTHER TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT SUPPORT ACTIVITIES

6-21. The Army designed the Table of Distribution and Allowances (TDA) calibration and repair support organizational structure for flexibility relative to the theater mission requirements, while the capabilities to perform the unified land operations mission are contained at a single TMDE support activity. A carefully controlled network of TMDE support activities supports all levels of the operational and generating forces. The U.S. Army TMDE activity provides sustainment level calibration and repair support for all Army components and serves as a back-up support for the Area TMDE support team's mission.

6-22. The ARNG embed TDA calibration and repair support in state-operated Combined Support Maintenance Shops. They provide field-level support to TMDE owners within their state or region of responsibility.

6-23. The Combined Arms Support Command, also called CASCOP, Capabilities Development and Integration Directorate provide the requirements management support for all MTOE TMDE. Combined Arms Support Command Capabilities Development and Integration Directorate is the user representative for the area TMDE support team calibration and repair Soldier. This also ensures the area TMDE support team has the accurate quantity and allocation of calibration standards to execute the Army MTOE TMDE mission. Combined Arms Support Command Capabilities Development and Integration Directorate prioritizes calibration requirements for procurement on an annual basis with coordination between all key stakeholder organizations.

TACTICAL OPERATIONS COMMAND AND CONTROL

6-24. Throughout all operations, U. S. Army Forces Command, also known as FORSCOM, and USAMC are responsible for providing all TMDE logistics assets in theater and advising sustainment commands on sourcing requirements. These assets include TMDE calibration and repair support mission functions provided by TDA and MTOE elements within the theater of war, to include the ARNG.

6-25. Planners base the number of area TMDE support teams required to support the overall calibration and repair support mission on the category and densities of supported TMDE and the geographic dispersion of supported units. Operational control for all technical aspects of the mission falls under the Area TMDE support team's parent maintenance unit. The unit of attachment exercises administrative control of the area TMDE support team when area TMDE support team elements are attached to a unit within a designated force.

6-26. The U.S. Army TMDE Activity provides a TMDE liaison officer to the AFSB to provide Army metrology expertise and technical assistance. The TMDE liaison officer coordinates and provides support to the TSC G-4 on all TMDE requirements. The TMDE liaison officer monitors and reports on calibration and repair support metrics, oversees evacuation of TMDE to higher levels of support, and provides the necessary coordination to establish and maintain comprehensive calibration and repair support coverage through interlocking combinations of civilian, contractor, and military TMDE Support Teams. In addition, the U.S. Army TMDE Activity coordinates with Army command G-4 staff on calibration issues that impact the area TMDE support team mission.

OPERATIONAL CONCEPT

6-27. The U.S. Army TMDE Activity TMDE liaison officer is the central point within the area of operations for coordinating internal and external TMDE calibration and repair support technical and operational requirements. Each area TMDE support team will set up operations in the designated area; and provide one-stop TMDE calibration and repair support to all units within or passing through their area of support. The area TMDE support teams utilize U.S. Army TMDE Activity support for organic and customer secondary reference laboratory support.

6-28. Most area TMDE support teams maintain a split-based, mobile capability, to respond to selected TMDE calibration requirements within the divisional area for a limited timeframe and as determined by the elements of the division G-4 staff.

MISSION EQUIPMENT

6-29. The MTOE area TMDE support team consists of two major equipment sets. The principal set is the fully mobile and environmentally controlled calibration and repair facility. A dedicated tactical vehicle with power generation equipment provides for the facility's mobility and electrical power requirements. The facility houses calibration standards, ancillary TMDE, communication equipment, production control facilities, and workspace for repair functions. This single facility can support the TMDE support team mission. In addition to the principal equipment set, there is a secondary equipment set consisting of a vehicle-mounted shelter with on-board power and environmental control systems. The shelter houses a limited calibration capability, (radiation, detection, indication and computation, torque meter, and oscilloscope standards) for use in a split-based mode of operations, where high densities of TMDE are located.

6-30. When used in a split-based mode of operations, the two-man mobile facility is dependent on the parent area TMDE support team's principal equipment set for repair functions and production control operations.

MODES OF OPERATION

6-31. The MTOE area TMDE support team's equipment configuration allows the team to operate in a fully uploaded mobile mode or in a dismounted fixed facility mode of operations. Within the fixed facility mode of operations, the team may retain limited mobile calibration capability with the shelter-mounted set of equipment for special or split-base requirements. Mission variables, as determined by the appropriate SPO staff, determine the mode of operations. The calibration standards allocated to the area TMDE support team provides a modular versatility for fixed facility and mobile calibration mission support.

6-32. The TDA TMDE support activities located in theater operate largely in the dismantled fixed facility mode of operation using calibration sets configured to support a wide variety of general purpose and select special purpose TMDE.

6-33. MTOE and TDA units will evacuate TMDE assets requiring secondary reference level calibration. Designated regional support centers will normally provide support external to the theater.

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Chapter 7

Other Maintenance Activities

Each maintenance activity has special requirements and must be tailored to meet the commander's intent. This chapter will discuss those requirements for communication and electronic, missile systems, army watercraft, and aviation.

COMMUNICATION AND ELECTRONICS MAINTENANCE

7-1. C&E maintenance ensures that communication and electronic systems are operating to proper capability and integrity in accordance with the operator TM. Operators perform PMCS to ensure functionality. If faults are detected, operators record them and typically contact the C&E maintenance shop for repair or replacement. Ordnance maintainer communication and electronic maintenance field-level efforts are focused on performing on or near platform maintenance tasks in accordance with the applicable TM and institutionally-trained skills, assigned tools, available TMDE and authorized as indicated by an "F" in the third position of the source, maintenance, and recoverability code and "Maintainer Level" column of the MAC. Ordnance maintainers for C&E (CMF 94) efforts focus on performing repairs or replacement of an end item, line replaceable unit, shop replaceable unit, modules, subassemblies, subcomponent, circuit card assembly, plug-in units, repair parts, fault verification, troubleshooting assistance and applicable software upgrades. Additional maintenance-related tasks include technical inspections, warranty claims, spares management, serial number change documentation for administrative adjustment reports, packaging and shipment tracking, maintenance work orders, and coordination with other maintenance elements such as a regional support center, forward repair activities, or BLSE. The item is returned to the user upon completion of all necessary repairs.

7-2. In order to fully understand the maintenance operation for communication and electronic equipment, it is important to understand the differences between military equipment; the activity providing support for this equipment; and the key personnel associated with the repair process. This section defines the roles, responsibilities and procedures required to ensure C&E systems are maintained and readily available.

TYPES OF EQUIPMENT

7-3. The United States Army utilizes two different categories of equipment: life cycle managed, and non-standard equipment.

Life Cycle Managed Items

7-4. Also known as program of record items, life cycle managed items are procured military equipment items that follow the life cycle from procurement to fielding — sustainment — disposal. These items are designated with a line item number, also called a LIN. Examples of life-cycle managed equipment supported at the C&E maintenance shop and maintained by CMF 94 maintainers include:

- Single channel ground and airborne radio system, also called SINCGARS.
- The WIN-T.
- Command and control systems.
- Situational awareness platforms such as Joint Battle Command–Platform, also called JBC–P.
- Encryption devices, power supplies and ruggedized computers.
- Night vision devices, also called NVDs.

Non-Standard Equipment

7-5. Non-standard equipment items are referred to as COTS items. This type of equipment does not usually go through the life cycle management process due to the urgent need of the unit to support its mission. The Army acquires non-standard equipment through rapid fielding initiatives. Units receive these items after submitting an operational needs statement, Joint Improvised Explosive Device Defeat Agency, secure communication item, or purchased by unit credit card or other funds. Maintenance for these systems varies from CFSR service to replacement under warranty terms.

AREA MAINTENANCE AND SUPPORT FACILITY

7-6. U.S. Army Network Enterprise Technology Command, (NETCOM), maintains one area maintenance and support facility for the European theater, also called AMSF-E. All other NETCOM units utilize locally aligned SSAs and maintenance activities. NETCOM Europe provides the following services: technical hardware support for information technology networks, electronic communications, and associated line replaceable unit equipment using government furnished property, also called GFP, and other government furnished property test equipment. The area maintenance support facility – Europe performs go/no-go testing and perform repairs, documentation and government furnished property automatic test equipment, also called ATE, and other government furnished property test systems for printed circuit boards, also called PCBs, communication and information technology networking electronic equipment.

7-7. NETCOM provides both field-level and sustainment-level maintenance. The special repair activity provides most sustainment-level maintenance including limited depot level sustainment maintenance. Maintenance tasks performed by NETCOM include:

- Power systems.
- Battery backups.
- Uninterruptable power systems.
- Hydrogen cells.
- C&E repair.
- Intrusion detection and environmental alarms.
- Antenna/tower maintenance.
- Environmental support maintenance.
- TMDE repair and calibration.
- Air traffic services maintenance.

7-8. The area maintenance and support facility supports the defense satellite communication system, the LandWarNet portion of the global information grid, Armed Forces Radio and Television Service, also called AFRTS, military affiliate radio system, also called MARS, and other theater unique communication or command and control systems. The area maintenance and support facility may also provide support to other U.S. military departments, DOD activities, and other US government agencies or installations. The U.S. Army or a civilian contractor with U.S. Army oversight operate the area maintenance and support facility.

7-9. The area maintenance and support facility furnishes maintenance support teams, also called MST, to provide scheduled and emergency backup maintenance and technical assistance and instruction at the C&E facility or unit location that is beyond the unit's capability and authorization. The facility maintains an authorized stockage list of C&E supplies, repair parts, approved stock record account to receive, store, and issue items on bills of material and approved stock of operational readiness floats. The area maintenance and support facility maintains the capability to provide a training base for specialized C&E material, and to respond to emergency assistance request from supported units. It assists supported units in correcting faults found during performance evaluations and inspections to improve and maintain the operational availability of C&E systems and equipment. Other support includes operating a module and printed circuit board repair section capable of repairing unserviceable equipment through the use of microelectronics repair methods and automatic test equipment. Finally, the area maintenance and support facility repairs peripheral material, such as power and environmental equipment, when not supported by the facility engineer or other area support maintenance units.

7-10. The maintenance support team provides scheduled and emergency maintenance to NETCOM units. Maintenance support teams are a functional responsibility of the area maintenance and support facility and other authorized command maintenance organizations.

Theater Level Communication and Electronics Maintenance

7-11. NETCOM is responsible for maintenance support of all theater level communication equipment assigned by both the Headquarters Department of the Army or the Chief Information Officer, also called CIO/G-6. This responsibility includes—

- Organization and operation of all area maintenance and support facilities supporting OCONUS commanders.
- NETCOM maintenance support teams.
- Module and repair activities required for direct exchange of communication material and other electronics material as assigned.
- A senior electronic systems maintenance warrant officer serves in each vital CONUS or OCONUS geographic location to advise the G-4 and staff on all signal communication maintenance and readiness functions impacting network operations at the strategic, operational and tactical levels.

Corps and Division Headquarters Communication and Electronics Maintenance

7-12. The corps and division G-6 is responsible for monitoring the status and sustaining the division networks that comprise the Land War Net. The G-6, working closely with the division signal company, division headquarters, headquarters and headquarters battalion staff G-3, and the executive officer, ensures the critical network maintenance is performed and parts are available as needed for communication and electronic systems to remain operational. The 948B is a critical integrator and liaison on the division and corps staff reporting directly to the G-6 and network operations staff. This warrant officer advises the G-3, G-4 and G-6 on:

- Maintenance readiness.
- New equipment training and fielding coordination efforts.
- Information assurance vulnerability alert updates.
- Modification work order actions.
- Signal spares management and replenishment guidance.

7-13. The warrant officer also serves as the facilitator for all sources of maintenance support for tactical network systems within their formations.

7-14. All external coordination for any signal platform or communication and electronic maintenance support should be routed through the Signal network management, and Ordnance electronic systems maintenance warrant officer or NCOs. This ensures centralized reporting and readiness efforts. This applies to requests for support from the area U.S. Army CECOM Logistics Assistance Representative, BLSE, regional support center and form of contracted field support representatives.

7-15. Corps and division formations do not have organic C&E maintenance support above the operator and maintainer level.

Expeditionary Signal Battalion

7-16. The expeditionary signal battalion has sufficient organic supply and maintenance structure to handle normal logistical requirements in garrison or during an operation when the subordinate elements are in close proximity to one another. Companies, platoons, sections, and teams deployed separately will ordinarily receive logistical, maintenance, and spare parts support from the supported unit. The supported unit may provide maintenance services and repair parts for unit-unique equipment or the mission may require the deployment of battalion maintenance or maintenance support unit assets.

7-17. The BDE S-3, S-2 Plans, S-4, and 948B coordination for the maintenance and logistics support of the expeditionary signal battalion's deployed companies and teams in advance. Their collective planning must consider factors including funding, location (CONUS or OCONUS) and assemblages involved.

7-18. The C&E maintenance shop performs almost all maintenance tasks on the communication and signal systems/assemblages within the expeditionary signal battalion aside from PMCS. The C&E maintenance shop also provides routine, scheduled, and emergency maintenance support. The 948B and Ordnance electronics maintainers (CMF 94) in the organic C&E maintenance shop perform spares management on unique command and control systems, such as the WIN-T and other similar Signal communication platforms, and battalion/brigade/division level systems. Spares management also affects various quarterly, semi-annual or annual scheduled services performed by operator-maintainers and Ordnance maintainers on Signal platforms.

7-19. All external coordination for any signal platform or communication and electronic maintenance support should first be routed through the Signal network and Ordnance electronic systems maintenance warrant officers or NCOs. This ensures centralized reporting and readiness efforts. This applies to requests for support from the area U.S. Army CECOM logistics assistance representatives, BLSE, regional support center or any form of contracted field support representatives.

Division Signal Company

7-20. The division signal company's staff coordinates network performance and maintenance issues with the division G-6 through the division headquarters battalion staff. The 948B in the division G-6 is a key contributor to the maintenance process. The warrant officer assists with the development of the Division maintenance plan, provides oversight of maintenance work orders and maintenance support to the division signal company along with other units in the division. Network management technicians, MOS 255N, in the G-6 work closely with the signal company's signal system integration and oversight personnel. The division signal company has operator-maintainers tasked with performing authorized field-level maintenance on organic signal assemblages. The executive officer of the signal company maintains oversight on the status of all logistical and maintenance matters within the company and coordinates for additional C&E maintenance support for organic equipment from the SMC.

Brigade Signal Company

7-21. The brigade signal company staff coordinates with the 948B located in the FMC of the BSB to facilitate network performance and maintenance issues with the brigade information officer's staff. The brigade signal company has operator-maintainers tasked with performing maintenance on signal assemblages. The executive officer of the signal company coordinates with the 948B located in the FMC of the BSB to facilitate maintenance support for organic equipment from the C&E maintenance shop. The executive officer maintains oversight on the status of logistical and maintenance matters within the company.

C&E FIELD-LEVEL MAINTENANCE

7-22. The brigade information officer ensures that the unit performs critical network maintenance utilizing operations and maintenance, also called OMA, and training resource model, also called TRM, funding synchronized with the S-3 and maintenance assets. The brigade information officer also oversees any readiness efforts that impact tactical network operations or the DOD Information Network such as signal platform readiness reporting in GCSS-A and spares management.

7-23. At the brigade level, there is a communication and electronic maintenance section located in the FMC within the BSB. The 948B and Ordnance electronic maintainers (CMF 94) in the organic C&E maintenance shop, are the best choice to perform repairs on unique command and control systems and battalion/brigade/division spares management. These systems include the WIN-T and other similar Signal communication platforms. This is an essential readiness and logistics function sustaining a multitude of platforms. Centralized management of Signal spares expedites the replacement of unserviceable items, enables fault verification, generates requisition demand history, and improves the efficient use of limited spares across a formation. Prolonged retention of unserviceable spares post-maintenance diagnosis by the Signal company or team personnel severely delays the overall replacement timeline.

7-24. The C&E maintenance shop verifies faults to avoid unwarranted evacuation of spares without genuine hardware faults or overlooked software/firmware version faults. Evacuation of items with no evidence of failure wastes unit operational funds for shipping, impacts readiness, and results in a reduction of spares availability from an already sparse quantity of spares.

7-25. Management of spares through the C&E maintenance shop maintenance actions generates parts demand history for future spares retention on C&E shop's shop stock or an SSA's authorized stockage list. Maintainers can generate a GCSS-Army supply demand history for spares, even if replacements are obtained from warranty, common hardware systems or standard Army requisition processes. The C&E maintenance shop can better sustain spares while also providing the flexibility required to support various mission requirements at the company and team levels. Ongoing coordination between the battalion's S-3, S-4, S-6, and the electronic systems maintenance officer identifies the proper logistics package required to support a training or operational mission based on Signal platform types, quantity, location remoteness, and duration of mission. This allows for better prioritization, balanced C&E maintenance shop manpower support and more efficient spares utilization in support of command and control communication systems.

7-26. At the brigade level, the FMC within the BSB contains a C&E maintenance shop. A 948B and Ordnance electronic maintainers (CMF 94) reside in the communication and electronic maintenance section. The communication and electronic maintenance section provides technical inspections, scheduled services, unscheduled maintenance, troubleshooting and repair of communication equipment to expeditiously repair and return equipment to supported units. These maintainers perform repair, replacement of the end item, line replaceable units, shop replaceable units, modules, subassemblies, subcomponents, circuit card assemblies, plug-in units, conduct faults verifications, provide troubleshooting assistance and make applicable software upgrades. These upgrades include equipment covered by spares management. Maintenance-related tasks include warranty claims, spares management, serial number change documentation, packaging and shipment tracking and coordination with other maintenance elements such as regional support center, forward repair activities, or the BLSE. For all BCTs, each battalion has an FSC to provide field-level maintenance support and distribution of most classes of supply.

7-27. Each maneuver battalion within a BCT has a battalion information officer who is responsible for the integrity of the battalion's signal systems. The information officer works in conjunction with the S-4, BSB support operations officer, the FSC commander, and the 948B in the BSB's C&E section to develop a comprehensive maintenance plan. The BSB electronic maintenance system warrant officer has an important role in the planning process, concept of operations and concept of support to include the technical oversight and training of Ordnance electronic maintainers in FSCs. Duties occasionally require assistance at FSC's location that requires security assistance from supported battalions due to a lack of force protection assets within the BSB. BSB's communication and maintenance section who work with a CFSR manage coordination for external support. Units must incorporate any external support into the maintenance standing operating procedures. This ensures that clearly understood tactics, techniques and procedures, SOP, and processes are in place to reinforce proper command maintenance discipline program adherence for Signal maintenance activities.

7-28. The maneuver battalion's supporting FSC lacks internal communications or electronic support. The maneuver battalion's FSC can request support from the missile/electronic repair section, for support in a field environment. The missile/electronic repair section maintainers are typically attached to the FSC, under the maintenance control officer for the duration of the mission.

7-29. The battalion S-4 is the main logistics planner and the FSC commander assists the S-4 in developing maintenance plans based on the battalion commander's guidance. The FSC commander also works with the battalion executive officer, S-4 and BSB support operations officer to synchronize maintenance efforts.

7-30. The FSC maintenance control officer has the following responsibilities: perform maintenance according to the maneuver battalion commander's priorities; monitor the status of equipment undergoing repairs; and determine the status of the repair parts required to complete those repairs. The maintenance control officer maintains a close collaboration with the BSB C&E maintenance shop's electronic maintenance warrant officer regarding maintenance planning and management of Ordnance electronic maintainers in the FSC.

7-31. The FSC may not have the capability to repair or replace some communication and electronic equipment. In this instance, the FSC must coordinate with the BSB SPO staff and BSB electronic maintenance warrant officer to request assistance from the FMC. Spares that are managed by the BSB C&E maintenance shop, for example parts for the WIN-T, are ordered through the normal work order process and do not require coordination between the maintenance control officer and the BSB SPO staff.

7-32. At echelons above the brigade, the SMC, typically attached to a sustainment brigade, has a C&E repair section capable of providing field-level maintenance support to units on an area basis.

7-33. Most organizations at EAB do not have any assigned communication and electronic field-level maintenance capability assigned. Division and corps level formations do not have assigned Ordnance electronics maintainers/repairers to support communication equipment or a C&E maintenance shop. The only Ordnance maintainers in the headquarters company are CMF 91 maintainers for automotive, utilities, and power generation.

7-34. The Corps and Division G6 Senior Electronic Systems Maintenance Warrant Officer (948B) provides oversight for all C&E maintenance support for division and corps command and control and signal systems providing logistics assistance to the Division G4 Ordnance Logistics Officer on readiness. The 948B provides technical guidance and support concepts to their respective G6, Signal company commander, executive officer, and the headquarters battalion maintenance officer. The 948B assists with coordinating maintenance functions with the supporting C&E maintenance shop located at the Sustainment Brigade's SMC. This C&E shop is managed by a 948B and staffed with 94 series maintainers who execute C&E maintenance repairs, warranty control management, fault verification and replacement of line replaceable units or subcomponents supporting overall spares replenishment from shop stock or other designated source.

7-35. Maintenance workflow is the same for communication and electronic equipment, as with any other equipment in the Army inventory. The crew or operator upon identifying a fault on a piece of equipment during PMCS records the TM verified fault on a DA Form 5988-E or DA Form 2404. The crew or operator turns the form in to the appropriate maintenance section for fault verification and repair. The C&E maintenance section (FMT, FSC) verifies the fault and if possible repairs it. If the item cannot be repaired at their location, the maintenance section opens a maintenance request in GCSS-Army, or completes a DA Form 5990-E, or DA Form 2407, (Maintenance Request) and DA Form 2407-1, (Maintenance Request–Continuation Sheet). The item is evacuated to the appropriate maintenance level able to address the issue, typically the C&E maintenance shop in the FMC or SMC.

7-36. The C&E maintenance shop within the FMC accepts the work order and if possible repairs the equipment. If repair at the field level is not possible, the maintenance section sends the equipment to an authorized repair facility, requests a CFSR's assistance or requests a return merchandise agreement with the original equipment manufacturer. The type of owning unit dictates where the unit will seek the appropriate C&E maintenance shop. For example, if the item comes from a company within an expeditionary signal battalion, it would be work ordered to the C&E maintenance section within the HHC. If the item came from a company within a BCT maneuver unit it would be submitted on a maintenance request to the FSC C&E section first.

7-37. C&E personnel are responsible for the piece of equipment after proper receipt of maintenance request or a work order. They maintain accountability and facilitate local transportation or traceable shipping of these items to external sources for repair or replacement. The maintenance request for sensitive or secure items is vital for commanders to maintain property accountability and enforce command supply discipline. The C&E maintenance shop completes this documentation for their supported units.

7-38. Unit commanders and organizational staff are able to receive status on the readiness of their equipment via reports from GCSS-Army. For additional information regarding GCSS-Army reporting, see appendix B.

7-39. Military personnel may not be authorized to support some automated command and control systems. Maintenance managers at each echelon must coordinate with CECOM representatives to ensure adequate maintenance support is in place for these systems. The BLSE is often the best avenue for coordinating support for these systems at the brigade level. USAMC logistics support teams may also coordinate support at EAB.

7-40. Contracted maintenance support provided by the LCMC may perform field-level maintenance for some automated command and control systems or non-standard equipment. Contracted maintenance support is utilized when deemed appropriate by the proper collaboration chain. This may occur when an FSC's C&E maintenance shop is unable to support the equipment due to warranty or lack of expertise. In these instances, the equipment is forwarded to the FMC's C&E maintenance shop. The BSB will coordinate with the brigade SPO staff, electronic systems maintenance warrant officer or senior CMF 94 NCO and BLSE to obtain the requested CFSR for any C&E maintenance actions including COTS or non-standard lifecycle items.

C&E SUSTAINMENT-LEVEL MAINTENANCE

7-41. Sustainment-level maintenance for communication and electronic equipment is the same as for any Army item. Sustainment maintenance units are USAMC assets that provide in-theater support as required for repairing, rebuilding, overhauling components and end-items, and returning them to the supply system. Sustainment-level maintenance support for communication and electronic items is coordinated through the supporting maintenance organization to the supporting battalion or brigade SPO staff.

7-42. At the brigade level, sustainment maintenance may also be coordinated through the BLSE. The SPO staff in the BSB, after consulting with their electronic systems maintenance warrant officer, will coordinate with the BLSE. It is important that the BLSE keep the supporting BSB apprised of sustainment maintenance activity to ensure no duplication of effort occurs.

7-43. The Army field support battalion may also provide logistics assistance support to units that do not have BLSE support.

C&E NON-STANDARD EQUIPMENT WORKFLOW

7-44. Maintenance workflow starts with a fault on a piece of equipment being annotated on DA Form 5988-E or DA Form 2404. The Soldier turns the form into the appropriate maintenance section for verification and repair. The maintenance section verifies the item is non-mission-capable and opens a maintenance request. The supporting FMC contacts the C&E maintenance shop, the BLSE and the Army field support battalion to see if they have the available resources to repair the item. If not, the C&E maintenance shop coordinates with the appropriate supporting maintenance activity for the item's evacuation. Before evacuation, maintainers ensure that the battalion S-4 and the maintenance control officer are informed.

7-45. Some non-standard equipment items have an extended warranty. In this instance, the service provider may be able to replace the item one-for-one. Warranty management responsibilities are managed above the FMC level for C&E systems. The electronics system maintenance warrant officer coordinates with the USAMC support representatives to identify the appropriate service provider for the non-standard item. Warranties vary by system.

7-46. The chain of custody for equipment submitted for sustainment-level maintenance is similar to the standard process. The customer unit is responsible for the delivery of their equipment and turns over the equipment to the FMC's C&E maintenance shop for maintenance. The FMC assumes responsibility for the equipment turned in for maintenance with a valid work request. In cases where the FMC is unable to repair the equipment, the FMC C&E maintenance shop will evacuate the equipment for sustainment-level maintenance. The maintenance request can act as the hand receipt during the process and must contain the nomenclature and model number along with the serial number of the equipment.

COMMUNICATIONS SECURITY MAINTENANCE

7-47. COMSEC item maintenance differs based on the type of equipment involved, facilities, support availability, and time considerations. Individual organizations are limited to diagnosis and fault isolation as authorized by the maintenance allocation chart located in the equipment's TM. Field-level maintenance organizations are authorized to perform all maintenance tasks coded "C" (operator/crew maintenance (Signal Support System Specialist MOS 25U)) or "F" (maintainer maintenance; MOS 94E Radio Equipment Repairer) as outlined in the MAC. To complete a total supply transaction and return a serviceable device to the user the unit evacuates COMSEC equipment through maintenance channels from the unit to the first supporting maintenance unit. The repair of COMSEC material is performed at sustainment level. COMSEC controlled items and COMSEC maintenance activities must restrict access to personnel requiring only a valid need for access. Unsupervised or undetected access to secure maintenance facilities and items must be prevented in accordance with AR 25-12, *Communications Security Equipment Maintenance and Maintenance Training*, AR 190-13, *The Army Physical Security Program*, AR 190-51, *Security of Unclassified Army Property (Sensitive and Non-Sensitive)*, and AR 380-40, *Safeguarding and Controlling Communications Security Material (U)*. Units grant access to maintenance areas or access to internal components only to personnel with a valid need-to-know, appropriate security clearances and required duties.

7-48. Sustainment-level maintenance on Army COMSEC material will be performed at Tobyhanna Army Depot on maintenance tasks coded "D" and "H" as outlined in the MAC. Only depot sustainment-level maintenance organizations are authorized to perform the full range of maintenance tasks coded "C, F, H, D" as outlined in the equipment MAC.

7-49. Maintainers evacuate unserviceable classified COMSEC materiel through the COMSEC Materiel Control System by COMSEC accounts to Tobyhanna Army Depot. Unserviceable COMSEC material that is considered unclassified, including controlled cryptographic items, also called CCI, will be evacuated through supply channels to Tobyhanna Army Depot.

7-50. Army customers are required to submit requirements through the U. S. Army Communication Security Logistics Activity, also called CSLA, via the information systems security program, also called ISSP, when requesting a replacement for classified COMSEC equipment and/or controlled cryptographic items in accordance with AR 25-2, *Army Cybersecurity*. The Information Systems Security Program unifies and streamlines the procurement processes of COMSEC and information assurance resources needed to protect Army communication systems. The information systems security program fully automates the logistical processes that identify equipment needs, procurement, and allocation of COMSEC devices to Army units. The program allows units to conduct a direct exchange of unserviceable COMSEC equipment (condition code A through G) through the Communication Security Logistics Activity.

7-51. National Security Agency Commercial COMSEC Evaluation Program, also called CCEP, fields procured items with a limited vendor warranty. Maintainers send all defective COMSEC equipment with a vendor warranty to Tobyhanna Army Depot for proper implementation of the Army Warranty Program per AR 700-139, *Army Warranty Program*. Tobyhanna Army Depot provides support and sustainment repairs after the warranty expires.

COMMUNICATION AND ELECTRONICS MAINTENANCE SCENARIOS

7-52. The Army utilizes two overarching categories of C&E equipment: standard Army equipment, also known as life cycle managed, and non-standard equipment such as COTS.

Army Standard Equipment

7-53. Typically, units notify a Signal Support Systems Specialist (MOS 25U or CMF 25) if there is a problem with vehicle mounted C&E equipment. The MOS 25U validates the operator/crew PMCS on the system using the appropriate TM and diagnostic tools to isolate and verify the fault. They will then replace the identified failed line replaceable unit. If a repair of the line replaceable unit is required, the MOS 25U will open a work order with the support company C&E maintenance shop.

7-54. The supporting C&E maintenance shop performs repairs or replacement of the end item, line or shop replaceable unit, module, subassembly, subcomponent, circuit card assembly, plug-in unit, or part. It will also perform fault verification, troubleshooting assistance and applicable software upgrades. Maintenance-related tasks include, but are not limited to, technical inspections, warranty claims, spares management, serial number change documentation for administrative adjustment reports, packaging and shipment tracking, maintenance work order tracking, maintenance work order application and coordination with other maintenance elements. The item is returned to the user upon completion of these maintenance actions,

Army Non-Standard Equipment

7-55. In the case of non-standard communication and electronic equipment, the operator/crew member will troubleshoot the equipment, and then identify the fault using the appropriate TM or equipment's commercial maintenance manual. After identifying the faulty component, the crewmember will replace it using on-board spares or with a spare provided by the C&E maintenance shop. The 948B and the specific CFSR verify this action. As a standard practice, units first evacuate the faulty component to the supporting C&E maintenance shop for processing through the appropriate repair facility. Units must use the most expeditious shipping method available, maintaining traceable accountability, to include approved mail services or a courier. The supporting maintenance organization and command policy identifies the exact means of evacuation of the equipment. The C&E maintenance shop is the centralized commodity to access external CFSR support for C&E maintenance actions for COTS and Army non-standard equipment.

7-56. Utilization of COTS in C&E maintenance can be complicated. There are instances where COTS are component elements of programs of record systems integrated into Army sustainment. Some systems contain both COTS and standard Army equipment including some capability-set systems. For example, WIN-T is a program of record. Elements of WIN-T Increment 1, which manages numerous capabilities and programs, utilizes both COTS and parts procured through Army supply. It is imperative that C&E maintainers are well versed and understand secondary level effects of COTS because they may affect the warranties on common hardware systems as well as COMSEC equipment.

MISSILE SYSTEM MAINTENANCE

7-57. All maintenance management applications remain the same for missile maintenance as it is with any two-level maintenance organization. However because these units can be employed on an operational, strategic-theater or strategic national basis most of their maintenance is performed by organic maintenance personnel. SMCs typically provide only general maintenance support including vehicle maintenance, power generation and C&E support. Maintenance reporting for all missile systems flows through GCSS-Army.

7-58. There are five basic types of missile units and each varies slightly. They are as follows—

- Air and missile battalion (Patriot) maintenance company.
- Air and missile defense composite battalion (Patriot/Avenger).
- Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System battery.
- Terminal high altitude area defense battery, also called THAAD.
- Maneuver air and missile defense battalion (Avenger) maintenance detachment.

AIR AND MISSILE BATTALION (PATRIOT) MAINTENANCE

7-59. The Air and Missile Defense Battalion (Patriot) conducts field maintenance on all assigned equipment using organic maintenance assets.

7-60. Patriot fire control and launching station operators/crew are trained and equipped to perform a significant amount of crew maintenance. This includes detailed electronics testing, diagnostics, and repair. The Patriot battalion also has a FMC that employed with the battalion during any type of mission.

7-61. The patriot crews and the FMC, when available, provide field-level maintenance support to all assigned units and equipment to include automotive, ground support equipment, communication-electronic and missile peculiar systems. The maintenance platoon performs the majority of the conventional Patriot system maintenance work done by the maintenance company. The maintenance company also maintains an authorized stockage list of repairable exchange and shop stock.

7-62. Each Patriot automotive field maintenance team may co-locate with a patriot battery and can provide maintenance support for automotive, refrigeration and power generation. The headquarters and headquarters battery is responsible for automotive and power generation maintenance to the headquarters and headquarters battery of the patriot battalion.

AIR AND MISSILE DEFENSE COMPOSITE BATTALION (PATRIOT/AVENGER) MAINTENANCE COMPANY

7-63. The maintenance company has the same characteristics as the Patriot maintenance company above with the exception of an Avenger system support team and an Avenger automotive field maintenance team (which replaced the Patriot automotive FMTs). Both of these teams provide onsite field maintenance to the Avenger battery and platoons that are normally spread throughout the operating environment. It is capable of providing radar, automotive and generator support. For additional information on the maintenance capabilities of the Patriot Battery, see ATP 3-01.85, *Patriot Battalion Techniques*.

JOINT LAND ATTACK CRUISE MISSILE DEFENSE ELEVATED NETTED SENSOR SYSTEM BATTERY

7-64. The Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System battery is employed as a battery or as an independent subsystem as determined by mission variables. It provides a theater long duration surveillance base piece for theater surveillance. It provides overlapping coverage necessary to enhance the joint composite tracking process and enables tactical employment flexibility for other joint theater air and missile defense sensors and weapons. The Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System is also employed to provide integrated fire control support capability in direct or general support of systems and forces, including joint task forces and naval ships operating in littoral regions. It is also employed as part of cooperative and integrated capabilities that complement joint theater air and missile defense weapons and sensors system.

7-65. The battery is comprised of a headquarters, field maintenance and warfighting protection section along with an air and missile defense planning and coordination cell, two-sensor control and sensor sections and a support platoon.

7-66. The support platoon is responsible to maintain the battery's bench stock, shop stock, system records, parts inventory, and provides helium support for the battery. The field maintenance section is responsible for providing maintenance of automotive, power generation, radar, and communication-electronic repair.

TERMINAL HIGH ALTITUDE AREA DEFENSE BATTERY

7-67. The Terminal High Altitude Area Defense, also called THAAD, Battery has an organic field maintenance section within the battery support center and conducts field maintenance on all assigned equipment.

7-68. The battery consists of a headquarters, field maintenance section, fire control, radar, launcher, and battery logistics operation sections. In addition, there is a sensor platoon headquarters. For additional information on the Terminal High Altitude Area Defense Battery maintenance capabilities see ATP 3-01.91, *Terminal High Altitude Defense (THAAD) Techniques*.

MANEUVER AIR AND MISSILE DEFENSE BATTALION (AVENGER) MAINTENANCE DETACHMENT

7-69. The mission of the maintenance detachment is to provide field-level maintenance support to the maneuver air and missile defense battalion. It provides all of the automotive, ground support equipment, communication-electronic and peculiar missile systems maintenance. The detachment also includes specialists who support the AN/MPQ-64 Sentinel, Army Lightweight Counter Mortar Radar, and Counter-Rocket, Artillery, Mortar, also called C-RAM, system. The detachment normally deploys with the headquarters and headquarters battery.

7-70. The detachment is comprised of a headquarters, mechanical maintenance, recovery and Avenger maintenance sections. The mechanical maintenance section provides all the automotive, ground support and communication-electronic maintenance while the recovery section provides all the lift capabilities for the repair shops along with recovery of organic equipment. It also provides limited recovery and welding to supported units and assists with maintenance-to-maintenance evacuation support.

7-71. The Avenger electronic/missile field maintenance team is capable of breaking into six teams to provide contact system maintenance support to the avenger battalion. It also serves as an alternate net control station. For additional information on the Maneuver Air and Missile Defense Battalion maintenance detachment, see ATP 3-01.64, *Avenger Battalion and Battery Techniques*.

GROUND BASED MISSILE SYSTEM MAINTENANCE

7-72. Maintenance for ground based missile systems primarily supports the targeting optics and radar that enable target identification. These low-density MOS maintainers typically serve in FMCs.

7-73. The Javelin portable anti-tank missile's M98A1 Command Launch Unit, also called CLU, is the reusable portion of the Javelin system. The command launch unit contains a day sight, night vision sight, controls, and indicators. The command launch unit attaches to the launch tube assembly and uses an automatic infrared guidance system. Maintainers for the Javelin missile systems serve in the FMC's maintenance platoon missile and electronic repair section. Authorized repairs to the Javelin missile system are limited to simple exterior repairs and diagnostics. Shop stock for the Javelin is limited to the items the contract allows maintainers to repair. Sustainment-level maintainers perform most internal repairs on the M98A1 Command Launch Unit. Maintainers evacuate the command launch unit to contractor service centers that can be as far back as CONUS. Javelins systems sent out for sustainment level maintenance are one of the few items returned to the using unit after sustainment-level maintenance is completed.

7-74. The ground or high mobility multipurpose wheeled vehicle, better known as the HMMWV, mounted tube-launched, optically tracked, wire-guided missile (TOW) Improved Target Acquisition System, also called ITAS, is a long-range multi-sensor system that provides real-time ability to detect, recognize, identify and geo-locate distant targets. Maintainers for the TOW's Improved Target Acquisition System are part of the missile and electronic repair section within the FMC's maintenance platoon. TOW equipment requiring field-level maintenance is job ordered back to the FMC. The FMC carries a complete set of combat spare parts for the TOW system within its maintenance section. Maintainers draw repair parts for the TOW from Army class IX stocks, line replaceable units or shop replaceable units as required. If the FMC is unable to repair the TOW system at its level, the maintainer evacuates the system to a sustainment level maintenance shop. Sustainment-level maintenance for the Improved Target Acquisition System is contract supported. A field service representative performs sustainment level repairs. Units should coordinate with the FMC for annual system checks.

7-75. Bradley Infantry Fighting Vehicle and Cavalry Fighting Vehicle's Improved Bradley Acquisition System, also called IBAS, provides Forward Looking Infrared, also called FLIR, a day television camera, a TOW tracker, direct view optics, a dual target tracker, an eye safe laser range finder, and a dual axis stabilized head mirror assembly. The 91M Bradley Fighting Vehicle System maintainers in the FSC maintain the optics system as part of the systems maintainer concept.

7-76. The M1134 Stryker Anti-Tank Guided Missile Vehicle's Modified Improved Target Acquisition System, also called MITAS, is a TOW missile system integrated within the turret. The modification allows the gunner to operate the TOW system from within the protective hull of the vehicle. Maintainers for the target acquisition system are part of the missile and electronic repair section within the FMC's maintenance platoon. Target acquisition system equipment requiring field-level maintenance is job ordered back to the FMC. The FMC carries a complete set of combat spare parts for the TOW system within its maintenance section. Maintainers draw repair parts for the TOW from Army class IX stocks, line replaceable units or shop replaceable units as required. The modified improved target acquisition system is a contract-supported system and a contractor will typically make sustainment level repairs. Units should coordinate with the FMC to perform annual service on the system.

7-77. Long-Range Advanced Scout Surveillance System also called LRAS3, the long-range multi-sensor system provides real-time ability to detect, recognize, identify and geo-locate distant targets. Cavalry squadron/troops normally operate the system in a either a ground or vehicle mounted configuration. Maintainers for the Long-Range Advanced Scout Surveillance System serve in the FMC support maneuver units through job orders from their FSC. The 94A land combat electronic missile system repairer in the FMC conducts all maintenance on the Long-Range Advanced Scout Surveillance System to include software updates and maintenance work orders. Maintainers draw repair parts for the Long-Range Advanced Scout Surveillance System from Army class IX stocks, line replaceable units, or shop replaceable units as required. Contractor support is not available for this system. Units should coordinate with the FMC for annual system checks.

7-78. The Firefinder weapon locating system radars detect, track, and classify enemy indirect fire systems to permit rapid engagement with counter fire. The system also tracks friendly weapons, providing impact prediction, registration, and fire adjustment information to the fire control center. The Firefinder can be integrated with the counter-rocket, artillery, mortar, also known as C-RAM

- The AN/TPQ-36/37 Firefinder radars detect, track, and classify enemy indirect fire systems with sufficient accuracy to permit rapid engagement with counter fire.

- The AN/TPQ-50 LCMR performs short-range target detection, verification, tracking, and classification of enemy and friendly mortar, cannon, and rocket locations. It provides continuous 360-degree detection and location of indirect fire weapons.
- The AN/TPQ-53 is highly mobile, long-range counter fire target acquisition radar. It is capable of locating hostile RAM fires in a clutter environment and providing friendly artillery registration. This radar will replace the AN/TPQ-36-37 Firefinder radars.

7-79. The 94M radar repairers located in the FMC and field artillery FSC perform maintenance for the Firefinder radars. Troubleshooting starts at the unit level. When a fault occurs during normal operation, the operator performs maintenance at the crew and operator level of field-level maintenance. If the crew or operator is unable to correct the fault the unit notifies the radar repairer in the FSC. The radar repairer in the FMC may provide additional maintenance support for the Firefinder radar systems as required. The FSC's radar repairer typically accomplishes repairs on the lightweight counter mortar radar through on-site maintenance. Additional technical support is available through the FMC Brigade Electronic Missile Systems Maintenance Technician.

ARMY WATERCRAFT MAINTENANCE

7-80. The purpose of Army watercraft maintenance is to ensure safe, seaworthy, and reliable watercraft. Maintenance tasks include any action that sustains material in an operational condition, restores it to a fully mission-capable condition, or upgrades it through modification or product improvement. Maintenance tasks range from simple preventive maintenance checks and services of equipment to complex depot operations performed in fixed shops and facilities and categorized in the Army maintenance system as field-level maintenance or sustainment-level maintenance. Army watercraft, field maintenance is described as on-craft maintenance, repairs, and return of subcomponents. Sustainment maintenance is described as a combination of on and off-craft maintenance for assemblies and sub-assemblies.

7-81. Army watercraft utilizes a tiered, two-level maintenance system comprised of field and sustainment maintenance. Watercraft Command teams, maintenance personnel and planners must have a complete understanding of watercraft two-level maintenance fundamentals in order to properly plan and execute their mission. Two-level maintenance ensures the vessels are safe and seaworthy.

- Vessel crews perform watercraft field maintenance while in port and underway. Vessel crewmembers, equipment operators, transportation and Ordnance trained maintainers perform field maintenance. Crews of Army watercraft consist of watercraft operators and watercraft engineers. Watercraft engineers are transportation corps trained to perform field maintenance and sustainment maintenance.
- Vessel crews, DOD civilians, contractors, and commercial shipyards perform Watercraft sustainment maintenance. Vessel crews are authorized to perform sustainment level maintenance while underway. Watercraft sustainment maintenance returns vessels to a safe and seaworthy state in compliance with international maritime regulatory requirements. There are no Army Depot facilities supporting watercraft. When a unit sends equipment for sustainment maintenance the owning unit retains the equipment on its property book. Only in rare instances will a property book transaction occur.

ARMY WATERCRAFT CLASSIFICATION

7-82. The Army classifies watercraft vessels into three classes.

Class A Vessels

7-83. Class A vessels are self-propelled, self-sustaining with berthing and messing facilities. They accomplish their primary mission underway and are capable of tactical and operational sustainment near coastal, interisland and inland waterway service between two or more water terminals. Class A vessels routinely deploy in support of near coastal, interisland and inland waterway service operations. Class A2 vessels include the Logistics Support Vessel and the 800 Series Large Tug; Class A1 vessels include Landing Craft Utility 2000 series. The Army organizes Landing Craft Utility 2000 series under the heavy boat company and large ocean going tugs under the floating craft company.

7-84. The Logistics Support Vessel is an independent detachment and does not have any other sections within the organization other than the authorized crew. The crew consists of watercraft operators, watercraft engineers, communication personnel, cooks, and a medic. All non-vessel related functions are additional duties performed by the crew.

Class B Vessels

7-85. Class B vessels are self-propelled, but not self-sustaining. They accomplish their primary mission underway in and around ports. Class B vessels are capable of tactical and operational support of logistical and harbor operations. They provide waterborne security, cargo and personnel transportation, perform fireboat duties when properly equipped and inter-harbor barge movements. Class B vessels include the Landing Craft Mechanized-8, series 900 Small Tug, Warping Tug, and Causeway Ferry. The Army organizes Landing Craft Mechanized-8 under Medium Boat Detachments and series 900 Small Tug under Floating Craft Companies. The Army organizes Warping Tugs and Causeway Ferries as part of the Modular Causeway System under the Modular Causeway Company.

Class C Vessels

7-86. Class C vessels are neither self-propelled nor self-sustaining. They accomplish their primary mission in port, are capable of tactical and operational support of logistical, and harbor operations, and/or waterborne cargo transportation when towed by a Class A towing vessel (Tugboat). They also provide waterborne support for maintenance and repair, or light and heavy lifts. Class C vessels include barge cargo, barge derrick, roll on/roll off discharge facility, and floating causeway.

MAINTENANCE OPERATIONS

7-87. Operations personnel must continually communicate with maintenance personnel to manage and influence maintenance operations, and subsequently the operational posture of the organization. This information must flow smoothly between each level of responsibility. Operations and maintenance information originates with the individual vessels. Vessels manage their operational and maintenance status and provide this information to the unit's vessel support office, also called the VSO, or to the battalion marine maintenance office on a daily basis. The vessel support office consolidates the information, provides assistance and resources within its ability and provides the status to the harbormaster operations detachment.

7-88. The Army designed the harbormaster operations detachment to provide a battalion or transportation terminal with the ability and expertise to monitor both the operations and maintenance status of Army watercraft. The harbormaster operations detachment coordinates and monitors maintenance information with the vessel support offices and the supporting field maintenance organizations and provides this status to the battalion operations staff who then forwards the information to the sustainment brigade's theater opening element. The theater opening element contains a sustainment brigade's terminal operations and watercraft operations expertise. Other critical links for Army watercraft include the field maintenance support organization and TACOM's Watercraft Inspection Branch. All of these organizations continually communicate and cooperate to ensure vessel availability and ultimately, mission accomplishment.

7-89. Operational commanders determine the status of each vessel based on the mission requirements. Field maintenance managers (vessel chief engineers and support maintenance production control personnel) determine and manage the level of effort applied to a vessel based on the vessel's maintenance status. They then prioritize maintenance actions into critical and non-critical systems.

7-90. Maintenance management and reporting is accomplished using the organic sustainment information systems and follows command standing operating procedures. For more detail regarding Army watercraft maintenance operations, see ATP 4-15, *Army Watercraft Operations*.

Watercraft Field Level Maintenance

7-91. Watercraft field-level maintenance consist of two subcategories: watercraft operators and maintainers. Watercraft maintainers include watercraft engineers and Ordnance Corps trained Allied Trades Specialists. Crews perform field-level maintenance on systems and subsystems of a vessel, and authorized safety equipment in accordance with the applicable MAC, maritime regulatory requirements, and AR 56-9, *Watercraft*. Field-

level maintenance includes adjustment, alignment, service, application of approved field-level modification work orders, fault/failure diagnoses, and shipboard damage control, also called SDC. The vessel crew, vessel support office maintenance team, and/or watercraft FMC normally perform field level services using tools and test equipment found on the vessel or in the units.

Maintenance actions within watercraft legacy MACs identified in columns “F” are a shared responsibility between field and sustainment levels of maintenance. Availability of manpower, tools, and support equipment at the field level will be the primary factor in determining which level the repair will be performed. Maintenance actions within watercraft legacy MACs identified in columns “H” are the responsibility of sustainment maintenance.

7-92. Field-level maintenance is the responsibility of unit or detachment commanders, vessel masters and chief engineers. The Army designed the makeup of a vessel crew to include equipment operators as well as equipment operator/maintainers. For this reason a vessels crew is treated in the same regard as a ground based maintenance support team. All regulations, policies, apportionments, and allocations that apply to a maintenance support team apply to a vessel crew. For instance, a vessel is authorized shop stock and bench stock the same as a maintenance support team.

7-93. Watercraft safety equipment, including firefighting, dewatering, and lifesaving equipment, is maintained by the crew. A combination of operator/crew for field-level and TACOM Watercraft Inspection Branch for sustainment level maintain hard-mounted, wired systems that are an inherent part of the vessel. For example, the crew may test the general alarm system, but the wiring of the system may require sustainment level repair.

Watercraft Field-Level Maintenance – Watercraft Operator

7-94. Operator maintenance is characterized by on-system maintenance and includes; inspect, test and service of watercraft components, modules, sub-assemblies, assemblies, and systems ensuring the vessels is maintained in good working condition. Watercraft operators and watercraft engineers perform crew level maintenance actions. Vessel crews perform field-level maintenance on their assigned equipment as outlined in the operator’s -10 TM.

Watercraft Field-Level Maintenance – Maintainer

7-95. Maintainer maintenance is characterized by on/off-system maintenance and includes; inspect, test, service, adjust, replace, and repair of watercraft components, modules, sub-assemblies, assemblies, and systems returning them to a serviceable condition. Maintenance contractors are require to perform some maintainer level maintenance action in accordance with the applicable MAC.

7-96. Watercraft engineers are system specialists for Army watercraft who receive formal training from the Maritime and Intermodal Training Division of the Transportation School (advanced individual training, Non-Commissioned Officer Education System, Warrant Officer Basic Course, and specialized functional courses) on diagnosing specific system faults. Watercraft engineers perform the majority of field level maintenance while assigned to a vessel, a vessel support office maintenance section, or the watercraft field maintenance companies. Watercraft engineers are trained on shipboard damage control procedures which include welding, however, allied trades specialist perform the majority of welding and fabrication repairs at the field level while assigned to vessel support offices or watercraft FMCs.

Not all watercraft units are supported by watercraft FMCs.

Watercraft Field-Level Maintenance – Vessel Support Office Maintainer

7-97. The vessel support office maintenance section is comprised of a marine maintenance officer, watercraft engineers, allied trades specialists, and automated logistics specialists. The primary responsibility of this section is to provide additional field level capabilities to the vessel crews to assist in performing unscheduled maintenance tasks, coordinate for external support requirements, consolidates logistic efforts across the unit’s

fleet, and decrease the administrative burden on the vessel crews. Vessel support office's supporting Class B vessels provide maintenance management of repairs performed by the vessel support office maintenance section and each vessel's crew. Vessel support office responsibilities include but are not limited to—

- Conduct supply transactions with the SSA.
- Assist the chief engineers in developing supply support solutions.
- Liaison to TACOM LCMC.
- Publication management.
- Modification work order, safety of use messages, and maintenance advisory messages coordinator.
- Configuration control and deviation from specification, also known as DFS coordinator.
- Maintenance management of the repairs performed by the vessel support office maintenance section.

Watercraft Field-Level Maintenance – Watercraft Field Maintenance Company

7-98. Watercraft FMCs are comprised of marine maintenance warrant officers, watercraft engineers, an allied trades warrant officer, allied trades specialists, and automated logistics specialists. A watercraft FMC's capability is focused within two field maintenance teams and a maintenance control section. The field maintenance teams' primary responsibility is to provide scheduled and unscheduled maintainer level overload maintenance to watercraft organizations in accordance with the applicable MAC. The maintenance control section's primary responsibilities are production/quality control of the maintenance performed by the field maintenance teams and acts as the liaison between supported organizations, field maintenance teams, and installation maintenance activity. The maintenance control section is also responsible for coordinating sustainment maintenance with the TACOM Watercraft Inspection Branch.

Watercraft Sustainment Level Maintenance

7-99. TACOM Watercraft Inspection Branch manages watercraft sustainment-level maintenance comprised of below depot and depot level maintenance. The Army authorizes vessel crews to conduct sustainment level maintenance while underway.

7-100. Below depot maintenance includes: inspect, test, service, on condition cyclic maintenance, adjust, replace, repair, overhaul and rebuild of watercraft components, modules, sub-assemblies assemblies, and systems returning them to the original user in a serviceable condition. Below depot maintenance actions are of an intensive nature, requiring maintenance man hours, typically beyond the capacity of field-level maintenance activities. This level of maintenance does not require dry-dock or shipyard facilities but in most cases does require tools and/or support equipment exceeding the authorizations of field-level maintenance activities, and is authorized by TACOM Watercraft Inspection Branch and routinely performed by contracted maintenance support or by exception through an installation maintenance activity.

7-101. Depot maintenance includes: inspect, test, service, on condition cyclic maintenance, adjust, replace, repair, overhaul and rebuild of watercraft components, modules, sub-assemblies assemblies, and systems returning them to the original user in a serviceable condition. Depot maintenance actions are of an intensive nature, typically requiring dry-dock and/or shipyard facilities and are performed by a contractor using best commercial practices in accordance with the language of a specific service(s) contract tailored to those repairs.

7-102. Sustainment-level maintenance also provides oversight of required tests, inspections and certifications that the crew perform. Units and FMTs are responsible for initiating all regulatory required tests, inspections, certifications and correcting deficiencies preventing certifications of systems/equipment in accordance with AR 56-9. Crews complete Annual inspections around planned on condition cyclic maintenance when applicable. All watercraft sustainment-level maintenance actions must be reported to the Logistics Information Warehouse Maintenance Module in accordance with AR 750-1.

Annual Maintenance

7-103. Crews complete Army inspection and surveys to evaluate the entire vessel's condition and the operation of all vessel systems. The Army may contract some annual maintenance performed when the vessel is in port. The Army generates conditioned based maintenance contract for pier side repairs. These repairs are

performed at a military base or contractor's facility depending upon which location is most advantageous to the Army. Non-emergency repairs requiring dry-docking are deferred to on condition cyclic maintenance.

On Condition Cyclic Maintenance

7-104. All Army watercraft undergo depot level service referred to as on condition cyclic maintenance within the maximum maintenance intervals specified in AR 750-1. On condition cyclic maintenance consists of a series of inspections and maintenance service actions that are designed to ensure that a watercraft's structure, piping, main and auxiliary engines, electrical installations, lifesaving appliances, fire detecting and extinguishing equipment, pollution prevention equipment, and other equipment is maintained in a suitable, seaworthy, and safe condition. On condition cyclic maintenance is performed by contracted shipyard facilities under the supervision of TACOM Watercraft Inspection Branch, not an Army depot.

7-105. A marine condition survey is performed 180 days prior to the scheduled on condition cyclic maintenance. The survey is conducted dockside and provides the basis for written specifications to accomplish the maintenance. When possible an underwater hull survey in accordance with TB 55-1900-201-45/1, *Guide to Army Watercraft Survey Inspections, Repair Procedures and Repair Specifications Preparation*, will be conducted in addition to the 180-day inspection.

7-106. The scope of work completed during on condition cyclic maintenance is dependent upon watercraft condition, resource limitations, class of vessel and other factors. At a minimum the following will be accomplished:

- Bottom cleaning and painting up to the deep-load waterline.
- All repairs below the deep-load waterline identified during dry-dock inspection/underwater hull survey.
- Overhaul, replacement, and/or renewal of all major components identified for overhaul at depot level.
- All minimum maritime safety inspections required by the American Bureau of Shipping.

7-107. While scheduled sustainment-level maintenance actions are not inherent to on condition cyclic maintenance they are routinely accomplished concurrently with on condition cyclic maintenance. This enables the Army to take advantage of both vessel availability as well as contracted facilities.

Additional Inspections

7-108. Maintenance required for the American Bureau of Shipping's five-year load line letter, as well as quadrennial crane inspections, hull structural repairs, and vessel system repairs that exceed field level capabilities are best accomplished in a shipyard. Shipyards are also the preferred location for deferred maintenance, application of engineering change proposal packages or modification work orders. American bureau of shipping certification provides a 90-day warranty for shipyard maintenance.

Maintenance In Port

7-109. Due to the nature of watercraft operations, it is common for vessels to operate in areas with no organic maintenance capability beyond the watercraft engineers on board. The unit commander determines when to use contracted support for field maintenance based on priority and resource availability. The Army authorizes vessel masters and chief engineers to coordinate for contracted maintenance support for either level of repair when deployed. Locally contracted support should only be used to restore a vessel to a mission capable status, not to eliminate a maintenance backlog. Contracted maintenance support should not replace organic crew or FMC support if either is available to perform the required maintenance.

7-110. The vessel chief engineer is responsible for coordinating sustainment maintenance through the TACOM Watercraft Inspection Branch. The Watercraft Inspection Branch determines how the repairs are performed. In some instances, TACOM Watercraft Inspection Branch may authorize the watercraft engineers onboard to perform the sustainment maintenance repairs.

Underway Maintenance

7-111. The vessel master and chief engineer are responsible for all maintenance while a vessel is underway. The crew performs all necessary field maintenance both scheduled and unscheduled to ensure safe and seaworthy operation. The chief engineer directs the maintenance effort to critical systems. These systems are necessary for the safe operation of the vessel and its ability to perform its intended mission. If required, the vessel master is authorized by AR 750-1 to perform any level of maintenance when engaged in sailing operations (underway and/or deployed away from home port) when faults or deficiencies occur which are outside their authorized level of repair. This decision is based upon the availability of resources at sea, the skill of the crew, and the impact of repairs to seaworthiness and operability. The vessel master and chief engineer may also elect to defer some unscheduled maintenance until the vessel reaches a port where the crew can be augmented with resources from a support field maintenance organization. Repairs conducted underway that alter the configuration of the vessel/system must be restored to the approved configuration upon return to home station.

Maintenance in an Away Port

7-112. When a vessel reaches a port other than the home port, the maintenance effort is directed to restoring it to serviceability as determined by its mission profile. The chief engineer determines the maintenance burden prior to return or arrival at a port. They record all maintenance requirements and make an estimate of field maintenance requirements in terms of man-hours. The chief engineer manages the maintenance effort to bring the vessel to an operational status with regard to critical systems. If sustainment-level maintenance tasks are identified and can be deferred until arrival in port, coordination to affect these repairs will be made at the same time.

SUPPLY SUPPORT

7-113. In addition to on-board spares listing, known as OBSL, the crew of class A and B vessels have authorized stock list, which is generally referred to as shop stock. Stockage of other authorized repair items are maintained by the vessel supply office. Management of loads will be in accordance with AR 710-2.

7-114. Availability and long lead times in procuring some class IX items for Army watercraft continues to be a challenge. Because of the age of on-hand vessels and the different manufacturers of those vessels, many unique parts have to be procured or manufactured through commercial means. Installation activities with watercraft units on station will maintain watercraft unique items. Repair parts for Army watercraft will continue to be held at unit, installation and national wholesale levels. Components and major end-item replacement parts must be intensely managed at all levels to maintain visibility throughout the distribution system to effect needed repair or replacement.

AVIATION MAINTENANCE

7-115. Aviation maintenance uses the two-level maintenance concept. Field-level maintenance is accomplished at the brigade level and below with sustainment level support provided externally through units positioned in theater and various organizations, including depots permanently located in the continental United States. Aviation maintenance requirements are prescriptive and must be considered in the planning process to ensure that adequate support is available and provides planners with realistic airframe numbers to support tactical operations.

AVIATION FIELD LEVEL MAINTENANCE

7-116. Aviation flight companies or troops and aviation maintenance companies or troops within each of the aviation maneuver battalions and the aviation support company within the aviation support battalion (ASB) provide field-level maintenance throughout the CAB. The aviation maneuver battalion's aviation maintenance company supports flight companies.

7-117. Aviation flight companies perform scheduled maintenance with assigned maintenance personnel. They also perform unscheduled field maintenance on assigned manned and unmanned aircraft if they have readily available parts and required tools to perform those maintenance tasks. Aviation flight companies provide a

robust capability that performs both scheduled and unscheduled aircraft maintenance. In addition, the aviation maintenance company performs maintenance on aircraft components during in-depth maintenance (complex services or phase), or to repair components during unscheduled maintenance.

7-118. The aviation maintenance company is organized with a production control section that develops a maintenance execution plan to support mission requirements as determined by the unit commander. A QC section supports the production control section. The QC section consists of a group of qualified and experienced NCOs that provide technical oversight and safety on all associated maintenance actions to ensure strict adherence to maintenance task performance and inspection.

Maintainers in the airframe and component repair platoons are trained and equipped to support distinct unit assigned aircraft. This expertise is normally found only within these units.

7-119. The ASB is a combat aviation element that provides aviation field maintenance support through the aviation support company. The ASB is tailored to support aviation battalions that cannot perform certain maintenance tasks. The aviation support company can also provide maintenance augmentation to aviation battalions due to high operational tempo or other situations where augmentation is required such as with split based maintenance support operations. The aviation support company contains sets, kits, outfits and tools that enhance capabilities and capacity to conduct back-shop component repairs not available across the rest of the combat aviation battalion.

7-120. The theater aviation brigade, expeditionary combat aviation brigade and combat aviation brigade each have an assigned ASB. The ASB provides aviation and ground field-level maintenance, network communication, resupply, and Role 1 medical support. It can provide augmentation to aviation battalions when required. The ASB consists of a HHC, a distribution company, an aviation support company, and a network support company. The combat aviation battalion may have attached FSCs.

7-121. The headquarters and support company provides command intent and guidance for the ASB. The headquarters and support company maintenance platoon provides field maintenance on automotive equipment, communication devices, and ground support equipment. This support includes limited lift capability, recovery, allied trades and maintenance evacuation for supported units. The maintenance control section directs, controls, and supervises field maintenance activities throughout the company. It also performs maintenance management and production control functions and maintains class IX (ground) repair parts for company ground field-level maintenance.

Note: The headquarters and support company is not designed to operate as back-up maintenance for the FSC or to provide support for low-density equipment that is beyond the FSCs' capabilities.

7-122. FSCs are tailored to support the assigned type of aviation battalion. The size and structure of the maintenance section varies by type of battalion assault, attack, general support, or medical. FSCs provide ground field-level maintenance support for allied trades, recovery missions, repair parts, armament, communications and electronics, and field level maintenance operations for organic ground equipment. Each FSCs has a maintenance section to support the battalion's ground equipment.

7-123. The FSC's maintenance platoon headquarters is responsible for providing the planning and coordination for ground equipment field maintenance support to the supported battalion. This element also performs field level maintenance management, production control and maintains class IX (ground) repair parts for shop operations. The FSCs are dependent on the headquarters and support company ASB for sustainment automation management support. The FSCs also depend on the ASB for supplemental recovery, automation management and ground field-level maintenance support for the unit's assigned vehicles, weapons, and ground support equipment. For additional information on the ASB, see FM 3-04, *Army Aviation*.

AVIATION SUSTAINMENT LEVEL MAINTENANCE

7-124. Sustainment-level maintenance consists of tasks on airframes or components that cannot be performed by the combat aviation battalion due to the lack of facilities, tools, technical skills or authorization. Theater

aviation sustainment maintenance groups, the original equipment manufacturer, contract maintenance personnel, or depot organizations typically provide sustainment-level support.

7-125. Operationally, the theater aviation sustainment maintenance group is a fixed-base dedicated theater aviation sustainment/depot (minus) capability that provides 24-hour maintenance support for the deployed aviation maneuver commander. It is able to perform both field and sustainment-level maintenance for manned and unmanned aviation systems, battle damage repair, and repair and return of components and end items to support the National Maintenance Program.

7-126. The theater aviation sustainment maintenance group is formed from ARNG aviation depot maintenance round-out units. The aviation depot maintenance round-out unit provides depot level aviation maintenance support. AMCOM maintenance engineering personnel and/or contractors may also augment the theater aviation sustainment maintenance group. These personnel and/or contractors provide on-site technical assistance and engineering support for major field modifications, non-standard repairs, or major battle damage.

7-127. The theater aviation sustainment maintenance group's detachments are normally attached to a supporting AFSB. The detachments rely on the supported unit for logistics and force protection support. When deployed, theater aviation sustainment maintenance group detachments remain under command of the AFSB although technical authority remains with the AMCOM.

7-128. The Corpus Christi Army Depot and the Letterkenny Army Depot facilitate depot support. Corpus Christi Army Depot is the Army's organic facility for the repair and overhaul of rotary-wing aircraft, engines, and components. The Letterkenny Army Depot provides aviation specific system support to include the AH-64 target acquisition designation sight/pilot night vision sensor, and aviation ground power unit reset and overhaul.

7-129. For additional information regarding aviation maintenance, see ATP 3-04.7, *Army Aviation Maintenance* and FM 3-04.

ARMY AIR TRAFFIC SERVICE TACTICAL SYSTEM MAINTENANCE

7-130. The air traffic maintenance program is aligned with standard Army maintenance regulations as well as AR 95-2, *Air Traffic Control, Airfield/Heliport, and Airspace Operations* and Federal Aviation Administration requirements. Unique to the Army air traffic service (ATS) maintenance strategy is the alignment of repair functions for both field and sustainment level maintenance. Field maintenance, also known as on-system maintenance, is primarily associated with repairs that return equipment to operators. Sustainment maintenance, also known as off-system maintenance, primarily repairs and returns equipment to the supply system. ATS maintainers support each of these functions.

7-131. In order to maintain tactical Army ATS equipment maintenance personnel must be—

- School trained Soldiers currently holding the MOS 94D or other equivalent military service branch specialty.
- DA Civilians, foreign nationals employed by DA, or contractors that have graduated an accredited air traffic control maintenance school in accordance with AR 95-2.

7-132. Additionally, after repairs are complete the tactical equipment must be certified to ensure it is operating within prescribed standards. In accordance with AR 95-2, certification responsibilities for accredited air traffic control equipment and services are inherently governmental. Non-federal contractor personnel will not be issued certification authority.

7-133. There are three types of tactical units staffed with personnel that are certified to perform maintenance on tactical ATS equipment as well as certify the equipment is operating within prescribed standards:

- General Support Aviation Battalion ATS Company.
- Airfield Operations Battalion.
- ATS Maintenance Detachment.

7-134. Maintenance examiners are the only authorized individuals, who may certify ATS maintainers on tactical equipment. Maintenance examiners must be appointed in writing by an O-5 commander or higher, or

facility managers/ chiefs GS-13 or higher in accordance with AR 95-2. Only U.S. military personnel, DA Civilians per U. S. Army office of the program manager, also called OPM, guidelines, or foreign nationals working in overseas locations and meeting the eligibility requirements listed in AR 95-2 may serve as ATS maintenance examiners; non-federal contractor personnel are not authorized to certify ATS maintainers.

GENERAL SUPPORT AVIATION BATTALION ATS COMPANY/ AIRFIELD OPERATIONS BATTALION

7-135. The Communication/Navigation section houses the maintainers for ATS systems support. Maintainers at this level perform field level maintenance actions on ATS systems. ATS maintenance personnel perform the following maintenance actions under field level maintenance:

- Schedule and complete PMCS for ATS systems.
- Report all ATS maintenance and logistics actions in Standard Army Management Information System, also called STAMIS, or GCSS-Army systems.
- Manage and maintain ATS maintenance personnel training records and DA Form 3479-6 (*ATC Facility and Personnel Status Report*) in accordance with AR 95-2 and TC 3-04.81, *Air Traffic Control Facility Operations, Training, Maintenance, and Standardization*.
- Plan and schedule ATS maintenance individual and collective training in the Digital Training Management System.
- Execute the provisions on the certification program in accordance with AR 95-2.
- Manage Test Measurement and Diagnostics Equipment (TMDE).
- Manage electrical safety programs in accordance with DA PAM 385-26, *The Army Electrical Safety Program*.
- Manage shop supply for ATS equipment.
- Inspections by sight and touch of accessible components per the TM XX-20 series and condition-based maintenance indicators or instrumentation.
- Lubricate, clean, preserve, tighten, replace, and make minor on-system adjustments.
- Limited diagnosis and fault isolation.
- Replacement of on-board spares.
- Requisition, receipt, storage, and issue of ATS specific repair parts.
- Evacuation to the appropriate maintenance support activity of unserviceable reparable components.
- Coordination and transportation of ATS systems.
- Materiel readiness reporting.
- Fabrication as identified by the appropriate TM.
- Equipment certification.

ATS MAINTENANCE DETACHMENT

7-136. The ATS Maintenance Detachment is capable of deploying maintenance support teams within 96 hours to provide back-up field level and below depot sustainment level support on-site for all Army components, worldwide. This singular unit is organized under U. S. Army Forces Command and aligned under the Ordnance branch. The ATS maintenance detachment operates a SSA and provides class IX material support for tactical ATS systems worldwide. Unique to the ATS maintenance detachment is the assignment of four general schedule-12, also called GS-12, electronic technicians who provide worldwide training/ certification and on-site maintenance support. The maintenance technicians assigned to the ATS maintenance detachment can perform all field level tasks indicated above as well as the following below depot maintenance actions:

- Reports below depot ATS maintenance and logistics actions in the Standard Army Management Information System or GCSS-Army systems.
- Inspect, diagnose, isolate, and repair faults within modules and components.
- Turn-in of unserviceable end items and components through the appropriate supply activity.
- Fabrication or manufacture of repair parts, assemblies, and components.

- Equipment modifications as required by AR 750-10, *Army Modification Program*.
- Manufacturing of end items and parts not provided or stocked by the national supply system.
- Special inspections and modifications of equipment requiring extensive disassembly or elaborate test equipment.
- Nondestructive testing to determine the acceptability of removed parts.
- Installation of all outstanding modification work orders and minor alterations directed by the materiel proponent.
- Postproduction software support, the sustainment of the operational software embedded in weapon systems after closure of the production line.
- Custom cable repair and fabrication.

7-137. The ATS Maintenance Detachment has worldwide certifiers and the capabilities to provide maintenance assistance and instruction teams, also called MAIT, for on-site training/certification in accordance with AR 95-2 and Federal Aviation Administration requirements.

MEDICAL MAINTENANCE

7-138. Medical logistics planners must understand the organic medical equipment maintenance capabilities of medical units throughout the area of operations. Planners properly scale resources to ensure resource support the mission and avoid interruptions in the availability of essential medical equipment.

7-139. Over 98 percent of Army medical equipment is COTS and often requires nonstandard class VIII repair parts that are not part of the medical catalogue. Units requiring nonstandard repair parts can obtain instructions for ordering these parts through the U.S. Army Medical Materiel Center-Europe or the U. S. Army Medical Materiel Agency Web site.

BCT MEDICAL EQUIPMENT MAINTENANCE SUPPORT

7-140. Maintenance support at the battalion aid station is coordinated through the brigade support medical company. The medical platoon leader is responsible for ensuring Soldiers perform operator maintenance on assigned equipment and for the preparation of a medical maintenance support plan. The plan is then coordinated with the brigade support medical company. When a repair is needed, the platoon leader reports the equipment status to the brigade medical supply office and the equipment is transported to the brigade support medical company. The brigade support medical company may dispatch a contact repair team from the medical logistics company to repair the equipment or issue a medical maintenance regeneration enabler if the owning unit cannot evacuate the equipment.

7-141. The brigade support medical company has one biomedical equipment specialist assigned. The brigade support medical company may task the biomedical equipment specialist to provide support on a limited basis while the treatment squad is forward deployed.

7-142. The medical logistics company is under the command and control of a medical battalion (multifunctional) external to the BCT. The medical logistics company provides field and very limited sustainment medical equipment maintenance support, including class VIII repair parts. The company includes a maintenance support platoon whose three medical maintenance sections perform field maintenance. These maintenance sections may support units in the area of operations that do not have organic medical equipment maintenance personnel assigned or attached, and are not supported by a biomedical equipment specialist from other units. The platoon also has an additional maintenance section that is responsible for vehicle maintenance for organic company assets.

7-143. Maintenance for much of the equipment carried by the ground ambulances in the battalion aid station and brigade support medical company cannot be repaired through normal crew level field maintenance. Units request maintenance for these systems through the brigade medical supply office in the BCT or directly from the medical logistics company.

7-144. The brigade support medical company's brigade medical support office provides primary field maintenance for the company and may provide emergency medical equipment maintenance for the medical platoons in the BCT. The brigade medical support office is responsible for reporting and oversight for all

medical equipment within the brigade. The brigade medical supply office carries minimal class VIII repair parts. Units request class VIII repair parts from the supporting medical logistics company. Units report all medical equipment within the brigade to the supporting medical logistics company. The brigade medical supply office is responsible for ensuring that an accurate density list of all medical equipment in the BCT is developed, accounted for, and forwarded to the medical logistics company daily.

7-145. Units within the BCT that do not have organic medical equipment repair capabilities will coordinate with the brigade medical support office for field and sustainment maintenance from the medical logistics company FMTs.

ECHELONS ABOVE BRIGADE MEDICAL SUPPORT

7-146. The logistics support company assigned to the medical battalion (multifunctional) provides direct support for class VII materiel, medical equipment maintenance and repair to EAB medical units operating within the supported area. It also provides backup support to the medical logistics company.

7-147. The logistics support company's maintenance platoon is responsible for providing field maintenance support to units that do not have organic biomedical equipment specialists assigned and field maintenance for organizational equipment within the company. The platoon's medical maintenance section performs field medical maintenance services for units in its area of operations that do not have organic medical equipment maintenance personnel assigned, attached, or not supported by biomedical equipment specialists from other units. This section has three mobile support teams. The platoon's organizational maintenance section is responsible for vehicle maintenance for the company's organic assets.

7-148. The theater lead agent for medical materiel and/or operational medical logistics company provides theater medical logistics capabilities. These organizations have the personnel and expertise to provide both field and sustainment-level medical equipment maintenance support to units on a direct support or area basis. These formations are also responsible for the maintenance of theater assets for equipment exchange, and calibration of equipment, and manage critical repair parts needed to maintain equipment used in theater. Theater medical maintenance functions include both maintenance operations and the provision of contact repair teams to support forward units and manage or coordinate contractor support provided by theater or national-level contracting activities.

7-149. The medical logistics management center provides centralized, strategic-level management of critical class VIII materiel, patient movement items, optical fabrication, contracting, and medical equipment maintenance support. When deployed, the medical logistics management center forward support team is assigned to the medical command (deployment support) and collocates with the distribution management center of the TSC/ESC command. The medical maintenance management division is responsible for the theater medical equipment maintenance program. It serves as the medical maintenance consultant to multiple ASCC surgeons. Analysis of workload data, bench stock management (which includes the management of repair parts, medical device alerts, and field change orders), and maintenance programs are part of this division's activities. It also assists units with maintenance backlogs through resource allocation and equipment evacuation policies.

7-150. For additional information on medical equipment maintenance formations and capabilities refer to ATP 4-02.1, *Army Medical Logistics*.

Appendix A

Geographic Considerations for Maintenance Operations

Extreme weather conditions that will affect mission preparation and performance usually accompany adverse environments encompassing a wide range of geographies (desert, jungle, and mountainous terrain). Extreme heat, cold, and humidity directly affect personnel as well as certain components of the systems maintained. This appendix discusses key areas maintainers should consider when operating in different environments.

MAINTENANCE CONSIDERATIONS FOR DESERT OPERATIONS

A-1. Maintenance support for desert operations requires an understanding of the environment. Temperatures vary according to latitude and season. In some deserts, day to night temperature fluctuation can exceed 70 ° Fahrenheit. Desert terrain varies from place to place; the common denominator is lack of water and little, if any, vegetation. This environment can profoundly affect military operations.

LOCATION

A-2. Desert locations are seldom close to normal lines of communication. The effects of the environment (extreme heat and sand) on equipment are severe, requiring increased levels of maintenance to maintain readiness. Distances between units and lines of communication are long.

CLASS IX SUPPLY SUPPORT

A-3. Demand for repair parts will increase due to harsh desert environmental factors and the extra maintenance effort required. Units should hold small items with high-usage rates as far forward as practical. Typical high-consumption items include, filter elements, tires, water pumps, gaskets, fan belts, coolant hoses, clamps, sprocket nuts, seals, and wedge bolts.

TERRAIN

A-4. Terrain varies from nearly flat with high traffic areas to lava beds and salt marshes with little or no maneuverable areas. Units must train drivers to judge terrain in order to select the best routes of travel based on the conditions. Tracked vehicles are best suited for desert operations. Wheeled vehicles will go many places that tracked vehicles can go, however, their lower average speed on poor terrain may be unacceptable during certain operations.

A-5. Vehicles should be equipped with extra water cans, fuel cans, meals, air recognition panels, signal mirrors, and tarpaulin (to provide shade for the crew).

A-6. The harsh environment requires a high standard of maintenance. Specialized support personnel may not be available to perform maintenance. Commanders must train their operators to ensure they are able to operate, maintain, and recover their equipment. Some types of terrain can have a severe effect on suspension and transmission systems, especially those of wheeled vehicles. Soldiers must properly ground all power generation and communication-electronic equipment in a desert environment in order to prevent system failure. Items affected by mileage (such as tires, steering assemblies, track wedge bolts, sprocket nuts, and transmission shafts) must be checked for undue wear when completing PMCS maintenance checks.

HEAT

A-7. Vehicle cooling and lubrication systems are interdependent. A malfunction by one rapidly places the other under severe strain. All types of engines may overheat to some degree, leading to excessive wear, and ultimately, to leaking oil seals.

A-8. Commanders should be aware of which vehicle types are prone to overheating and schedule extra maintenance for them. Check oil levels frequently (a too high level may be as bad as a too low level) and check seals for leaks. Keep radiators and airflow areas around engines clean and free of debris and other obstructions. Water-cooled engines should be fitted with condensers to avoid waste of steam through the overflow pipe. Crew or operator must keep cooling hoses tight (one drip per second amounts to seven gallons in 24 hours). Operators should not remove hood side panels from engine compartments while the engine is running. This causes turbulence, leading to ineffective cooling.

A-9. Crew or operator must keep air vents clean or vapors may build up pressure and cause the battery to explode. Voltage regulators should be set as low as practical. Commanders must increase stocks of batteries to offset the high attrition rates caused by heat exposure.

A-10. Severe heat increases pressure in closed systems and increases the volume of liquids. Crew or operator exercise care to ensure working pressure of all equipment is within safety limits. Caution must be exercised when removing items such as filler caps. Some items of equipment are fitted with thermal cutouts that open circuit breakers when equipment begins to overheat. Crew or operators can partly avoid overheating by keeping the item in the shade and wrapping it in a wet cloth to maintain a lower temperature by evaporation. Wood shrinks in a high-temperature, low-humidity environment. Equipment, such as axes carried on tracked vehicles, can become safety hazards, as heads are more likely to fly off as handles shrink.

A-11. Crew or operators must take special care of power generation and communication-electronic equipment to ensure that they do not overheat. Excessive heat can cause system failure.

A-12. Keep ammunition away from direct heat and sunlight. Generally, ammunition is safe to fire if it can be held in a bare hand. White phosphorous ammunition filler tends to liquefy at temperatures over 111° F, which will cause unstable flight unless projectiles are stored in an upright position.

RADIANT LIGHT

A-13. Radiant light or its heat effect may be detrimental to plastics, lubricants, pressurized gases, some chemicals, and infrared tracking and guidance systems. Crew or operators must keep items like carbon dioxide fire extinguishers and Stinger missiles out of constant direct sunlight. Optics should remain covered when not in use as they may discolor in direct sunlight. It is best to limit their exposure to the sun's rays.

DUST AND SAND

A-14. Dust and sand are probably the greatest dangers to efficient functioning of equipment in the desert. Lubrication must be of the correct viscosity for the temperature. The temperature must be kept to the absolute minimum in the case of exposed or semi-exposed moving parts. Sand mixed with oil forms an abrasive paste. Crew or operators should check lube fittings and other critical items frequently. They must also constantly inspect Teflon bearings to ensure that the coating remains intact. Engine maintenance is critical due to the strong possibility of sand or dust entering cylinders or moving parts when the equipment. Screens against flying sand are essential. They also provide shade for mechanics.

A-15. Examine and clean air cleaners on all equipment at frequent intervals. The exact interval depends on operating conditions but should be at least daily. Use filters when refueling all vehicles. Keep the gap between the nozzle and the fuel tank filler covered. Fuel filters require frequent cleaning and oil filters require replacement more often. Engine oils require changing more often than in temperate climates. Over time, windblown sand and grit will damage electrical wire insulation. Crew or operators should protect all cables before insulation becomes worn.

A-16. Sand will also find its way into electrical items like harness connections. This can prevent electrical contact or make it impossible to join the connections together. Crew or operators should carry a brush (for example, an old toothbrush) to brush out such items before joining.

A-17. Dust affects communication equipment such as amplitude-modulated radio frequency amplifiers, satellite communication equipment, and keyboards. The latter are especially prone to damage due to their oil lubrication, so dust whenever possible. Some receiver-transmitters have ventilating parts and channels that can become clogged with dust, check them regularly and keep them clean to prevent overheating. Soldiers should take special care to prevent dust from interfering with the logistics system hardware computers, in particular non-standard hardware. Non-standard hardware is often extremely sensitive to extreme environments, including excessive dust that can cause overheating.

A-18. Sand and dust accumulation may cause weapons clogging or missiles jams on launching rails. Sand- or dust-clogged barrels can lead to in-bore detonation. Keep muzzles covered by a thin cover so an explosive projectile fires through the cover without risk of explosion. Soldiers must also cover missiles on launchers until just prior to launch. Working parts of weapons must have minimum lubrication. It may even be preferable for them to be totally dry, as any damage caused during firing will be less than that produced by the sand-oil abrasive paste.

A-19. Blowing sand affects all optics. Their performance gradually degrades due to small pitting and scratches. It is also necessary to guard against buildup of dust on optics that may not be apparent until low-light optical performance has severely deteriorated. It may be advisable to keep optics covered with some form of cling film until operations begin, especially if the unit is near a sandstorm. Store optics in a dehydrated condition using hygroscopic material. Keep those in use where free air can circulate around them and purge them at frequent intervals.

A-20. Sand and dirt can accumulate in hull bottoms of armored vehicles and, when combined with condensation or oil, can cause jamming of control linkages. Sand accumulation in the air bleeder valve can inhibit heat from escaping the transmission and result in damage.

TEMPERATURE VARIATIONS

A-21. In deserts with relatively high dew levels and high humidity, overnight condensation can occur wherever surfaces are cooler than the air temperature (such as metal exposed to air). This condensation can affect optics, fuel lines, and air tanks. Drain fuel lines at night and in the morning. Crew or operators should clean optics must be frequently. Weapons, even if not lubricated, will accumulate sand and dirt due to condensation; another reason for daily cleaning.

A-22. Air and fluids expand and contract according to temperature. Ensure tire pressures are checked when tires are cold (not recently driven on). Do not exceed recommended pressure as shown in the TM. Fuel tanks filled to the brim at night will overflow as temperatures rise. Check the air pressure when equipment is operating at an efficient working temperature and fill fuel tanks to their correct capacity as defined in the appropriate TM.

A-23. When using computers, crew or operator should use special care when using non-standard hardware to prevent heat related damage to the logistics system hardware computer systems. Non-standard hardware has minimum and maximum-operating temperatures that should be observed at all times.

STATIC ELECTRICITY

A-24. Static electricity is common in the desert, caused by atmospheric conditions coupled with an inability to ground out due to dry terrain. It is particularly likely with aircraft or vehicles having no conductor contact with the soil. The difference in electrical potential between separate materials may cause a spark on contact. If present, flammable gases may explode or cause a fire. When refueling, Soldiers must establish a grounding circuit between fuel tankers and vehicles. This circuit must be maintained before and during refueling and both tankers and vehicles must be grounded.

WINDS

A-25. The velocity of desert winds can be destructive to large, relatively light material such as aircraft, tents, and antenna systems. To reduce wind damage, materiel Soldiers should utilize given terrain protection and firmly picket items to the ground.

DESERT MAINTENANCE

A-26. Establish a recovery and maintenance SOP before or immediately after arrival in-theater. The SOP should include field-level maintenance recovery, expedient repair, recovery priorities by vehicle types, limitations of field expedient recovery techniques (for example, the distance/time that one tank is allowed to tow another may vary considering the heat buildup in transmissions in this environment), and security.

A-27. The recovery plan should include locations of MCPs for equipment that cannot be repaired forward. These points must be located where they can be reached by heavy equipment transporters, which may require the recovery vehicle to perform a longer than normal tow.

A-28. The MCP should cover a large area to allow for dispersion of the supporting unit's equipment and inoperable weapon systems. A field maintenance team from the FSC will normally be located at the MCP to determine the disposition of inoperable equipment. Maintainers can utilize equipment authorized for disposal for controlled exchange to support the repair of like vehicles. When considering recovery in the desert, pay special attention to ground-anchoring equipment since natural anchoring material is scarce.

MAINTENANCE CONSIDERATIONS FOR COLD WEATHER OPERATIONS

A-29. One of the major problems for units operating in cold weather conditions is the lack of personnel with adequate training in cold weather operations and maintenance support. If troops stationed in warm climates must move to cold climates to perform their mission, cold weather training is of utmost importance. Soldiers expend significant time and energy in cold weather areas on self-preservation. This reduces personnel efficiency in operating and maintaining materiel. Maintenance personnel must learn how to live and work in cold regions.

A-30. Locations. Operation of materiel in temperatures down to -10° Fahrenheit presents a few problems. Conditions are similar to those in the northern portions of the CONUS during the winter. From -10° Fahrenheit to -40° Fahrenheit, operations become difficult.

A-31. Proper maintenance and training will prevent failures of materiel and injuries to personnel. When the temperature is below -40° Fahrenheit, operations become increasingly difficult. At temperatures near -65° Fahrenheit, the maximum efforts of well-trained personnel are required to perform even a simple task with completely winterized materiel.

A-32. Class IX Supply Support. The effect of cold weather on class IX supply support makes handling and storage of materials of prime importance. Supporting transportation delivers supplies as far forward as weather, terrain, and the tactical situation permit.

A-33. Supply handling requirements will vary significantly from those encountered in temperate climates. Metals become brittle at extremely low temperatures. Proper storage of parts and electrical assemblies is critical at these temperatures. Parts cannot withstand the shock loads that they sustain at higher temperatures. Extreme care is required when handling rubber-covered cables at low temperatures. If rubber jackets become hard, cables must be protected from shock loads and bending to prevent short circuits caused by breaks in the covering. Neoprene jackets on cables become very brittle and break readily at low temperatures. Parts of tires in contact with the ground during shutdown period become rigid when cold, causing flat spots. At extreme low temperatures, sidewalls become brittle and crack. Plastics expand and contract much more than metal or glass. Soldiers must carefully handle any parts or materials made of plastic. Glass, porcelain, and other ceramics should perform normally at low temperatures if handled carefully. Direct heat may cause cracking to cold windshields or vehicle glass. Fabrics retain their flexibility even at extremely low temperatures provided they remain dry.

A-34. It is imperative that Soldiers properly ground all power generation and communication-electronic equipment in an arctic environment in order to avoid system failure. See TM 4-33.31, *Cold Weather Maintenance Operations*, for additional information on grounding challenges in an arctic environment.

COLD WEATHER MAINTENANCE

A-35. Personnel must be aware of the importance of maintenance. Maintenance of mechanical equipment is exceptionally difficult during cold weather. Maintainers cannot complete automotive and other mechanical maintenance with normal speed because they must warm up equipment before making repairs. Routine tasks require additional time. The time lag, which cannot be overemphasized, must be included in all planning. The bulky clothing required to operate in cold weather also reduces personnel efficiency.

A-36. The resulting loss of the sense of touch further reduces efficiency. Even the routine operations, such as handling latches or opening engine enclosures, becomes frustrating and time-consuming with gloves. At temperatures below -20° Fahrenheit, maintenance requires up to five times the normal time. Complete winterization, diligent maintenance and well-trained crews are the keys to efficient cold weather operations.

A-37. The following requirements, affecting maintenance planning and preparation, should be complied with before beginning a cold weather operation:

- Shelter for materiel requiring maintenance.
- Proper clothing and tools for maintenance personnel.
- Ground cover (plywood or canvas) for personnel to lie on under vehicles.
- Adequate portable heaters.
- Suitable methods to store and issue antifreeze materials, fuels, hydraulic fluids, and lubricants.
- Sufficient lighting equipment.
- Supply of repair parts for equipment.
- Sufficient equipment for removal of snow and ice.

BUILDINGS AND SHELTERS

A-38. Cold weather maintenance operations often require heated buildings or shelters. Maintenance of many components requires careful, precise servicing. Without heaters, the increase in maintenance man-hours will be from 25 to 500 percent above normal requirements. When buildings are not available, maintainers can utilize maintenance tents as a temporary expedient. When possible, lay wooden flooring inside all tents. Heat tents with portable duct heaters or tent stoves.

A-39. In the absence of buildings or maintenance tents, maintainers may use tarpaulins as a field expedient to create overhead shelter and windbreaks. Soldiers can erect tarpaulins on a framework of poles erected around the vehicle.

LIGHTING EQUIPMENT

A-40. Sufficient lighting equipment must be available to furnish lights during maintenance operations. Lights with ample cable extensions, attachment plugs, connectors, and spare bulbs are essential.

MAINTENANCE PERSONNEL, TOOLS, AND EQUIPMENT

A-41. An increased number of mechanics will be required to maintain equipment in cold weather operations. As a minimum, a highly organized, more intensive effort is required of personnel on-hand. Remember that the amount of work performed under cold conditions is considerably less than work accomplished in moderate temperatures.

A-42. An additional supply of battery chargers must be available to meet the heavy requirements for battery maintenance in subzero temperatures. Hydrometers and testers must be on-hand to check the state of charge of batteries. Tools provided in the various tool kits are normally adequate for maintenance at subzero temperatures.

A-43. Fluids saturate gloves worn while performing maintenance on fuel systems and lubrication of cooling systems. This reduces the insulating value of the gloves and may result in a cold weather injury to personnel. Maintenance personnel should carry extra gloves.

A-44. Personnel should avoid leaning on cold, soaked equipment, or kneeling or lying on the ground. Rapid body cooling caused by heat transfer to the equipment or ground may result in a cold weather injury. Place some sort of insulation such as fiber packing material, corrugated cardboard, rags, or tarpaulins between the mechanic/repairer and the equipment.

A-45. When performing maintenance under arctic weather conditions, use a box or a pan to hold small parts. Utilize a tarpaulin under the vehicle to catch dropped parts to prevent them from being lost in the snow.

MAINTENANCE CONSIDERATIONS FOR JUNGLE OPERATIONS

A-46. Maintenance units in a jungle environment retain the same basic mission and capabilities as in other environments. However, they must make adjustments due to terrain, weather, and vegetation.

LOCATION

A-47. Jungle operations subject personnel and equipment to effects not found in other environments. Traffic areas and security problems often affect maintenance units as much as maneuver forces. The lack of an extensive all-weather transportation network in many jungle areas makes the mission of support units more difficult. Transportation difficulties may dictate that maneuver units be resupplied by air, pack animals, or human portage.

CLASS IX SUPPLY SUPPORT

A-48. Leaders must identify repair parts that deteriorate or wear out faster in the jungle environment. The shop stock/bench stock must reflect the increased turnover of these parts.

JUNGLE MAINTENANCE

A-49. In the jungle, maintenance units operate essentially the same as in other operations. High humidity and temperatures in jungle areas increase maintenance requirements. Preventative maintenance checks and services on any items affected by moisture and heat is extremely important. The shop stock/bench stock must be increased to ensure responsive maintenance support.

TRANSPORTATION

A-50. Maintenance units should consider the employment of all types of transportation. Surface transportation facilities are poor in most jungle areas. They often cannot handle heavy military traffic without extensive improvements. Human portage is a basic means of moving supplies and equipment in jungle operations. However, this method, at best, is slow, laborious, and inefficient.

A-51. Wheeled vehicles are normally restricted to roads and wider trails. However, sometimes even these may prove impassable during heavy rains. Transloading from wheeled to tracked vehicles is sometimes required to transport repair parts. For example, large wheeled vehicles move supplies as far forward as possible; the supplies are transloaded to tracked vehicles for final delivery. The tracked vehicles are uniquely suited to move the supplies cross-country. In rugged terrain, supplies may require further transloading to pack animals or supply bearers.

A-52. Fixed-wing transport aircraft can usually operate at greater distances without refueling than cargo helicopters. However, use of fixed-wing aircraft to land supplies requires more landing strips than may be available. Construction and maintenance of airfields in jungles are difficult engineering tasks, but a savanna may be large and firm enough to use as an airstrip.

A-53. Airdrop of supplies is an alternative to air landing. Airdrop makes deliveries to isolated units possible without further transloading. Disadvantages include the dispersion of supplies and the possibility of lost cargo under the jungle canopy, vulnerability to local enemy air defense, and requirements for, at least, local friendly air superiority.

MAINTENANCE CONSIDERATIONS FOR MOUNTAIN OPERATIONS

A-54. Historically, the focal point of mountain operations has been the battle to control the heights. Changes in weaponry and equipment have not altered this fact. Infantry is the basic maneuver force in the mountains in all but the most extreme terrain and weather. With proper equipment and training, the infantry is ideally suited for fighting the close-in battle commonly associated with mountain warfare. Mechanized infantry can also enter the mountain battle, but it must be prepared to dismount and conduct operations on foot. Because of the severity of the environment, maintenance support in mountainous areas can be challenging.

LOCATION

A-55. Due to terrain constraints, it may be necessary to disperse units over a wide area. Dispersion reduces the vulnerability; however, it may cause problems with command, control, and local security. Since support units will be high-priority targets, they must have adequate protection against ground and air attack to ensure continuous operations.

CLASS IX SUPPLY SUPPORT

A-56. In mountain operations, rugged terrain and climatic extremes cause repair parts consumption to increase. Transporters should expedite movement of repair parts into and within the combat area. Maintainers should increase the quantity of high usage rate parts within the authorized stockage list, bench stock, and shop stock. Typical high-consumption repair parts include tires, tie rods, transmissions, brake shoes, tracks and pads, final drives and winch parts.

MAINTENANCE

A-57. Fixing equipment as far forward as possible is extremely important in mountain operations. Leaders need to train vehicle crews and maintenance personnel to accurately evaluate damage to their equipment. Recovery of equipment will be very difficult. Moved disabled equipment only as far rearward necessary to make repairs when recovery is required.

TRANSPORTATION

A-58. Vehicles move a large share of repair parts forward but they are not always able to reach deployed units. Locally obtained animals or individual Soldiers must often move repair parts from roads to unit positions. Whenever possible, use vehicles to move heavy, bulky items or repair parts.

A-59. When weather permits, use helicopters to move repair parts from the SSA directly to forward units. Helicopters speed resupply operations and reduce multiple handling. Helicopters are good for emergency resupply and movement of high-priority supplies. Use helicopters whenever possible. Resupply by U.S. Air Force aircraft is another option.

MAINTENANCE CONSIDERATIONS FOR URBAN OPERATIONS

A-60. The urban battlefield does not cause significant changes in maintenance doctrine or organizations. Urban environments may affect how maintainers provide maintenance support. Urban regions normally contain a well-developed distribution system, major portions of which are highways, rail lines, airfields, manufacturing plants, and storage areas. Built-up areas frequently provide suitable locations for deployment of maintenance units. Such areas offer excellent cover and concealment. They may also contain easily adaptable maintenance and storage facilities. At the same time, rubble or damaged built-up areas may present obstacles along lines of communication, which are vital to the effective functioning of maintenance units

LOCATION

A-61. Because of the tactical situation, maintenance units may support from a built-up area. When using built-up areas, protection and physical security become important considerations. Commanders must protect supplies and equipment from both enemy attack and theft. Refugees may seriously impede or block

movement over routes required by FMTs or movement of equipment to field maintenance points. Maintenance units may take advantage of hard stands, overhead lift, installed communication systems, and maintenance facilities existing in their areas of responsibility.

CLASS IX SUPPLY SUPPORT

A-62. In urban terrain operations, the use of vehicle repair parts may decrease as units dismount. Consumption of repair parts for small arms and engineer equipment may subsequently rise. Concentrated operations allow centralized control of repair parts in urban operations.

MAINTENANCE

A-63. Fixing equipment on-site is extremely important in urban operations. Leaders must train maintenance personnel to evaluate damage to their equipment. Recovery of equipment will prove very difficult. Maintainers should move equipment only as far to the rear as necessary to make repairs when recovery is required.

TRANSPORTATION

A-64. Although wheeled vehicles move many repair parts forward, they are not always able to reach the unserviceable equipment due to rubble and blocked roads. Tracked vehicles can often move repair parts forward over the obstruction. Individuals and Soldiers must often move repair parts from clear areas to equipment locations.

MAINTENANCE CONSIDERATIONS FOR NIGHT OPERATIONS

A-65. Night operations use the same organization and require the same functions as daylight maintenance support. Commanders continue to effect internal adjustments of their maintenance assets to meet unique situations. Maintenance elements retain responsibility for performing their assigned function. Maintenance deferred until daylight remains the responsibility of the deferring maintenance element.

TRAINING

A-66. The goal of night maintenance operations is to attain and sustain the same degree of effectiveness as in daylight operations. Intensive night training is a key element in attaining this goal. Such training improves the capabilities of unit personnel performing technical tasks under less than normal light conditions and provides a sound basis for developing a night maintenance SOP.

A-67. Maintainers cannot perform some tasks under subdued visible light or by using night vision goggles. Maintainers develop procedures for deferring the repairs until daylight hours. Leaders develop procedures to preposition of equipment, tools, and repair parts supplies to allow ready access, identification, and handling at night. Procedures for night movement and relocation stress light discipline and camouflage.

PLANNING

A-68. Detailed planning for maintenance support of night operations is essential. Maintenance support planners must provide a realistic assessment of the capability to support night operations. The planners base their assessment on the degree of proficiency attained by the maintenance elements concerned in training and on the SOP for night maintenance operations.

A-69. With the present night vision technology, planners must anticipate built-in backlog each morning. They must ensure that the Maintenance Support Plan (annex I, *Service Support*) provides timely support without interfering with or compromising the tactical plan.

PROCEDURES

A-70. Using night vision devices, maintenance elements repair and return to service those critical items within their repair capability. Maintainers utilize night vision devices for tasks accomplished outside. Bulky

items or repair parts supply, as well as equipment and tools, are pre-positioned for rapid location, identification, and handling during the night.

A-71. Where enemy observations may be possible, maintainers can construct field expedient drape-type shelters to hide the light source. Maintainers can also use lightproof shelters with visible subdued light for the repair of small equipment items such as radios and small arms. They also provide a place to use required TMs. The tactical commander must approve the use of subdued visible light.

A-72. Maintainers conduct night recovery operations is on a case-by-case basis depending on the tactical situation and the need for recovery of the item. Equipment, tools, and repair parts are pre-positioned and marked for easy location, identification, and handling. Elements must also be concerned with aerial observation of heat and light source signatures. Where required, the supported unit provides security for the recovery element. Support teams dispatched from support elements into areas farther forward should have night vision devices.

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Appendix B

Maintenance Management Information Systems (Ground)

Maintenance management includes forecasting, distributing, scheduling, and controlling the production of maintenance workloads. Factors that influence maintenance management are budget, supply, personnel, and property accountability. Automation greatly increases the ability of maintenance managers to manage the flow of maintenance data. This appendix discusses how maintainers utilize automation systems for maintenance management.

GLOBAL COMBAT SUPPORT SYSTEM - ARMY

B-1. GCSS-Army provides a modern, state-of-the-art; web-based Enterprise resource planning solution that uses DOD approved web services to facilitate the *Department of Defense Instruction For Sharing Data, Information, and Information Technology* services.

B-2. GCSS-Army is an enterprise resource planning system and provides a single maneuver sustainment picture through integration of sustainment information. Enterprise resource planning is a cross-functional enterprise system driven by an integrated suite of software modules that supports the basic internal logistics processes. Employment of GCSS-Army is inclusive of all tactical echelons. GCSS-Army replaced the multiple standalone and overlapping sustainment information systems for supply, property accountability, and maintenance operating at the tactical and TDA installation level of Army logistics. The Army describes GCSS-Army's capability as the integration and modernization of current tactical sustainment information systems into one overall multi-echelon, web-based logistics enterprise resource planning system with improved interfaces to command and control systems and to the wholesale level of Army and national supply.

SYSTEM DESCRIPTION

B-3. GCSS-Army replaced a variety of logistics information systems, and automated capabilities including the Standard Army Retail Supply System, the Standard Army Maintenance System, and the Property Book Unit Supply Enhanced. It also replaces the fleet management system used by the U.S. Army reserve component to support equipment storage and maintenance for reserve units. The Army enterprise system integration program links GCSS-Army, the Army's field-level logistics information system, with the logistics modernization program—the Army's national-level logistics system. GCSS-Army, Army enterprise system integration program, and logistics modernization program provides a single access point to the single Army logistics enterprise for external customers, such as the U.S. Transportation Command, the CFSRs, and original equipment manufacturers. The single Army logistics enterprise is characterized by—

- A single enterprise built around already defined and universally accepted processes that instill confidence through accuracy, reliability, and connectivity.
- Logistics processes that fully interact with operational and financial processes.
- Systems that can significantly improve capabilities to build combat power and manage readiness.
- Performance-based partnerships with industry.

B-4. GCSS-Army also interfaces with other information technology initiatives, including military and commercial communication infrastructure, to meet warfighter requirements:

- To have the right materiel, at the right place and at the right time.
- Operational Army, generating force, and sustaining base logisticians requirements.
- The capability to anticipate warfighter requirements and to provide asset visibility and control along with timely and accurate management information.

B-5. GCSS-Army is capable of supporting Army force generation processes, rapid force projection, and informing system life-cycle management decisions. GCSS-Army also meets tactical financial requirements by providing an audit trail from financial transaction to originating logistics event and substantive evidence of general ledger account balances for financial audit purposes.

OPERATIONAL CHARACTERISTICS

B-6. Operationally, GCSS-Army is a logistic information system that employed with equal effectiveness in garrison and on the modern battlefield. The word combat in the title of the system highlights the Soldier role. This distinguishes GCSS-Army from the previous line of tactical/retail logistics information systems supporting supply, maintenance and property book. In garrison GCSS-Army allows commanders, staff, and logisticians to—

- Enable effective decision-making and mission planning in combat operations through enterprise resource management.
- Effectively and efficiently manage equipment, monitor equipment readiness and take proactive measures to maximize resources and ensure mission capable equipment.
- Originate more accurate and timely Sustainment business transactions to obtain materiel and services, to organize and display Sustainment data collected from these transactions and then collate and array it for more effective management of materiel and services resources by commanders and the logistics staff.
- Maintain situational awareness, in near real time, of supplies and services through tactical to national level in-transit visibility.

B-7. The Army employs GCSS-Army as a Soldier function support tool that “builds combat power” through use of modern information system and communication technology. Nested in the enterprise architecture for battlefield information systems, GCSS-Army is closely linked to the automated command and control system through its network centric relationship with Sustainment Support Command and Control. The speed, complexity, and extended range of combat operations dictate the timeliness and quality of the response by the sustainment support system. GCSS-Army is the comprehensive tool for logisticians to orchestrate sustainment for these types of operations. GCSS-Army meets the performance levels of the modular and future forces.

B-8. GCSS-Army is a functional logistical information management system with full financial capability that increases the productivity of the individual Soldier and effectiveness of the unit. It provides the logistics infrastructure required for military operations. The technical goal is to establish a seamless and interoperable enterprise network. The network involves the integration of communication software used by systems. GCSS-Army interfaces with multiple current logistics information systems. The primary systems are Property Book Unit Supply Enhanced, and Standard Army Maintenance System Enhanced. The Army plans to integrate Unit Level Logistics System - Aviation Enhanced in the future.

B-9. GCSS-Army allows the Army to integrate the supply chain, obtain accurate equipment readiness, support split base operations, and get up-to-date status on maintenance actions and supplies in support of the warfighter. Because of the characteristics of the system, it requires managers to interact with the process in GCSS-Army to review and approve transactions generated by unit materiel requirements. GCSS-Army also provides an automated audit trail that also provides visibility and interaction with all levels of execution and management.

PLANT MAINTENANCE OPERATIONS

B-10. GCSS-Army Plant maintenance (formally known as the motor pool, shop office, or production control) enables the user to notify, order, track, and report Army maintenance activities. GCSS-Army maintenance elements include—

- Maintenance Master Data. Data relating to individual objects (such as units, equipment, and materiel) that remains relatively constant over an extended period of time. Master Data is the key to data sharing for maintenance.
- Maintenance Planning. Schedules planned and preventive maintenance to ensure equipment readiness and labor man-hours are accurately accounted. Planning maintenance is critical for

keeping equipment fully mission-capable. Part of the planning process is scheduling the creation of notifications for planned and preventive maintenance. Notifications are one of the primary means in GCSS-Army for tracking equipment maintenance.

- Maintenance Processing. Performance of the maintenance notification (fault), work order, and supply execution processes to complete maintenance activities. Soldiers normally initiate processing maintenance work with a notification and generation of the maintenance work order. Work orders are the instructions for the performance of maintenance tasks.

B-11. GCSS-Army has numerous benefits for Army logistics. Some of the main benefits relative to plant maintenance are—

- Near real-time view of equipment status.
- Enhanced asset visibility, including near real-time availability of parts.
- Elimination of redundant entry and reworking of data.
- Automated notification of upcoming service/inspection requirements.
- Provides standardized maintenance plans for use across the Army.
- Permanent personnel qualification records available from unit to unit.
- Improved reporting for planning, execution, and readiness.

B-12. GCSS-Army replaced the current field-level automated maintenance systems SAMS-E (AR 750-1), across all Army components (I, II, III), providing the capability to conduct field-level maintenance operations at all levels of a command. GCSS-Army also replaces the automated maintenance systems (SAMS-IE) utilized to conduct sustainment maintenance at theater maintenance facilities across the Army. The maintenance system functions consist of recording and documenting repairs, inspections and services performed on equipment, systems, components and end items. National level users, USAMC, TACOM, AMCOM, and CECOM are users of GCSS-Army. Roles and permissions support the unique business requirements for national level users; those business requirements enable national level users to sustain Material/Equipment Master Record type data. The national level users have the ability to update equipment service/maintenance intervals, and equipment structure, type data in GCSS-Army.

MAINTENANCE FUNCTIONS

B-13. GCSS-Army supports maintenance functions that consist of the following—

- Manage Maintenance. Manage equipment notifications, maintain equipment notifications, maintain work order, maintain work order register, manage task, maintain task, maintain scheduled services and maintenance data, maintain operational/historical information, update equipment record, manage man-hour accounting, maintain man-hour accounting.
- Maintenance Operations. Equipment management, equipment/vehicle dispatching, operational readiness float transaction. Create work order, work order task listing, close work order task, close work order, perform corrective action, determine level of maintenance required, perform final inspection, enter notification, correct equipment notification, and perform quality inspection.
- Supply Management. Request repair parts, turn-in materiel including recoverable items, and manage shop stock, manage open orders register, maintain open and closed order register, issue repair parts, manage storage location, and manage materiel resource planning.
- Personnel Management. Create work center, update personnel data, maintain personnel qualification records, and maintain skills and qualifications data.
- Reports Readiness. Army materiel status system reports, equipment projection reports, non-mission-capable reports, shop supply listing, review, aggregate logistics report, generate readiness reports.
- Interfaces. Common logistics operating environment information management service, Army enterprise system integration program, sustainment information systems, current financial systems (until subsumed), aviation logistics enterprise-platform and digital logbook.
- Ad hoc queries. Custom reports.

- System Utilities. Receive equipment data updates, subscribe to information, receive safety of use message, post information, download aircraft sensor data, and manage outputs. Monitor equipment situation report - equipment view (maintenance cockpit).

B-14. The equipment situation report displays a list of equipment for which a unit is responsible. Within GCSS-Army, the equipment situation report view is the main maintenance report that allows a user to perform 90% of their unit maintenance operation:

- Create a fault/notification and work order.
- Request repair parts.
- Dispatch a vehicle and print a DA Form 5988-E.
- View a service schedule.
- View equipment availability.
- View equipment usage.
- View shop stock on hand.
- View parts available at the SSA for work orders.
- Update service schedule.
- View and change weapon system/sub-system configuration.
- View serial number of vehicle/equipment requiring serial number tracking.
- Install/dismantle components (engines/transmissions).

B-15. From the equipment situation report, users are able to monitor the equipment assigned to a unit and assess many of the daily maintenance task transactions in GCSS-Army. Below are some of the processes launched from the equipment situation report.

DISMANTLE/INSTALL WEAPON SYSTEM

B-16. This process facilitates managing and tracking serial number/item-unique identification tracked items. The remove/replace process is required when replacing a component in an end item or larger assembly. By performing this process all related maintenance actions that occurred at the component level transfer with the component providing a historical record of maintenance and operations that have occurred.

- The maintenance supervisor, maintenance manager, and/or unit supply sergeant initiate the movement of equipment that results in the dismantling and/or the installation of a weapon system.
- The maintainer uses the appropriate training materials for dismantling and/or installing components of a weapon system from the specified functional locations structure.
- Supervisors and/managers are informed when the process is complete. Maintainers must also contact the property book officer if the weapon system configuration maintenance performed was due to a property book requirement. The property book office must check the financial accuracy of the property book transfer and the weapon system configuration maintenance that was completed.

DISPATCH EQUIPMENT

B-17. The dispatching process in GCSS-Army provides a validation check of the operator/crew's equipment qualification and identifies whether sustainment training is current, in accordance with AR 600-55. This automated process within GCSS-Army sends an approval request to the responsible commander for an unqualified operator/crew, expired qualifications, an exception, such as extended or off-post dispatch, or a restriction. GCSS-Army sends an automated request to the commander-requesting circle X approval for non-mission-capable equipment. If a fault or safety fault is found that is not potentially dangerous to the operator, crew, or equipment, the fault can be circled X under set limited operations. If the equipment is essential, only the commander or maintenance/motor officer can circle X a fault for limited operations prior to signing dispatch. The limited operations can be for a single operation only. The commander or designated representative through GCSS-Army can approve or disapprove the request.

B-18. Alert Dispatch Notification (A) is a type of notification used to create an alert dispatch for multiple pieces of equipment and track equipment usage during the alert.

- The user launches the equipment situation report to print DA Form 5988-E once a dispatch requirement is identified.
- The user launches an equipment dispatch notification to create a dispatch notification for the piece of equipment. The equipment dispatch is a type of notification used to create an individual equipment dispatch for one-time use and track equipment usage. This enables the user to enter the required information (purpose, date/time, status) to dispatch the equipment. The user distributes the DA Form 5988-E is distributed to the operator/crew to perform the preventive maintenance checks and services. This process also allows the user to determine if the operator/crew is qualified to operate the equipment.
- After the approvals (if necessary), a DA Form 5987-1-E (Motor Equipment Dispatch-Alert) is printed and given to the operator to utilize the equipment.

MAINTENANCE PLANS

B-19. Users perform this transaction if there is a need to activate a deactivated maintenance plan. Users can utilize maintenance plans to merge the records of specific service items, intervals, task lists, and measuring points that generate a recurring maintenance schedule. Users utilize the maintenance schedule to establish parameters and system monitoring requirements in the maintenance plan. The monitoring of this maintenance event schedule is based on the counter and date requirements.

PROCESS ARMY OIL ANALYSIS PROGRAM'S O1 NOTIFICATION - NORMAL LAB RESULT

B-20. Users utilize these transactions to change an oil sample notification by entering normal lab results and completing the notification. These transactions display a list of open notifications that have resulted from scheduled maintenance plans. The resulting list of notifications is displayed in change mode, which allows you to locate the appropriate notification, drill-down to make changes by entering oil sample data, putting the notification in process, and printing the oil analysis request.

- Users use the maintenance plan to create an oil sample notification for regularly scheduled Army oil analysis program samples. Users can also create a plan manually for special requests.
- To initiate the notification process and to print DA Form 5991-E (Oil Analysis Request), use the equipment situation report to display a list of all the notifications, filter the list to show only the O1 notifications, and enter the required information of how the oil sample was taken. Print all the required notifications.
- After the unit takes an oil sample, a lab tests the sample, and the lab returns the results to the unit.
- The unit closes the oil sample notification after the lab returns a normal result and enters the lab result into the notification.
- When the unit receives problem results from the lab, the recommendation and reason for action identified on the DA Form 3254-R (Oil Analysis Recommendation and Feedback) is entered in the notification.
- Follow the maintenance notification and work order process to create a maintenance notification and work order to replace the engine or transmission.
- For abnormal results, the unit keeps an oil sample notification remains open until normal results (resample) or lab results indicating a problem are received. Problem results may indicate that an engine or transmission requires replacement.

NOTIFICATION AND WORK ORDER PROCESSING

B-21. A notification is a non-financial transaction in GCSS-Army used to report a problem, request work, or record an event or activity. It includes what is currently known as a fault. The work order captures time (man-hours) and material costs for maintaining equipment. It includes operations that specify the maintenance actions needed to complete the work and the material components required to complete repairs. Creating the work order automatically puts the notification in process; work orders created from a notification are directly linked.

- In creating a preventative maintenance notification, enter a description of the maintenance action, set the notification priority and identify how the issue was found. Enter all information known about the piece of equipment on the notification.
- Create the maintenance work order. This puts the notification in process.
- The information entered in the notification copies into the work order. Note also, the information entered in the notification defaults into certain fields in the overall completion confirmation for the work order.
- Add the work order operations (tasks) required to complete the maintenance action.
- Open a work order to issue materiel through the equipment situation report. The information for the goods issue copies from the work order into the goods issue transaction. When checking for material availability for a work order, if the item is not in stock, material requirements' planning uses the reservation to create a purchase requisition to order the material.
- To technically complete the work order, issue all materials to the work order, enter time confirmations, and enter all required codes and activities.

RECEIVE MATERIALS AT UNIT

B-22. Use this transaction to display the inbound deliveries ready for pick-up at the SSA. The inbound delivery process begins with staging the goods at the SSA for the unit, in the unit customer bin, or initiation of shipment to the unit via transportation. The inbound delivery process ends when the goods receipt posting is made via interactive processing or Automatic Identification Technology. This process includes the subsequent put away of the material at the unit. When the material is ready for pick up, the user uses the automatic identification technology device or a desktop application to post a goods receipt. The posting of the material goods receipt increases the unit's inventory.

PHYSICAL INVENTORY - SHOP STOCK

B-23. This transaction inventories all items assigned to a unit's storage location and creates physical inventory documents. Generate documents based on your provision storage location. Items are assigned to a physical inventory record in GCSS-Army. Performing physical inventory operations allows the maintainer to manage proper inventory levels of shop stock items that sustain the unit's equipment to perform missions.

- Prepare Physical Inventory: Covers creating a physical inventory document and printing the physical inventory document, which is the count sheet for counting inventory. Soldiers utilize the physical inventory document throughout the entire process and it assigns materials to a physical inventory within a storage location.
- Perform Physical Inventory: Covers completing physical counts, entering counts for each physical inventory document, listing inventory differences to review discrepancies, recounting and changing an inventory count.
- Post Physical Inventory: Covers posting a physical inventory document, and explains why the document must be posted and what the posting does.

MANAGE BENCH STOCK

B-24. Bench stock refers to low cost, high use consumables class II-IV and IX items used by maintenance personnel at unpredictable rate (ex. common hardware, repair kits). Units must maintain bench stock materials to ensure material availability. Use this transaction to change bench stock material requirements planning type and safety stock requirements. Safety stock is the quantity of stock maintained to fulfill demand and prevent material shortages. The maintainer has the ability to verify the current on-hand balance of bench stock materials in GCSS-Army and effectively consume bench stock materials. Users must verify the current bench stock level in GCSS-Army prior to consumption. This value determines the amount of the bench stock material that is to be consumed. Users must post a goods issue to consume the material inventory. The next material requirements planning run replenishes the bench stock material if the bench stock inventory falls below the safety stock level requirements.

FORMS AND REPORTS

B-25. There are a number of reports within GCSS-Army; all of which are downloadable into Excel format. Some of the current reports and forms within GCSS-Army are:

- Open/closed notification/work orders (faults).
- Equipment status report.
- Open/closed document control register.
- Usage report. Service schedule.
- Parts received not installed.
- Equipment maintenance and inspection worksheet DA Form 5988-E. Used to document faults or shortcomings discovered during preventive maintenance checks and services or other maintenance activity inspections and the actions taken to correct a fault or a shortcoming.
- DA Form 5987-E (Motor Equipment Dispatch). Used to capture the operator usage and equipment usage information when a piece of equipment is dispatched for one-time use. The alert dispatch DA Form 5987-1-E allows you to capture multiple equipment operators and equipment usage events when a piece of equipment is alert dispatched.
- Alert dispatch DA Form 5987-1-E.
- Oil analysis request DA Form 5991-E.
- Equipment status report. Used to monitor equipment records and parts. It displays the reportable and non-reportable equipment that had been deadline including status, work order, and deadline aging information. Maintainers are able to identify the notifications and work orders for equipment undergoing repairs and monitor material requirements, quantity ordered, received, on hand, and issued to the work order.

RECORD MAN-HOURS

B-26. Use this process to account for direct man-hours in GCSS-Army performed at the work order level. A supervisor or manager has the ability to account for indirect man-hours against a work center using the cross application time sheet transaction codes.

MAINTAIN PREVENTIVE MAINTENANCE SCHEDULE AND RECORD

B-27. The service schedule process in GCSS-Army provides the ability to create and assign a service schedule to equipment/vehicle. Services performed and entered into GCSS-Army become a permanent record on the equipment master record.

GENERAL TASK LIST

B-28. General task lists are required when a new major assembly or sub-assembly is delivered into inventory or an existing major assembly lacks a defined task list. Users perform these transactions when they need to maintain a general task list. This includes verifying if a general task list exists or updating an existing general task list when a modification is required. Soldiers use these transactions to display a list of general task lists in change mode and to change a general task list. From the results, you are able to drill-down to change a general task list. General task list can be modified to meet the specific maintenance requirements of the associated material or National Item Identification Number.

EQUIPMENT TASK LIST

B-29. Maintainers use equipment task lists to identify the unique maintenance tasks performed on a particular piece of equipment. Users perform this transaction when a piece of equipment has maintenance requirements that are unique and defined specifically for that piece of equipment. This includes verifying an equipment task list or changing attributes in an existing equipment task list. Also, use these transactions to display a list of equipment task lists and to change attributes for a single equipment task list. Initially you search and display a list of equipment task lists. Then from the resulting list, you identify, select and make changes to a

specific equipment task list. Maintainers can establish equipment task lists to meet the specific maintenance requirements of the associated piece of equipment.

FUNCTIONAL LOCATION TASK LIST

B-30. Functional location task lists identify the unique maintenance tasks performed for on a particular piece of equipment installed in a functional location. This functions like the equipment task list. Maintainers utilize functional location task lists to meet the specific maintenance requirements of a component in the location.

NOTIFICATION/FAULT/WORK ORDER END-TO-END PROCESS

B-31. The process is explained in the example below—

- The operator/crew conducts a preventive maintenance check and services at the platform.
- The operator/crew identifies two non-mission-capable faults at the platform; the operator annotate the faults on the DA Form 5988-E.
- The DA Form 5988-E is turned into the section; the inspection work sheet is reviewed by maintenance section NCO in charge for completeness.
- The section NCOIC reviews the DA Form 5988-E before the unit enters the faults into GCSS-Army, creating a notification for each fault identified on the maintenance inspection work sheet. Prior to operator entering the faults into GCSS-Army, the process is manual.
- The maintenance section NCO in charge assigns mechanics within the section to verify the faults/notifications identified by the operator/crew on the DA Form 5988-E and to identify the action required to correct the fault/notification.
- Maintainers verify faults/notifications and if the required parts are on hand, they correct the fault. Maintainers accounts for the man-hours required to conduct the repair on the DA Form 5988-E.
- The maintainer verifying the faults/notifications identifies those requiring repair part(s). The maintainer adds the national item identification number, also known as the NIIN, to the DA Form 5988-E. The information from the DA Form 5988-E is entered into GCSS-Army by the motor sergeant, shop foreman or the parts record clerk.
- Creating a work order for any fault/notification or to request repair parts requires man-hours to be accounted for.
- GCSS-Army verifies if the repair part is on the requesting units shop stock or available in the supporting SSA. If the repair parts are on the units shop stock GCSS-Army notifies the user that the material is on hand. If the repair parts are on the supporting SSA Authorized Stockage Listing, the SSA creates a pick ticket. The supporting SSA processes the pick ticket creating a materiel release order.
- After the SSA picks the material and places it in the requesting unit's bin or the ships the part to the unit, the requesting unit has visibility of the class IX parts placed in their bin or shipped.
- The requesting unit receives the repair parts from the supporting SSA and process the material by receiving the item and issuing the material to the work order.
- After the unit receives the material, the maintenance shop issues it to the mechanic for installation onto the vehicle/equipment. After the installation has been completed the mechanic turns in the DA Form 5988-E to the motor sergeant, shop foreman or parts record clerk.
- The motor sergeant, shop foreman or parts record clerk updates the notification/fault in GCSS-Army. The notification/fault and work orders are then cleared and closed in GCSS-Army.

DISPATCHING

B-32. The dispatch process is explained in the example below—

- The motor sergeant, shop foreman or parts record clerk has the ability to create a dispatch for the vehicle/equipment in the location.
- After the operator/crew have completed before operations PMCS as well as all additional unit directed requirements, the unit can create a vehicle/equipment dispatch.
- If a fault is found—

- The field maintenance team NCOIC reviews platform inspection work sheet, assigns inspection work sheet to field maintenance team to verify or repair the notification.
- The field maintenance team verifies repair parts required for platform, annotate on inspection work sheet and turn them into field maintenance team NCO in charge.
- The field maintenance team NCO in charge reviews information on the inspection work sheet before giving the inspection work sheet to the field maintenance team's records/parts clerk.
- The motor sergeant, shop foreman or parts record clerk selects the vehicle/equipment from the maintenance cockpit, selects the dispatch button, enters the return date and time, reason for the dispatch, the operators name or ID number and "Save" the data.
- GCSS-Army checks to verify if the individual is qualified to dispatch the vehicle/equipment by verifying the individual meets all the training requirements identified in AR 600-55, *The Army Driver and Operator Standardization Program*. GCSS-Army generates an automated notification and forwards it to the commander for individuals not meeting the requirements outlined in AR 600-55, allowing the commander to approve or disapprove the request for dispatch.
- For non-mission-capable vehicles/equipment, an automated notification is generated in GCSS-Army and forwarded to the commander only, allowing the commander to approve the vehicle/equipment for limited operations.
- If local SOP requires a commander or executive officer approval GCSS-Army can send an automated notification with-in GCSS-Army to the commander and executive officer giving them the capability to approve a normal dispatch.

ARMY MATERIEL STATUS SYSTEM REPORT IN GLOBAL COMBAT SUPPORT SYSTEM - ARMY

B-33. GCSS-Army produces equipment readiness reports for ground, missile and aviation, and watercraft required for the monthly equipment readiness report. Daily, GCSS-Army produces near real time reportable equipment readiness data that is available at logistics support activity. On the 15th of each month, GCSS-Army produces the Army materiel status system report that contains reportable equipment readiness data and respective supporting commander's comments. Reports are available 24 hours following the end of the report period. The report begins at the 16th of each month and ends on the 15th of the following month. Commanders have the ability to enter commander's comments throughout the reporting period and up to 24 hours following the end of the reporting period. The commander will not have the ability to change the reported data. GCSS-Army provides the capability to rollup reporting battalion equipment status and process to the unit readiness officer to include in the monthly unit status report.

THE OPERATIONS LOGISTICS PLANNER

B-34. The Operations Logistics, also called OPLOG, Planner is a web-based interactive tool that assists commanders and staff from strategic through operational levels in developing a logistics estimate. It is designed to support operations typically associated with multi-phase operations plans and orders. The Operations Logistics Planner enables maintenance planners and staffs to develop estimated mission requirements for supply class II, class VII, and class IX. The tool uses the latest Army approved planning rates and force structures. It is updated at least annually to stay current with force structure and rate changes.

B-35. The planners have the option of using predefined default planning rates or customizing rates based on what a unit is experiencing. Operations Logistics Planner generates the logistics supply requirements which can be viewed in a variety of ways. Logistics requirement reports can be printed or exported to automated spread sheets for further analysis or saved for recall to be used in course of action analysis.

WATERCRAFT MAINTENANCE OPERATIONS

B-36. Watercraft maintains specific forms, documents, and records required specific to the class of vessel being maintained/operated and federally regulated. For example, the engine department uses two documents for maintenance, DA Form 4993 (Harbor Boat Engine Department Log for Class A and C-1 Vessels), and

DA Form 5273 (Harbor Boat Deck and Engine Log for Class B Vessels). The deck department uses two documents for operations, DA Form 4640 (Harbor Boat Deck Department Log for Class A and B Vessels), and DA Form 5273 that is also for Class B vessels. Maintainers use these documents generally for one year at a time (up to 3 years maximum) and maintain them for 3 years after the last entry. They provide daily records of crew availability, strength, usage, hourly readings and operations. The crew also records equipment master data in their logbooks. The watch officers and the chief engineer verify the maintenance forms (engine department logs) record faults and deferred maintenance, shop repairs and records of inspection, notes and daily equipment operational recordings. Many of the fields used in these documents are mapped to fields into the GCSS-Army database. The operational forms (deck department logs) are required by Title 46, *Code of Federal Regulations* and the maintenance forms are used as both input and supporting documentation. The primary difference in these documents is the type of daily entries; the deck department log includes operational conditions, weather, sea state, loads and usage data. The GCSS-Army maintenance operation system supports watercraft maintenance operations requirements.

DISCONNECTED OPERATIONS

B-37. The Very Small Aperture Terminal and the Combat Service Support Automated Information Systems Interface tactical network, also called Combat Service Support Automated Information Systems Interface / Very Small Aperture Terminal, is the primary choice for sustainment system connectivity. Sustainment reporting is conducted over these systems through GCSS-Army

B-38. Commanders and staffs at all levels should plan and prepare to operate under periods of denied service or limited connectivity. This will require Soldiers to utilize manual process in order to execute maintenance reporting and supply operations.

Appendix C

MAC and Source Maintenance and Recoverability Codes

To ensure balance in the maintenance system, it is important that responsibilities of each maintenance level be kept in perspective. It is a tactical necessity for owning units to perform preventive maintenance. The maintenance allocation chart designates overall authority and responsibility for the performance of maintenance functions on an item. This appendix discusses the functions and effects modularity had on the MAC.

MAINTENANCE ALLOCATION CHARTS

C-1. The Army Maintenance System is organized to service and repair equipment throughout its in-service life cycle. Organizations are tailored to provide the required equipment maintenance capability at appropriate levels throughout the maintenance system.

C-2. As of the date of this publication, many TMs do not reflect the change to two level maintenance. Refer to AR 700-82, *Joint Regulation Governing the Use and Application of Uniform Source Maintenance and Recoverability Codes*, figure C-1, on page C-2, displays a maintenance allocation chart from a two-level maintenance compliant TM. Figure C-2 on page C-3, gives an example of a maintenance allocation chart you will see in legacy TMs.

C-3. Maintainers perform tasks in accordance with the maintenance allocation charts. Field maintenance organizations are authorized to perform all maintenance tasks coded "C," "O," and "F" as outlined in the equipment TM's maintenance activity chart when skilled maintainers, required sets, kits, outfits and tools; test, measurement, and diagnostic equipment, and other necessary resources are available to perform the maintenance task.

C-4. Sustainment maintenance organizations are authorized to perform maintenance tasks coded "C," "O," "F," and "H" as outlined in the equipment TM maintenance allocation charts when skilled maintainers, required sets, kits, outfits and tools; test, measurement, and diagnostic equipment, and other necessary resources are available to perform the maintenance task. Only depot maintenance organizations and USAMC designated sustainment maintenance activities are authorized to perform the full range of maintenance tasks. These tasks are coded "C," "O," "F," "H," "L," and "D" as outlined in the equipment TM maintenance allocation charts when skilled labor, industrial facilities and equipment, sets, kits, outfits and tools; test, measurement, and diagnostic equipment, and other necessary resources are available to perform the maintenance task.

FIELD MAINTENANCE TSEC/ST-34 MAINTENANCE ALLOCATION CHART (MAC) Table 1. MAC for TSEC/ST-34								
(1) Group Number	(2) Component Assembly	(3) Maintenance Function	(4) Maintenance Level				(5) Tools and Equipment Reference Code	(6) Remarks Code
			Field		Sustainment			
			Crew	Maintainer	Below Depot	Depot		
			C	F	H	D		
00	TSEC/ST-34	Inspect Service Replace Test Repair Repair Repair Overhaul	0.1 0.2 0.4 0.3	1.0	2.0	2.0 10.0	1 1, 2 1, 2, 3, 4, 5 1, 2, 3, 4, 5, 6, 7, 8 1, 2, 3, 4, 5, 6, 7, 8	A B C, D E F G, H I J
01	Power Unit, STP-34	Inspect Test Repair Repair Repair	0.1 0.3	1.8	2.0	2.0	1, 2 1, 2, 3, 4, 5 1, 2, 3, 4, 5, 6, 7, 8	A E F G, J H
0101	Print Circuit Board, TP-34							
010101	E-EB01	Inspect Replace Test Repair Replace		0.1 0.5 0.5		1.0 2.0	1, 3 1, 2, 3, 6, 7, 8 1 1, 2, 3, 4, 6, 7, 8	A A I G
010102	Switching Assembly	Inspect Replace Test Repair	0.1 0.5	0.1 0.5		1.0 2.0	1 1 1, 2, 3, 6, 7, 8 1, 2, 3, 4, 6, 7, 8	A H
02	Logic Unit, STB-34	Inspect Test Repair Repair	- -	1.0	2.0		1, 2 1, 2, 3, 4, 5	A E F

Figure C-1. Example of two-level MAC

MAINTENANCE ALLOCATION CHART									
Group Number	Component Assembly	Maintenance Function	* Maintenance Level					Tools and Equipment	Remarks
			C	O	F	H	D		
05	COOLING SYSTEM CONT.								
0505	Fan Tower Assembly	Inspect Test Replace Repair Overhaul	0.2 0.2 4.5	0.3			**	35 37	A
06	ELECTRICAL								
0601	Alternator	Inspect Test Replace Repair Overhaul	0.2 0.2 2.0	8.0			**		B
0602	Voltage Regulation	Inspect Test Replace Repair Overhaul	0.2 0.2 2.0	0.2 1.0					
0603	Motor Starting	Inspect Test Replace Repair Overhaul	0.2 0.2 2.0	2.4			**	48	
** Worktimes are included in DMWR		*C = Operator or Crew O = Organizational F = Direct Support Maintenance H = General Support Maintenance D = Depot Support							

Figure C-2. Example of MAC (legacy)

C-5. Each column of the maintenance allocation chart gives pertinent information to all users of the MAC. Each column listed is explained below.

- Column 1 - Group Number: Listed group numbers, which identify components, assemblies, subassemblies, and modules with the next higher assembly.
- Column 2 - Component/Assembly: Contains noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.
- Column 3 - Maintenance Function: Lists functions performed on items in Column 2.
- Column 4 - Maintenance Level: Specifies the lowest level of maintenance authorized to perform the function listed in Column 3. Under the two-level maintenance system, field-level maintenance is authorized to perform all functions listed as C, O (until deleted by an update), and F. Below depot sustainment-level maintenance activities are authorized to perform any function listed as H, and depots are authorized to perform and function listed as H and D.
- Column 5 - Tools and Equipment: Names, common tool sets, special tools, and test/support equipment required to perform the designated function.
- Column 6 - Remarks: Lists references to the page at the end of the MAC.

TIME

C-6. All maintenance functions (Column 3) have an associated maintenance level with an estimated amount of time that should be allotted to complete the task. (Column 4). This time estimate is found under the C, O, and indicates the level the work. The projected time is broken out in 6 minute increments, 1 = 6 minutes, .5 = 30 minutes, and 1 = 60 minutes.

C-7. For example in Figure C-3 below, an operator/crew field maintenance level inspection of the TSEC/ST-34 should take 6 minutes. The task requires no tool or equipment and the maintainer can find the applicable reference on page A after the MAC.

Tasks without a specified time listed under a maintenance level indicate that the maintenance level is not authorized to conduct the task.

C-8. In Figure C-3 below the repair task for the TSEC/ST-34 is not authorized for crew and operators. A maintainer is responsible for conducting this task.

FIELD MAINTENANCE TSEC/ST-34 MAINTENANCE ALLOCATION CHART (MAC) Table 1.MAC for TSEC/ST-34								
(1) Group Number	(2) Component Assembly	(3) Maintenance Function	(4) Maintenance Level				(5) Tools and Equipment Reference Code	(6) Remarks Code
			Field		Sustainment			
			Crew	Maintainer	Below Depot	Depot		
			C	F	H	D		
00	TSEC/ST-34	Inspect	0.1				A	
		Service	0.2				B	
		Replace	0.4			1	C, D	
		Test	0.3				E	
		Repair		1.0		1,2	F	
		Repair			2.0	1,2,3,4,5	G, H	
		Repair				2.0	I	
		Overhaul				10.0	J	
01	Power Unit, STP-34	Inspect	0.1				A	
		Test	0.3				E	

Figure C-3. Example of two-level MAC with the operator/crew inspection circled

LOCATION

C-9. Maintenance allocation charts are found in equipment TMs that contain field-level (-12, -13, -14, -20, -23, and -24) maintenance procedures. Some recently fielded; highly complex weapon systems have separate manuals for the maintenance allocation chart. In those instances, the TM has the same first eight digits as other series manuals, followed by "MAC."

FUNCTIONS

C-10. Many functions are essential to ensure that equipment sustains its service life. Maintenance functions are defined in the following paragraphs.

- **Inspect** - To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination. This includes scheduled inspections, gauging, and evaluation of cannon tubes.
- **Test** - To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards on a scheduled basis such as load testing of lifting devices and hydrostatic testing of pressure hoses.
- **Service** - Operation required periodically to keep an item in proper operating condition; to clean, preserve, drain, paint, or to replenish fuel, lubricants, chemical fluids, or gases.

- **Adjust/Align** - To maintain or regulate an item, within prescribed limits, by bringing it into proper position or by setting the operating characteristics to specified parameters.
- **Calibrate** - To determine corrections and cause them to be made or to make adjustments on instruments of TMDE used in precision measurement. Consists of comparisons of two instruments, one of which is in certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.
- **Remove/Install** - To remove and install the same type of item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, replacement part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.
- **Replace** - To remove an unserviceable item and install a serviceable counterpart in its place. Replace is authorized by the maintenance allocation chart and assigned a maintenance level shown as the third position code of the Source, Maintenance, and Recoverability code.
- **Repair** - The application of maintenance services, including fault location/troubleshooting, removal/installation, disassembly/assembly procedures, and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.
- **Overhaul** - To restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications. Overhaul does not normally return an item to like new condition.
- **Rebuild** - Consist of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing tolerances.

SOURCE MAINTENANCE AND RECOVERABILITY CODES

C-11. The Army uses Source, maintenance, and recoverability codes to communicate maintenance and supply instructions to the various logistic support levels and using commands for the logistic support of systems, equipment, and end items. These codes are available by means of technical publications or manuals that end with a "P" (for example, illustrated parts breakdown manuals, repair parts, and special tools lists). The maintenance and recoverability codes assigned to each support item is based on the logistic support planned for the end item and its components. Figure C-4 on page C-6 provides an example of where you would locate the source, maintenance and recoverability codes within a technical manual.

TM 11-5855-306-23&P						0027
FIELD MAINTENANCE MONOCULAR NIGHT VISION DEVICE, AN/PVS-14 REPAIR PARTS LIST						
(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
GROUP 00 FIG. 1 Monocular Night Vision Device (MNVD), AN/PVS-14 and Accessories.						
1	PACCC	5855-01-246-8266	80063	A3144268	HEADSET ASSEMBLY (SEE FIGURE 4 FOR PARTS BREAKDOWN)	1
2	PACZZ	5965-01-444-1216	80063	A3256347	ADAPTER, HEADSET	1
3	PACZZ	5340-01-446-8588	80063	A3256348	BRACKET, MOUNTING (ARMY AND AIR FORCE ONLY)	1
4	PACZZ	5855-01-250-2431	80063	A3144267	STRAPPING	1

Figure C-4. Example of source maintenance and recoverability codes

C-12. The source, maintenance, and recoverability code is a five-character code. The first two characters explain the source of the repair part for replacement purposes. The third character identifies the level of maintenance authorized to remove or replace the item. The fourth character identifies the level of maintenance authorized to repair the item. The fifth character identifies the method of disposition (turn-in or dispose) for the item. Figure C-5 provides a breakdown of the source, maintenance and recoverability codes.

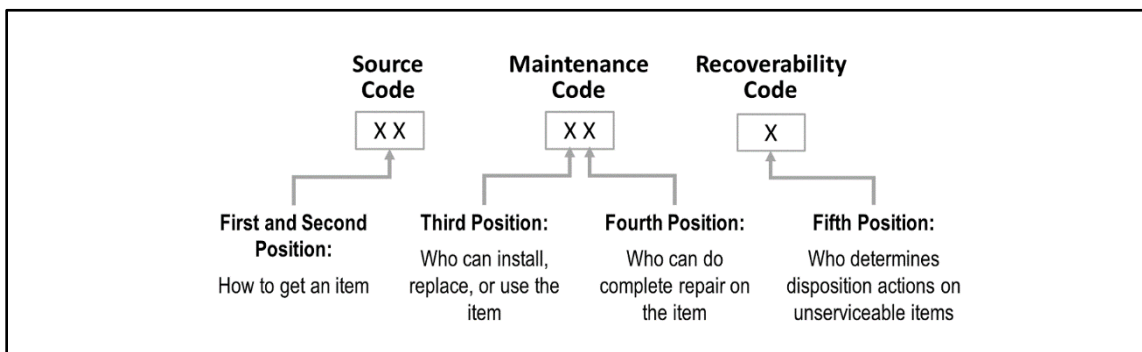


Figure C-5. Break down of the source maintenance and recoverability codes

FIRST TWO POSITIONS: HOW TO GET AN ITEM

C-13. Codes entered into the first two positions indicate the source for acquiring the item for replacement purposes.

P Series

C-14. Code P indicates centrally procured items.

- **PA** - Item procured and stocked for anticipated or known usage. Items are normally considered for replenishment.
- **PB** - Item procured and stocked for insurance purposes because essentiality dictates that a quantity be available in the supply systems.
- **PC** - Item procured and stocked, but is deteriorative in nature.
- **PD** - Support item excluding support equipment, procured for initial issue or outfitting and stocked only for subsequent or additional initial issues or out-fittings. Not subject to automatic replenishment.
- **PE** - End item or support equipment procured and stocked for initial issue or outfitting for specific maintenance repair activities.
- **PF** - Support equipment which will not be stocked, but which will be centrally procured on demand.
- **PG** - Item procured and stocked to provide for sustained support for the life of the equipment. It is applied to an item, which because of probable discontinuance or shutdown of production facilities, would prove uneconomical to reproduce at a later time.
- **PH** - Item procured and stocked and has been identified to contain hazardous material that requires special handling during normal use. Item requires recordation in the Hazardous Material Information Resource System and a Safety Data Sheet.
- **PR** - End item and support item, terminal or obsolete and replaced. No longer authorized for procurement. On-hand assets may be issued until exhausted. Then use replacement item.
- **PZ** - Item terminal or obsolete with no replacement; discontinue use (Army only). This code will not affect other Services if they are recorded as a user at the Defense Logistics Agency Logistics Information Service.

K Series

C-15. Code K indicates the items are contained in kits and do not or will not have a national stock number.

- **KD** - An item contained in a depot overhaul or repair kit and not purchased separately. Depot kit defined as a kit that provides items required at the time of depot overhaul or repair.
- **KF** - An item contained in a maintenance kit and not purchased separately. Maintenance kit defined as a kit that provides an item that can be replaced at organizational or intermediate levels of maintenance.
- **KB** - Item included in both a depot overhaul or repair kit and a maintenance kit.

M Series

C-16. Code M indicates the items are to be manufactured or fabricated at a specified maintenance activity. They are normally consumable items or those requiring very limited repair. Typical M series coded items include (for example, hose assemblies, tubing, nameplates, decals, and wires), which have minimal likelihood of replacement during the life cycle of the end item. All the publications, manufacturing data, and required shop equipment and skills must be available at the specified maintenance activity.

- **MO** - Items manufactured or fabricated at organizational activity.
- **MF** - Items manufactured or fabricated at intermediate field-level maintenance activity.
- **MH** - Items manufactured or fabricated at intermediate sustainment-level maintenance activity.
- **ML** - Items manufactured at a specialized repair facility (for example, environmental considerations).
- **MD** - Items manufactured or fabricated at depot level maintenance activity.

A Series

C-17. Code A indicates items authorized for assembly at a maintenance activity. These codes will be assigned when all parts for assembly, the required support equipment, and the skills required for the assembly are available at the specified maintenance activity. A series source coded items require at least one P series coded item in the assembly.

- **AO** - Items assembled at organizational activity.
- **AL** - Items assembled at a specialized repair activity (for example, item requires specialized tests and fixtures to insure proper assembly).
- **AF** - Items assembled at intermediate field-level maintenance activity.
- **AH** - Items assembled at intermediate sustainment-level maintenance activity.
- **AD** - Items assembled at depot maintenance activity.

X Series

C-18. Code X indicates an item for which no demand is anticipated.

- **XA** - Item is not procured or stocked because the requirements for the item will result in the replacement of the next higher assembly.
- **XB** - Support item with low mortality rate, not procured or stocked. Item may or may not be available through salvage. Salvage should be considered, unless use of salvage item is prohibited by instructions in equipment publications. If prohibited, requisition through normal supply channels using commercial and government entity code and reference number.
- **XC** - Installation drawing, diagram, instruction sheet, or field Service drawing, that is identified by the manufacturers' part number.
- **XD** - Support item with low mortality rate, not stocked. Local purchase or requisition through normal channels using contractor and commercial and government entity and reference number. Not obtainable from salvage or cannibalization.

THIRD POSITION: LOWEST LEVEL ALLOWED TO COMPLETE THE WORK

C-19. The 3rd position, Use, indicates lowest level allowed to complete the work. Army applicable codes include—

- **C** - Denotes crew or operator maintenance.
- **O** - Used to indicate field-level maintenance performed at aviation maintenance companies.
- **F** - Indicates field maintenance or ASB.
- **H** - Indicates below depot level maintenance.
- **D** - Indicates depot, mobile depot, and specialized repair activity organization.
- **K** - Indicated repairable item. Item is removed, replaced, or used at contractor facility.
- **L** - Indicates Item is removed, replaced, or used at designated specialized repair activity.

FOURTH POSITION: REPAIR CODE

C-20. The 4th position, Repair, indicates the lowest level capable of making the repair.

- **C** - Indicates operator/crew.
- **O** - Field maintenance at aviation maintenance companies.
- **F** - Field maintenance or ASB.
- **H** - below depot sustainment.
- **D** - depot, Army depot forward repair activities.
- **L** - Repair should be performed at the designated specialized repair activity or theater aviation support maintenance group.
- **Z** - Non-repairable. No repair authorized.
- **B** - No repair authorized. The item may be reconditioned by the user. No parts or special tools procured for the maintenance of this item.

FIFTH POSITION: RECOVERABILITY CODE

C-21. Recoverability codes are assigned to support items to indicate the disposition action on un-serviceable items.

- **C** - Repairable item. When uneconomically repairable, condemn and disposed of by the operator/crew.
- **Z** - Non-Repairable Item. When item becomes unserviceable, condemn and disposed of by authorizing activity.
- **O** - Repairable item. When uneconomically repairable, condemn and dispose at Aviation Maintenance Companies.
- **H** - Repairable Item. When uneconomically repairable, condemn and dispose through below depot sustainment.
- **F** - Repairable Item. When uneconomically repairable, condemn and dispose at field maintenance or aviation sustainment battalion Army Safeguard Program.
- **L** - Repairable Item. Specialized Repair or Theater Aviation Support Maintenance Group.
- **A** - Non-repairable. Item requires special handling or condemnation procedures because of specific reasons. Refer to appropriate manuals or directives for specific instructions.
- **D** - Repairable Item. When beyond lower level repair capability, return to depot.
- **K** - Repairable Item. Condemnation and disposal to be performed at contractor facility.

C-22. For additional information on source, maintenance, and recoverability codes see AR 700-82.

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Glossary

The glossary lists acronyms and terms with Army or joint definitions. Where Army and joint definitions differ, (Army) precedes the definitions. The glossary lists terms for which ATP 4-33 is the proponent with an asterisk (*) before the term.

SECTION I – ACRONYMS AND ABBREVIATIONS

AFSB	Army field support brigade
AMCOM	aviation and missile life cycle management command
ARNG	Army National Guard
ASA(ALT)	Assistant Secretary of the Army for Acquisitions, Logistics, and Technology
ASB	aviation support battalion
ASC	Army Sustainment Command
ASCC	Army Service component command
ATS	air traffic service
BCT	brigade combat team
BDAR	battle damage assessment and repair
BLSE	brigade logistics support element
BSA	brigade support area
BSB	brigade support battalion
C&E	communication and electronics
CAB	combat aviation battalion
CECOM	communications-electronics life cycle management command
CMF	career management field
CFSR	contractor field service representative
COMSEC	communications security
CONUS	continental United States
COTS	commercial off-the-shelf
CSSB	combat sustainment support battalion
DA	Department of the Army
DOD	Department of Defense
EAB	echelons above brigade
ESC	expeditionary sustainment command
FMC	field maintenance company
FMT	field maintenance team
FSC	forward support company
GCC	geographic combatant commander
GCSS-Army	Global Combat Support System-Army

HHC	headquarters and headquarters company
LCMC	life cycle management command
LOGSTAT	logistics status report
MAC	maintenance allocation chart
MCP	maintenance collection point
MDMP	military decisionmaking process
MOS	military occupational specialty
MTOE	modification table of organization and equipment
NETCOM	Network Enterprise Technology Command
OCONUS	outside continental United States
NCO	non-commissioned officer
NCOIC	non-commissioned officer in charge
OE	operational environment
PMCS	preventative maintenance checks and services
QA	quality assurance
QC	quality control
SMC	support maintenance company
SOP	standard operating procedures
SPO	support operations
SSA	supply support activity
SBCT	stryker brigade combat team
TACOM	tank-automotive, and armaments life cycle management command
TDA	Table of Distribution and Allowances
TM	technical manual
TMDE	test, measurement, and diagnostic equipment
TOW	tube-launched, optically tracked, wire-guided
TSC	theater sustainment command
U. S.	United States
USAMC	United States Army Materiel Command
WIN-T	Warfighter Information Network - Tactical

SECTION II – TERMS

***maintenance collection point**

A temporary location established within the battalion echelon for the collection of equipment needing or undergoing field maintenance.

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